

# Strand7 Software

# API Manual

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*Documentation for the Strand7 Application Programming Interface*





# API Manual

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**Release 2.4.6**

**December 2014**

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# Introduction

The Strand7 Application Programming Interface (API) allows programmers to interface their code to Strand7. This makes it possible to create a program that can access geometric and result data from Strand7 models. Data obtained can then be used by the program for display or further processing.

The Strand7 API consists of a Dynamic Link Library (DLL) file (St7API.dll) and a number of header and include files. The DLL file contains functions that can be used to: read Strand7 finite element data; modify or create Strand7 finite element data; launch the Strand7 solvers; and read Strand7 result data.

The header files allow external programs to communicate with St7API.dll. They define all the constants used and the function calling conventions for each language supported (all functions in the Strand7 API use the Windows calling convention "stdcall"). A different set of header files is needed for each language (e.g. Delphi, C++, Fortran, etc). Note that in some cases, header files are even compiler product dependent - e.g. the header files for Visual Fortran will be different to the header files for Lahey Fortran. Release 2.4.6 comes with header files for Delphi, C/C++, Compaq/Intel Visual Fortran, Lahey Fortran, Microsoft Visual Basic (including VBA), Microsoft Visual C# and Matlab. New header files are being added to meet user requirements – please contact us if you need header files for a different language.

The majority of this documentation is devoted to describing each of the functions in the Strand7 API. The C syntax for the available functions is given, along with the input and output parameters and example code.

The remainder of the documentation lists error codes and conventions and types for property information, attributes and results.

For compiler specific information, see the *Using the Strand7 API* section.

## Using the Strand7 API

This section summarises the steps needed for preparing a program to use the Strand7 API.

In general:

1. To enable the Strand7 API for operation, it must be licenced with the Strand7 keycode. You can check if your version of the API is enabled via the **Help/Licence Information** option on the Strand7 main menu.
2. The Strand7 API file St7API.dll must be located in a directory where it can be found by the calling program. This means that St7API.dll must be in a directory that is within the Windows search path. Alternatively, it is possible to specify where the DLL is located via the Windows API function LOADLIBRARY. See the Win32 API for more information about this.
3. To call the functions in the API, an interface file that declares the exported function calls in St7API.dll is needed. This file is provided in the Strand7 API Toolkit and its name is dependent on the compiler:

St7APICall.pas	for Delphi
St7APICall.h	for C/C++ and Matlab
St7APICall.vb	for Microsoft Visual Basic
St7APICall.bas	for Microsoft Visual Basic 6 and VBA
St7API.cs	for Microsoft Visual C#
St7APICall.f90	for Fortran

4. For some languages, explicit loading of St7API.dll is required via the Windows API call LOADLIBRARY. The code to do this is also provided in the Strand7 API Toolkit for the languages where it is needed:

St7APILoad.cpp	for C++
St7APILoad.f90	for Compaq/Intel Visual Fortran

5. As most of the API functions employ pre-defined constants, these are conveniently defined within an external file in the Strand7 API Toolkit. It is not essential that you use this file, especially if you prefer to declare your arrays as 1-based instead of the 0-based approach used. The name of the constants file is dependent on the compiler:

St7APIConst.pas	for Delphi
St7APIConst.h	for C/C++
St7APIConst.vb	for Microsoft Visual Basic

---

St7APIConst.bas	for Microsoft Visual Basic 6 and VBA
St7API.cs	for Microsoft Visual C#
St7APIConst.f90	for Fortran
St7APIConst.m	for Matlab

The following sections describe how each compiler can use the source/include files supplied with the Strand7 API Toolkit to create programs that use the Strand7 API.

## Linking to the API with Delphi

There are two Delphi include files in the API toolkit – these are St7ApiCall.pas and St7ApiConst.pas as described above. An example of a declaration in St7ApiCall.pas is:

```
function St7Init():Longint; stdcall external 'St7api.dll';
```

Linking to the include files involves adding “compiler include” statements, as follows:

```
unit MainForm;

interface

uses
  Windows, Messages, SysUtils, Variants, Classes, Graphics,
  Controls, Forms, Dialogs, StdCtrls;

{$i St7APIConst.pas}
{$i St7APICall.pas}

.
```

## API Strings and Delphi

The Strand7 API uses null-terminated strings. This is different to the so-called Delphi short string. You should not pass short strings to Strand7 API functions. A null-terminated string can be passed as either a packed array of AnsiChar or as a PAnsiChar. As shipped, St7APICall.pas uses the type CharString = packed array[0..kMaxStrLen] Of AnsiChar, defined in St7APIConst.pas. However, you could replace this with CharString = PAnsiChar if you prefer.

## API Arrays and Delphi

Many Strand7 API functions use arrays of longint or double as parameters. These are always passed by reference. In most cases, when an array is passed to a Strand7 API function using the Delphi interface, the array type is specified. For example, the array for node coordinates is defined as Array3Double = array[0..2] of double. As Delphi allows you to bypass Pascal’s strong type rules, you could redefine the function:

```
St7GetNodeXYZ(uID:Longint; NodeNum:Longint; var
XYZ:Array3Doubles):Longint;
```

---

as:

```
St7GetNodeXYZ (uID:Longint; NodeNum:Longint; var  
XYZ):Longint;
```

This would then allow you to pass anything to the function for the XYZ variable. However, this would increase the possibility of programming errors because the compiler can no longer detect type conflicts.

As mentioned above, most of the function definitions in St7APICall.pas are typed. There are some exceptions, e.g. the function:

```
St7SetBeamSectionProperties (uID:Longint; PropNum:Longint;  
var Doubles):Longint;
```

This is generally done for functions which require arrays of variable lengths. Of course you can change this declaration if you prefer the full type checking offered by Pascal.

## Linking to the API with C++

There are two header/include files and one source file included in the Strand7 API Toolkit – these are St7APICall.h, St7APIConst.h and St7APILoad.cpp as described above. To use these files include the two header files, and add St7APILoad.cpp to your project.

```
#include "St7APIConst.h"  
#include "St7APICall.h"
```

St7APILoad.cpp includes two functions. These functions are LoadSt7API and FreeSt7API, to load and free the DLL respectively. These must be run by your program to load the DLL for use and then to unload it after use. LoadSt7API must be called before the call to St7Init. An example of part of LoadSt7API is as follows:

```
HMODULE hDLL;  
  
bool LoadSt7API()  
{  
    hSt7API=LoadLibrary("St7api.dll");  
    // should check if LoadLibrary returns a NULL value  
    // before proceeding...  
    if (hSt7API!=NULL)  
    {  
        St7Init=(St7InitType)GetProcAddress(hSt7API,"St7Init");  
        .  
        .  
    }  
}
```

### API Strings and C++

The Strand7 API uses null-terminated strings. These are always declared as `char*` in the normal C++ convention.

### API Arrays and C++

Many Strand7 API functions use arrays of longint or double as parameters. These are always passed by reference and declared as `double*` or `long*`.

# Linking to the API with Visual Basic 6 and VBA

There are two source files included in the API Toolkit – these are St7APICall.bas and St7APIConst.bas as described above. To use these files add them to your project.

## API Strings

The Strand7 API uses null-terminated strings. These are always declared as `ByVal StringName As String`. Note that as Visual Basic strings will be declared as a fixed length array, e.g. `Dim FileName As String * 255`, an API call returning the string will null-terminate the string via the `CHAR=0` at some point. All character values beyond this point will be undefined.

## API Arrays

Many Strand7 API functions use arrays of longint or double as parameters. These are always passed by reference and declared as `ByRef LongArray As Long` or `ByRef DoubleArray As Double`. The array passing syntax `LongArray() As Long` or `DoubleArray() As Double` should not be used with the Strand7 API. The arrays to be passed should be declared as `Dim LongArray(n) As Long` or `Dim DoubleArray(n) As Double`, where `n` is some integer value. When passing these arrays to a Strand7 API function it is essential that the first index of the array be passed. The following example further illustrates the correct procedure:

```
function declaration:  
Declare Function St7GetNodeXYZ& Lib "St7API.DLL" (ByVal uID  
As Long, ByVal NodeNum As Long, ByRef XYZ As Double)  
  
variable declaration:  
Dim XYZ(2) As Double  
  
function call:  
ErrorCode = St7GetNodeXYZ(1, NodeNumber, XYZ(0))
```

## API Boolean

Many Strand7 API functions use boolean or arrays of boolean as parameters. These should always be passed as `Byte`, (both by value and by reference). This is necessary because the Strand7 API uses single byte boolean representation, which is compatible with the `Byte` type. The `Boolean` type is two bytes long, therefore not compatible. True boolean values will therefore be represented by `Byte=1` and False boolean values will be represented by `Byte=0`.

## Linking to the API with Visual Basic

There are two source files included in the API Toolkit – these are St7APICall.vb and St7APIConst.vb as described above. To use these files add them to your project.

### API Strings and Visual Basic

The Strand7 API uses null-terminated strings. These are always declared as `ByVal StringName As String`. To pass a string to the API, declare it as `Dim StringName As String` and assign it a value, Visual Basic will ensure that the string is null-terminated when you pass it as an argument. When you need to get a string value back from the API, the string must be pre-allocated and this is no longer possible in Visual Basic without assigning it a value. It is therefore necessary to assign the string a value with a length longer than the specified string length prior to passing to a function that writes to it. When the string is returned it is also necessary to discard all characters from the first CHAR=0 to the end of the string.

### API Arrays and Visual Basic

Many Strand7 API functions use arrays of longint or double as parameters. These are always passed by reference and declared as `ByRef LongArray As Long` or `ByRef DoubleArray As Double`. The array passing syntax `LongArray() As Long` or `DoubleArray() As Double` should not be used with the Strand7 API. The arrays to be passed should be declared as `Dim LongArray(n) As Long` or `Dim DoubleArray(n) As Double`, where n is some integer value. When passing these arrays to a Strand7 API function via Visual Basic, it is essential that the first index of the array be passed. The following example further illustrates the correct procedure:

```
function declaration:  
Declare Function St7GetNodeXYZ& Lib "St7API.DLL" (ByVal uID  
As Long, ByVal NodeNum As Long, ByRef XYZ As Double)  
  
variable declaration:  
Dim XYZ(2) As Double  
  
function call:  
ErrorCode = St7GetNodeXYZ(1, NodeNumber, XYZ(0))
```

### API Boolean and Visual Basic

Many Strand7 API functions use boolean or arrays of boolean as parameters. These should always be passed as Byte in Visual Basic, (both by value and by reference). This is necessary because the Strand7 API uses single byte boolean representation, which is compatible with the Visual Basic Byte type. The Visual Basic Boolean type is two bytes

---

long, therefore not compatible. True boolean values will therefore be represented by Byte=1 and False boolean values will be represented by Byte=0.

## Linking to the API with Visual C#

There is one source file included in the API Toolkit - this is St7API.cs as described above. To use this file add it to your project.

The API functions and constants are declared within a static class called St7. When calling the API functions and using the API constants it is necessary to prefix the function or constant name with the St7 class name followed by a period character.

### API Strings and Visual C#

The Strand7 API uses null-terminated strings. Strings that are passed to the API are declared as string StringName and strings that are returned from the API are declared as StringBuilder StringName. When you pass a string to the API, C# will ensure that the string is null-terminated. When you wish to retrieve a string from the API you will need to pass a StringBuilder object with a pre-allocated buffer. The returned string can be retrieved from the StringBuilder object using the StringBuilder.ToString() method which will copy the retrieved characters up until the terminating null character. The following example further illustrates the correct procedure for retrieving a string:

```
StringBuilder sb = new StringBuilder(St7.kMaxStrLen);
string errorstring;

St7.St7GetAPIErrorString(12, sb, sb.Capacity);
errorstring = sb.ToString();
```

### API Arrays and Visual C#

Many Strand7 API functions use arrays of longint or double as parameters. These are always passed by reference and should be declared as double[] DoubleArray = new double[n] or int[] IntegerArray = new int[n], where n is some integer value.

# Linking to the API with Visual Fortran

There are three source files included in the API Toolkit – these are `St7APICall.f90`, `St7APIConst.f90` and `St7APILoad.f90` as described above. To use these files add them to your project and insert `USE` statements at the top of each subroutine that uses the API.

```
USE St7APICall  
USE St7APIConst
```

## API Strings and Visual Fortran

The Strand7 API uses null-terminated strings. These are always declared as `CHARACTER (LEN=*)` in the interface section (`St7APICall.f90`), and are passed by reference. Strings will be declared in your program as `CHARACTER (LEN=255)` (for example). An API call returning the string will null-terminate the string with `CHAR=0` at some point. All character values beyond this point will be undefined.

## API Arrays and Visual Fortran

Many Strand7 API functions use arrays of `longint` or `double` as parameters. These are always passed by reference and should be declared as

```
REAL (8) :: DOUBLEARRAY (n)  
INTEGER (4) :: INTEGERARRAY (n)
```

where `n` is some integer value.

## API Boolean and Visual Fortran

Many Strand7 API functions use boolean or arrays of boolean as parameters. These should always be declared as `LOGICAL (1)` in Visual Fortran. This is necessary because the Strand7 API uses single byte boolean representation, whereas the Visual Fortran `LOGICAL` type can be up to four bytes long.

When passing boolean values to the Strand7 API it is also necessary to pass `btTrue` and `btFalse` in place of Fortran native `.TRUE.` and `.FALSE.`. This is required because the Strand7 API and Visual Fortran interpret boolean values differently.

## Linking to the API with GNU Fortran

There are three source files included in the API Toolkit – these are `St7APICall.f90`, `St7APIConst.f90` and `St7APILoad.f90` as described above. To use these files insert `USE` statements at the top of each subroutine that uses the API.

```
USE St7APICall
USE St7APIConst
USE St7APILoad
```

### API Strings and GNU Fortran

The Strand7 API uses null-terminated strings. These are always declared as

```
CHARACTER(KIND=C_CHAR) :: CHARARRAY(*)
```

in the interface section (`St7APICall.f90`), and are passed by reference. Strings will be declared in your program as `CHARACTER(LEN=255)` (for example). An API call returning the string will null-terminate the string with `CHAR=0` at some point. All character values beyond this point will be undefined.

### API Arrays and GNU Fortran

Many Strand7 API functions use arrays of longint or double as parameters. These are always passed by reference and should be declared as;

```
REAL(8) :: DOUBLEARRAY(n)
INTEGER(4) :: INTEGERARRAY(n)
```

where `n` is some integer value.

### API Boolean and GNU Fortran

Many Strand7 API functions use boolean or arrays of boolean as parameters. These should always be declared as `LOGICAL(1)` in GNU Fortran. This is necessary because the Strand7 API uses single byte boolean representation, which is compatible with the GNU Fortran `LOGICAL(1)` type. The GNU Fortran `LOGICAL` type can be up to four bytes long and therefore not compatible.

# Linking to the API with Lahey Fortran

There are two include files included in the API Toolkit – these are `St7APICall.f90` and `St7APIConst.f90` as described above. There is an additional import file called `St7APILoad.imp` which contains input definitions for the API calls and should be used at the command line:

```
lf95.exe @St7APILoad.imp MyCode.f90 -ml bd
```

## API Strings and Lahey Fortran

The Strand7 API uses null-terminated strings. Strings will be declared in your program as `CHARACTER (255)` (for example). An API call returning the string will null-terminate the string via the `CHAR=0` at some point. All character values beyond this point will be undefined.

## API Arrays and Lahey Fortran

Many Strand7 API functions use arrays of longint or double as parameters. These are always passed by reference and should be declared as

```
REAL (8) :: DOUBLEARRAY (n)  
INTEGER (4) :: INTEGERARRAY (n)
```

where `n` is some integer value.

## API Boolean and Lahey Fortran

Many Strand7 API functions use boolean or arrays of boolean as parameters. These should always be declared as `LOGICAL (1)` in Lahey Fortran. This is necessary because the Strand7 API uses single byte boolean representation, which is compatible with the Lahey Fortran `LOGICAL (1)` type. The Lahey Fortran `LOGICAL` type can be up to four bytes long and therefore not compatible.

## Value Parameters and Lahey Fortran

Many Strand7 API functions pass parameters by value rather than by reference. For compatibility, these parameters must be wrapped in the `CARG ()` function provided with Lahey Fortran. Parameters that are passed by reference do not require this special treatment. In the following example the `uID` and `iNode` parameters are passed by value, and hence the `CARG ()` function is used:

```
iErr = St7GetNodeXYZ (CARG (uID), CARG (iNode), XYZ)
```

## Linking to the API with Matlab

There are two header/include files included in the API toolkit – these are `St7APICall.h` and `St7ApiConst.m` as described above.

Matlab includes a series of built-in functions that can be used to load and manipulate the `St7API.dll` – see `loadlibrary`, `libisloaded` and `unloadlibrary` within Matlab for additional information.

Due to Matlab's interpreted operation, all API calls must be made via the `calllib` Matlab built-in function. The complete list of API function arguments is passed into `calllib` on the right-hand side, but just the API function's error return and list of pointer arguments is assigned on the left-hand side, for example:

```
XYZ = zeros(3, 1);
[iErr, XYZ] = calllib('St7API', 'St7GetNodeXYZ', uID,
NodeNum, XYZ);
```

The variable `iErr` is the integer error return from `St7GetNodeXYZ`, and the array `XYZ` is a pointer argument in the function's argument list (in C notation, this is denoted by an asterisk in the argument list – `long*`, `double*`, `bool*` or `char*`). The list of pointer arguments on the left-hand side must be in the same order as the right-hand side, and contains both input and output pointer arguments. If a pointer argument is assigned an output value by the Strand7 API, then it must be allocated before the call to `calllib`. Note that text strings are also pointer arguments, even when they are passed into the API function.

It is possible to pass in dummy variables for the output arguments listed on the right-hand side. These values are never actually referenced or assigned and exist only so that `calllib` can match the number of variables. The list of pointer arguments on the left-hand side may also be truncated, but it must be complete up to the last listed argument.

See `calllib` within Matlab for additional information.

## Linking to the API with Python

Both constants and function definitions are in the module `St7API.py`; the module should be placed in a directory in the Python path (for example `C:\Python33\Lib`) so it can be used without being copied to the directory of each new project. The module is for 32-bit Python versions and can be used with Python 2.6 upwards, including Python 3.

The module is loaded using;

```
import St7API
```

after which functions and constants can be accessed using the prefix `St7API`, for example;

```
St7API.St7Init()
```

The prefix is omitted if the contents of the module is imported into the current namespace. For example,

```
from St7API import *
St7Init()
```

Types from `ctypes` are used for input and output with the Strand7 API. Input arguments of type integer, double, boolean and string (bytes in Python 3) are cast into the appropriate type, including conversion to pointers. Output arguments must be declared explicitly using `ctypes` constructors since the native python types are immutable. For example, if a function has output argument of type double it should be declared as `ctypes.c_double()`.

### Arrays in Python

Python lists must be converted to `ctypes` arrays before passing as arguments to Strand7 API calls. A type for an array of length `n` can be created using the syntax `arrayType = singularType * n`. For example,

```
unitsArray = ctypes.c_int * St7API.kLastUnit
units = unitsArray()
```

creates an array of integers 6 elements long suitable for passing to functions `St7GetUnits`, `St7SetUnits` and `St7ConvertUnits`.

Arrays from `ctypes` are indexed in the same manner as python lists, for example

```
units[St7API.ipSTRESSU] = St7API.suMEGAPASCAL
```

## Initialisation and File Management

### St7Init

---

#### Description

Initialises the Strand7 API DLL. This function should be called before subsequent API calls are made. If this function is not called first all subsequent API calls will return an error code.

#### Syntax

```
long St7Init()
```

#### Errors

ERR7\_InvalidRegionalSettings, ERR7\_InvalidDLLsPresent,  
ERR7\_NoError, ERR7\_UnknownError

### St7Release

---

#### Description

Releases the Strand7 API DLL, unloading the Strand7 licence manager and freeing any active licences. The *St7Init* function must again be called before subsequent API operations can be run.

#### Syntax

```
long St7Release()
```

#### Errors

ERR7\_FilesStillOpen, ERR7\_SolverStillRunning, ERR7\_NoError

### St7APIVersion

---

#### Description

Returns the version information for the Strand7 API DLL that is currently loaded.

#### Syntax

```
long St7APIVersion(long* Major, long* Minor, long* Point)
```

#### Output Parameters

Major

---

Major version number A in the A.B.C format.

Minor

Minor version number B in the A.B.C format.

Point

Point version number C in the A.B.C format.

## Errors

ERR7\_NoError

# St7OpenFile

---

## Description

Opens a Strand7 model file. This call is required before any data can be examined or written to any Strand7 model file. A new Strand7 file may be opened without closing a currently open file. Multiple files can therefore be opened simultaneously. Each file that is to be opened must be specified with the use of a file ID number.

## Syntax

```
long St7OpenFile(long uID, char* FileName, char*
ScratchPath)
```

## Input Parameters

uID

Strand7 model file ID number.

FileName

Full path and filename for the Strand7 model.

ScratchPath

A valid path to be used for temporary storage.

## Errors

ERR7\_APINotInitialised, ERR7\_APINotLicensed,  
ERR7\_CannotReadFile, ERR7\_FileAlreadyOpen, ERR7\_FileIsNewer,  
ERR7\_FileNotFound, ERR7\_FileNotSt7, ERR7\_InvalidFileName,  
ERR7\_InvalidFileUnit, ERR7\_InvalidScratchPath, ERR7\_NoError

## St7CloseFile

---

### Description

Closes an open Strand7 model file. All associated scratch files that may have been created are automatically deleted.

### Syntax

```
long St7CloseFile(long uID)
```

### Input Parameters

uID

Strand7 model file ID number.

### Errors

```
ERR7_APINotInitialised, ERR7_APINotLicensed,  
ERR7_FileNotOpen, ERR7_InvalidFileUnit, ERR7_NoError,  
ERR7_UnknownError
```

## St7NewFile

---

### Description

Creates and opens a new Strand7 model file. Note that if a file of the same name exists, the existing file will stay open and will not be overwritten until the new file is saved.

### Syntax

```
long St7NewFile(long uID, char* FileName, char*  
ScratchPath)
```

### Input Parameters

uID

Strand7 model file ID number.

FileName

Full path and filename for the Strand7 model.

ScratchPath

A valid path to be used for temporary storage.

---

## Errors

```
ERR7_APINotInitialised, ERR7_APINotLicensed,  
ERR7_FileAlreadyOpen, ERR7_InvalidFileName,  
ERR7_InvalidFilePath, ERR7_InvalidFileUnit,  
ERR7_InvalidScratchPath, ERR7_NoError
```

## St7SaveFile

---

### Description

Saves a specified Strand7 model file. The file remains open after the call. This function cannot be called if the file has open result files associated with it.

### Syntax

```
long St7SaveFile(long uID)
```

### Input Parameters

uID

Strand7 model file ID number.

### Errors

```
ERR7_APINotInitialised, ERR7_APINotLicensed,  
ERR7_CannotSaveFile, ERR7_FileNotOpen, ERR7_InvalidFileUnit,  
ERR7_NoError
```

## St7SaveFileTo

---

### Description

Saves a specified Strand7 model to a new file. The file remains open after the call. This function cannot be called if the file has open result files associated with it.

### Syntax

```
long St7SaveFileTo(long uID, char* FileName)
```

### Input Parameters

uID

Strand7 model file ID number.

FileName

Full path and filename for the Strand7 model.

## Errors

```
ERR7_APINotInitialised, ERR7_APINotLicensed,  
ERR7_CannotSaveFile, ERR7_FileNotOpen, ERR7_InvalidFileName,  
ERR7_InvalidFileUnit, ERR7_NoError
```

# St7OpenResultFile

---

## Description

Opens a result file associated with a specified Strand7 model. All supported result file types may be opened.

## Syntax

```
long St7OpenResultFile(long uID, char* FileName, char*  
                           SpectralName, bool Combinations, long* NumPrimary,  
                           long* NumSecondary)
```

## Input Parameters

uID

Strand7 model file ID number.

FileName

Full path and filename for the Strand7 result file.

SpectralName

Full path and filename for the spectral result file to be combined. A null string may be passed to combine with the default spectral file as defined by the user in the Strand7 model.

Combinations

btTrue to calculate all secondary result combinations on open. The “Saved result” setting in **Results Options** determines whether previously calculated combinations are used – for **Prompt**, combinations are recalculated.

Note that result envelopes are not calculated – use *St7GenerateEnvelopes* for these.

## Output Parameters

NumPrimary

Number of primary result cases available.

NumSecondary

---

Number of secondary result cases available (excluding envelopes).

### Errors

ERR7\_APINotInitialised, ERR7\_APINotLicensed,  
ERR7\_FileNotOpen, ERR7\_InvalidFileUnit,  
ERR7\_InvalidResultFile, ERR7\_NoError

## St7GenerateLSACombinations

---

### Description

Generate the secondary result cases for the linear load case combinations in a Strand7 model. The result file must be open.

### Syntax

```
long St7GenerateLSACombinations(long uID, long*  
    NumSecondary)
```

### Input Parameters

uID

Strand7 model file ID number.

### Output Parameters

NumSecondary

Number of secondary result cases available.

### Errors

ERR7\_ExceededResultCase, ERR7\_FileNotOpen,  
ERR7\_InvalidFileUnit, ERR7\_NoError, ERR7\_ResultFileNotOpen

## St7GenerateEnvelopes

---

### Description

Generate the secondary result cases for the result envelopes specified in the Strand7 model. The result file must be open.

### Syntax

```
long St7GenerateEnvelopes(long uID, long* NumLimitEnvelopes,  
    long* NumCombinationEnvelopes, long*  
    NumFactorsEnvelopes)
```

## **Input Parameters**

uID

Strand7 model file ID number.

## **Output Parameters**

NumLimitEnvelopes

Number of limit envelope results cases available.

NumCombinationEnvelopes

Number of combination envelope results cases available.

NumFactorsEnvelopes

Number of factors envelope results cases available.

## **Errors**

ERR7\_ExceededResultCase, ERR7\_FileNotOpen,  
ERR7\_InvalidFileUnit, ERR7\_NoError, ERR7\_ResultFileNotOpen

# **St7CloseResultFile**

---

## **Description**

Closes any open result file associated with a specified Strand7 model.

## **Syntax**

```
long St7CloseResultFile(long uID)
```

## **Input Parameters**

uID

Strand7 model file ID number.

## **Errors**

ERR7\_APINotInitialised, ERR7\_APINotLicensed,  
ERR7\_FileNotOpen, ERR7\_InvalidFileUnit, ERR7\_NoError,  
ERR7\_ResultFileNotOpen

# **St7GetDisplayOptionsPath**

---

## **Description**

Returns the full path name of the display options file.

---

## Syntax

```
long St7GetDisplayOptionsPath(char* ConfigPath, long  
                             MaxStringLen)
```

### Input Parameters

MaxStringLen

The maximum number of characters allocated for ConfigPath.

### Output Parameters

ConfigPath

Full path name of the display options file.

### Errors

ERR7\_NoError

---

## St7SetDisplayOptionsPath

### Description

Sets the full path to the display options file. If only the directory is given, then Settings.cfg will be used to control display behaviour. The display options are only used to define settings for model files created subsequently to this call.

### Syntax

```
long St7SetDisplayOptionsPath(char* ConfigPath)
```

### Input Parameters

ConfigPath

Full path name of the display options file.

### Errors

ERR7\_InvalidDisplayOptionsPath, ERR7\_NoError

---

## St7GetLibraryPath

### Description

Returns the full path name to the directory containing the Strand7 library files.

## Syntax

```
long St7GetLibraryPath(char* LibraryPath, long  
MaxStringLen)
```

### Input Parameters

MaxStringLen

The maximum number of characters allocated for LibraryPath.

### Output Parameters

LibraryPath

Full path name to the directory containing the Strand7 library files.

### Errors

ERR7\_NoError

## St7SetLibraryPath

---

### Description

Sets the full path name to the directory containing the Strand7 library files. Any subsequent calls to the libraries will use the files contained in this directory.

### Syntax

```
long St7SetLibraryPath(char* LibraryPath)
```

### Input Parameters

LibraryPath

Full path name to the directory containing the Strand7 library files.

### Errors

ERR7\_InvalidLibraryPath, ERR7\_NoError

## St7GetPath

---

### Description

Returns the full path name to the directory that contains the Strand7 API that is currently loaded.

### Syntax

```
long St7GetPath(char* St7Path, long MaxStringLen)
```

---

## **Input Parameters**

MaxStringLen

Maximum number of characters allocated for St7Path.

## **Output Parameters**

St7Path

Full path name to the ..\Strand7\Bin directory that contains the St7API.dll that is currently loaded.

## **Errors**

ERR7\_NoError

---

# **St7GetLastError**

## **Description**

Returns the error code generated by the last Strand7 API call.

## **Syntax**

```
long St7GetLastError()
```

## **Errors**

ERR7\_NoError

---

# **St7GetAPIErrorString**

## **Description**

Returns the error message corresponding to a specified Strand7 API error code. Error codes corresponding to a Strand7 solver error should be processed using the St7GetSolverErrorString function described below.

## **Syntax**

```
long St7GetAPIErrorString(long iErr, char* ErrorString,  
                           long MaxStringLen)
```

## **Input Parameters**

iErr

Strand7 API error code.

MaxStringLen

Maximum number of characters allocated for ErrorString.

### **Output Parameters**

ErrorString

Error message string corresponding to iErr.

### **Errors**

ERR7\_InvalidErrorCode, ERR7\_NoError

## **St7GetSolverErrorString**

---

### **Description**

Returns the error message corresponding to a specified Strand7 solver error code. Error codes corresponding to a Strand7 API error should be processed using the St7GetAPIErrorString function described above.

### **Syntax**

```
long St7GetSolverErrorString(long iErr, char* ErrorString,  
                           long MaxStringLen)
```

### **Input Parameters**

iErr

Strand7 solver error code.

MaxStringLen

Maximum number of characters allocated for ErrorString.

### **Output Parameters**

ErrorString

Error message string corresponding to iErr.

### **Errors**

ERR7\_InvalidErrorCode, ERR7\_NoError

---

# Utility

## St7TransformToUCS

---

### Description

Transforms a position vector specified in the Global Cartesian coordinate system to an arbitrary UCS.

### Syntax

```
long St7TransformToUCS (long uID, long UCSId, double* XYZ)
```

### Input Parameters

uID

Strand7 model file ID number.

UCSID

ID number for the specified UCS.

### Output Parameters

XYZ [0..2]

The position vector as a 3 element array. This array should initially hold the XYZ Global Cartesian position coordinates to be transformed. The transformed coordinates are returned in this array based on the 123 axis convention.

### Errors

```
ERR7_APINotInitialised, ERR7_APINotLicensed,  
ERR7_FileNotOpen, ERR7_InvalidFileUnit, ERR7_NoError,  
ERR7_UnknownUCS
```

## St7TransformToXYZ

---

### Description

Transforms a position vector specified in an arbitrary UCS to the Global Cartesian coordinate system.

### Syntax

```
long St7TransformToXYZ (long uID, long UCSId, double* XYZ)
```

## Input Parameters

uID

Strand7 model file ID number.

UCSId

ID number for the specified UCS.

## Output Parameters

XYZ [0..2]

The position vector as a 3 element array. This array should initially hold the 123 axis position coordinates to be transformed. The transformed coordinates are returned in this array according to the XYZ Global Cartesian coordinate convention.

## Errors

ERR7\_APINotInitialised, ERR7\_APINotLicensed,  
ERR7\_FileNotOpen, ERR7\_InvalidFileUnit, ERR7\_NoError,  
ERR7\_UnknownUCS

# St7VectorTransformToUCS

---

## Description

Transforms a vector (e.g. force) specified in the Global Cartesian coordinate system to an arbitrary UCS reference frame.

## Syntax

```
long St7VectorTransformToUCS(long uID, long UCSId, double*  
Position, double* VXYZ)
```

## Input Parameters

uID

Strand7 model file ID number.

UCSId

ID number for the specified UCS.

Position [0..2]

The position as a 3 element array. This array should hold the XYZ Global Cartesian position coordinates of the reference point of the vector to be

---

transformed. The coordinates are not transformed by this function. If this is required, use `St7TransformToUCS`.

### Output Parameters

`VXYZ[0..2]`

The vector defined as a 3 element array. This array should initially hold the vector in the XYZ Global Cartesian system. The transformed vector is returned in this array based on the 123 axis convention.

### Errors

`ERR7_APINotInitialised`, `ERR7_APINotLicensed`,  
`ERR7_FileNotOpen`, `ERR7_InvalidFileUnit`, `ERR7_NoError`,  
`ERR7_UnknownUCS`

## St7VectorTransformToXYZ

---

### Description

Transforms a vector (e.g. force) specified in a User Coordinate System to the Global Cartesian system.

### Syntax

```
long St7VectorTransformToXYZ(long uID, long UCSId, double*  
Position, double* VXYZ)
```

### Input Parameters

`uID`

Strand7 model file ID number.

`UCSId`

ID number for the specified UCS.

`Position[0..2]`

The position as a 3 element array. This array should hold the XYZ Global Cartesian position coordinates of the reference point of the vector to be transformed. The coordinates are not transformed by this function.

### Output Parameters

`VXYZ[0..2]`

The vector defined as a 3 element array. This array should initially hold the vector in the UCS reference frame. The transformed vector is returned in this array based on the Global Cartesian system.

## Errors

```
ERR7_APINotInitialised, ERR7_APINotLicensed,  
ERR7_FileNotOpen, ERR7_InvalidFileUnit, ERR7_NoError,  
ERR7_UnknownUCS
```

# St7SetCleanMeshData

---

## Description

Specifies the settings used by the St7CleanMesh function.

## Syntax

```
long St7SetCleanMeshData(long uID, long* Integers, double*  
Doubles)
```

## Input Parameters

uID

Strand7 model file ID number.

Integers [0..14]

[ipMeshToleranceType] - Tolerance type, either ztAbsolute or ztRelative.

[ipActOnWholeModel] - Clean whole model, either btTrue or btFalse.

[ipZipNodes] - Clean nodes, either btTrue or btFalse.

[ipRemoveDuplicateElements] - Remove duplicate elements, either btTrue or btFalse.

[ipFixElementConnectivity] - Repair element connectivity, either btTrue or btFalse.

[ipDeleteFreeNodes] - Delete unconnected nodes, either btTrue or btFalse.

[ipDoBeams] - Act on beam elements, either btTrue or btFalse.

[ipDoPlates] - Act on plate elements, either btTrue or btFalse.

[ipDoBricks] - Act on bricks, either btTrue or btFalse.

---

[ipDoLinks] - Act on links, either btTrue or btFalse.

[ipZeroLengthLinks] - Allow zero length links, either btTrue or btFalse.

[ipZeroLengthBeams] - Allow zero length beams, either btTrue or btFalse.

[ipNodeAttributeKeep] - Keep attributes from nodes, either naLower or naHigher.

[ipNodeCoordinates] - Move nodes, one of ncAverage, ncLowerNode, ncHigherNode or ncSelectedNode.

[ipAllowDifferentProps] - Allow duplicate elements of different properties, either btTrue or btFalse.

Doubles[0..0]

[ipMeshTolerance] - Zip tolerance, scaled based on Integers[ipMeshToleranceType].

## Errors

ERR7\_APINotInitialised, ERR7\_APINotLicensed,  
ERR7\_FileNotOpen, ERR7\_InvalidFileUnit,  
ERR7\_InvalidNodeCoordinateKeepType,  
ERR7\_InvalidZipTolerance, ERR7\_InvalidZipType, ERR7\_NoError

# St7GetCleanMeshData

---

## Description

Returns the current settings used by the St7CleanMesh function.

## Syntax

```
long St7GetCleanMeshData(long uID, long* Integers, double* Doubles)
```

## Input Parameters

uID

Strand7 model file ID number.

## Output Parameters

Integers[0..14]

[ipMeshToleranceType] - Tolerance type, either ztAbsolute or ztRelative.

[ipActOnWholeModel] - Clean whole model, either btTrue or btFalse.

[ipZipNodes] - Clean nodes, either btTrue or btFalse.

[ipRemoveDuplicateElements] - Remove duplicate elements, either btTrue or btFalse.

[ipFixElementConnectivity] - Repair element connectivity, either btTrue or btFalse.

[ipDeleteFreeNodes] - Delete unconnected nodes, either btTrue or btFalse.

[ipDoBeams] - Act on beam elements, either btTrue or btFalse.

[ipDoPlates] - Act on plate elements, either btTrue or btFalse.

[ipDoBricks] - Act on bricks, either btTrue or btFalse.

[ipDoLinks] - Act on links, either btTrue or btFalse.

[ipZeroLengthLinks] - Allow zero length links, either btTrue or btFalse.

[ipZeroLengthBeams] - Allow zero length beams, either btTrue or btFalse.

[ipNodeAttributeKeep] - Keep attributes from nodes, either naLower or naHigher.

[ipNodeCoordinates] - Move nodes, one of ncAverage, ncLowerNode, ncHigherNode or ncSelectedNode.

[ipAllowDifferentProps] - Allow duplicate elements of different properties, either btTrue or btFalse.

Doubles[0..0]

[ipMeshTolerance] - Zip tolerance, scaled based on  
Integers[ipMeshToleranceType].

## Errors

ERR7\_APINotInitialised, ERR7\_APINotLicensed,  
ERR7\_FileNotOpen, ERR7\_InvalidFileUnit, ERR7\_NoError

---

## St7CleanMesh

---

### Description

Performs a mesh cleaning operation on the Strand7 model using the current settings specified via the *St7SetCleanMeshData* function.

### Syntax

```
long St7CleanMesh(long uID)
```

### Input Parameters

uID

Strand7 model file ID number.

### Errors

```
ERR7_APINotInitialised, ERR7_APINotLicensed,  
ERR7_FileNotOpen, ERR7_InvalidFileUnit, ERR7_NoError,  
ERR7_ResultFileIsOpen
```

## St7DeleteUnusedNodes

---

### Description

Deletes the unused nodes in a Strand7 model. A node is unused if it is not referenced by the connectivity of any element in the model.

### Syntax

```
long St7DeleteUnusedNodes(long uID, long* NumDeleted)
```

### Input Parameters

uID

Strand7 model file ID number.

### Output Parameters

NumDeleted

Number of unused nodes deleted.

### Errors

```
ERR7_APINotInitialised, ERR7_APINotLicensed,  
ERR7_FileNotOpen, ERR7_InvalidFileUnit, ERR7_NoError,  
ERR7_ResultFileIsOpen
```

## St7InvalidateElement

---

### Description

Marks a specified element as invalid to be subsequently removed using the St7DeleteInvalidElements function.

### Syntax

```
long St7InvalidateElement(long uID, long Entity, long  
EltNum)
```

### Input Parameters

uID

Strand7 model file ID number.

Entity

Strand7 entity type, one of tyNODE, tyBEAM, tyPLATE, tyBRICK, tyLINK,  
tyVERTEX, tyGEOMETRYEDGE, tyGEOMETRYFACE or tyLOADPATH.

EltNum

Element number to invalidate.

### Errors

```
ERR7_APINotInitialised, ERR7_APINotLicensed,  
ERR7_DataNotFound, ERR7_FileNotOpen, ERR7_InvalidEntity,  
ERR7_InvalidEntityNumber, ERR7_InvalidFileUnit,  
ERR7_NoError, ERR7_ResultFileIsOpen
```

## St7DeleteInvalidElements

---

### Description

Deletes all elements marked as invalid from a Strand7 model.

### Syntax

```
long St7DeleteInvalidElements(long uID, long Entity, long*  
NumDeleted)
```

### Input Parameters

uID

Strand7 model file ID number.

---

Entity

Strand7 entity type, one of tyNODE, tyBEAM, tyPLATE, tyBRICK, tyLINK,  
tyVERTEX, tyGEOMETRYEDGE, tyGEOMETRYFACE or tyLOADPATH.

### Output Parameters

NumDeleted

Number of entities deleted.

### Errors

ERR7\_APINotInitialised, ERR7\_APINotLicensed,  
ERR7\_FileNotOpen, ERR7\_InvalidEntity, ERR7\_InvalidFileUnit,  
ERR7\_NoError, ERR7\_ResultFileIsOpen

## St7GetPlateUV

---

### Description

Returns the local plate UV coordinates corresponding to an XYZ position. The XYZ position should be located approximately on the surface of the element.

### Syntax

```
long St7GetPlateUV(long uID, long PlateNum, double* XYZ,  
                    double* UV)
```

### Input Parameters

uID

Strand7 model file ID number.

PlateNum

Plate number.

XYZ [0..2]

A 3 element array containing coordinates of the point in the Global Cartesian Coordinate system.

### Output Parameters

UV[0..1]

A 2 element array containing the local UV plate coordinates.

**Errors**

```
ERR7_APINotInitialised, ERR7_APINotLicensed,  
ERR7_FileNotOpen, ERR7_InvalidEntityNumber,  
ERR7_InvalidFileUnit, ERR7_NoError
```

## St7GetBrickUVW

---

**Description**

Returns the local brick UVW coordinates corresponding to an XYZ position. The XYZ position should be located approximately within the brick.

**Syntax**

```
long St7GetBrickUVW(long uID, long BrickNum, double* XYZ,  
                     double* UVW)
```

**Input Parameters**

uID

Strand7 model file ID number.

BrickNum

Brick number.

XYZ [0..2]

A 3 element array containing coordinates of the point in the Global Cartesian Coordinate system.

**Output Parameters**

UVW [0..2]

A 3 element array containing the local brick UVW coordinates. See *Brick Local Coordinates* for further information.

**Errors**

```
ERR7_APINotInitialised, ERR7_APINotLicensed,  
ERR7_FileNotOpen, ERR7_InvalidEntityNumber,  
ERR7_InvalidFileUnit, ERR7_NoError
```

---

## St7GetNumElementResultGaussPoints

---

### Description

Returns the number of Gauss points used to store result quantities for a specified entity type.

### Syntax

```
long St7GetNumElementResultGaussPoints(long uID, long
                                         Entity, long NumNodes, long* NumGauss)
```

### Input Parameters

uID

Strand7 model file ID number.

Entity

Entity type, either tyPLATE or tyBRICK.

NumNodes

Number of nodes for the element type.

### Output Parameters

NumGauss

Number of result Gauss points.

### Errors

```
ERR7_APINotInitialised, ERR7_APINotLicensed,
ERR7_FileNotOpen, ERR7_InvalidEntity,
ERR7_InvalidEntityNodes, ERR7_InvalidFileUnit, ERR7_NoError
```

---

## St7ConvertElementResultNodeToGaussPoint

---

### Description

Converts element nodal results to Gauss point results via interpolation. It is important to specify the un-averaged nodal quantities in order to capture the true element Gauss point values.

### Syntax

```
long St7ConvertElementResultNodeToGaussPoint(long uID, long
                                              Entity, long NumNodes, long NumColumns, double*
                                              NodeDoubles, long* NumGauss, double* GaussDoubles)
```

## Input Parameters

`uID`

Strand7 model file ID number.

`Entity`

Entity type, either `tyPLATE` or `tyBRICK`.

`NumNodes`

Number of nodes in the element.

`NumColumns`

Number of result quantities contained in the `NodeDoubles` array.

`NodeDoubles[0..NumNodes*NumColumns-1]`

An array containing the elemental nodal result quantities, arranged in blocks of length `NumColumns`. The start of the  $i^{\text{th}}$  block, relating to the  $i^{\text{th}}$  node in the element's definition, is at `NodeDoubles[(i-1)*NumColumns]`.

## Output Parameters

`NumGauss`

Number of result Gauss points for the element; a maximum of 9 for `tyPLATE`, or 27 for `tyBRICK`.

`GaussDoubles[0..NumGauss*NumColumns-1]`

An array containing the interpolated Gauss point result quantities, arranged in blocks of length `NumColumns`. The start of the  $i^{\text{th}}$  block, relating to the  $i^{\text{th}}$  Gauss point in the element's definition, is at `GaussDoubles[(i-1)*NumColumns]`.

## Errors

`ERR7_APINotInitialised`, `ERR7_APINotLicensed`,  
`ERR7_ExceededMaxNumColumns`, `ERR7_FileNotOpen`,  
`ERR7_InvalidEntity`, `ERR7_InvalidEntityNodes`,  
`ERR7_InvalidFileUnit`, `ERR7_NoError`

## St7SetResultOptions

---

### Description

Sets the **Results Options** for the specified model.

---

## Syntax

```
long St7SetResultOptions(long uID, long* Integers)
```

### Input Parameters

uID

Strand7 model file ID number.

Integers [0..6]

[ipResOptsBeamEnvelope] - Beam envelope results, either beLocal or bePrincipal.

[ipResOptsRotationUnit] - Rotation units for model window output, either ipRadian or ipDegree. By default this setting is ignored by the Strand7 API, see *St7EnableModelRotationUnit*.

[ipResOptsHRADisplacement] - Harmonic Response displacement results, either hrRelative or hrTotal.

[ipResOptsHRAVelocity] - Harmonic Response velocity results, either hrRelative or hrTotal.

[ipResOptsHRAAcceleration] - Harmonic Response acceleration results, either hrRelative or hrTotal.

[ipResOptsStageDisplacement] - Stage displacement results, either sdBirthStage or sdlInitial.

[ipResOptsStrainUnit] - Strain unit, one of suUnit, suPercent or suMicro. By default this setting is ignored by the Strand7 API, see *St7EnableModelStrainUnit*.

### Errors

```
ERR7_APINotInitialised, ERR7_APINotLicensed,  
ERR7_FileNotOpen, ERR7_InvalidFileUnit,  
ERR7_InvalidResOptsBeamEnvelope,  
ERR7_InvalidResOptsHRASetting,  
ERR7_InvalidResOptsRotationUnit,  
ERR7_InvalidResOptsStageDisplacement,  
ERR7_InvalidResOptsStrainUnit, ERR7_NoError
```

## St7GetResultOptions

---

### Description

Returns the **Results Options** for the specified model.

### Syntax

```
long St7GetResultOptions(long uID, long* Integers)
```

### Input Parameters

uID

Strand7 model file ID number.

### Output Parameters

Integers [0..6]

[ipResOptsBeamEnvelope] - Beam envelope results, either beLocal or bePrincipal.

[ipResOptsRotationUnit] - Rotation units for model window output, either ipRadian or ipDegree. By default this setting is ignored by the Strand7 API, see *St7EnableModelRotationUnit*.

[ipResOptsHRADisplacement] - Harmonic Response displacement results, either hrRelative or hrTotal.

[ipResOptsHRAVelocity] - Harmonic Response velocity results, either hrRelative or hrTotal.

[ipResOptsHRAAcceleration] - Harmonic Response acceleration results, either hrRelative or hrTotal.

[ipResOptsStageDisplacement] - Stage displacement results, either sdBirthStage or sdlInitial.

[ipResOptsStrainUnit] - Strain unit, one of suUnit, suPercent or suMicro. By default this setting is ignored by the Strand7 API, see *St7EnableModelStrainUnit*.

### Errors

ERR7\_APINotInitialised, ERR7\_APINotLicensed,  
ERR7\_FileNotOpen, ERR7\_InvalidFileUnit, ERR7\_NoError

---

## St7SetToolOptions

---

### Description

Sets the tool options for the specified model.

### Syntax

```
long St7SetToolOptions(long uID, long* Integers, double* Doubles)
```

### Input Parameters

uID

Strand7 model file ID number.

Integers [0..13]

[ipToolOptsElementTolType] - Element tolerance type, either ztAbsolute or ztRelative.

[ipToolOptsGeometryAccuracyType] - Geometry accuracy type, either ztAbsolute or ztRelative.

[ipToolOptsGeometryFeatureType] - Geometry feature length type, either ztAbsolute or ztRelative.

[ipToolOptsZipMesh] - Mesh zipping, one of zmAsNeeded, zmOnSave or zmOnRequest.

[ipToolOptsNodeCoordinate] - New node coordinates, one of ncAverage, ncLowerNode, ncHigherNode or ncSelectedNode.

[ipToolOptsNodeAttributeKeep] - Attribute keep, one of naLower, naHigher or naAccumulate.

[ipToolOptsAllowZeroLengthLinks] - Allow zero length links, either btTrue or btFalse.

[ipToolOptsAllowZeroLengthBeams] - Allow zero length beams, either btTrue or btFalse.

[ipToolOptsAllowSameProperty] - Allow duplicates of a different property, either btTrue or btFalse.

[ipToolOptsCompatibleTriangle] - Compatible triangle faces, either btTrue or btFalse.

[ipToolOptsSubdivideBeams] - Subdivide only normal beams, either btTrue or btFalse.

[ipToolOptsPlateAxisAlign] - Axis alignment, either paCentroid or paCurvilinear.

[ipToolOptsCopyMode] - Copy mode, either cmRoot or cmSibling.

[ipToolOptsAutoCreateProperties] - Auto create new properties, either btTrue or btFalse.

Doubles[0..2]

[ipToolOptsElementTol] - Element zip tolerance.

[ipToolOptsGeometryAccuracy] - Geometry accuracy.

[ipToolOptsGeometryFeatureLength] - Geometry feature length.

## Errors

ERR7\_APINotInitialised, ERR7\_APINotLicensed,  
ERR7\_FileNotOpen, ERR7\_InvalidFileUnit,  
ERR7\_InvalidToleranceType, ERR7\_InvalidToolOptsCopyOptions,  
ERR7\_InvalidToolOptsSubdivideOptions,  
ERR7\_InvalidToolOptsZipOptions, ERR7\_InvalidZipTolerance,  
ERR7\_NoError, ERR7\_ResultFileIsOpen

## St7GetToolOptions

---

### Description

Returns the tool options assigned to the specified model.

### Syntax

```
long St7GetToolOptions(long uID, long* Integers, double* Doubles)
```

### Input Parameters

uID

Strand7 model file ID number.

### Output Parameters

Integers

- 
- [ipToolOptsElementTolType] - Element tolerance type, either ztAbsolute or ztRelative.
  - [ipToolOptsGeometryAccuracyType] - Geometry accuracy type, either ztAbsolute or ztRelative.
  - [ipToolOptsGeometryFeatureType] - Geometry feature length type, either ztAbsolute or ztRelative.
  - [ipToolOptsZipMesh] - Mesh zipping, one of zmAsNeeded, zmOnSave or zmOnRequest.
  - [ipToolOptsNodeCoordinate] - New node coordinates, one of ncAverage, ncLowerNode, ncHigherNode or ncSelectedNode.
  - [ipToolOptsNodeAttributeKeep] - Attribute keep, one of naLower, naHigher or naAccumulate.
  - [ipToolOptsAllowZeroLengthLinks] - Allow zero length links, either btTrue or btFalse.
  - [ipToolOptsAllowZeroLengthBeams] - Allow zero length beams, either btTrue or btFalse.
  - [ipToolOptsAllowSameProperty] - Allow duplicates of a different property, either btTrue or btFalse.
  - [ipToolOptsCompatibleTriangle] - Compatible triangle faces, either btTrue or btFalse.
  - [ipToolOptsSubdivideBeams] - Subdivide only normal beams, either btTrue or btFalse.
  - [ipToolOptsPlateAxisAlign] - Axis alignment, either paCentroid or paCurvilinear.
  - [ipToolOptsCopyMode] - Copy mode, either cmRoot or cmSibling.
  - [ipToolOptsAutoCreateProperties] - Auto create new properties, either btTrue or btFalse.

#### Doubles

- [ipToolOptsElementTol] - Element zip tolerance.
- [ipToolOptsGeometryAccuracy] - Geometry accuracy.

[ipToolOptsGeometryFeatureLength] - Geometry feature length.

## Errors

ERR7\_APINotInitialised, ERR7\_APINotLicensed,  
ERR7\_FileNotOpen, ERR7\_InvalidFileUnit, ERR7\_NoError,  
ERR7\_ResultFileIsOpen

# St7EnableModelStrainUnit

---

## Description

Allows the strain units set by *St7SetResultOptions* to override the report of absolute strains, which is the API default.

## Syntax

```
long St7EnableModelStrainUnit(long uID)
```

## Input Parameters

uID

Strand7 model file ID number.

## Errors

ERR7\_APINotInitialised, ERR7\_APINotLicensed,  
ERR7\_FileNotOpen, ERR7\_InvalidFileUnit, ERR7\_NoError

# St7DisableModelStrainUnit

---

## Description

Restores the API default report of absolute strains, overriding the strain units set by *St7SetResultOptions*.

## Syntax

```
long St7DisableModelStrainUnit(long uID)
```

## Input Parameters

uID

Strand7 model file ID number.

## Errors

ERR7\_APINotInitialised, ERR7\_APINotLicensed,  
ERR7\_FileNotOpen, ERR7\_InvalidFileUnit, ERR7\_NoError

---

## St7EnableModelRotationUnit

---

### Description

Allows the rotation units set by *St7SetResultOptions* to override the report of rotation in radians, which is the API default.

### Syntax

```
long St7EnableModelRotationUnit(long uID)
```

### Input Parameters

uID

Strand7 model file ID number.

### Errors

```
ERR7_APINotInitialised, ERR7_APINotLicensed,  
ERR7_FileNotOpen, ERR7_InvalidFileUnit, ERR7_NoError
```

## St7DisableModelRotationUnit

---

### Description

Restores the API default report of rotations in radians, overriding the rotation units set by *St7SetResultOptions*.

### Syntax

```
long St7DisableModelRotationUnit(long uID)
```

### Input Parameters

uID

Strand7 model file ID number.

### Errors

```
ERR7_APINotInitialised, ERR7_APINotLicensed,  
ERR7_FileNotOpen, ERR7_InvalidFileUnit, ERR7_NoError
```

## St7EnableModelRCUnit

---

### Description

Allows the length and area units set by *St7SetRCUnits* to override the report of plate RC results in consistent model units, which is the API default.

### Syntax

```
long St7EnableModelRCUnit(long uID)
```

### Input Parameters

uID

Strand7 model file ID number.

### Errors

```
ERR7_APINotInitialised, ERR7_APINotLicensed,  
ERR7_FileNotOpen, ERR7_InvalidFileUnit, ERR7_NoError
```

## St7DisableModelRCUnit

---

### Description

Restores the API default report of plate RC results in consistent model units, overriding the length and area units set by *St7SetRCUnits*.

### Syntax

```
long St7DisableModelRCUnit(long uID)
```

### Input Parameters

uID

Strand7 model file ID number.

### Errors

```
ERR7_APINotInitialised, ERR7_APINotLicensed,  
ERR7_FileNotOpen, ERR7_InvalidFileUnit, ERR7_NoError
```

# Entity Selection

## St7SetEntitySelectState

### Description

Sets the selected state of a specified entity.

### Syntax

```
long St7SetEntitySelectState(long uID, long Entity, long EntityNum, long EndEdgeFace, bool Selected)
```

### Input Parameters

uID

Strand7 model file ID number.

Entity

Entity type, one of tyNODE, tyBEAM, tyPLATE, tyBRICK, tyLINK, tyVERTEX, tyGEOMETRYEDGE, tyGEOMETRYFACE or tyLOADPATH.

EntityNum

Entity number.

EndEdgeFace

Local entity number, either 1 or 2 for tyBEAM, one of 1,2,3 or 4 for tyPLATE or 1,2,3,4,5 or 6 for tyBRICK. Use zero to select tyNODE and for entire tyBEAM, tyPLATE and tyBRICK.

Selected

Selected state, either btTrue or btFalse.

### Errors

```
ERR7_APINotInitialised, ERR7_APINotLicensed,  
ERR7_FileNotOpen, ERR7_InvalidEntity,  
ERR7_InvalidEntityNumber, ERR7_InvalidFileUnit,  
ERR7_InvalidSelectionEndEdgeFace, ERR7_NoError
```

## St7GetEntitySelectState

---

### Description

Returns the select state of a specified entity.

### Syntax

```
long St7GetEntitySelectState(long uID, long Entity, long EntityNum, long EndEdgeFace, bool* Selected)
```

### Input Parameters

uID

Strand7 model file ID number.

Entity

Entity type, one of tyNODE, tyBEAM, tyPLATE, tyBRICK, tyLINK, tyVERTEX, tyGEOMETRYEDGE, tyGEOMETRYFACE or tyLOADPATH.

EntityNum

Entity number.

EndEdgeFace

Local entity number, either 1 or 2 for tyBEAM, one of 1,2,3 or 4 for tyPLATE or 1,2,3,4,5 or 6 for tyBRICK. Use zero to check state of tyNODE and for entire tyBEAM, tyPLATE and tyBRICK.

### Output Parameters

Selected

Selected state, either btTrue or btFalse.

### Errors

```
ERR7_APINotInitialised, ERR7_APINotLicensed,  
ERR7_FileNotOpen, ERR7_InvalidEntity,  
ERR7_InvalidEntityNumber, ERR7_InvalidFileUnit,  
ERR7_InvalidSelectionEndEdgeFace, ERR7_NoError
```

---

# Model Window

## St7CreateModelWindow

---

### Description

Creates a Strand7 graphical window for a Strand7 model.

### Syntax

```
long St7CreateModelWindow(long uID)
```

### Input Parameters

uID

Strand7 model file ID number.

### Errors

```
ERR7_APINotInitialised, ERR7_APINotLicensed,  
ERR7_CouldNotCreateModelError, ERR7_FileNotOpen,  
ERR7_InvalidFileUnit, ERR7_NoError
```

## St7DestroyModelError

---

### Description

Destroys the graphical model window for a Strand7 model.

### Syntax

```
long St7DestroyModelError(long uID)
```

### Input Parameters

uID

Strand7 model file ID number.

### Errors

```
ERR7_APINotInitialised, ERR7_APINotLicensed,  
ERR7_CouldNotDestroyModelError, ERR7_FileNotOpen,  
ERR7_InvalidFileUnit, ERR7_ModelWindowWasNotCreated,  
ERR7_NoError
```

## St7GetModelState

---

### Description

Returns the state of the graphical model window for a Strand7 model.

### Syntax

```
long St7GetModelState(long uID, long* State)
```

### Input Parameters

uID

Strand7 model file ID number.

### Output Parameters

State

Model window state, one of wsModelErrorNotCreated,  
wsModelErrorVisible, wsModelErrorMaximised,  
wsModelErrorMinimised or wsModelErrorHidden.

### Errors

```
ERR7_APINotInitialised, ERR7_APINotLicensed,  
ERR7_FileNotOpen, ERR7_InvalidFileUnit, ERR7_NoError
```

## St7GetModelWindowHandle

---

### Description

Returns the handle to the graphical model window.

### Syntax

```
long St7GetModelWindowHandle(long uID, long* Handle)
```

### Input Parameters

uID

Strand7 model file ID number.

### Output Parameters

Handle

Handle to the graphics window.

---

## **Errors**

ERR7\_APINotInitialised, ERR7\_APINotLicensed,  
ERR7\_FileNotOpen, ERR7\_InvalidFileUnit,  
ERR7\_ModelWindowWasNotCreated, ERR7\_NoError

---

## **St7SetModelWindowParent**

### **Description**

Sets the parent control for the graphical model window. This function can be used to dock the model window inside another graphical control.

### **Syntax**

```
long St7SetModelWindowParent(long uID, long Handle)
```

### **Input Parameters**

uID

Strand7 model file ID number.

Handle

Handle to the parent control for the graphics window.

### **Errors**

ERR7\_APINotInitialised, ERR7\_APINotLicensed,  
ERR7\_CannotSetWindowParent, ERR7\_FileNotOpen,  
ERR7\_InvalidFileUnit, ERR7\_ModelWindowWasNotCreated,  
ERR7\_NoError

---

## **St7ShowModelWindow**

### **Description**

Shows the graphical model window.

### **Syntax**

```
long St7ShowModelWindow(long uID)
```

### **Input Parameters**

uID

Strand7 model file ID number.

## Errors

```
ERR7_APINotInitialised, ERR7_APINotLicensed,  
ERR7_CantDoWithModalWindows, ERR7_FileNotOpen,  
ERR7_InvalidFileUnit, ERR7_ModelWindowWasNotCreated,  
ERR7_ModelWindowWasNotShowing, ERR7_NoError
```

# St7HideModelWindow

---

## Description

Hides the graphical model window.

## Syntax

```
long St7HideModelWindow(long uID)
```

## Input Parameters

uID

Strand7 model file ID number.

## Errors

```
ERR7_APINotInitialised, ERR7_APINotLicensed,  
ERR7_CantDoWithModalWindows, ERR7_FileNotOpen,  
ERR7_InvalidFileUnit, ERR7_ModelWindowWasNotCreated,  
ERR7_ModelWindowWasNotShowing, ERR7_NoError
```

# St7RedrawModel

---

## Description

Redraws the graphics within the graphical model window.

## Syntax

```
long St7RedrawModel(long uID, bool Rescale)
```

## Input Parameters

uID

Strand7 model file ID number.

Rescale

Rescale the view limits when the graphics are redrawn, either btTrue or btFalse.

---

## Errors

```
ERR7_APINotInitialised, ERR7_APINotLicensed,  
ERR7_CantDoWithModalWindows, ERR7_FileNotOpen,  
ERR7_InvalidFileUnit, ERR7_ModelWindowWasNotCreated,  
ERR7_ModelWindowWasNotShowing, ERR7_NoError
```

---

## St7UpdateElementPropertyData

### Description

Updates the display database used by the graphical model window so that a redraw shows modifications made to entities when *St7RedrawModel* is used, e.g. changes to property colours, beam section dimensions, plate thickness, etc.

### Syntax

```
long St7UpdateElementPropertyData(long uID, long Entity,  
                                long PropNum)
```

### Input Parameters

uID

Strand7 model file ID number.

Entity

The property type, either ptBEAMPROP or ptPLATEPROP.

PropNum

The updated property number.

### Errors

```
ERR7_APINotInitialised, ERR7_APINotLicensed,  
ERR7_FileNotOpen, ERR7_InvalidEntity, ERR7_InvalidFileUnit,  
ERR7_NoError, ERR7_ResultFileIsOpen, ERR7_UnknownProperty
```

---

## St7ClearModelWindow

### Description

Clears the graphics within the graphical model window.

### Syntax

```
long St7ClearModelWindow(long uID)
```

## **Input Parameters**

uID

Strand7 model file ID number.

## **Errors**

ERR7\_APINotInitialised, ERR7\_APINotLicensed,  
ERR7\_CantDoWithModalWindows, ERR7\_FileNotOpen,  
ERR7\_InvalidFileUnit, ERR7\_ModelWindowWasNotCreated,  
ERR7\_ModelWindowWasNotShowing, ERR7\_NoError

# **St7ShowWindowPopUp**

---

## **Description**

Enables a menu group in the right-click popup menu available in the model window.

## **Syntax**

long **St7ShowWindowPopUp**(long uID, long MenuGroup)

## **Input Parameters**

uID

Strand7 model file ID number.

MenuGroup

Popup menu group ID, one of imView, imDisplay, imShow, imSelect or imResults.

## **Errors**

ERR7\_APINotInitialised, ERR7\_APINotLicensed,  
ERR7\_CantDoWithModalWindows, ERR7\_FileNotOpen,  
ERR7\_InvalidFileUnit, ERR7\_ModelWindowWasNotCreated,  
ERR7\_ModelWindowWasNotShowing, ERR7\_NoError

# **St7HideWindowPopUp**

---

## **Description**

Disables a menu group in the right-click popup menu available in the model window.

---

## Syntax

```
long St7HideWindowPopUp(long uID, long MenuGroup)
```

### Input Parameters

uID

Strand7 model file ID number.

MenuGroup

Popup menu group ID, one of imView, imDisplay, imShow, imSelect or imResults.

### Errors

ERR7\_APINotInitialised, ERR7\_APINotLicensed,  
ERR7\_CantDoWithModalWindows, ERR7\_FileNotOpen,  
ERR7\_InvalidFileUnit, ERR7\_ModelWindowWasNotCreated,  
ERR7\_ModelWindowWasNotShowing, ERR7\_NoError

---

## St7ShowWindowTopPanel

### Description

Shows the top menu panel within the graphical model window.

### Syntax

```
long St7ShowWindowTopPanel(long uID)
```

### Input Parameters

uID

Strand7 model file ID number.

### Errors

ERR7\_APINotInitialised, ERR7\_APINotLicensed,  
ERR7\_CantDoWithModalWindows, ERR7\_FileNotOpen,  
ERR7\_InvalidFileUnit, ERR7\_ModelWindowWasNotCreated,  
ERR7\_ModelWindowWasNotShowing, ERR7\_NoError

---

## St7HideWindowTopPanel

### Description

Hides the top menu panel within the graphical model window.

## Syntax

```
long St7HideWindowTopPanel(long uID)
```

## Input Parameters

uID

Strand7 model file ID number.

## Errors

```
ERR7_APINotInitialised, ERR7_APINotLicensed,  
ERR7_CantDoWithModalWindows, ERR7_FileNotOpen,  
ERR7_InvalidFileUnit, ERR7_ModelWindowWasNotCreated,  
ERR7_ModelWindowWasNotShowing, ERR7_NoError
```

# St7ShowWindowToolbar

---

## Description

Shows the toolbar within the graphical model window.

## Syntax

```
long St7ShowWindowToolbar(long uID)
```

## Input Parameters

uID

Strand7 model file ID number.

## Errors

```
ERR7_APINotInitialised, ERR7_APINotLicensed,  
ERR7_CantDoWithModalWindows, ERR7_FileNotOpen,  
ERR7_InvalidFileUnit, ERR7_ModelWindowWasNotCreated,  
ERR7_ModelWindowWasNotShowing, ERR7_NoError
```

# St7HideWindowToolbar

---

## Description

Hides the toolbar within the graphical model window.

## Syntax

```
long St7HideWindowToolbar(long uID)
```

---

## **Input Parameters**

uID

Strand7 model file ID number.

## **Errors**

ERR7\_APINotInitialised, ERR7\_APINotLicensed,  
ERR7\_CantDoWithModalWindows, ERR7\_FileNotOpen,  
ERR7\_InvalidFileUnit, ERR7\_ModelWindowWasNotCreated,  
ERR7\_ModelWindowWasNotShowing, ERR7\_NoError

---

## **St7ShowWindowStatusBar**

### **Description**

Shows the status bar within the graphical model window.

### **Syntax**

long **St7ShowWindowStatusBar**(long uID)

## **Input Parameters**

uID

Strand7 model file ID number.

## **Errors**

ERR7\_APINotInitialised, ERR7\_APINotLicensed,  
ERR7\_CantDoWithModalWindows, ERR7\_FileNotOpen,  
ERR7\_InvalidFileUnit, ERR7\_ModelWindowWasNotCreated,  
ERR7\_ModelWindowWasNotShowing, ERR7\_NoError

---

## **St7HideWindowStatusBar**

### **Description**

Hides the status bar within the graphical model window.

### **Syntax**

long **St7HideWindowStatusBar**(long uID)

## **Input Parameters**

uID

Strand7 model file ID number.

## Errors

ERR7\_APINotInitialised, ERR7\_APINotLicensed,  
ERR7\_CantDoWithModalWindows, ERR7\_FileNotOpen,  
ERR7\_InvalidFileUnit, ERR7\_ModelWindowWasNotCreated,  
ERR7\_ModelWindowWasNotShowing, ERR7\_NoError

# St7ShowSelectionToolBar

---

## Description

Shows the selection toolbar when using the graphical model window.

## Syntax

long **St7ShowSelectionToolBar**(long uID)

## Input Parameters

uID

Strand7 model file ID number.

## Errors

ERR7\_APINotInitialised, ERR7\_APINotLicensed,  
ERR7\_CantDoWithModalWindows, ERR7\_FileNotOpen,  
ERR7\_InvalidFileUnit, ERR7\_ModelWindowWasNotCreated,  
ERR7\_ModelWindowWasNotShowing, ERR7\_NoError

# St7HideSelectionToolBar

---

## Description

Hides the selection toolbar when using the graphical model window.

## Syntax

long **St7HideSelectionToolBar**(long uID)

## Input Parameters

uID

Strand7 model file ID number.

## Errors

ERR7\_APINotInitialised, ERR7\_APINotLicensed,  
ERR7\_CantDoWithModalWindows, ERR7\_FileNotOpen,

---

```
ERR7_InvalidFileUnit, ERR7_ModelWindowWasNotCreated,  
ERR7_ModelWindowWasNotShowing, ERR7_NoError
```

## St7SetSelectionToolBarPosition

---

### Description

Sets the screen position of the selection toolbar.

### Syntax

```
long St7SetSelectionToolBarPosition(long uID, long Left,  
                                    long Top)
```

### Input Parameters

uID

Strand7 model file ID number.

Left

Pixel position of the left edge of the selection toolbar.

Top

Pixel position of the top edge of the selection toolbar.

### Errors

```
ERR7_APINotInitialised, ERR7_APINotLicensed,  
ERR7_CantDoWithModalWindows, ERR7_FileNotOpen,  
ERR7_InvalidFileUnit, ERR7_ModelWindowWasNotCreated,  
ERR7_ModelWindowWasNotShowing, ERR7_InvalidWindowDimensions,  
ERR7_NoError
```

## St7GetSelectionToolBarPosition

---

### Description

Returns the screen position of the selection toolbar.

### Syntax

```
long St7GetSelectionToolBarPosition(long uID, long* Left,  
                                    long* Top)
```

### Input Parameters

uID

Strand7 model file ID number.

### Output Parameters

Left

Pixel position of the left edge of the selection toolbar.

Top

Pixel position of the top edge of the selection toolbar.

### Errors

ERR7\_APINotInitialised, ERR7\_APINotLicensed,  
ERR7\_CantDoWithModalWindows, ERR7\_FileNotOpen,  
ERR7\_InvalidFileUnit, ERR7\_ModelWindowWasNotCreated,  
ERR7\_ModelWindowWasNotShowing, ERR7\_NoError

## St7RotateModel

---

### Description

Sets the view angle for the model within the graphical display window.

### Syntax

```
long St7RotateModel(long uID, double RX, double RY, double  
RZ)
```

### Input Parameters

uID

Strand7 model file ID number.

RX

Rotation about the Global X axis in degrees.

RY

Rotation about the Global Y axis in degrees.

RZ

Rotation about the Global Z axis in degrees.

### Errors

ERR7\_APINotInitialised, ERR7\_APINotLicensed,  
ERR7\_FileNotOpen, ERR7\_InvalidFileUnit, ERR7\_NoError

---

## St7ShowEntity

---

### Description

Shows all entities of a specified type within the graphical model window.

### Syntax

```
long St7ShowEntity(long uID, long Entity)
```

### Input Parameters

uID

Strand7 model file ID number.

Entity

Strand7 entity type, one of tyNODE, tyBEAM, tyPLATE, tyBRICK, tyLINK, tyVERTEX, tyGEOMETRYEDGE, tyGEOMETRYFACE or tyLOADPATH.

### Errors

```
ERR7_APINotInitialised, ERR7_APINotLicensed,  
ERR7_FileNotOpen, ERR7_InvalidEntity, ERR7_InvalidFileUnit,  
ERR7_NoError
```

## St7HideEntity

---

### Description

Hides all entities of a specified type within the graphical model window.

### Syntax

```
long St7HideEntity(long uID, long Entity)
```

### Input Parameters

uID

Strand7 model file ID number.

Entity

Strand7 entity type, one of tyNODE, tyBEAM, tyPLATE, tyBRICK, tyLINK, tyVERTEX, tyGEOMETRYEDGE, tyGEOMETRYFACE or tyLOADPATH.

## Errors

ERR7\_APINotInitialised, ERR7\_APINotLicensed,  
ERR7\_FileNotOpen, ERR7\_InvalidEntity, ERR7\_InvalidFileUnit,  
ERR7\_NoError

# St7SetEntityDisplay

---

## Description

Sets the display settings for the specified model entity.

## Syntax

```
long St7SetEntityDisplay(long uID, long Entity, long*  
    Integers)
```

## Input Parameters

uID

Strand7 model file ID number.

Entity

Strand7 entity type, one of tyNODE, tyBEAM, tyPLATE, tyBRICK, tyLINK,  
tyVERTEX, tyGEOMETRYEDGE, tyGEOMETRYFACE or tyLOADPATH.

Integers [0..20]

See *Entity Display Settings* for additional information.

## Errors

ERR7\_APINotInitialised, ERR7\_APINotLicensed,  
ERR7\_CantDoWithModalWindows, ERR7\_FileNotOpen,  
ERR7\_InvalidDrawParameters, ERR7\_InvalidEntity,  
ERR7\_InvalidFileUnit, ERR7\_ModelWindowWasNotCreated,  
ERR7\_ModelWindowWasNotShowing, ERR7\_NoError

# St7GetEntityDisplay

---

## Description

Returns the display settings assigned for the specified model entity.

## Syntax

```
long St7GetEntityDisplay(long uID, long Entity, long*  
    Integers)
```

---

## **Input Parameters**

uID

Strand7 model file ID number.

Entity

Strand7 entity type, one of tyNODE, tyBEAM, tyPLATE, tyBRICK, tyLINK, tyVERTEX, tyGEOMETRYEDGE, tyGEOMETRYFACE or tyLOADPATH.

## **Output Parameters**

Integers[0..20]

See *Entity Display Settings* for additional information.

## **Errors**

ERR7\_APINotInitialised, ERR7\_APINotLicensed,  
ERR7\_CantDoWithModalWindows, ERR7\_FileNotOpen,  
ERR7\_InvalidEntity, ERR7\_InvalidFileUnit,  
ERR7\_ModelWindowWasNotCreated,  
ERR7\_ModelWindowWasNotShowing, ERR7\_NoError

---

# **St7ShowPointAttributes**

## **Description**

Shows the node and vertex attributes within the graphical model window.

## **Syntax**

```
long St7ShowPointAttributes(long uID)
```

## **Input Parameters**

uID

Strand7 model file ID number.

## **Errors**

ERR7\_APINotInitialised, ERR7\_APINotLicensed,  
ERR7\_FileNotOpen, ERR7\_InvalidFileUnit, ERR7\_NoError

## St7HidePointAttributes

---

### Description

Hides the node and vertex attributes within the graphical model window.

### Syntax

```
long St7HidePointAttributes(long uID)
```

### Input Parameters

uID

Strand7 model file ID number.

### Errors

```
ERR7_APINotInitialised, ERR7_APINotLicensed,  
ERR7_FileNotOpen, ERR7_InvalidFileUnit, ERR7_NoError
```

## St7ShowEntityAttributes

---

### Description

Shows the element attributes within the graphical model window.

### Syntax

```
long St7ShowEntityAttributes(long uID)
```

### Input Parameters

uID

Strand7 model file ID number.

### Errors

```
ERR7_APINotInitialised, ERR7_APINotLicensed,  
ERR7_FileNotOpen, ERR7_InvalidFileUnit, ERR7_NoError
```

## St7HideEntityAttributes

---

### Description

Hides the element attributes within the graphical model window.

### Syntax

```
long St7HideEntityAttributes(long uID)
```

---

## **Input Parameters**

**uID**

Strand7 model file ID number.

## **Errors**

ERR7\_APINotInitialised, ERR7\_APINotLicensed,  
ERR7\_FileNotOpen, ERR7\_InvalidFileUnit, ERR7\_NoError

---

# **St7PositionModelWindow**

## **Description**

Sets the screen position of the graphical model window.

## **Syntax**

```
long St7PositionModelWindow(long uID, long Left, long Top,  
                           long Width, long Height)
```

## **Input Parameters**

**uID**

Strand7 model file ID number.

**Left**

Pixel position of the left edge of the model window.

**Top**

Pixel position of the top edge of the model window.

**Width**

Pixel width of the model window.

**Height**

Pixel height of the model window.

## **Errors**

ERR7\_APINotInitialised, ERR7\_APINotLicensed,  
ERR7\_FileNotOpen, ERR7\_InvalidFileUnit,  
ERR7\_InvalidWindowDimensions, ERR7\_NoError

## St7GetModelWindowPosition

---

### Description

Returns the screen position of the graphical model window.

### Syntax

```
long St7GetModelWindowPosition(long uID, long* Left, long*
    Top, long* Width, long* Height)
```

### Input Parameters

uID

Strand7 model file ID number.

### Output Parameters

Left

Pixel position of the left edge of the model window.

Top

Pixel position of the top edge of the model window.

Width

Pixel width of the model window.

Height

Pixel height of the model window.

### Errors

ERR7\_APINotInitialised, ERR7\_APINotLicensed,  
ERR7\_CantDoWithModalWindows, ERR7\_FileNotOpen,  
ERR7\_InvalidFileUnit, ERR7\_ModelWindowWasNotCreated,  
ERR7\_ModelWindowWasNotShowing, ERR7\_NoError

## St7GetDrawAreaSize

---

### Description

Returns the screen area available for drawing the model graphics within the graphical model window.

---

## Syntax

```
long St7GetDrawAreaSize(long uID, long* Width, long*  
Height)
```

## Input Parameters

uID

Strand7 model file ID number.

## Output Parameters

Width

Pixel width of the drawing area.

Height

Pixel height of the drawing area.

## Errors

```
ERR7_APINotInitialised, ERR7_APINotLicensed,  
ERR7_CantDoWithModalWindows, ERR7_FileNotOpen,  
ERR7_InvalidFileUnit, ERR7_ModelWindowWasNotCreated,  
ERR7_ModelWindowWasNotShowing, ERR7_NoError
```

---

## St7ShowProperty

### Description

Shows all of the entities of a specified property within the graphical model window.

### Syntax

```
long St7ShowProperty(long uID, long Entity, long PropNum)
```

## Input Parameters

uID

Strand7 model file ID number.

Entity

Strand7 entity type, one of tyNODE, tyBEAM, tyPLATE, tyBRICK, tyLINK, tyVERTEX, tyGEOMETRYEDGE, tyGEOMETRYFACE or tyLOADPATH.

PropNum

The ID number of the property to show.

## Errors

```
ERR7_APINotInitialised, ERR7_APINotLicensed,  
ERR7_FileNotOpen, ERR7_InvalidEntity, ERR7_InvalidFileUnit,  
ERR7_NoError, ERR7_UnknownProperty
```

# St7HideProperty

---

## Description

Hides all of the entities of a specified property number within the graphical model window.

## Syntax

```
long St7HideProperty(long uID, long Entity, long PropNum)
```

## Input Parameters

uID

Strand7 model file ID number.

Entity

Strand7 entity type, one of tyNODE, tyBEAM, tyPLATE, tyBRICK, tyLINK, tyVERTEX, tyGEOMETRYEDGE, tyGEOMETRYFACE or tyLOADPATH.

PropNum

The ID number of the property to hide.

## Errors

```
ERR7_APINotInitialised, ERR7_APINotLicensed,  
ERR7_FileNotOpen, ERR7_InvalidEntity, ERR7_InvalidFileUnit,  
ERR7_NoError, ERR7_UnknownProperty
```

# St7ShowGroup

---

## Description

Shows all entities in a specified group within the graphical model window.

## Syntax

```
long St7ShowGroup(long uID, long GroupID)
```

## Input Parameters

uID

---

Strand7 model file ID number.  
GroupID

The ID number of the group to show.

### Errors

ERR7\_APINotInitialised, ERR7\_APINotLicensed,  
ERR7\_FileNotOpen, ERR7\_GroupIdDoesNotExist,  
ERR7\_InvalidFileUnit, ERR7\_NoError

## St7HideGroup

---

### Description

Hides all of the entities in a specified group within the graphical model window.

### Syntax

```
long St7HideGroup(long uID, long GroupID)
```

### Input Parameters

uID

Strand7 model file ID number.

GroupID

The ID number of the group to hide.

### Errors

ERR7\_APINotInitialised, ERR7\_APINotLicensed,  
ERR7\_FileNotOpen, ERR7\_GroupIdDoesNotExist,  
ERR7\_InvalidFileUnit, ERR7\_NoError

## St7SetBeamResultDisplay

---

### Description

Sets the display options for the beam results within the graphical model window.

### Syntax

```
long St7SetBeamResultDisplay(long uID, long* Integers)
```

### Input Parameters

uID

Strand7 model file ID number.

Integers [0..12]

[ipResultType] - Beam result type, one of rtAsNone, rtAsContour, rtAsDiagram or rtAsVector.

[ipResultQuantity] - See *Result Display Options*.

[ipResultAxis] - See *Result Display Options*.

[ipResultComponent] - See *Result Display Options*.

[ipVectorStyle] - Vector display style, one of vtVectorComponent, vtVectorTranslationMag, vtVectorRotationMag.

## Errors

ERR7\_APINotInitialised, ERR7\_APINotLicensed,  
ERR7\_FileNotOpen, ERR7\_InvalidAxisSystem, ERR7\_InvalidAxis,  
ERR7\_InvalidComponent, ERR7\_InvalidDiagramAxis,  
ERR7\_InvalidFileUnit, ERR7\_InvalidResultSubQuantity,  
ERR7\_InvalidResultType, ERR7\_InvalidUCSID,  
ERR7\_InvalidVectorComponents, ERR7\_NoError,  
ERR7\_ResultFileNotOpen, ERR7\_ResultIsNotAvailable

## St7SetPlateResultDisplay

---

### Description

Sets the display options for the plate results within the graphical model window.

### Syntax

```
long St7SetPlateResultDisplay(long uID, long* Integers)
```

### Input Parameters

uID

Strand7 model file ID number.

Integers [0..12]

[ipResultType] - Plate result type, one of rtAsNone, rtAsContour, rtAsDiagram or rtAsVector.

[ipResultQuantity] - See *Result Display Options*.

- 
- [ipResultAxis] - See *Result Display Options*.
  - [ipResultComponent] - See *Result Display Options*.
  - [ipResultSurface] - Plate surface display, one of psPlateMidPlane, psPlateZMinus or psPlateZPlus.
  - [ipVectorStyle] - Vector display style, one of vtVectorComponent, vtVectorTranslationMag, vtVectorRotationMag.

## Errors

```
ERR7_APINotInitialised, ERR7_APINotLicensed,  
ERR7_FileNotOpen, ERR7_InvalidAxisSystem, ERR7_InvalidAxis,  
ERR7_InvalidComponent, ERR7_InvalidFileUnit,  
ERR7_InvalidPlateSurface, ERR7_InvalidResultSubQuantity,  
ERR7_InvalidResultType, ERR7_InvalidUCSID,  
ERR7_InvalidVectorComponents, ERR7_NoError,  
ERR7_ResultFileNotOpen, ERR7_ResultIsNotAvailable,  
ERR7_UnknownSubType
```

## St7SetBrickResultDisplay

---

### Description

Sets the display options for the brick results within the graphical model window.

### Syntax

```
long St7SetBrickResultDisplay(long uID, long* Integers)
```

### Input Parameters

uID

Strand7 model file ID number.

Integers[0..12]

- [ipResultType] - Brick result type, one of rtAsNone, rtAsContour, rtAsDiagram or rtAsVector.

- [ipResultQuantity] - See *Result Display Options*.

- [ipResultAxis] - See *Result Display Options*.

- [ipResultComponent] - See *Result Display Options*.

[ipVectorStyle] - Vector display style, one of vtVectorComponent, vtVectorTranslationMag, vtVectorRotationMag.

## Errors

```
ERR7_APINotInitialised, ERR7_APINotLicensed,  
ERR7_FileNotOpen, ERR7_InvalidAxisSystem, ERR7_InvalidAxis,  
ERR7_InvalidComponent, ERR7_InvalidFileUnit,  
ERR7_InvalidResultSubQuantity, ERR7_InvalidResultType,  
ERR7_InvalidUCSID, ERR7_InvalidVectorComponents,  
ERR7_NoError, ERR7_ResultFileNotOpen,  
ERR7_ResultIsNotAvailable, ERR7_UnknownSubType
```

## St7SetWindowResultCase

---

### Description

Sets the result case to be displayed within the graphical model window.

### Syntax

```
long St7SetWindowResultCase(long uID, long CaseNum)
```

### Input Parameters

uID

Strand7 model file ID number.

CaseNum

The result case ID number to be displayed.

### Errors

```
ERR7_APINotInitialised, ERR7_APINotLicensed,  
ERR7_CantDoWithModalWindows, ERR7_ExceededResultCase,  
ERR7_FileNotOpen, ERR7_InvalidFileUnit,  
ERR7_ModelWindowWasNotCreated,  
ERR7_ModelWindowWasNotShowing, ERR7_NoError,  
ERR7_ResultFileNotOpen
```

## St7SetWindowLoadCase

---

### Description

Sets the load case to be displayed within the graphical model window.

---

## Syntax

```
long St7SetWindowLoadCase(long uID, long CaseNum)
```

### Input Parameters

uID

Strand7 model file ID number.

CaseNum

The load case ID number to be displayed.

### Errors

```
ERR7_APINotInitialised, ERR7_APINotLicensed,  
ERR7_CantDoWithModalWindows, ERR7_FileNotOpen,  
ERR7_InvalidFileUnit, ERR7_InvalidLoadCase,  
ERR7_ModelWindowWasNotCreated,  
ERR7_ModelWindowWasNotShowing, ERR7_NoError,  
ERR7_ResultFileIsOpen
```

## St7SetWindowFreedomCase

---

### Description

Sets the freedom case to be displayed within the graphical model window.

### Syntax

```
long St7SetWindowFreedomCase(long uID, long CaseNum)
```

### Input Parameters

uID

Strand7 model file ID number.

CaseNum

The freedom case ID number to be displayed.

### Errors

```
ERR7_APINotInitialised, ERR7_APINotLicensed,  
ERR7_CantDoWithModalWindows, ERR7_FileNotOpen,  
ERR7_InvalidFileUnit, ERR7_InvalidFreedomCase,  
ERR7_ModelWindowWasNotCreated,  
ERR7_ModelWindowWasNotShowing, ERR7_NoError,  
ERR7_ResultFileIsOpen
```

## St7SetWindowUCSCase

---

### Description

Sets the UCS case to be displayed within the graphical model window.

### Syntax

```
long St7SetWindowUCSCase(long uID, long CaseNum)
```

### Input Parameters

uID

Strand7 model file ID number.

CaseNum

The UCS ID number to be displayed.

### Errors

```
ERR7_APINotInitialised, ERR7_APINotLicensed,  
ERR7_CantDoWithModalWindows, ERR7_FileNotOpen,  
ERR7_InvalidFileUnit, ERR7_InvalidUCSIndex,  
ERR7_ModelWindowWasNotCreated,  
ERR7_ModelWindowWasNotShowing, ERR7_NoError
```

## St7SetEntityContourFile

---

### Description

Sets a user defined contour file for beam, plate or brick elements.

### Syntax

```
long St7SetEntityContourFile(long uID, long Entity, long  
    FileType, char* FileName)
```

### Input Parameters

uID

Strand7 model file ID number.

Entity

Strand7 entity type to contour, one of tyBEAM, tyPLATE or tyBRICK.

FileType

Basis for the contour values, either ucNode or ucElement.

---

FileName

Full path and name of the text file containing the user defined contour values.

### Errors

ERR7\_APINotInitialised, ERR7\_APINotLicensed,  
ERR7\_FileNotOpen, ERR7\_InvalidFileUnit, ERR7\_FileNotFound,  
ERR7\_InvalidEntity, ERR7\_NoError

## St7GetEntityContourFile

---

### Description

Returns the user defined contour file specified for beam, plate or brick elements.

### Syntax

```
long St7GetEntityContourFile(long uID, long Entity, long*  
    FileType, char* FileName, long MaxStringLen)
```

### Input Parameters

uID

Strand7 model file ID number.

Entity

Strand7 entity type to contour, one of tyBEAM, tyPLATE or tyBRICK.

MaxStringLen

Maximum number of characters allocated for FileName.

### Output Parameters

FileType

Basis of the contour values, either ucNode or ucElement.

FileName

Full path and name of the text file containing the user defined contour values.

### Errors

ERR7\_APINotInitialised, ERR7\_APINotLicensed,  
ERR7\_FileNotOpen, ERR7\_InvalidFileUnit, ERR7\_FileNotFound,  
ERR7\_InvalidEntity, ERR7\_NoError

# Post-Processing

## St7SetDisplacementScale

---

### Description

Sets the Displacement Scale used to draw the deformed model, when an associated model result file is open.

### Syntax

```
long St7SetDisplacementScale(long uID, double DispScale,  
                           long ScaleType)
```

### Input Parameters

uID

Strand7 model file ID number.

DispScale

The scaling factor or percentage to be applied.

ScaleType

The manner of scaling to be used, either dsPercent or dsAbsolute.

### Errors

ERR7\_APINotInitialised, ERR7\_APINotLicensed,  
ERR7\_FileNotOpen, ERR7\_InvalidFileUnit, ERR7\_NoError

## St7GetDisplacementScale

---

### Description

Returns the Displacement Scale used to draw the deformed model when an associated model result file is open.

### Syntax

```
long St7GetDisplacementScale(long uID, double* DispScale,  
                           long* ScaleType)
```

### Input Parameters

uID

Strand7 model file ID number

---

## **Output Parameters**

DispScale

The scaling factor or percentage applied.

ScaleType

The manner of scaling used, either dsPercent or dsAbsolute.

## **Errors**

ERR7\_APINotInitialised, ERR7\_APINotLicensed,  
ERR7\_FileNotOpen, ERR7\_InvalidFileUnit, ERR7\_NoError

## Import/Export Utilities

### St7ImportST7File

#### Description

Imports a specified Strand7 text file format model.

#### Syntax

```
long St7ImportST7File(long uID, char* FileName, long Mode)
```

#### Input Parameters

uID

Strand7 model file ID number.

FileName

Full path and name for the Strand7 text-file to be imported.

Mode

Controls the display of a progress bar, either ieQuietRun or ieProgressRun.

#### Errors

```
ERR7_APINotInitialised, ERR7_APINotLicensed,  
ERR7_CannotReadImportFile, ERR7_FileNotOpen,  
ERR7_InvalidFileUnit, ERR7_InvalidImportExportMode,  
ERR7_NoError, ERR7_ResultFileIsOpen
```

### St7ImportIGESFile

#### Description

Imports a geometry file in IGES format.

#### Syntax

```
long St7ImportIGESFile(long uID, char* FileName, long*  
Integers, double* Doubles, long Mode)
```

#### Input Parameters

uID

Strand7 model file ID number.

---

#### FileName

Full path and name for the IGES file to be imported.

#### Integers [0..6]

[ipImportGeomProp] - Default property ID number.

[ipImportGeomCurvesToBeams] - Convert unreferenced curves to beam elements, either btTrue or btFalse.

[ipImportGeomGroupsAs] - Geometry groups import, one of ggNone, ggAuto, ggSubfigures or ggLevels.

[ipImportGeomColourAsProperty] - Import geometry colour definitions as property definitions, either btTrue or btFalse.

[ipImportGeomBlackReplacement] - Black replacement colour as a 32 bit RGB value.

[ipImportGeomLengthUnit] - specifies a length unit for the import file, one of luGeomNONE, luGeomINCH, luGeomMILLIMETRE, luGeomFEET, luGeomMILES, luGeomMETRE, luGeomKILOMETRE, luGeomMIL, luGeomMICRON, luGeomCENTIMETRE, luGeomMICROINCH, or luGeomUNSPECIFIED

#### Doubles [0..0]

[ipImportGeomTol] - Relative tolerance used when importing geometry.

#### Mode

Controls the display of a progress bar, either ieQuietRun or ieProgressRun.

#### Errors

ERR7\_APINotInitialised, ERR7\_APINotLicensed,  
ERR7\_CannotReadImportFile, ERR7\_FileNotOpen,  
ERR7\_InvalidFileUnit, ERR7\_NoError, ERR7\_ResultFileIsOpen

---

## St7ImportACISFile

#### Description

Imports a geometry file in the ACIS format.

## Syntax

```
long St7ImportACISFile(long uID, char* FileName, long*
    Integers, double* Doubles, long Mode)
```

## Input Parameters

uID

Strand7 model file ID number.

FileName

Full path and name for the ACIS file to be imported.

Integers[0..6]

[ipImportGeomProp] - Default property ID number.

[ipImportGeomACISBodiesAsGroups] - Imports ACIS bodies as groups,  
either btTrue or btFalse.

[ipImportGeomCurvesToBeams] - Imports unused curves as beams,  
either btTrue or btFalse.

[ipImportGeomLengthUnit] - specifies a length unit for the import file,  
one of luGeomNONE, luGeomINCH, luGeomMILLIMETRE, luGeomFEET,  
luGeomMILES, luGeomMETRE, luGeomKILOMETRE, luGeomMIL,  
luGeomMICRON, luGeomCENTIMETRE, luGeomMICROINCH, or  
luGeomUNSPECIFIED

Doubles[0..0]

[ipImportGeomTol] - Relative tolerance used when importing geometry.

Mode

Controls the display of a progress bar, either ieQuietRun or ieProgressRun.

## Errors

ERR7\_APINotInitialised, ERR7\_APINotLicensed,  
ERR7\_CannotReadImportFile, ERR7\_FileNotOpen,  
ERR7\_InvalidFileUnit, ERR7\_NoError, ERR7\_ResultFileIsOpen

## St7ImportSTEPFile

---

### Description

Imports a geometry file in the STEP format.

---

## Syntax

```
long St7ImportSTEPFile(long uID, char* FileName, long*  
Integers, double* Doubles, long Mode)
```

## Input Parameters

uID

Strand7 model file ID number.

FileName

Full path and name for the STEP file to be imported.

Integers[0..6]

[ipImportGeomProp] - Default property ID number.

[ipImportGeomBlackReplacement] - Black replacement colour as a 32 bit RGB value.

[ipImportGeomColourAsProperty] - Use the geometry colours as property definitions, either btTrue or btFalse.

[ipImportGeomGroupsAs] - Geometry groups import, either ggNone or ggAssemblies.

[ipImportGeomLengthUnit] - specifies a length unit for the import file, one of luGeomNONE, luGeomINCH, luGeomMILLIMETRE, luGeomFEET, luGeomMILES, luGeomMETRE, luGeomKILOMETRE, luGeomMIL, luGeomMICRON, luGeomCENTIMETRE, luGeomMICROINCH, or luGeomUNSPECIFIED

Doubles[0..0]

[ipImportGeomTol] - Relative tolerance used when importing geometry.

Mode

Controls the display of a progress bar (ieQuietRun or ieProgressRun).

## Errors

```
ERR7_APINotInitialised, ERR7_APINotLicensed,  
ERR7_CannotReadImportFile, ERR7_FileNotOpen,  
ERR7_InvalidFileUnit, ERR7_NoError, ERR7_ResultFileIsOpen
```

## St7ImportST6BinaryFile

---

### Description

Imports a Strand6 model in the binary file format.

### Syntax

```
long St7ImportST6BinaryFile(long uID, char* FileName, long Mode)
```

### Input Parameters

uID

Strand7 model file ID number.

FileName

Full path and name for the Strand6 file to be imported.

Mode

Controls the display of a progress bar, either ieQuietRun or ieProgressRun.

### Errors

```
ERR7_APINotInitialised, ERR7_APINotLicensed,  
ERR7_CannotReadImportFile, ERR7_FileNotOpen,  
ERR7_InvalidFileUnit, ERR7_InvalidImportExportMode,  
ERR7_NoError, ERR7_ResultFileIsOpen
```

## St7ImportST6TextFile

---

### Description

Imports a Strand6 model in the text file format.

### Syntax

```
long St7ImportST6TextFile(long uID, char* FileName, long Mode)
```

### Input Parameters

uID

Strand7 model file ID number.

FileName

Full path and name for the Strand6 file to be imported.

---

### Mode

Controls the display of a progress bar, either ieQuietRun or ieProgressRun.

### Errors

```
ERR7_APINotInitialised, ERR7_APINotLicensed,  
ERR7_CannotReadImportFile, ERR7_FileNotOpen,  
ERR7_InvalidFileUnit, ERR7_InvalidImportExportMode,  
ERR7_NoError, ERR7_ResultFileIsOpen
```

## St7ImportDXFFile

---

### Description

Imports a geometry file in the DXF format.

### Syntax

```
long St7ImportDXFFile(long uID, char* FileName, long*  
Integers, long Mode)
```

### Input Parameters

uID

Strand7 model file ID number.

FileName

Full path and name for the DXF file to be imported.

Integers[0..5]

[ipDXFImportFrozenLayers] - Import frozen layers, either btTrue or btFalse.

[ipDXFImportLayersAsGroups] - Import geometry layers as groups, either btTrue or btFalse.

[ipDXFImportColoursAsProps] - Use geometry colours as property definitions, either btTrue or btFalse.

[ipDXFImportPolylineAsPlates] - Import polyline definitions as plate elements, either btTrue or btFalse.

[ipDXFImportPolygonAsBricks] - Import polygon definitions as brick elements, either btTrue or btFalse.

[ipDXFImportSegmentsPerCircle] - Number of line segments used to discretise curves.

Mode

Controls the display of a progress bar, either ieQuietRun or ieProgressRun.

## Errors

ERR7\_APINotInitialised, ERR7\_APINotLicensed,  
ERR7\_CannotReadImportFile, ERR7\_FileNotOpen,  
ERR7\_InvalidFileUnit, ERR7\_InvalidImportExportMode,  
ERR7\_NoError, ERR7\_ResultFileIsOpen

# St7ImportSTLFile

---

## Description

Imports a stereo-lithography file.

## Syntax

```
long St7ImportSTLFile(long uID, char* FileName, long Mode)
```

## Input Parameters

uID

Strand7 model file ID number.

FileName

Full path and name for the STL file to be imported.

Mode

Controls the display of a progress bar, either ieQuietRun or ieProgressRun.

## Errors

ERR7\_APINotInitialised, ERR7\_APINotLicensed,  
ERR7\_CannotReadImportFile, ERR7\_FileNotOpen,  
ERR7\_InvalidFileUnit, ERR7\_InvalidImportExportMode,  
ERR7\_NoError, ERR7\_ResultFileIsOpen

# St7ImportNASTRANFile

---

## Description

Imports a NASTRAN model file.

---

## Syntax

```
long St7ImportNastranFile(long uID, char* FileName, long*  
    Integers, long Mode)
```

## Input Parameters

uID

Strand7 model file ID number.

FileName

Full path and name for the Nastran file to be imported.

Integers [0..0]

[ipNastranImportUnits] - Nastran file units, one of naUnits\_kg\_N\_m ,  
naUnits\_T\_N\_mm, naUnits\_sl\_lbf\_ft, naUnits\_lbm\_lbf\_in, naUnits\_sl\_lbf\_in or  
naUnits\_NoUnits.

Mode

Controls the display of a progress bar, either ieQuietRun or ieProgressRun.

## Errors

ERR7\_APINotInitialised, ERR7\_APINotLicensed,  
ERR7\_CannotReadImportFile, ERR7\_FileNotOpen,  
ERR7\_InvalidFileUnit, ERR7\_InvalidImportExportMode,  
ERR7\_NoError, ERR7\_ResultFileIsOpen

---

## St7ImportANSYSFile

### Description

Imports an ANSYS model file.

### Syntax

```
long St7ImportANSYSFile(long uID, char* FileName, char*  
    LoadCaseFilePath, long* Integers, long Mode)
```

### Input Parameters

uID

Strand7 model file ID number.

FileName

Full path and name for the ANSYS file to be imported.

LoadCaseFilePath

Full path to the directory containing the load case data for the ANSYS file.

Integers [0..5]

[ipANSYSImportFormat] - Import format, one of ieANSYSBatchImport, ieANSYSCDBImport or ieANSYSBatchCDBImport.

[ipANSYSArrayParameters] Array parameter type, one of ieANSYSArrayOverwrite, ieANSYSArrayPrompt or ieANSYSArrayIgnore.

[ipANSYSImportLoadCaseFiles] - Import additional load case files, either btTrue or btFalse.

[ipANSYSImportIGESEntities] - Import IGES geometry definitions, either btTrue or btFalse.

[ipANSYSFixElementConnectivity] - Fix element connectivity, either btTrue or btFalse.

[ipANSYSRemoveDuplicateProps] - Remove duplicate property definitions, either btTrue or btFalse.

Mode

Controls the display of a progress bar, either ieQuietRun or ieProgressRun.

## Errors

ERR7\_APINotInitialised, ERR7\_APINotLicensed,  
ERR7\_CannotReadImportFile, ERR7\_FileNotOpen,  
ERR7\_InvalidAnsysArrayStatus, ERR7\_InvalidAnsysImportFormat,  
ERR7\_InvalidFileUnit, ERR7\_InvalidImportExportMode,  
ERR7\_InvalidLoadCaseFilePath, ERR7\_NoError,  
ERR7\_ResultFileIsOpen

## St7ImportSTAADFile

---

### Description

Imports a STAAD model file.

### Syntax

```
long St7ImportSTAADFile(long uID, char* FileName, long*  
    Integers, long Mode)
```

---

## **Input Parameters**

**uID**

Strand7 model file ID number.

**FileName**

Full path and name for the STAAD file to be imported.

**Integers [0..5]**

[ipSTAADCountryType] - Default country type, one of ieSTAADAmericanCode, ieSTAADAustralianCode or ieSTAADBritishCode.

[ipSTAADIncludeSectionLibrary] - Search additional beam cross-section libraries, either btTrue or btFalse.

[ipSTAADStripUnderscore] - Remove underscore from group names, either btTrue or btFalse.

[ipSTAADStripSectionSpaces] - Remove spaces from section names, either btTrue or btFalse.

[ipSTAADLengthUnit] - Length unit, one of sdLengthUnit\_in, sdLengthUnit\_ft, sdLengthUnit\_cm, sdLengthUnit\_m, sdLengthUnit\_mm, sdLengthUnit\_dm or sdLengthUnit\_km.

[ipSTAADForceUnit] - Force unit, one of sdForceUnit\_kip, sdForceUnit\_lbf, sdForceUnit\_kgf, sdForceUnit\_MTf, sdForceUnit\_N, sdForceUnit\_kN, sdForceUnit\_MN or sdForceUnit\_dN.

**Mode**

Controls the display of a progress bar, either ieQuietRun or ieProgressRun.

## **Errors**

ERR7\_APINotInitialised, ERR7\_APINotLicensed,  
ERR7\_CannotReadImportFile, ERR7\_FileNotOpen,  
ERR7\_InvalidFileUnit, ERR7\_InvalidImportExportMode,  
ERR7\_InvalidStaadCountryCodeOption,  
ERR7\_InvalidStaadForceUnit, ERR7\_InvalidStaadLengthUnit,  
ERR7\_NoError, ERR7\_ResultFileIsOpen

## St7ImportSAP2000File

---

### Description

Imports a SAP2000 model file.

### Syntax

```
long St7ImportSAP2000File(long uID, char* FileName, long*  
    Integers, long Mode)
```

### Input Parameters

uID

Strand7 model file ID number.

FileName

Full path and name for the SAP2000 file to be imported.

Integers [0..3]

[ipSAP2000ConvertBlackTo] - Black replacement colour as a 32 bit RGB value.

[ipSAP2000DecimalSeparator] - Decimal character, either ieSAP2000Period or ieSAP2000Comma.

[ipSAP2000ThousandSeparator] - Thousands character, one of ieSAP2000Period, ieSAP2000Comma, ieSAP2000Space or ieSAP2000None.

[ipSAP2000MergeDuplicateFreedomSets] - Merges duplicate freedom sets in the imported file, either btTrue or btFalse.

Mode

Controls the display of a progress bar, either ieQuietRun or ieProgressRun.

### Errors

ERR7\_APINotInitialised, ERR7\_APINotLicensed,  
ERR7\_CannotReadImportFile, ERR7\_FileNotOpen,  
ERR7\_InvalidFileUnit, ERR7\_InvalidImportExportMode,  
ERR7\_NoError, ERR7\_ResultFileIsOpen

---

## St7ExportImageFile

---

### Description

Exports the Strand7 graphics as an image file.

### Syntax

```
long St7ExportImageFile(long uID, char* FileName, long  
    ImageType, long Width, long Height)
```

### Input Parameters

uID

Strand7 model file ID number.

FileName

Full path and name for the image file to be created.

ImageType

Type of image file generated, one of itBitmap8Bit, itBitmap16Bit, itBitmap24Bit or itJPEG.

Width

Pixel width for the image.

Height

Pixel height for the image.

### Errors

```
ERR7_APINotInitialised, ERR7_APINotLicensed,  
ERR7_CannotSaveImageFile, ERR7_CantDoWithModalWindows,  
ERR7_FileNotOpen, ERR7_InsufficientRamToCreateImage,  
ERR7_InvalidFileName, ERR7_InvalidFileUnit,  
ERR7_InvalidImageDimensions, ERR7_InvalidImageType,  
ERR7_ModelWindowWasNotCreated,  
ERR7_ModelWindowWasNotShowing, ERR7_NoError
```

---

## St7ExportST7File

---

### Description

Exports the current model in the Strand7 text file format.

## Syntax

```
long St7ExportST7File(long uID, char* FileName, long Mode,  
                      long ExportFormat)
```

## Input Parameters

uID

Strand7 model file ID number.

FileName

Full path and name for the Strand7 text-file to be created.

Mode

Controls the display of a progress bar, either ieQuietRun or ieProgressRun.

ExportFormat

Controls the export format for backwards compatibility, one of  
ieSt7ExportCurrent, ieSt7Export106, ieSt7Export21x, ieSt7Export22x or  
ieSt7Export23x.

## Errors

```
ERR7_APINotInitialised, ERR7_APINotLicensed,  
ERR7_CannotWriteExportFile, ERR7_FileNotOpen,  
ERR7_InvalidFileUnit, ERR7_InvalidImportExportMode,  
ERR7_InvalidSt7ExportFormat, ERR7_NoError,  
ERR7_ResultFileIsOpen
```

# St7ExportIGESFile

---

## Description

Exports the current Strand7 geometry as an IGES format geometry file.

## Syntax

```
long St7ExportIGESFile(long uID, char* FileName, long*  
                        Integers, long Mode)
```

## Input Parameters

uID

Strand7 model file ID number.

FileName

---

Full path and name for the IGES file to be created.

Integers [0..6]

[ipExportGeomColour] - Export colours, one of ieFaceColour, ieGroupColour or iePropertyColour.

[ipExportGeomFullPath] - Export the full group definition, either btTrue or btFalse.

[ipExportGeomGroupsAsLevels] - Export the groups as levels, either btTrue or btFalse.

[ipExportGeomFormatProtocol] - Export format, one of ifBoundedSurface, ifTrimmedParametricSurface, ifOpenShell or ifManifoldSolidBRep.

[ipExportGeomPeriodicFace] - Periodic face control one of ieSeamOnlyAsRequired, ieSplitOnFaceBoundary or ieSplitIntoHalves.

[ipExportGeomKeepAnalytic] - Export the analytic geometry definitions, either btTrue or btFalse.

Mode

Controls the display of a progress bar, either ieQuietRun or ieProgressRun.

## Errors

ERR7\_APINotInitialised, ERR7\_APINotLicensed,  
ERR7\_CannotWriteExportFile, ERR7\_FileNotOpen,  
ERR7\_InvalidFileUnit, ERR7\_InvalidGeometryFormatProtocol,  
ERR7\_NoError, ERR7\_ResultFileIsOpen

# St7ExportSTEPFile

---

## Description

Exports the current Strand7 geometry as a STEP format geometry file.

## Syntax

```
long St7ExportSTEPFile(long uID, char* FileName, long*  
    Integers, long Mode)
```

## Input Parameters

uID

Strand7 model file ID number.

**FileName**

Full path and name for the STEP file to be created.

**Integers [0..6]**

[ipExportGeomColour] - Export colours, one of ieFaceColour,  
ieGroupColour or iePropertyColour.

[ipExportGeomFullGroupPath] - Export the full group definition, either  
btTrue or btFalse.

[ipExportGeomGroupsAsLevels] - Export the groups as levels, either  
btTrue or btFalse.

[ipExportGeomFormatProtocol] - Export format, either  
spConfigControlDesign or spAutomotiveDesign.

[ipExportGeomPeriodicFace] - Periodic face control one of  
ieSeamOnlyAsRequired, ieSplitOnFaceBoundary or ieSplitIntoHalves.

[ipExportGeomKeepAnalytic] - Export the analytic geometry definitions,  
either btTrue or btFalse.

**Mode**

Controls the display of a progress bar, either ieQuietRun or ieProgressRun.

**Errors**

ERR7\_APINotInitialised, ERR7\_APINotLicensed,  
ERR7\_CannotWriteExportFile, ERR7\_FileNotOpen,  
ERR7\_InvalidFileUnit, ERR7\_InvalidGeometryFormatProtocol,  
ERR7\_NoError, ERR7\_ResultFileIsOpen

## St7ExportDXFFile

---

**Description**

Exports the current Strand7 geometry as a DXF format geometry file.

**Syntax**

```
long St7ExportDXFFile(long uID, char* FileName, long*  
Integers, long Mode)
```

---

## Input Parameters

uID

Strand7 model file ID number.

FileName

Full path and name for the DXF file to be created.

Integers [0..4]

[ipDXFExportPlatesBricks3DFaces] - Export plates and bricks as AutoCAD 3D faces, either btTrue or btFalse.

[ipDXFExportGroupsAsLayers] - Export groups as AutoCAD layers, either btTrue or btFalse.

[ipDXFExportPropColoursAsEntityColours] - Export property colours as AutoCAD entity colours, either btTrue or btFalse.

[ipDXFExportBeamsAs] - Beam element export, one of bmLine, bmSection or bmSolid.

[ipDXFExportPlatesAs] - Plate element export, either plSurface or plSolid.

Mode

Controls the display of a progress bar, either ieQuietRun or ieProgressRun.

## Errors

ERR7\_APINotInitialised, ERR7\_APINotLicensed,  
ERR7\_CannotWriteExportFile, ERR7\_FileNotOpen,  
ERR7\_InvalidDXFBeamOption, ERR7\_InvalidDXFPlateOption,  
ERR7\_InvalidFileUnit, ERR7\_InvalidImportExportMode,  
ERR7\_NoError, ERR7\_ResultFileIsOpen

---

## St7ExportNASTRANFile

### Description

Exports the current Strand7 model as a NASTRAN model file.

### Syntax

```
long St7ExportNASTRANFile(long uID, char* FileName, long*  
Integers, double* Doubles, long Mode)
```

## Input Parameters

uID

Strand7 model file ID number.

FileName

Full path and name for the NASTRAN file to be created.

Integers [0..9]

[ipNASTRANFreedomCase] - Exported freedom case.

[ipNASTRANLoadCase] - Exported load case for non-structural mass attributes.

[ipNASTRANSolver] - Nastran solver type, one of ieNASTRANSolverLSA, ieNASTRANSolverNFA or ieNASTRANSolverLBA.

[ipNASTRANExportUnits] - Units for exported file, one of naUnits\_kg\_N\_m, naUnits\_T\_N\_mm, naUnits\_sl\_lbf\_ft, naUnits\_lbm\_lbf\_in, naUnits\_sl\_lbf\_in or naUnits\_NoUnits.

[ipNASTRANBeamStressSections] - Number of sections defined for exported beam elements.

[ipNASTRANBeamSectionGeometry] - Export beam section geometry, either ieNASTRANExportGeometryProps or ieNASTRANExportPropsOnly.

[ipNASTRANExportHeatTransfer] - Export heat transfer property data, either btTrue or btFalse.

[ipNASTRANExportNSMass] - Export non-structural mass attributes, either btTrue or btFalse.

[ipNASTRANExportUnusedProps] - Export unreferenced material properties, either btTrue or btFalse.

[ipNASTRANTemperatureCase] - Load case from which reference temperature is exported.

Doubles [0..0]

[ipNASTRANExportZeroFields] - Zero tolerance. Parameters with magnitude less than this value are set to zero on export.

Mode

---

Controls the display of a progress bar, either ieQuietRun or ieProgressRun.

## Errors

```
ERR7_APINotInitialised, ERR7_APINotLicensed,  
ERR7_CannotWriteExportFile, ERR7_FileNotOpen,  
ERR7_InvalidFileUnit, ERR7_InvalidFreedomCase,  
ERR7_InvalidImportExportMode, ERR7_InvalidUnits,  
ERR7_NoError, ERR7_ResultFileIsOpen, ERR7_UnknownSolver
```

# St7ExportANSYSFile

---

## Description

Exports the current Strand7 model as an ANSYS model file.

## Syntax

```
long St7ExportANSYSFile(long uID, char* FileName, long*  
Integers, long Mode)
```

## Input Parameters

uID

Strand7 model file ID number.

FileName

Full path and name for the ANSYS file to be created.

Integers[0..8]

[ipANSYSExportFormat] - Export format, one of ieANSYSBatch1Export, ieANSYSBatch3Export, ieANSYSBlockedCDBExport or ieANSYSUnblockedCDBExport.

[ipANSYSFreedomCase] - Exported freedom case.

[ipANSYSLoadCase] - Exported load case for pre-load and non-structural mass attributes.

[ipANSYSUnits] Units for the exported file, one of anUnits\_NoUnits, anUnits\_kg\_m\_C, anUnits\_g\_cm\_C, anUnits\_T\_mm\_C, anUnits\_sl\_ft\_F or anUnits\_lbm\_in\_F.

[ipANSYSEndRelease] Export partial beam end-release attributes, either ieANSYSEndReleaseFixed or ieANSYSEndReleaseFull.

[ipANSYSExportNonlinearMat] - Export nonlinear material data, either btTrue or btFalse.

[ipANSYSExportHeatTransfer] - Export heat transfer property data, either btTrue or btFalse.

[ipANSYSExportPreLoadNSMass] - Export pre-load and non-structural mass attributes.

[ipANSYSExportTetraOption] - Export Tet4/Tet10 brick elements as SOLID72/SOLID92.

### Mode

Controls the display of a progress bar, either ieQuietRun or ieProgressRun.

## Errors

ERR7\_APINotInitialised, ERR7\_APINotLicensed,  
ERR7\_CannotWriteExportFile, ERR7\_FileNotOpen,  
ERR7\_InvalidAnsysEndReleaseOption,  
ERR7\_InvalidAnsysExportFormat, ERR7\_InvalidAnsysExportUnits,  
ERR7\_InvalidFileUnit, ERR7\_InvalidFreedomCase,  
ERR7\_InvalidImportExportMode, ERR7\_InvalidLoadCase,  
ERR7\_NoError, ERR7\_ResultFileIsOpen

---

# Animation

## St7PlayAnimationFile

---

### Description

Opens and plays a SAF animation file in an animation window.

### Syntax

```
long St7PlayAnimationFile(long pHandle, char* FileName,  
                           long* aHandle)
```

### Input Parameters

pHandle

The Windows handle for the parent control or form. Passing a 0 value results in a free-floating animation window.

FileName

Full path and name for the SAF animation file.

### Output Parameters

aHandle

The Windows handle for the animation window.

### Errors

```
ERR7_APINotInitialised, ERR7_APINotLicensed,  
ERR7_CannotSetWindowParent, ERR7_FileNotFound,  
ERR7_InvalidAnimationFile, ERR7_NoError,  
ERR7_TooManyAnimations
```

## St7CreateAnimation

---

### Description

Creates a SAF animation file and plays it in an animation window. The Strand7 model referenced by uID must have a results file open.

### Syntax

```
long St7CreateAnimation(long uID, long* Integers, long*  
                           aHandle)
```

## Input Parameters

uID

Strand7 model file ID number.

Integers [0..4]

[ipAniParentHandle] - The Windows handle for the parent control or form. Passing a 0 value results in a free-floating animation window.

[ipAniCase] - The result case index for a single case animation.

[ipNumFrames] - The number of animation frames for a single case animation. For a multi case animation, passing a -1 value will animate all result cases, passing a 0 value will animate only those cases marked using the *St7SetAnimationCase* function.

[ipAniWidth] - The width in pixels for the animation window.

[ipAniHeight] - The height in pixels for the animation window.

## Output Parameters

aHandle

The Windows handle for the animation window.

## Errors

```
ERR7_AnimationDimensionsTooLarge,  
ERR7_AnimationDimensionsTooSmall, ERR7_APINotInitialised,  
ERR7_APINotLicensed, ERR7_CannotFindStubFile,  
ERR7_CannotSetWindowParent, ERR7_CantDoWithModalWindows,  
ERR7_CouldNotCreateModelWindow,  
ERR7_CouldNotSaveAnimationFile, ERR7_ExceededResultCase,  
ERR7_FileNotOpen, ERR7_InsufficientFrames,  
ERR7_InvalidAnimationMode, ERR7_InvalidAnimationType,  
ERR7_InvalidFileUnit, ERR7_ModelWindowWasNotCreated,  
ERR7_ModelWindowWasNotShowing, ERR7_NoError,  
ERR7_ReducedAnimation, ERR7_ResultFileNotOpen,  
ERR7_TooManyAnimations
```

## St7CreateAnimationFile

---

### Description

Creates an animation file but does not play it.

---

## Syntax

```
long St7CreateAnimationFile(long uID, long* Integers, char*  
                           FileName)
```

## Input Parameters

uID

Strand7 model file ID number.

Integers [0..5]

[ipAniParentHandle] - The Windows handle for the parent control or form. Passing a 0 value results in a free-floating animation window.

[ipAniCase] - The result case index for a single case animation.

[ipNumFrames] - The number of animation frames for a single case animation. For a multi case animation, passing a -1 value will animate all result cases, passing a 0 value will animate only those cases marked using the St7SetAnimationCase function.

[ipAniWidth] - The width in pixels for the animation window.

[ipAniHeight] - The height in pixels for the animation window.

[ipAniType] - The animation file type, one of kAniSAF, kAniEXE or kAniAVI.

FileName

Full path and name for the animation file.

## Errors

```
ERR7_AnimationDimensionsTooLarge,  
ERR7_AnimationDimensionsTooSmall, ERR7_APINotInitialised,  
ERR7_APINotLicensed, ERR7_CannotFindStubFile,  
ERR7_CannotSetWindowParent, ERR7_CantDoWithModalWindows,  
ERR7_CouldNotCreateModelWindow,  
ERR7_CouldNotSaveAnimationFile, ERR7_ExceededResultCase,  
ERR7_FileNotOpen, ERR7_InsufficientFrames,  
ERR7_InvalidAnimationMode, ERR7_InvalidAnimationType,  
ERR7_InvalidFileUnit, ERR7_ModelWindowWasNotCreated,  
ERR7_ModelWindowWasNotShowing, ERR7_NoError,  
ERR7_ReducedAnimation, ERR7_ResultFileNotOpen,  
ERR7_TooManyAnimations
```

## St7CloseAnimation

---

### Description

Closes a SAF animation that is currently running.

### Syntax

```
long St7CloseAnimation(long aHandle)
```

### Input Parameters

aHandle

The Windows handle for the animation window.

### Errors

ERR7\_AnimationHandleOutOfRange, ERR7\_AnimationNotRunning,  
ERR7\_APINotInitialised, ERR7\_APINotLicensed, ERR7\_NoError

## St7SetAnimationCase

---

### Description

Sets the state of a specified result case for multi-case animations.

### Syntax

```
long St7SetAnimationCase(long uID, long CaseNum, bool  
Activate)
```

### Input Parameters

uID

Strand7 model file ID number.

CaseNum

Result case number.

Activate

btTrue if the case is included in the animation.

### Errors

ERR7\_APINotInitialised, ERR7\_APINotLicensed,  
ERR7\_ExceededResultCase, ERR7\_FileNotOpen,  
ERR7\_InvalidFileUnit, ERR7\_NoError, ERR7\_ResultFileNotOpen

---

## St7GetAnimationCase

---

### Description

Returns the state assigned to the specified result case for multi-case animations.

### Syntax

```
long St7GetAnimationCase(long uID, long CaseNum, bool*  
    Active)
```

### Input Parameters

uID

Strand7 model file ID number.

CaseNum

Result case number.

### Output Parameters

Active

btTrue if the case is included in the animation.

### Errors

```
ERR7_APINotInitialised, ERR7_APINotLicensed,  
ERR7_ExceededResultCase, ERR7_FileNotOpen,  
ERR7_InvalidFileUnit, ERR7_NoError, ERR7_ResultFileNotOpen
```

## General Model

### St7GetTotal

#### Description

Returns the total number of entities of a specified entity type in a Strand7 model.

#### Syntax

```
long St7GetTotal(long uID, long Entity, long* Total)
```

#### Input Parameters

uID

Strand7 model file ID number.

Entity

Strand7 entity type, one of tyNODE, tyBEAM, tyPLATE, tyBRICK, tyLINK,  
tyVERTEX, tyGEOMETRYEDGE, tyGEOMETRYFACE or tyLOADPATH.

#### Output Parameters

Total

Total number of entities in the model.

#### Errors

```
ERR7_APINotInitialised, ERR7_APINotLicensed,  
ERR7_FileNotOpen, ERR7_InvalidEntity, ERR7_InvalidFileUnit,  
ERR7_NoError
```

### St7SetTitle

#### Description

Sets the title for a Strand7 model.

#### Syntax

```
long St7SetTitle(long uID, long TitleType, char*  
TitleString)
```

#### Input Parameters

uID

Strand7 model file ID number.

---

TitleType

Title type, one of TITLEModel, TITLEProject, TITLEReference or TITLEAuthor. See *Title Types* for details.

TitleString

String containing the Strand7 model title.

## Errors

ERR7\_APINotInitialised, ERR7\_APINotLicensed,  
ERR7\_FileNotOpen, ERR7\_InvalidFileUnit, ERR7\_NoError,  
ERR7\_UnknownTitle

# St7GetTitle

---

## Description

Returns the title of a Strand7 model.

## Syntax

```
long St7GetTitle(long uID, long TitleType, char*
                  TitleString, long MaxStringLen)
```

## Input Parameters

uID

Strand7 model file ID number.

TitleType

Title type, one of TITLEModel, TITLEProject, TITLEReference, TITLEAuthor, TITLECreated or TITLEModified. See *Title Types* for details.

MaxStringLen

Maximum number of characters allocated for TitleString.

## Output Parameters

TitleString

String containing the Strand7 model title.

## Errors

ERR7\_APINotInitialised, ERR7\_APINotLicensed,  
ERR7\_FileNotOpen, ERR7\_InvalidFileUnit, ERR7\_NoError,  
ERR7\_UnknownTitle

## St7AddComment

---

### Description

Appends a comment to the Strand7 model's comments. Comments are stored contiguously and are identified by their index, from one up to the total number of comments.

### Syntax

```
long St7AddComment(long uID, char* CommentString)
```

### Input Parameters

uID

Strand7 model file ID number.

CommentString

String containing the comment to be added. Each string is presented as a line in the Strand7 comments dialogue.

### Errors

ERR7\_APINotInitialised, ERR7\_APINotLicensed,  
ERR7\_FileNotOpen, ERR7\_InvalidFileUnit, ERR7\_NoError

## St7GetNumComments

---

### Description

Returns the number of comments in a Strand7 model.

### Syntax

```
long St7GetNumComments(long uID, long* NumComments)
```

### Input Parameters

uID

Strand7 model file ID number.

### Output Parameters

NumComments

Number of comments in the model.

---

## Errors

```
ERR7_APINotInitialised, ERR7_APINotLicensed,  
ERR7_FileNotOpen, ERR7_InvalidFileUnit, ERR7_NoError
```

## St7SetComment

---

### Description

Replaces the text in a specified comment of a Strand7 model.

### Syntax

```
long St7SetComment(long uID, long Comment, char*  
CommentString)
```

### Input Parameters

uID

Strand7 model file ID number.

Comment

Index number of the comment to be replaced.

CommentString

String containing the new comment. Each string is presented as a line in the Strand7 comments dialogue.

### Errors

```
ERR7_APINotInitialised, ERR7_APINotLicensed,  
ERR7_FileNotOpen, ERR7_InvalidFileUnit, ERR7_NoError,  
ERR7_CommentDoesNotExist
```

## St7GetComment

---

### Description

Returns the specified comment in a Strand7 model.

### Syntax

```
long St7GetComment(long uID, long Comment, char*  
CommentString, long MaxStringLen)
```

### Input Parameters

uID

Strand7 model file ID number.

Comment

Index number for the comment to be returned.

MaxStringLen

Maximum number of characters allocated for CommentString.

### **Output Parameters**

CommentString

String containing the returned comment.

### **Errors**

ERR7\_APINotInitialised, ERR7\_APINotLicensed,  
ERR7\_FileNotOpen, ERR7\_InvalidFileUnit, ERR7\_NoError,  
ERR7\_CommentDoesNotExist

## **St7DeleteComment**

---

### **Description**

Deletes the specified comment in a Strand7 model.

### **Syntax**

long **St7DeleteComment**(long uID, long Comment)

### **Input Parameters**

uID

Strand7 model file ID number.

Comment

Index number of the comment to be deleted.

### **Errors**

ERR7\_APINotInitialised, ERR7\_APINotLicensed,  
ERR7\_CommentDoesNotExist, ERR7\_FileNotOpen,  
ERR7\_InvalidFileUnit, ERR7\_NoError

---

# St7GetBeamAxisSystem

---

## Description

Returns the beam axis system for a specified beam element in a Strand7 model.  
See *Beam Local Coordinates* for further information.

## Syntax

```
long St7GetBeamAxisSystem(long uID, long EltNum, bool  
Initial, double* Doubles)
```

## Input Parameters

uID

Strand7 model file ID number.

EltNum

Beam number

Initial

Use btTrue to return the initial axis system, btFalse will return the updated system due to any geometric nonlinearity in the analysis.

## Output Parameters

Doubles[0..8]

[0..2] - A unit vector in the 1-direction of the beam, expressed in the global coordinate system.

[3..5] - A unit vector in the 2-direction of the beam.

[6..8] - A unit vector in the 3-direction of the beam.

## Errors

ERR7\_APINotInitialised, ERR7\_APINotLicensed,  
ERR7\_ExceededTotal, ERR7\_FileNotOpen,  
ERR7\_InvalidEntityNumber, ERR7\_InvalidFileUnit,  
ERR7\_NoError

## St7GetPlateAxisSystem

---

### Description

Returns the plate axis system for a specified plate element in a Strand7 model.  
See *Plate Local Coordinates* for further information.

### Syntax

```
long St7GetPlateAxisSystem(long uID, long EltNum, bool  
Initial, double* Doubles)
```

### Input Parameters

uID

Strand7 model file ID number.

EltNum

Plate number.

Initial

btTrue to return the initial axis system.

### Output Parameters

Doubles [0..8]

[0..2] - A unit vector in the local x-direction of the plate, expressed in the global coordinate system.

[3..5] - A unit vector in the local y-direction of the plate.

[6..8] - A unit vector in the local z-direction of the plate.

### Errors

ERR7\_APINotInitialised, ERR7\_APINotLicensed,  
ERR7\_ExceededTotal, ERR7\_FileNotOpen,  
ERR7\_InvalidEntityNumber, ERR7\_InvalidFileUnit,  
ERR7\_NoError

## St7GetBrickFaceAxisSystem

---

### Description

Returns the brick face axis system for a specified brick face in a Strand7 model.  
See *Brick Local Coordinates* for further information.

---

## Syntax

```
long St7GetBrickFaceAxisSystem(long uID, long EltNum, long  
FaceNum, bool Initial, double* Doubles)
```

## Input Parameters

uID

Strand7 model file ID number.

EltNum

Brick number.

FaceNum

Local face number. See *Brick Local Coordinates* for further information.

Initial

btTrue to return the initial axis system.

## Output Parameters

Doubles [0..8]

[0..2] - A unit vector in the local x-direction of the face, expressed in the global coordinate system.

[3..5] - A unit vector in the local y-direction of the face.

[6..8] - A unit vector in the local z-direction of the face, note this is directed out of the median plane of the face.

## Errors

ERR7\_APINotInitialised, ERR7\_APINotLicensed,  
ERR7\_ExceededTotal, ERR7\_FileNotOpen, ERR7\_InvalidBrickFace,  
ERR7\_InvalidEntityNumber, ERR7\_InvalidFileUnit,  
ERR7\_NoError

---

## St7GetPlateNumPlies

### Description

Returns the number of plies in a specified plate element in a Strand7 model.

## Syntax

```
long St7GetPlateNumPlies(long uID, long EltNum, long*
    NumPlies)
```

## Input Parameters

uID

Strand7 model file ID number.

EltNum

Plate number.

## Output Parameters

NumPlies

Number of plies.

## Errors

```
ERR7_APINotInitialised, ERR7_APINotLicensed,
ERR7_ExceededTotal, ERR7_FileNotOpen,
ERR7_InvalidEntityNumber, ERR7_InvalidFileUnit,
ERR7_NoError, ERR7_UnknownProperty
```

---

## BXS Utilities

### St7GetNumBXSLoopsAndPlates

---

#### Description

Returns the number of loops and plates in a specified BXS.

#### Syntax

```
long St7GetNumBXSLoopsAndPlates(long uID, long PropNum,  
                                long* NumLoops, long* NumPlates)
```

#### Input Parameters

uID

Strand7 model file ID number.

PropNum

BXS property number.

#### Output Parameters

NumLoops

Number of loops in the BXS.

NumPlates

Number of plates in the BXS.

#### Errors

```
ERR7_APINotInitialised, ERR7_APINotLicensed,  
ERR7_BeamIsNotBXS, ERR7_CannotReadBXS, ERR7_FileNotOpen,  
ERR7_InvalidFileUnit, ERR7_NoError, ERR7_UnknownProperty
```

### St7GetNumBXSLoopPoints

---

#### Description

Returns the number of points contained in a specified loop in a BXS.

#### Syntax

```
long St7GetNumBXSLoopPoints(long uID, long PropNum, long  
                                LoopNum, long* NumPoints)
```

## Input Parameters

uID

Strand7 model file ID number.

PropNum

The BXS property number.

LoopNum

The loop number within the BXS.

## Output Parameters

NumPoints

The number of points within LoopNum.

## Errors

ERR7\_APINotInitialised, ERR7\_APINotLicensed,  
ERR7\_CannotReadBXS, ERR7\_FileNotOpen, ERR7\_InvalidFileUnit,  
ERR7\_NoError, ERR7\_UnknownProperty

# St7GetBXSLoop

---

## Description

Returns the coordinates of the points in a specified loop of a BXS. The points are always specified in a 2D plane. Use *St7GetNumBXSLoopPoints* to determine the number of points in a loop.

## Syntax

```
long St7GetBXSLoop(long uID, long PropNum, long LoopNum,  
                     long MaxPoints, long* NumPoints, double* Doubles)
```

## Input Parameters

uID

Strand7 model file ID number.

PropNum

The BXS property number.

LoopNum

The loop number.

---

MaxPoints

The maximum number of points allocated in Doubles, returns all points if set greater than or equal to NumPoints.

### Output Parameters

NumPoints

The number of points in the specified loop.

Doubles[0..2\*MaxPoints-1]

An array containing the XY coordinates of the points in the loop. The XY coordinates of point  $i$  are contained in Doubles [2\*i-2..2\*i-1].

### Errors

ERR7\_APINotInitialised, ERR7\_APINotLicensed,  
ERR7\_CannotReadBXS, ERR7\_FileNotOpen, ERR7\_InvalidFileUnit,  
ERR7\_NoError, ERR7\_UnknownProperty

## St7GenerateBXS

---

### Description

Generates a BXS property and returns the section data.

### Syntax

```
long St7GenerateBXS(long uID, char* BXSName, double*  
Doubles)
```

### Input Parameters

uID

Strand7 model file ID number.

BXSName

String containing the name of the BXS.

### Output Parameters

Doubles[0..33]

[ipBXSXBar] - Centroid X coordinate.

[ipBXSYBar] - Centroid Y coordinate.

[ipBXSArea] - Section area.

[ipBXS11] - Second moment of area about the principal 1 axis.  
[ipBXS12] - Second moment of area about the principal 2 axis.  
[ipBXSAngle] Orientation angle between the local X and principal 1 axes.  
[ipBXSZ11Plus] - Positive section modulus about the principal 1 axis.  
[ipBXSZ11Minus] - Negative section modulus about the principal 1 axis.  
[ipBXSZ22Plus] - Positive section modulus about the principal 2 axis.  
[ipBXSZ22Minus] - Negative section modulus about the principal 2 axis.  
[ipBXSS1] - Plastic modulus about the principal 1 axis.  
[ipBXSS2] - Plastic modulus about the principal 2 axis.  
[ipBXSr1] - Radius of gyration in the principal 1 axis direction.  
[ipBXSr2] - Radius of gyration in the principal 2 axis direction.  
[ipBXSSA1] - Shear area in the principal 1 axis direction.  
[ipBXSSA2] - Shear area in the principal 2 axis direction.  
[ipBXSSL1] - Shear centre offset in the principal 1 axis direction.  
[ipBXSSL2] - Shear centre offset in the principal 2 axis direction.  
[ipBXSIXX] - Second moment of area about the global X axis.  
[ipBXSIIYY] - Second moment of area about the global Y axis.  
[ipBXSIXY] - Second moment of area about the global XY axes.  
[ipBXSIXxL] - Second moment of area about the local X axis.  
[ipBXSIXyL] - Second moment of area about the local Y axis.  
[ipBXSIXyL] - Second moment of area about the local XY axes.  
[ipBXSZxxPlus] - Positive section modulus about the local X axis.  
[ipBXSZxxMinus] - Negative section modulus about the local X axis.  
[ipBXSZyyPlus] - Positive section modulus about the local Y axis.  
[ipBXSZyyMinus] - Negative section modulus about the local Y axis.

- 
- [ipBXSSxx] - Plastic modulus about the local X axis.
  - [ipBXSSyy] - Plastic modulus about the local Y axis.
  - [ipBXSrx] - Radius of gyration in the local X axis direction.
  - [ipBXSry] - Radius of gyration in the local Y axis direction.
  - [ipBXSJ] - Torsion constant.
  - [ipBXSIw] - Warping constant.

## Errors

```
ERR7_APINotInitialised, ERR7_APINotLicensed,  
ERR7_CannotCalculateBXSData, ERR7_CannotMakeBXS,  
ERR7_CannotSaveFile, ERR7_FileNotOpen, ERR7_InvalidFileName,  
ERR7_InvalidFileUnit, ERR7_NoError, ERR7_ResultFileIsOpen,  
ERR7_ZeroPlateElements
```

## Load and Freedom Cases

### St7NewLoadCase

#### Description

Creates a new load case within a Strand7 model.

#### Syntax

```
long St7NewLoadCase(long uID, char* CaseName)
```

#### Input Parameters

uID

Strand7 model file ID number.

CaseName

String containing the name of the new load case.

#### Errors

```
ERR7_APINotInitialised, ERR7_APINotLicensed,  
ERR7_CaseNameAlreadyExists, ERR7_FileNotOpen,  
ERR7_InvalidFileUnit, ERR7_NoError, ERR7_ResultFileIsOpen
```

### St7NewSeismicCase

#### Description

Creates a new seismic load case within a Strand7 model.

#### Syntax

```
long St7NewSeismicCase(long uID, char* CaseName)
```

#### Input Parameters

uID

Strand7 model file ID number.

CaseName

String containing the name of the new seismic case.

---

## Errors

```
ERR7_APINotInitialised, ERR7_APINotLicensed,  
ERR7_CaseNameAlreadyExists, ERR7_FileNotOpen,  
ERR7_InvalidFileUnit, ERR7_NoError, ERR7_ResultFileIsOpen
```

# St7NewFreedomCase

---

## Description

Creates a new freedom case within a Strand7 model.

## Syntax

```
long St7NewFreedomCase (long uID, char* CaseName)
```

## Input Parameters

uID

Strand7 model file ID number.

CaseName

String containing the name of the new freedom case.

## Errors

```
ERR7_APINotInitialised, ERR7_APINotLicensed,  
ERR7_CaseNameAlreadyExists, ERR7_FileNotOpen,  
ERR7_InvalidFileUnit, ERR7_NoError, ERR7_ResultFileIsOpen
```

# St7GetNumLoadCase

---

## Description

Returns the number of load cases in a Strand7 model.

## Syntax

```
long St7GetNumLoadCase (long uID, long* NumCases)
```

## Input Parameters

uID

Strand7 model file ID number.

## Output Parameters

NumCases

The number of load cases in the model.

### Errors

ERR7\_APINotInitialised, ERR7\_APINotLicensed,  
ERR7\_FileNotOpen, ERR7\_InvalidFileUnit, ERR7\_NoError

## St7GetNumSeismicCase

---

### Description

Returns the number of seismic cases in a Strand7 model.

### Syntax

```
long St7GetNumSeismicCase(long uID, long* NumCases)
```

### Input Parameters

uID

Strand7 model file ID number.

### Output Parameters

NumCases

The number of seismic cases in the model.

### Errors

ERR7\_APINotInitialised, ERR7\_APINotLicensed,  
ERR7\_FileNotOpen, ERR7\_InvalidFileUnit, ERR7\_NoError

## St7GetNumFreedomCase

---

### Description

Returns the number of freedom cases in a Strand7 model.

### Syntax

```
long St7GetNumFreedomCase(long uID, long* NumCases)
```

### Input Parameters

uID

Strand7 model file ID number.

### Output Parameters

NumCases

---

The number of freedom cases in the model.

## Errors

ERR7\_APINotInitialised, ERR7\_APINotLicensed,  
ERR7\_FileNotOpen, ERR7\_InvalidFileUnit, ERR7\_NoError

# St7SetLoadCaseName

---

## Description

Sets the name of a specified load case in a Strand7 model.

## Syntax

```
long St7SetLoadCaseName(long uID, long CaseNum, char*  
CaseName)
```

## Input Parameters

uID

Strand7 model file ID number.

CaseNum

The load case ID number.

CaseName

String containing the new name of the load case.

## Errors

ERR7\_APINotInitialised, ERR7\_APINotLicensed,  
ERR7\_CaseNameAlreadyExists, ERR7\_FileNotOpen,  
ERR7\_InvalidFileUnit, ERR7\_InvalidFreedomCase,  
ERR7\_InvalidLoadCase, ERR7\_InvalidSeismicCase, ERR7\_NoError,  
ERR7\_ResultFileIsOpen

# St7GetLoadCaseName

---

## Description

Returns the name of a specified load case within a Strand7 model.

## Syntax

```
long St7GetLoadCaseName(long uID, long CaseNum, char*  
CaseName, long MaxStringLen)
```

## **Input Parameters**

uID

Strand7 model file ID number.

CaseNum

The load case ID number.

MaxStringLen

The maximum number of characters allocated for CaseName.

## **Output Parameters**

CaseName

String containing the name of the specified load case.

## **Errors**

ERR7\_APINotInitialised, ERR7\_APINotLicensed,  
ERR7\_FileNotOpen, ERR7\_InvalidFileUnit,  
ERR7\_InvalidLoadCase, ERR7\_NoError

# **St7SetSeismicCaseName**

---

## **Description**

Sets the name of a specified seismic case in a Strand7 model.

## **Syntax**

```
long St7SetSeismicCaseName(long uID, long CaseNum, char*  
CaseName)
```

## **Input Parameters**

uID

Strand7 model file ID number.

CaseNum

The seismic case ID number.

CaseName

String containing the new name of the seismic case.

---

## Errors

```
ERR7_APINotInitialised, ERR7_APINotLicensed,  
ERR7_CaseNameAlreadyExists, ERR7_FileNotOpen,  
ERR7_InvalidFileUnit, ERR7_InvalidFreedomCase,  
ERR7_InvalidLoadCase, ERR7_InvalidSeismicCase, ERR7_NoError,  
ERR7_ResultFileIsOpen
```

---

## St7GetSeismicCaseName

### Description

Returns the name of a specified seismic case with a Strand7 model.

### Syntax

```
long St7GetSeismicCaseName(long uID, long CaseNum, char*  
CaseName, long MaxStringLen)
```

### Input Parameters

uID

Strand7 model file ID number.

CaseNum

The seismic case ID number.

MaxStringLen

The maximum number of characters allocated for CaseName.

### Output Parameters

CaseName

String containing the name of the specified seismic case.

### Errors

```
ERR7_APINotInitialised, ERR7_APINotLicensed,  
ERR7_FileNotOpen, ERR7_InvalidFileUnit,  
ERR7_InvalidSeismicCase, ERR7_NoError
```

---

## St7SetFreedomCaseName

### Description

Sets the name of a specified freedom case within a Strand7 model.

## Syntax

```
long St7SetFreedomCaseName(long uID, long CaseNum, char*  
CaseName)
```

## Input Parameters

uID

Strand7 model file ID number.

CaseNum

The freedom case ID number.

CaseName

String containing the new name for the freedom case.

## Errors

```
ERR7_APINotInitialised, ERR7_APINotLicensed,  
ERR7_CaseNameAlreadyExists, ERR7_FileNotOpen,  
ERR7_InvalidFileUnit, ERR7_InvalidFreedomCase,  
ERR7_InvalidLoadCase, ERR7_InvalidSeismicCase, ERR7_NoError,  
ERR7_ResultFileIsOpen
```

# St7GetFreedomCaseName

---

## Description

Returns the name of a specified freedom case in a Strand7 model.

## Syntax

```
long St7GetFreedomCaseName(long uID, long CaseNum, char*  
CaseName, long MaxStringLen)
```

## Input Parameters

uID

Strand7 model file ID number.

CaseNum

The freedom case ID number.

MaxStringLen

The maximum number of characters allocated for CaseName.

---

## **Output Parameters**

CaseName

String containing the name of the specified freedom case.

## **Errors**

ERR7\_APINotInitialised, ERR7\_APINotLicensed,  
ERR7\_FileNotOpen, ERR7\_InvalidFileUnit,  
ERR7\_InvalidFreedomCase, ERR7\_NoError

---

# **St7SetLoadCaseDefaults**

## **Description**

Sets the defaults for the specified load case in a Strand7 model.

## **Syntax**

```
long St7SetLoadCaseDefaults(long uID, long CaseNum, double*  
                           Defaults)
```

## **Input Parameters**

uID

Strand7 model file ID number.

CaseNum

The load case ID number.

Defaults[0..12]

[0] - Reference temperature.

[1..3] - Origin for angular velocity and acceleration.

[4..6] - Linear acceleration components.

[7..9] - Angular velocity components.

[10..12] - Angular acceleration components.

## **Errors**

ERR7\_APINotInitialised, ERR7\_APINotLicensed,  
ERR7\_FileNotOpen, ERR7\_InvalidFileUnit,  
ERR7\_InvalidLoadCase, ERR7\_NoError, ERR7\_ResultFileIsOpen

## St7GetLoadCaseDefaults

---

### Description

Returns the default values for a specified load case within a Strand7 model.

### Syntax

```
long St7GetLoadCaseDefaults(long uID, long CaseNum, double* Defaults)
```

### Input Parameters

uID

Strand7 model file ID number.

CaseNum

The load case ID number.

### Output Parameters

Defaults[0..12]

[0] - Reference temperature.

[1..3] - Origin for angular velocity and acceleration.

[4..6] - Linear acceleration components.

[7..9] - Angular velocity components.

[10..12] - Angular acceleration components.

### Errors

```
ERR7_APINotInitialised, ERR7_APINotLicensed,  
ERR7_FileNotOpen, ERR7_InvalidFileUnit,  
ERR7_InvalidLoadCase, ERR7_NoError
```

## St7SetSeismicCaseDefaults

---

### Description

Sets the defaults for a specified seismic case within a Strand7 model.

### Syntax

```
long St7SetSeismicCaseDefaults(long uID, long CaseNum,  
double* Defaults)
```

---

## **Input Parameters**

uID

Strand7 model file ID number.

CaseNum

The seismic case ID number.

Defaults[0..8]

[ipSeismicCaseDefAlpha] - Seismic case  $\alpha$  parameter.

[ipSeismicCaseDefPhi] - Seismic case  $\phi$  parameter.

[ipSeismicCaseDefBeta] - Seismic case  $\beta$  parameter.

[ipSeismicCaseDefK] - Seismic case  $k$  parameter.

[ipSeismicCaseDefh0] - Seismic base height parameter  $h_0$ .

[ipSeismicCaseDefDir] - Seismic acceleration direction, one of 1,2 or 3 to denote the Global Cartesian XYZ directions respectively.

[ipSeismicCaseDefLinAcc] - Seismic acceleration value.

[ipSeismicCaseDefV1] - Global X component of base excitation direction .

[ipSeismicCaseDefV2] - Global Y component of base excitation direction.

## **Errors**

ERR7\_APINotInitialised, ERR7\_APINotLicensed,  
ERR7\_FileNotOpen, ERR7\_InvalidFileUnit,  
ERR7\_InvalidSeismicCase, ERR7\_NoError,  
ERR7\_ResultFileIsOpen

---

## **St7GetSeismicCaseDefaults**

### **Description**

Returns the defaults for a specified seismic case within a Strand7 model.

## Syntax

```
long St7GetSeismicCaseDefaults(long uID, long CaseNum,  
double* Defaults)
```

## Input Parameters

uID

Strand7 model file ID number.

CaseNum

The seismic case ID number.

## Output Parameters

Defaults[0..8]

[ipSeismicCaseDefAlpha] - Seismic case  $\alpha$  parameter.

[ipSeismicCaseDefPhi] - Seismic case  $\phi$  parameter.

[ipSeismicCaseDefBeta] - Seismic case  $\beta$  parameter.

[ipSeismicCaseDefK] - Seismic case  $k$  parameter.

[ipSeismicCaseDefh0] - Seismic base height parameter  $h_0$ .

[ipSeismicCaseDefDir] - Seismic acceleration direction, one of 1,2 or 3  
to denote the Global Cartesian XYZ directions respectively.

[ipSeismicCaseDefLinAcc] - Seismic acceleration value.

[ipSeismicCaseDefV1] - Global X component of base excitation  
direction .

[ipSeismicCaseDefV2] - Global Y component of base excitation  
direction.

## Errors

ERR7\_APINotInitialised, ERR7\_APINotLicensed,  
ERR7\_FileNotOpen, ERR7\_InvalidFileUnit,  
ERR7\_InvalidSeismicCase, ERR7\_NoError

---

## St7SetFreedomCaseDefaults

---

### Description

Sets the defaults for a specified freedom case within a Strand7 model.

### Syntax

```
long St7SetFreedomCaseDefaults(long uID, long CaseNum,  
                                long* Defaults)
```

### Input Parameters

uID

Strand7 model file ID number.

CaseNum

The freedom case ID number.

Defaults[0..5]

An array describing the global restraint conditions for each DoF in the Global Cartesian coordinate system. Defaults[i] = btTrue indicates that DoF i is restrained.

### Errors

```
ERR7_APINotInitialised, ERR7_APINotLicensed,  
ERR7_FileNotOpen, ERR7_InvalidFileUnit,  
ERR7_InvalidFreedomCase, ERR7_NoError,  
ERR7_ResultFileIsOpen
```

## St7GetFreedomCaseDefaults

---

### Description

Returns the defaults for a specified freedom case in a Strand7 model.

### Syntax

```
long St7GetFreedomCaseDefaults(long uID, long CaseNum,  
                                long* Defaults)
```

### Input Parameters

uID

Strand7 model file ID number.

CaseNum

The freedom case ID number.

### Output Parameters

Defaults [0..5]

An array describing the global restraint conditions for each DoF in the Global Cartesian coordinate system. Defaults [i] = btTrue indicates that DoF i is restrained.

### Errors

ERR7\_APINotInitialised, ERR7\_APINotLicensed,  
ERR7\_FileNotOpen, ERR7\_InvalidFileUnit,  
ERR7\_InvalidFreedomCase, ERR7\_NoError

## St7SetLoadCaseType

---

### Description

Sets the type for a specified load case in a Strand7 model.

### Syntax

```
long St7SetLoadCaseType(long uID, long CaseNum, long  
CaseType)
```

### Input Parameters

uID

Strand7 model file ID number.

CaseNum

The load case ID number.

CaseType

The load case type (kNoInertia, kGravity or kAccelerations).

### Errors

ERR7\_APINotInitialised, ERR7\_APINotLicensed,  
ERR7\_FileNotOpen, ERR7\_InvalidFileUnit,  
ERR7\_InvalidLoadCase, ERR7\_InvalidLoadCaseType,  
ERR7\_NoError, ERR7\_ResultFileIsOpen

---

## St7GetLoadCaseType

---

### Description

Returns the type for a specified load case in a Strand7 model.

### Syntax

```
long St7GetLoadCaseType(long uID, long CaseNum, long*  
CaseType)
```

### Input Parameters

uID

Strand7 model file ID number.

CaseNum

The load case ID number.

### Output Parameters

CaseType

The load case type (kNoInertia, kGravity or kAccelerations).

### Errors

```
ERR7_APINotInitialised, ERR7_APINotLicensed,  
ERR7_FileNotOpen, ERR7_InvalidFileUnit,  
ERR7_InvalidLoadCase, ERR7_NoError
```

## St7SetLoadCaseGravityDir

---

### Description

Sets the direction of the gravity vector for the specified load case.

### Syntax

```
long St7SetLoadCaseGravityDir(long uID, long CaseNum, long  
GravDir)
```

### Input Parameters

uID

Strand7 model file ID number.

CaseNum

Load case number.

GravDir

Gravity direction as an axis index for the Global Cartesian Coordinate system, one of 1, 2 or 3.

## Errors

ERR7\_APINotInitialised, ERR7\_APINotLicensed,  
ERR7\_FileNotOpen, ERR7\_InvalidFileUnit,  
ERR7\_InvalidGravityDirection, ERR7\_InvalidLoadCase,  
ERR7\_NoError, ERR7\_ResultFileIsOpen

# St7GetLoadCaseGravityDir

---

## Description

Returns the direction of the gravity vector assigned to the specified load case.

## Syntax

```
long St7GetLoadCaseGravityDir(long uID, long CaseNum, long*  
                           GravDir)
```

## Input Parameters

uID

Strand7 model file ID number.

CaseNum

Load case number.

## Output Parameters

GravDir

Gravity direction as an axis index for the Global Cartesian Coordinate system, one of 1, 2 or 3.

## Errors

ERR7\_APINotInitialised, ERR7\_APINotLicensed,  
ERR7\_FileNotOpen, ERR7\_InvalidFileUnit,  
ERR7\_InvalidLoadCase, ERR7\_NoError

---

## St7SetFreedomCaseType

---

### Description

Sets the type for a specified freedom case in a Strand7 model.

### Syntax

```
long St7SetFreedomCaseType(long uID, long CaseNum, long  
CaseType)
```

### Input Parameters

uID

Strand7 model file ID number.

CaseNum

The freedom case ID number.

CaseType

The freedom case type, one of kNormalFreedom, kFreeBodyInertiaRelief,  
kSingleSymmetryInertiaXY, kSingleSymmetryInertiaYZ,  
kSingleSymmetryInertiaZX, kDoubleSymmetryInertiaX,  
kDoubleSymmetryInertiaY or kDoubleSymmetryInertiaZ.

### Errors

```
ERR7_APINotInitialised, ERR7_APINotLicensed,  
ERR7_FileNotOpen, ERR7_InvalidFileUnit,  
ERR7_InvalidFreedomCase, ERR7_InvalidFreedomCaseType,  
ERR7_NoError, ERR7_ResultFileIsOpen
```

## St7GetFreedomCaseType

---

### Description

Returns the type of a specified freedom case with a Strand7 model.

### Syntax

```
long St7GetFreedomCaseType(long uID, long CaseNum, long*  
CaseType)
```

### Input Parameters

uID

Strand7 model file ID number.

CaseNum

The freedom case ID number.

### Output Parameters

CaseType

The freedom case type, one of kNormalFreedom, kFreeBodyInertiaRelief, kSingleSymmetryInertiaXY, kSingleSymmetryInertiaYZ, kSingleSymmetryInertiaZX, kDoubleSymmetryInertiaX, kDoubleSymmetryInertiaY or kDoubleSymmetryInertiaZ.

### Errors

ERR7\_APINotInitialised, ERR7\_APINotLicensed,  
ERR7\_FileNotOpen, ERR7\_InvalidFileUnit,  
ERR7\_InvalidFreedomCase, ERR7\_NoError

## St7SetLoadCaseMassOption

---

### Description

Sets the mass options for a specified load case in a Strand7 model.

### Syntax

```
long St7SetLoadCaseMassOption(long uID, long CaseNum, bool  
SMass, bool NSMass)
```

### Input Parameters

uID

Strand7 model file ID number.

CaseNum

The load case ID number.

SMass

btTrue indicates that global accelerations are applied to structural mass in the model.

NSMass

btTrue indicates that global accelerations are applied to non-structural mass in the model.

---

## Errors

```
ERR7_APINotInitialised, ERR7_APINotLicensed,  
ERR7_FileNotOpen, ERR7_InvalidFileUnit,  
ERR7_InvalidLoadCase, ERR7_NoError, ERR7_ResultFileIsOpen
```

---

## St7GetLoadCaseMassOption

### Description

Returns the mass options for a specified load case in a Strand7 model.

### Syntax

```
long St7GetLoadCaseMassOption(long uID, long CaseNum, bool*  
    SMass, bool* NSMass)
```

### Input Parameters

uID

Strand7 model file ID number.

CaseNum

The load case ID number.

### Output Parameters

SMass

btTrue indicates that global accelerations are applied to structural mass in the model.

NSMass

btTrue indicates that global accelerations are applied to non-structural mass in the model.

### Errors

```
ERR7_APINotInitialised, ERR7_APINotLicensed,  
ERR7_FileNotOpen, ERR7_InvalidFileUnit,  
ERR7_InvalidLoadCase, ERR7_NoError
```

---

## St7EnableSeismicNSMassCase

### Description

Includes the non-structural mass from a specified load case in a seismic case.

## Syntax

```
long St7EnableSeismicNSMassCase(long uID, long  
SeismicCaseNum, long LoadCaseNum)
```

## Input Parameters

uID

Strand7 model file ID number.

SeismicCaseNum

The seismic case ID number.

LoadCaseNum

The load case ID number for the case to be included in the specified seismic case.

## Errors

ERR7\_APINotInitialised, ERR7\_APINotLicensed,  
ERR7\_FileNotOpen, ERR7\_InvalidFileUnit,  
ERR7\_InvalidSeismicCase, ERR7\_InvalidLoadCase, ERR7\_NoError

# St7DisableSeismicNSMassCase

---

## Description

Excludes the non-structural mass from a specified load case in a seismic case.

## Syntax

```
long St7DisableSeismicNSMassCase(long uID, long  
SeismicCaseNum, long LoadCaseNum)
```

## Input Parameters

uID

Strand7 model file ID number.

SeismicCaseNum

The seismic case ID number.

LoadCaseNum

The load case ID number for the case to be excluded from the specified seismic case.

---

## Errors

```
ERR7_APINotInitialised, ERR7_APINotLicensed,  
ERR7_FileNotOpen, ERR7_InvalidFileUnit,  
ERR7_InvalidSeismicCase, ERR7_InvalidLoadCase, ERR7_NoError
```

# St7GetSeismicNSMassCaseState

---

## Description

Returns whether the non-structural mass from a specified load case is included in a given seismic case in the Strand7 model.

## Syntax

```
long St7GetSeismicNSMassCaseState(long uID, long  
SeismicCaseNum, long LoadCaseNum, bool* State)
```

## Input Parameters

uID

Strand7 model file ID number.

SeismicCaseNum

The seismic case ID number.

LoadCaseNum

The load case ID number.

## Output Parameters

State

btTrue indicates that the non-structural mass from the specified load case is included in the given seismic case.

## Errors

```
ERR7_APINotInitialised, ERR7_APINotLicensed,  
ERR7_FileNotOpen, ERR7_InvalidFileUnit,  
ERR7_InvalidSeismicCase, ERR7_InvalidLoadCase, ERR7_NoError
```

# St7DeleteLoadCase

---

## Description

Deletes the specified load case from the Strand7 model.

## Syntax

```
long St7DeleteLoadCase(long uID, long CaseNum)
```

### Input Parameters

uID

Strand7 model file ID number.

CaseNum

The ID number for the load case to be deleted.

### Errors

```
ERR7_APINotInitialised, ERR7_APINotLicensed,  
ERR7_FileNotOpen, ERR7_InvalidFileUnit,  
ERR7_InvalidLoadCase, ERR7_NoError, ERR7_OnlyOneLoadCase,  
ERR7_ResultFileIsOpen
```

## St7DeleteSeismicCase

---

### Description

Deletes the specified seismic case from the Strand7 model.

### Syntax

```
long St7DeleteSeismicCase(long uID, long CaseNum)
```

### Input Parameters

uID

Strand7 model file ID number.

CaseNum

The ID number for the seismic case to be deleted.

### Errors

```
ERR7_APINotInitialised, ERR7_APINotLicensed,  
ERR7_FileNotOpen, ERR7_InvalidFileUnit,  
ERR7_InvalidSeismicCase, ERR7_NoError,  
ERR7_ResultFileIsOpen
```

---

## St7DeleteFreedomCase

---

### Description

Deletes the specified freedom case in the Strand7 model.

### Syntax

```
long St7DeleteFreedomCase(long uID, long CaseNum)
```

### Input Parameters

uID

Strand7 model file ID number.

CaseNum

The ID number of the freedom case to be deleted.

### Errors

```
ERR7_APINotInitialised, ERR7_APINotLicensed,  
ERR7_FileNotOpen, ERR7_InvalidFileUnit,  
ERR7_InvalidFreedomCase, ERR7_NoError,  
ERR7_OnlyOneFreedomCase, ERR7_ResultFileIsOpen
```

# Coordinate Systems

## St7SetUCS

---

### Description

Sets the data for a specified UCS in a Strand7 model.

### Syntax

```
long St7SetUCS(long uID, long UCSId, long UCSType, double*  
UCSDoubles)
```

### Input Parameters

uID

Strand7 model file ID number.

UCSId

The ID number for the specified UCS.

UCSType

The type of the UCS, one of UCSCartesian, UCSCylindrical, UCSSpherical or  
UCSToroidal.

UCSDoubles[0..kMaxUCSDoubles-1]

An array defining the UCS axis system. See *Coordinate System Conventions*.

### Errors

ERR7\_APINotInitialised, ERR7\_APINotLicensed,  
ERR7\_FileNotOpen, ERR7\_InvalidFileUnit, ERR7\_InvalidUCSID,  
ERR7\_InvalidUCSType, ERR7\_NoError

## St7GetUCS

---

### Description

Returns the data for a specified UCS in a Strand7 model.

### Syntax

```
long St7GetUCS(long uID, long UCSId, long* UCSType, double*  
UCSDoubles)
```

---

## **Input Parameters**

uID

Strand7 model file ID number.

UCSId

The ID number for the specified UCS.

## **Output Parameters**

UCSType

The type of the UCS, one of UCSCartesian, UCSCylindrical, UCSSpherical or UCSToroidal.

UCSDoubles [0 .. kMaxUCSDoubles-1]

An array defining the UCS axis system. See Coordinate System Conventions.

## **Errors**

ERR7\_APINotInitialised, ERR7\_APINotLicensed,  
ERR7\_FileNotOpen, ERR7\_InvalidFileUnit, ERR7\_NoError,  
ERR7\_UnknownUCS

---

## **St7SetUCSName**

### **Description**

Sets the name of a specified UCS in a Strand7 model.

### **Syntax**

```
long St7SetUCSName(long uID, long UCSId, char* UCSName)
```

## **Input Parameters**

uID

Strand7 model file ID number.

UCSId

The ID number of the specified UCS.

UCSName

String containing the new name of the UCS.

## Errors

```
ERR7_APINotInitialised, ERR7_APINotLicensed,  
ERR7_FileNotOpen, ERR7_InvalidFileUnit, ERR7_InvalidUCSID,  
ERR7_NoError, ERR7_UCSIDAlreadyExists
```

# St7GetUCSName

---

## Description

Returns the name of a specified UCS in a Strand7 model.

## Syntax

```
long St7GetUCSName(long uID, long UCSId, char* UCSName,  
                     long MaxStringLen)
```

## Input Parameters

uID

Strand7 model file ID number.

UCSId

The ID number of the specified UCS.

MaxStringLen

The maximum number of characters allocated for UCSName.

## Output Parameters

UCSName

String containing the name of the UCS.

## Errors

```
ERR7_APINotInitialised, ERR7_APINotLicensed,  
ERR7_FileNotOpen, ERR7_InvalidFileUnit, ERR7_NoError,  
ERR7_UnknownUCS
```

# St7GetUCSID

---

## Description

Returns the ID number corresponding to a specified UCS index in a Strand7 model.

---

## Syntax

```
long St7GetUCSID(long uID, long Index, long* UCSId)
```

### Input Parameters

uID

Strand7 model file ID number.

Index

The UCS index number. The list of available UCSs in the model is always contiguous.

### Output Parameters

UCSID

The UCS ID number corresponding to Index. UCS ID numbers are not required to be contiguous.

### Errors

```
ERR7_APINotInitialised, ERR7_APINotLicensed,  
ERR7_FileNotOpen, ERR7_InvalidFileUnit, ERR7_InvalidIndex,  
ERR7_NoError
```

---

## St7GetNumUCS

### Description

Returns the number of UCSs in a Strand7 model.

### Syntax

```
long St7GetNumUCS(long uID, long* NumUCS)
```

### Input Parameters

uID

Strand7 model file ID number.

### Output Parameters

NumUCS

The number of UCSs in the model.

### Errors

```
ERR7_APINotInitialised, ERR7_APINotLicensed,  
ERR7_FileNotOpen, ERR7_InvalidFileUnit, ERR7_NoError
```



---

# Groups

## St7GetGroupIDName

---

### Description

Returns the name of a specified group in a Strand7 model.

### Syntax

```
long St7GetGroupIDName(long uID, long ID, char* GName, long  
MaxStringLen)
```

### Input Parameters

uID

Strand7 model file ID number.

ID

The ID of the specified group.

MaxStringLen

The maximum number of characters allocated for GName.

### Output Parameters

GName

String containing the name of the group.

### Errors

ERR7\_APINotInitialised, ERR7\_APINotLicensed,  
ERR7\_FileNotOpen, ERR7\_GroupIdDoesNotExist,  
ERR7\_InvalidFileUnit, ERR7\_NoError

## St7GetNumGroups

---

### Description

Returns the number of groups in a Strand7 model.

### Syntax

```
long St7GetNumGroups(long uID, long* NumGroups)
```

## **Input Parameters**

uID

Strand7 model file ID number.

## **Output Parameters**

NumGroups

The number of groups in the model.

## **Errors**

ERR7\_APINotInitialised, ERR7\_APINotLicensed,  
ERR7\_FileNotOpen, ERR7\_InvalidFileUnit, ERR7\_NoError

# **St7GetGroupByIndex**

---

## **Description**

Returns the group name and ID number corresponding to a specified index.

## **Syntax**

```
long St7GetGroupByIndex(long uID, long Index, char* GName,  
                           long MaxStringLen, long* GroupID)
```

## **Input Parameters**

uID

Strand7 model file ID number.

Index

The index of the specified group. The list of group indices in the model is always contiguous, starting from one.

MaxStringLen

The maximum number of characters allocated for GName.

## **Output Parameters**

GName

String containing the name of the specified group.

GroupID

The ID number corresponding to the specified group. Group ID numbers are not required to be contiguous.

---

## Errors

```
ERR7_APINotInitialised, ERR7_APINotLicensed,  
ERR7_FileNotOpen, ERR7_GroupIdDoesNotExist,  
ERR7_InvalidFileUnit, ERR7_NoError
```

# St7NewChildGroup

---

## Description

Creates a new child group within the specified group parent after its last child.

## Syntax

```
long St7NewChildGroup(long uID, long ParentID, char* GName,  
                      long* ChildID)
```

## Input Parameters

uID

Strand7 model file ID number.

ParentID

The ID number for the parent group.

GName

String containing the name of the new group.

## Output Parameters

ChildID

The ID number for the newly created group.

## Errors

```
ERR7_APINotInitialised, ERR7_APINotLicensed,  
ERR7_FileNotOpen, ERR7_GroupIdDoesNotExist,  
ERR7_InvalidFileUnit, ERR7_NoError
```

# St7GetGroupParent

---

## Description

Returns the parent of a specified group. ParentID is -1 if the specified group is the root group.

## Syntax

```
long St7GetGroupParent(long uID, long GroupID, long* ParentID)
```

### Input Parameters

uID

Strand7 model file ID number.

GroupID

The ID number of the specified child group.

### Output Parameters

ParentID

The ID number of the parent group.

## Errors

ERR7\_APINotInitialised, ERR7\_APINotLicensed,  
ERR7\_FileNotOpen, ERR7\_GroupIdDoesNotExist,  
ERR7\_InvalidFileUnit, ERR7\_NoError

## St7GetGroupChild

---

### Description

Returns the first child of a specified group. ChildID is -1 if the specified group has no children.

## Syntax

```
long St7GetGroupChild(long uID, long GroupID, long* ChildID)
```

### Input Parameters

uID

Strand7 model file ID number.

GroupID

The ID number of the specified parent group.

### Output Parameters

ChildID

---

The ID number of the group child.

### Errors

ERR7\_APINotInitialised, ERR7\_APINotLicensed,  
ERR7\_FileNotOpen, ERR7\_GroupIdDoesNotExist,  
ERR7\_InvalidFileUnit, ERR7\_NoError

## St7GetGroupSibling

---

### Description

Returns the next sibling of a specified group. SiblingID is -1 if the specified group has no subsequent siblings.

### Syntax

```
long St7GetGroupSibling(long uID, long GroupID, long*  
    SiblingID)
```

### Input Parameters

uID

Strand7 model file ID number.

GroupID

The ID number of the specified group.

### Output Parameters

SiblingID

The ID number of the group sibling.

### Errors

ERR7\_APINotInitialised, ERR7\_APINotLicensed,  
ERR7\_FileNotOpen, ERR7\_GroupIdDoesNotExist,  
ERR7\_InvalidFileUnit, ERR7\_NoError

## St7DeleteGroup

---

### Description

Deletes the specified group. Elements in the group will be reassigned to the Model group.

## Syntax

```
long St7DeleteGroup(long uID, long GroupID)
```

### Input Parameters

uID

Strand7 model file ID number.

GroupID

The ID number of the group to delete.

### Errors

```
ERR7_APINotInitialised, ERR7_APINotLicensed,  
ERR7_FileNotOpen, ERR7_GroupIdDoesNotExist,  
ERR7_InvalidFileUnit, ERR7_NoError
```

## St7SetGroupColour

---

### Description

Sets the colour of the specified group for entity display purposes.

### Syntax

```
long St7SetGroupColour(long uID, long GroupID, long  
GroupCol)
```

### Input Parameters

uID

Strand7 model file ID number.

GroupID

The ID number of the specified group.

GroupCol

Group colour as a 32 bit RGB value.

### Errors

```
ERR7_APINotInitialised, ERR7_APINotLicensed,  
ERR7_FileNotOpen, ERR7_GroupIdDoesNotExist,  
ERR7_InvalidFileUnit, ERR7_NoError
```

---

## St7GetGroupColour

---

### Description

Returns the colour of the specified group for entity display purposes.

### Syntax

```
long St7GetGroupColour(long uID, long GroupID, long*  
    GroupCol)
```

### Input Parameters

uID

Strand7 model file ID number.

GroupID

The ID number of the specified group.

### Output Parameters

GroupCol

Group colour as a 32 bit RGB value.

### Errors

ERR7\_APINotInitialised, ERR7\_APINotLicensed,  
ERR7\_FileNotOpen, ERR7\_GroupIdDoesNotExist,  
ERR7\_InvalidFileUnit, ERR7\_NoError

## Staged Analysis

### St7AddStage

#### Description

Adds a new nonlinear analysis stage to a Strand7 model.

#### Syntax

```
long St7AddStage(long uID, char* StageName, long* Integers)
```

#### Input Parameters

uID

Strand7 model file ID number.

StageName

String containing the name of the new stage.

Integers[0..2]

[ipStageMorph] - Morphing option, either btTrue or btFalse.

[ipStageMovedFixedNodes] - Move fixed nodes option, either btTrue or btFalse.

[ipStageRotateClusters] - Rotate clusters option, either btTrue or btFalse.

#### Errors

ERR7\_APINotInitialised, ERR7\_APINotLicensed,  
ERR7\_ExceededMaxNumStages, ERR7\_FileNotOpen,  
ERR7\_InvalidFileUnit, ERR7\_NoError, ERR7\_ResultFileIsOpen

### St7InsertStage

#### Description

Inserts a new nonlinear analysis stage in a Strand7 model.

#### Syntax

```
long St7InsertStage(long uID, long Stage, char* StageName,  
long* Integers)
```

---

## **Input Parameters**

**uID**

Strand7 model file ID number.

**Stage**

Index at which to insert the new stage.

**StageName**

String containing the name of the new stage.

**Iintegers [0..2]**

[ipStageMorph] - Morphing option, either btTrue or btFalse.

[ipStageMovedFixedNodes] - Move fixed nodes option, either btTrue or btFalse.

[ipStageRotateClusters] - Rotate clusters option, either btTrue or btFalse.

## **Errors**

ERR7\_APINotInitialised, ERR7\_APINotLicensed,  
ERR7\_FileNotOpen, ERR7\_InvalidFileUnit, ERR7\_NoError,  
ERR7\_ResultFileIsOpen, ERR7\_StageDoesNotExist

---

# **St7DeleteStage**

## **Description**

Deletes a nonlinear analysis stage from a Strand7 model.

## **Syntax**

```
long St7DeleteStage(long uID, long Stage)
```

## **Input Parameters**

**uID**

Strand7 model file ID number.

**Stage**

Index of the stage to be deleted.

## Errors

```
ERR7_APINotInitialised, ERR7_APINotLicensed,  
ERR7_FileNotOpen, ERR7_InvalidFileUnit, ERR7_NoError,  
ERR7_ResultFileIsOpen, ERR7_StageDoesNotExist
```

# St7GetNumStages

---

## Description

Returns the number of nonlinear analysis stages in a Strand7 model.

## Syntax

```
long St7GetNumStages(long uID, long* NumStages)
```

## Input Parameters

uID

Strand7 model file ID number.

## Output Parameters

NumStages

The number of stages in the model.

## Errors

```
ERR7_APINotInitialised, ERR7_APINotLicensed,  
ERR7_FileNotOpen, ERR7_InvalidFileUnit, ERR7_NoError
```

# St7SetStageName

---

## Description

Sets the name of a specified nonlinear analysis stage.

## Syntax

```
long St7SetStageName(long uID, long Stage, char* StageName)
```

## Input Parameters

uID

Strand7 model file ID number.

Stage

The index of the specified stage.

---

StageName

String containing the new name of the stage.

### Errors

ERR7\_APINotInitialised, ERR7\_APINotLicensed,  
ERR7\_FileNotOpen, ERR7\_InvalidFileUnit, ERR7\_NoError,  
ERR7\_ResultFileIsOpen, ERR7\_StageDoesNotExist

## St7GetStageName

---

### Description

Returns the name of a specified nonlinear analysis stage.

### Syntax

```
long St7GetStageName(long uID, long Stage, char* StageName,  
                      long MaxStringLen)
```

### Input Parameters

uID

Strand7 model file ID number.

Stage

The index of the specified stage.

MaxStringLen

The maximum number of characters allocated for StageName.

### Output Parameters

StageName

String containing the name of the specified stage.

### Errors

ERR7\_APINotInitialised, ERR7\_APINotLicensed,  
ERR7\_FileNotOpen, ERR7\_InvalidFileUnit, ERR7\_NoError,  
ERR7\_StageDoesNotExist

## St7SetStageData

---

### Description

Sets the data for a specified nonlinear analysis stage.

### Syntax

```
long St7SetStageData(long uID, long Stage, long* Integers)
```

### Input Parameters

uID

Strand7 model file ID number.

Stage

The index of the specified stage.

Integers [0..2]

[ipStageMorph] - Morphing option, either btTrue or btFalse.

[ipStageMovedFixedNodes] - Move fixed nodes option, either btTrue or btFalse.

[ipStageRotateClusters] - Rotate clusters option, either btTrue or btFalse.

### Errors

ERR7\_APINotInitialised, ERR7\_APINotLicensed,  
ERR7\_FileNotOpen, ERR7\_InvalidFileUnit, ERR7\_NoError,  
ERR7\_ResultFileIsOpen, ERR7\_StageDoesNotExist

## St7GetStageData

---

### Description

Returns the data for a specified nonlinear analysis stage.

### Syntax

```
long St7GetStageData(long uID, long Stage, long* Integers)
```

### Input Parameters

uID

Strand7 model file ID number.

---

Stage

The index of the specified stage.

### Output Parameters

Integers [0..2]

[ipStageMorph] - Morphing option, either btTrue or btFalse.

[ipStageMovedFixedNodes] - Move fixed nodes option, either btTrue or btFalse.

[ipStageRotateClusters] - Rotate clusters option, either btTrue or btFalse.

### Errors

ERR7\_APINotInitialised, ERR7\_APINotLicensed,  
ERR7\_FileNotOpen, ERR7\_InvalidFileUnit, ERR7\_NoError,  
ERR7\_StageDoesNotExist

## St7EnableStageGroup

---

### Description

Enables a specified group for a given nonlinear analysis stage. The elements in all groups enabled for a given stage will participate in the solution once the specified stage becomes active.

### Syntax

```
long St7EnableStageGroup(long uID, long Stage, long  
GroupID)
```

### Input Parameters

uID

Strand7 model file ID number.

Stage

The index of the specified stage.

GroupID

The ID number for the group to be enabled for the specified stage.

## Errors

```
ERR7_APINotInitialised, ERR7_APINotLicensed,  
ERR7_FileNotOpen, ERR7_GroupIdDoesNotExist,  
ERR7_InvalidFileUnit, ERR7_NoError, ERR7_ResultFileIsOpen,  
ERR7_StageDoesNotExist
```

## St7DisableStageGroup

---

### Description

Disables a specified group for a given nonlinear analysis stage. The elements in all groups enabled for a given stage will participate in the solution once the specified stage becomes active.

### Syntax

```
long St7DisableStageGroup(long uID, long Stage, long  
GroupID)
```

### Input Parameters

uID

Strand7 model file ID number.

Stage

The index of the specified stage.

GroupID

The ID number for the group to be disabled for the specified stage.

## Errors

```
ERR7_APINotInitialised, ERR7_APINotLicensed,  
ERR7_FileNotOpen, ERR7_GroupIdDoesNotExist,  
ERR7_InvalidFileUnit, ERR7_NoError, ERR7_ResultFileIsOpen,  
ERR7_StageDoesNotExist
```

## St7GetStageGroupState

---

### Description

Returns whether a specified group is currently enabled for a given nonlinear analysis stage.

---

## Syntax

```
long St7GetStageGroupState(long uID, long Stage, long  
                           GroupID, bool* State)
```

## Input Parameters

uID

Strand7 model file ID number.

Stage

The index of the specified stage.

GroupID

The ID number for the specified group.

## Output Parameters

State

btTrue indicates that the specified group is enabled for the given stage.

## Errors

ERR7\_APINotInitialised, ERR7\_APINotLicensed,  
ERR7\_FileNotOpen, ERR7\_GroupIdDoesNotExist,  
ERR7\_InvalidFileUnit, ERR7\_NoError, ERR7\_StageDoesNotExist

## Units

### St7SetUnits

---

#### Description

Sets the units system for a specified Strand7 model.

#### Syntax

```
long St7SetUnits(long uID, long* Units)
```

#### Input Parameters

uID

Strand7 model file ID number.

Units [0..kLastUnit-1]

[ipLENGTHU] - luMETRE, luCENTIMETRE, luMILLIMETRE, luFOOT or luINCH.

[ipFORCEU] - fuNEWTON, fuKILONEWTON, fuMEGANEWTON, fuKILOFORCE,  
fuPOUNDFORCE, fuTONNEFORCE or fuKIPFORCE.

[ipSTRESSU] - suPASCAL, suKIOPASCAL, suMEGAPASCAL, suKSCm, suPSI,  
suksi or suPSF.

[ipMASSU] - muKILOGRAM, muTONNE, muGRAM, muPOUND or muSLUG.

[ipTEMPERU] - tuCELSIUS, tuFAHRENHEIT or tuKELVIN.

[ipENERGYU] - euJOULE, euBTU, euFTLBF or euCALORIE.

#### Errors

ERR7\_APINotInitialised, ERR7\_APINotLicensed,  
ERR7\_FileNotOpen, ERR7\_InvalidFileUnit, ERR7\_InvalidUnits,  
ERR7\_NoError, ERR7\_ResultFileIsOpen

### St7GetUnits

---

#### Description

Returns the units system for a specified Strand7 model.

#### Syntax

```
long St7GetUnits(long uID, long* Units)
```

---

## **Input Parameters**

uID

Strand7 model file ID number.

## **Output Parameters**

Units [0 .. kLastUnit-1]

[ipLENGTHU] - luMETRE, luCENTIMETRE, luMILLIMETRE, luFOOT or luINCH.

[ipFORCEU] - fuNEWTON, fuKILONEWTON, fuMEGANEWTON, fuKILOFORCE, fuPOUNDFORCE, fuTONNEFORCE or fuKIPFORCE.

[ipSTRESSU] - suPASCAL, suKIOPASCAL, suMEGAPASCAL, suKSCm, suPSI, suksi or suPSF.

[ipMASSU] - muKILOGRAM, muTONNE, muGRAM, muPOUND or muSLUG.

[ipTEMPERU] - tuCELSIUS, tuFAHRENHEIT or tuKELVIN.

[ipENERGYU] - euJOULE, euBTU, euFTLBF or euCALORIE.

## **Errors**

ERR7\_APINotInitialised, ERR7\_APINotLicensed,  
ERR7\_FileNotOpen, ERR7\_InvalidFileUnit, ERR7\_NoError

---

# St7SetRCUnits

## **Description**

Sets the units used for Plate RC results (in **Results Settings**). Note that this setting is ignored unless *St7EnableModelRCUnit* is called.

## **Syntax**

```
long St7SetRCUnits(long uID, long AreaUnit, long  
LengthUnit)
```

## **Input Parameters**

uID

Strand7 model file ID number.

AreaUnit

Units of area in unit length squared; one of luMETRE, luCENTIMETRE, luMILLIMETRE, luFOOT or luINCH.

LengthUnit

Units of length; one of luMETRE, luCENTIMETRE, luMILLIMETRE, luFOOT or luINCH.

## Errors

ERR7\_APINotInitialised, ERR7\_APINotLicensed,  
ERR7\_FileNotOpen, ERR7\_InvalidFileUnit, ERR7\_InvalidUnits,  
ERR7\_NoError

## St7GetRCUnits

---

### Description

Returns the units used for Plate RC results (in **Results Settings**). Note that this setting is ignored unless *St7EnableModelRCUnit* is called.

### Syntax

```
long St7GetRCUnits(long uID, long* AreaUnit, long*  
LengthUnit)
```

### Input Parameters

uID

Strand7 model file ID number.

### Output Parameters

AreaUnit

Units of area in unit length squared; one of luMETRE, luCENTIMETRE,  
luMILLIMETRE, luFOOT or luINCH.

LengthUnit

Units of length; one of luMETRE, luCENTIMETRE, luMILLIMETRE, luFOOT or luINCH.

## Errors

ERR7\_APINotInitialised, ERR7\_APINotLicensed,  
ERR7\_FileNotOpen, ERR7\_InvalidFileUnit, ERR7\_NoError

## St7ConvertUnits

---

### Description

Converts the current model into the specified units system.

---

## Syntax

```
long St7ConvertUnits(long uID, long* Units)
```

## Input Parameters

uID

Strand7 model file ID number.

Units [0..kLastUnit-1]

[ipLENGTHU] - luMETRE, luCENTIMETRE, luMILLIMETRE, luFOOT or luINCH.

[ipFORCEU] - fuNEWTON, fuKILONEWTON, fuMEGANEWTON, fuKILOFORCE,  
fuPOUNDFORCE, fuTONNEFORCE or fuKIPFORCE.

[ipSTRESSU] - suPASCAL, suKIOPASCAL, suMEGAPASCAL, suKSCm, suPSI,  
suKSI or suPSF.

[ipMASSU] - muKILOGRAM, muTONNE, muGRAM, muPOUND or muSLUG.

[ipTEMPERU] - tuCELSIUS, tuFAHRENHEIT or tuKELVIN.

[ipENERGYU] - euJOULE, euBTU, euFTLBF or euCALORIE.

## Errors

ERR7\_APINotInitialised, ERR7\_APINotLicensed,  
ERR7\_FileNotOpen, ERR7\_InvalidFileUnit, ERR7\_InvalidUnits,  
ERR7\_NoError, ERR7\_ResultFileIsOpen

## Entities – Nodes, Elements and Links

### St7SetNodeXYZ

#### Description

Sets the position of a specified node in the Global Cartesian coordinate system. A new node is created if the node number does not already exist. If the new node number is not consecutive with the existing node total a series of nodes are created at the origin such that the node list remains contiguous.

#### Syntax

```
long St7SetNodeXYZ (long uID, long NodeNum, double* XYZ)
```

#### Input Parameters

uID

Strand7 model file ID number.

NodeNum

The specified node number.

XYZ [0..2]

The node position as a 3 element array, specifying the position according to the Global Cartesian coordinate system.

#### Errors

ERR7\_APINotInitialised, ERR7\_APINotLicensed,  
ERR7\_FileNotOpen, ERR7\_InvalidEntityNumber,  
ERR7\_InvalidFileUnit, ERR7\_NoError, ERR7\_ResultFileIsOpen,  
ERR7\_UnknownError

### St7GetNodeXYZ

#### Description

Returns the position of a specified node in the Global Cartesian coordinate system, when no result file is open. When a result file and model window is open, results will depend on the draw state and **Displacement Scale**.

#### Syntax

```
long St7GetNodeXYZ (long uID, long NodeNum, double* XYZ)
```

---

## **Input Parameters**

uID

Strand7 model file ID number.

NodeNum

The specified node number.

## **Output Parameters**

XYZ [0..2]

The node position as a 3 element array, specifying the position according to the Global Cartesian coordinate system.

## **Errors**

ERR7\_APINotInitialised, ERR7\_APINotLicensed,  
ERR7\_DataNotFound, ERR7\_ExceededTotal, ERR7\_FileNotOpen,  
ERR7\_InvalidEntityNumber, ERR7\_InvalidFileUnit,  
ERR7\_NoError

---

## **St7SetNodeUCS**

### **Description**

Sets the position of a specified node in a given UCS. A new node is created if the node number does not already exist. If the new node number is not consecutive with the existing node total a series of nodes are created at the origin such that the node list remains contiguous.

### **Syntax**

```
long St7SetNodeUCS(long uID, long NodeNum, long UCSId,  
                     double* XYZ)
```

## **Input Parameters**

uID

Strand7 model file ID number.

NodeNum

The specified node number.

UCSId

The specified UCS ID number.

XYZ [0..2]

The node position as a 3 element array, specifying the position according to the 123 axis UCS convention.

### Errors

ERR7\_APINotInitialised, ERR7\_APINotLicensed,  
ERR7\_FileNotOpen, ERR7\_InvalidEntityNumber,  
ERR7\_InvalidFileUnit, ERR7\_NoError, ERR7\_ResultFileIsOpen,  
ERR7\_UnknownError, ERR7\_UnknownUCS

## St7GetNodeUCS

---

### Description

Returns the position of a specified node in a given UCS, when no result file is open. When a result file and model window is open, results will depend on the draw state and **Displacement Scale**.

### Syntax

```
long St7GetNodeUCS (long uID, long NodeNum, long UCSId,  
                     double* XYZ)
```

### Input Parameters

uID

Strand7 model file ID number.

NodeNum

The specified node number.

UCSId

The specified UCS ID number.

### Output Parameters

XYZ [0..2]

The node position as a 3 element array, specifying the position according to the 123 axis UCS convention.

### Errors

ERR7\_APINotInitialised, ERR7\_APINotLicensed,  
ERR7\_DataNotFound, ERR7\_ExceededTotal, ERR7\_FileNotOpen,

---

```
ERR7_InvalidEntityNumber, ERR7_InvalidFileUnit,  
ERR7_NoError, ERR7_UnknownUCS
```

## St7SetElementConnection

---

### Description

Sets the nodal connectivity and property ID for a specified element. A new entity is created if the element number does not already exist. If the new element number is not consecutive with the existing element total a series of null elements are created such that the element list remains contiguous. These null elements do not have any connectivity or property ID assigned.

### Syntax

```
long St7SetElementConnection(long uID, long Entity, long  
EltNum, long PropNum, long* Connection)
```

### Input Parameters

uID

Strand7 model file ID number.

Entity

Strand7 element type, one of tyBEAM, tyPLATE or tyBRICK.

EltNum

The specified element number.

PropNum

The ID number for the property or the link type to be assigned to the element.

Connection [0..kMaxElementNode]

[0] - Number of nodes in the element.

[1..20] - Node numbers in the element.

See *Element Connections* for more information.

### Errors

```
ERR7_APINotInitialised, ERR7_APINotLicensed,  
ERR7_FileNotOpen, ERR7_InvalidEntity,  
ERR7_InvalidEntityNodes, ERR7_InvalidEntityNumber,
```

```
ERR7_InvalidFileUnit, ERR7_InvalidLinkType, ERR7_NoError,  
ERR7_ResultFileIsOpen, ERR7_UnknownError
```

## St7GetElementConnection

---

### Description

Returns the connectivity information for a specified element.

### Syntax

```
long St7GetElementConnection(long uID, long Entity, long  
EltNum, long* Connection)
```

### Input Parameters

uID

Strand7 model file ID number.

Entity

Strand7 element type, one of tyBEAM, tyPLATE, tyBRICK or tyLINK.

EltNum

Element number.

### Output Parameters

Connection[0..kMaxElementNode]

[0] - Number of nodes in the element.

[1..20] - Node numbers in the element.

See *Element Connections* for more information.

### Errors

```
ERR7_APINotInitialised, ERR7_APINotLicensed,  
ERR7_DataNotFound, ERR7_ExceededTotal, ERR7_FileNotOpen,  
ERR7_InvalidEntity, ERR7_InvalidEntityNumber,  
ERR7_InvalidFileUnit, ERR7_NoError
```

## St7GetData

---

### Description

Return element specific geometric data for a given element.

---

## Syntax

```
long St7GetElementData(long uID, long Entity, long EltNum,  
                      double* EltData)
```

## Input Parameters

uID

Strand7 model file ID number.

Entity

Strand7 element type, one of tyBEAM, tyPLATE or tyBRICK.

EltNum

The specified element number.

## Output Parameters

EltData

Geometric data for the specified element:

tyBEAM - Beam length.

tyPLATE - Plate area.

tyBRICK - Brick volume.

## Errors

```
ERR7_APINotInitialised, ERR7_APINotLicensed,  
ERR7_DataNotFound, ERR7_ExceededTotal, ERR7_FileNotOpen,  
ERR7_InvalidEntity, ERR7_InvalidEntityNumber,  
ERR7_InvalidFileUnit, ERR7_NoError
```

---

## St7GetElementCentroid

### Description

Returns the position of the geometric centroid for a specified element, when no result file is open. When a result file and model window is open, results will depend on the draw state and **Displacement Scale**.

### Syntax

```
long St7GetElementCentroid(long uID, long Entity, long  
                           EltNum, long FaceEdgeNum, double* XYZ)
```

## **Input Parameters**

`uID`

Strand7 model file ID number.

`Entity`

Strand7 element type, either `tyPLATE` or `tyBRICK`.

`EltNum`

Element number.

`FaceEdgeNum`

Local face or edge number, one of 0,1,2,3 or 4 for `tyPLATE` or 0,1,2,3,4,5 or 6 for `tyBRICK`. Enter 0 to return centroid for whole element. See *Element Connections* for further information.

## **Output Parameters**

`XYZ[0..2]`

The centroid position as a 3 element array, specifying the position according to the XYZ Cartesian convention.

## **Errors**

`ERR7_APINotInitialised`, `ERR7_APINotLicensed`,  
`ERR7_DataNotFound`, `ERR7_ExceededTotal`, `ERR7_FileNotOpen`,  
`ERR7_InvalidBrickFace`, `ERR7_InvalidEntity`,  
`ERR7_InvalidEntityNumber`, `ERR7_InvalidFileUnit`,  
`ERR7_InvalidPlateEdge`, `ERR7_NoError`

# **St7GetLinkType**

---

## **Description**

Returns the link type for a specified link.

## **Syntax**

```
long St7GetLinkType(long uID, long LinkNum, long* LinkType)
```

## **Input Parameters**

`uID`

Strand7 model file ID number.

`LinkNum`

---

The specified link number.

### Output Parameters

#### LinkType

The link type, one of ilMasterSlaveLink, ilSectorSymmetryLink, ilCouplingLink, ilPinnedLink, ilRigidLink, ilShrinkLink, ilTwoPointLink, ilAttachmentLink or ilMultiPointLink

### Errors

ERR7\_APINotInitialised, ERR7\_APINotLicensed,  
ERR7\_FileNotOpen, ERR7\_InvalidEntityNumber,  
ERR7\_DataNotFound, ERR7\_ExceededTotal, ERR7\_InvalidFileUnit,  
ERR7\_NoError

## St7SetMasterSlaveLink

---

### Description

Assigns the parameters for the specified master/slave link.

### Syntax

```
long St7SetMasterSlaveLink(long uID, long LinkNum, long  
                           UCSId, long* Connection, long* Integers)
```

### Input Parameters

#### uID

Strand7 model file ID number.

#### LinkNum

The specified link number.

#### UCSId

The specified UCS ID number.

#### Connection [0..2]

[0] - Number of nodes in the link (2).

[1..2] - Node numbers.

#### Integers [0..5]

A 6 element array describing the relationship between each DoF in the linked nodes according to the UCS axis system. Entries for each DoF may be one of msFree, msFix or msFixNegate.

## Errors

```
ERR7_APINotInitialised, ERR7_APINotLicensed,  
ERR7_FileNotOpen, ERR7_InvalidEntityNumber,  
ERR7_InvalidFileUnit, ERR7_InvalidUCSID, ERR7_NoError,  
ERR7_ResultFileIsOpen
```

# St7GetMasterSlaveLink

---

## Description

Returns the parameters assigned to the specified master/slave link.

## Syntax

```
long St7GetMasterSlaveLink(long uID, long LinkNum, long*  
UCSID, long* Connection, long* Integers)
```

## Input Parameters

uID

Strand7 model file ID number.

LinkNum

The specified link number.

## Output Parameters

UCSID

The specified UCS ID number.

Connection[0..2]

[0] - Number of nodes in the link (2).

[1..2] - Node numbers.

Integers[0..5]

A 6 element array describing the relationship between each DoF in the linked nodes according to the UCS axis system. Entries for each DoF may be one of msFree, msFix or msFixNegate.

---

## Errors

```
ERR7_APINotInitialised, ERR7_APINotLicensed,  
ERR7_DataNotFound, ERR7_ExceededTotal, ERR7_FileNotOpen,  
ERR7_InvalidEntityNumber, ERR7_InvalidFileUnit,  
ERR7_LinkNotMasterSlave, ERR7_NoError
```

# St7SetSectorSymmetryLink

---

## Description

Assigns the parameters for the specified sector symmetry link.

## Syntax

```
long St7SetSectorSymmetryLink(long uID, long LinkNum, long  
Axis, long* Connection)
```

## Input Parameters

uID

Strand7 model file ID number.

LinkNum

The specified link number.

Axis

Axis of symmetry, one of 1,2 or 3.

Connection[0..2]

[0] - Number of nodes in the link (2).

[1..2] - Node numbers.

## Errors

```
ERR7_APINotInitialised, ERR7_APINotLicensed,  
ERR7_FileNotOpen, ERR7_InvalidAxisSystem, ERR7_InvalidAxis,  
ERR7_InvalidEntityNumber, ERR7_InvalidFileUnit,  
ERR7_NoError, ERR7_ResultFileIsOpen
```

## St7GetSectorSymmetryLink

---

### Description

Returns the parameters assigned to the specified sector symmetry link.

### Syntax

```
long St7GetSectorSymmetryLink(long uID, long LinkNum, long*  
Axis, long* Connection)
```

### Input Parameters

uID

Strand7 model file ID number.

LinkNum

The specified link number.

### Output Parameters

Axis

Axis of symmetry, one of 1,2 or 3.

Connection[0..2]

[0] - Number of nodes in the link (2).

[1..2] - Node numbers.

### Errors

ERR7\_APINotInitialised, ERR7\_APINotLicensed,  
ERR7\_DataNotFound, ERR7\_ExceededTotal, ERR7\_FileNotOpen,  
ERR7\_InvalidEntityNumber, ERR7\_InvalidFileUnit,  
ERR7\_LinkNotSectorSymmetry, ERR7\_NoError

## St7SetCouplingLink

---

### Description

Assigns the parameters for the specified coupling link.

### Syntax

```
long St7SetCouplingLink(long uID, long LinkNum, long Couple,  
long* Connection)
```

---

## **Input Parameters**

uID

Strand7 model file ID number.

LinkNum

The specified link number.

Couple

Coupling type, one of cpTranslational, cpRotational or cpBoth.

Connection[0..3]

[0] - Number of nodes in the link (3).

[1..3] - Node numbers.

See *Element Connections* for more information.

## **Errors**

ERR7\_APINotInitialised, ERR7\_APINotLicensed,  
ERR7\_FileNotOpen, ERR7\_InvalidCoupleType,  
ERR7\_InvalidEntityNumber, ERR7\_InvalidFileUnit,  
ERR7\_NoError, ERR7\_ResultFileIsOpen

---

## **St7GetCouplingLink**

### **Description**

Returns the parameters assigned to the specified coupling link.

### **Syntax**

```
long St7GetCouplingLink(long uID, long LinkNum, long*  
    Couple, long* Connection)
```

## **Input Parameters**

uID

Strand7 model file ID number.

LinkNum

The specified link number.

## Output Parameters

Couple

Coupling type, one of cpTranslational, cpRotational or cpBoth.

Connection[0..3]

[0] - Number of nodes in the link (3).

[1..3] - Node numbers.

See *Element Connections* for more information.

## Errors

ERR7\_APINotInitialised, ERR7\_APINotLicensed,  
ERR7\_DataNotFound, ERR7\_ExceededTotal, ERR7\_FileNotOpen,  
ERR7\_InvalidEntityNumber, ERR7\_InvalidFileUnit,  
ERR7\_LinkNotCoupling, ERR7\_NoError

## St7SetPinnedLink

---

### Description

Assigns the parameters for the specified pinned link.

### Syntax

```
long St7SetPinnedLink(long uID, long LinkNum, long*  
                      Connection)
```

### Input Parameters

uID

Strand7 model file ID number.

LinkNum

The specified link number.

Connection[0..2]

[0] - Number of nodes in the link (2).

[1..2] - Node numbers.

---

## Errors

```
ERR7_APINotInitialised, ERR7_APINotLicensed,  
ERR7_FileNotOpen, ERR7_InvalidEntityNumber,  
ERR7_InvalidFileUnit, ERR7_NoError, ERR7_ResultFileIsOpen
```

## St7GetPinnedLink

---

### Description

Returns the parameters assigned to the specified pinned link.

### Syntax

```
long St7GetPinnedLink(long uID, long LinkNum, long*  
Connection)
```

### Input Parameters

uID

Strand7 model file ID number.

LinkNum

The specified link number.

### Output Parameters

Connection[0..2]

[0] - Number of nodes in the link (2).

[1..2] - Node numbers.

### Errors

```
ERR7_APINotInitialised, ERR7_APINotLicensed,  
ERR7_DataNotFound, ERR7_ExceededTotal, ERR7_FileNotOpen,  
ERR7_InvalidEntityNumber, ERR7_InvalidFileUnit,  
ERR7_LinkNotPinned, ERR7_NoError
```

## St7SetRigidLink

---

### Description

Assigns the parameters for the specified rigid link.

## Syntax

```
long St7SetRigidLink(long uID, long LinkNum, long UCSId,  
                     long Plane, long* Connection)
```

## Input Parameters

uID

Strand7 model file ID number.

LinkNum

The specified link number.

UCSId

The specified Cartesian UCS ID number.

Plane

Rigid link type, one of rgPlaneXYZ, rgPlaneXY, rgPlaneYZ or rgPlaneZX.

Connection[0..2]

[0] - Number of nodes in the link (2).

[1..2] - Node numbers.

## Errors

ERR7\_APINotInitialised, ERR7\_APINotLicensed,  
ERR7\_FileNotOpen, ERR7\_InvalidEntityNumber,  
ERR7\_InvalidFileUnit, ERR7\_InvalidRigidPlane,  
ERR7\_InvalidUCSID, ERR7\_NoError, ERR7\_ResultFileIsOpen

# St7GetRigidLink

---

## Description

Returns the parameters assigned to the specified rigid link.

## Syntax

```
long St7GetRigidLink(long uID, long LinkNum, long* UCSId,  
                     long* Plane, long* Connection)
```

## Input Parameters

uID

Strand7 model file ID number.

---

LinkNum

The specified link number.

## Output Parameters

UCSId

The Cartesian UCS ID number.

Plane

Rigid link type, one of rgPlaneXYZ, rgPlaneXY, rgPlaneYZ or rgPlaneZX.

Connection[0..2]

[0] - Number of nodes in the link (2).

[1..2] - Node numbers.

## Errors

ERR7\_APINotInitialised, ERR7\_APINotLicensed,  
ERR7\_DataNotFound, ERR7\_ExceededTotal, ERR7\_FileNotOpen,  
ERR7\_InvalidEntityNumber, ERR7\_InvalidFileUnit,  
ERR7\_LinkNotRigid, ERR7\_NoError

# St7SetShrinkLink

---

## Description

Assigns the parameters for the specified shrink link.

## Syntax

```
long St7SetShrinkLink(long uID, long LinkNum, long*  
Connection, long* Integers)
```

## Input Parameters

uID

Strand7 model file ID number.

LinkNum

The specified link number.

Connection[0..2]

[0] - Number of nodes in the link (2).

[1..2] - Node numbers.

Integers[0..2]

A 3 element array describing the shrink directions for the link. Each entry may be either btTrue or btFalse to enable shrinkage in each of the global Cartesian co-ordinate directions.

## Errors

ERR7\_APINotInitialised, ERR7\_APINotLicensed,  
ERR7\_FileNotOpen, ERR7\_InvalidEntityNumber,  
ERR7\_InvalidFileUnit, ERR7\_NoError, ERR7\_ResultFileIsOpen

# St7GetShrinkLink

---

## Description

Returns the parameters assigned to the specified shrink link.

## Syntax

```
long St7GetShrinkLink(long uID, long LinkNum, long*  
                      Connection, long* Integers)
```

## Input Parameters

uID

Strand7 model file ID number.

LinkNum

The specified link number.

## Output Parameters

Connection[0..2]

[0] - Number of nodes in the link (2).

[1..2] - Node numbers.

Integers[0..2]

A 3 element array describing the shrink directions for the link. Each entry may be either btTrue or btFalse to enable shrinkage in each of the global Cartesian co-ordinate directions.

---

## Errors

```
ERR7_APINotInitialised, ERR7_APINotLicensed,  
ERR7_DataNotFound, ERR7_ExceededTotal, ERR7_FileNotOpen,  
ERR7_InvalidEntityNumber, ERR7_InvalidFileUnit,  
ERR7_LinkNotShrink, ERR7_NoError
```

# St7SetTwoPointLink

---

## Description

Assigns the parameters for the specified two point link.

## Syntax

```
long St7SetTwoPointLink(long uID, long LinkNum, long*  
Connection, long* Integers, double* Doubles)
```

## Input Parameters

uID

Strand7 model file ID number.

LinkNum

The specified link number.

Connection[0..2]

[0] - Number of nodes in the link (2).

[1..2] - Node numbers.

Integers[0..3]

[ipTwoPointDOF1] - DoF at node 1, one of 1,2,3,4,5 or 6.

[ipTwoPointDOF2] - DoF at node 2, one of 1,2,3,4,5 or 6.

[ipTwoPointUCS1] - UCS ID number at node 1.

[ipTwoPointUCS2] - UCS ID number at node 2.

Doubles[0..2]

[ipTwoPointC0] - Constant coefficient.

[ipTwoPointC1] - Coefficient of node 1.

[ipTwoPointC2] - Coefficient of node 2.

## Errors

ERR7\_APINotInitialised, ERR7\_APINotLicensed,  
ERR7\_FileNotOpen, ERR7\_InvalidEntityNumber,  
ERR7\_InvalidFileUnit, ERR7\_InvalidUCSID, ERR7\_NoError,  
ERR7\_ResultFileIsOpen

# St7GetTwoPointLink

---

## Description

Returns the parameters assigned to the specified two point link.

## Syntax

```
long St7GetTwoPointLink(long uID, long LinkNum, long*  
Connection, long* Integers, double* Doubles)
```

## Input Parameters

uID

Strand7 model file ID number.

LinkNum

The specified link number.

## Output Parameters

Connection[0..2]

[0] - Number of nodes in the link (2).

[1..2] - Node numbers.

Integers[0..3]

[ipTwoPointDOF1] - DoF at node 1, one of 1,2,3,4,5 or 6.

[ipTwoPointDOF2] - DoF at node 2, one of 1,2,3,4,5 or 6.

[ipTwoPointUCS1] - UCS ID number at node 1.

[ipTwoPointUCS2] - UCS ID number at node 2.

Doubles[0..2]

[ipTwoPointC0] - Constant coefficient.

---

[ipTwoPointC1] - Coefficient of node 1.

[ipTwoPointC2] - Coefficient of node 2.

## Errors

ERR7\_APINotInitialised, ERR7\_APINotLicensed,  
ERR7\_DataNotFound, ERR7\_ExceededTotal, ERR7\_FileNotOpen,  
ERR7\_InvalidEntityNumber, ERR7\_InvalidFileUnit,  
ERR7\_LinkNotTwoPoint, ERR7\_NoError

# St7SetAttachmentLink

---

## Description

Assigns the parameters for the specified attachment link.

## Syntax

```
long St7SetAttachmentLink(long uID, long LinkNum, long*  
                           Connection, long* Integers, double* Doubles)
```

## Input Parameters

uID

Strand7 model file ID number.

LinkNum

The specified link number.

Connection[0..1]

[0] - Number of nodes in the link (1).

[1] - Node number for attached node.

Integers[0..3]

[ipAttachmentElType] - Target entity type, one of tyBEAM, tyPLATE or  
tyBRICK.

[ipAttachmentElNum] - Target element number.

[ipAttachmentBrickFaceNum] - Target face number for tyBRICK, one of  
1,2,3,4,5 or 6.

[ipAttachmentCouple] - Connection between the degrees of freedom  
with target element, one of cpTranslational, cpRotational or cpBoth.

Doubles[0..1]

A 2 element array containing the UV coordinates for the attachment location on the target element. If the target element is a beam only the first value is used. These values must lie between -1.0 and +1.0.

## Errors

ERR7\_APINotInitialised, ERR7\_APINotLicensed,  
ERR7\_FileNotOpen, ERR7\_InvalidBrickFace, ERR7\_InvalidEntity,  
ERR7\_InvalidEntityNumber, ERR7\_InvalidFileUnit,  
ERR7\_NoError, ERR7\_ResultFileIsOpen

# St7GetAttachmentLink

---

## Description

Returns the parameters assigned to the specified attachment link.

## Syntax

```
long St7GetAttachmentLink(long uID, long LinkNum, long*  
                           Connection, long* Integers, double* Doubles)
```

## Input Parameters

uID

Strand7 model file ID number.

LinkNum

The specified link number.

## Output Parameters

Connection[0..1]

[0] - Number of nodes in the link (1).

[1] - Node number for attached node.

Integers[0..3]

[ipAttachmentElType] - Target entity type, one of tyBEAM, tyPLATE or tyBRICK.

[ipAttachmentElNum] - Target element number.

---

[ipAttachmentBrickFaceNum] - Target face number for tyBRICK, one of 1,2,3,4,5 or 6.

[ipAttachmentCouple]- Connection between the degrees of freedom with target element, one of cpTranslational, cpRotational or cpBoth.

Doubles[0..1]

A 2 element array containing the UV coordinates for the attachment location on the target element. If the target element is a beam only the first value is used. These values must lie between -1.0 and +1.0.

## Errors

ERR7\_APINotInitialised, ERR7\_APINotLicensed,  
ERR7\_DataNotFound, ERR7\_ExceededTotal, ERR7\_FileNotOpen,  
ERR7\_InvalidEntityNumber, ERR7\_InvalidFileUnit,  
ERR7\_LinkNotAttachment, ERR7\_NoError

# St7SetMultiPointLink

---

## Description

Assigns the parameters for the specified multi-point link.

## Syntax

```
long St7SetMultiPointLink(long uID, long LinkNum, long  
    NumNodes, long FactorsType, long Couple, long*  
    Connection, long* Integers, double* Doubles)
```

## Input Parameters

uID

Strand7 model file ID number.

LinkNum

The specified link number.

NumNodes

The number of nodes in the link.

FactorsType

Multi-point link type, either mpInterpolatedFactors or mpUserFactors.

Couple

Coupling type, one of cpTranslational, cpRotational or cpBoth.

Connection [0 .. NumNodes - 1]

Node numbers for linked nodes, with the slave node specified first.

Integers [0 .. NumNodes - 1]

DoF for linked nodes, with the slave DoF specified first.

Doubles [0 .. NumNodes]

Factors for linked nodes, with the slave factor specified first.

Doubles [NumNodes] is used to specify the constant factor.

## Errors

```
ERR7_APINotInitialised, ERR7_APINotLicensed,  
ERR7_FileNotOpen, ERR7_InvalidCoupleType,  
ERR7_InvalidEntityNodes, ERR7_InvalidEntityNumber,  
ERR7_InvalidFileUnit, ERR7_InvalidMultiPointFactorsType,  
ERR7_InvalidMultiPointLink, ERR7_NoError,  
ERR7_ResultFileIsOpen
```

## St7GetNumMultiPointLinkNodes

---

### Description

Returns the number of nodes in the specified multi-point link.

### Syntax

```
long St7GetNumMultiPointLinkNodes(long uID, long LinkNum,  
                                long* NumNodes)
```

### Input Parameters

uID

Strand7 model file ID number.

LinkNum

The specified link number.

### Output Parameters

NumNodes

The number of nodes in the link.

---

## Errors

```
ERR7_APINotInitialised, ERR7_APINotLicensed,  
ERR7_DataNotFound, ERR7_ExceededTotal, ERR7_FileNotOpen,  
ERR7_InvalidEntityNumber, ERR7_InvalidFileUnit,  
ERR7_LinkNotMultiPoint, ERR7_NoError
```

# St7GetMultiPointLink

---

## Description

Returns the parameters assigned to the specified multi-point link. Use St7GetNumMultiPointLinkNodes to determine the number of nodes in the specified multi-point link.

## Syntax

```
long St7GetMultiPointLink(long uID, long LinkNum, long*  
    FactorsType, long* Couple, long* Connection, long*  
    Integers, double* Doubles)
```

## Input Parameters

uID

Strand7 model file ID number.

LinkNum

The specified link number.

## Output Parameters

FactorsType

Multi-point link type, either mpInterpolatedFactors or mpUserFactors.

Couple

Coupling type, one of cpTranslational, cpRotational or cpBoth.

Connection [0 .. NumNodes-1]

Node numbers for linked nodes, with the slave node specified first.

Integers [0 .. NumNodes-1]

DoF for linked nodes, with the slave DoF specified first.

Doubles [0 .. NumNodes]

Factors for linked nodes, with the slave factor specified first.  
Doubles [NumNodes] is used to specify the constant factor.

## Errors

```
ERR7_APINotInitialised, ERR7_APINotLicensed,  
ERR7_DataNotFound, ERR7_ExceededTotal, ERR7_FileNotOpen,  
ERR7_InvalidEntityNumber, ERR7_InvalidFileUnit,  
ERR7_LinkNotMultiPoint, ERR7_NoError
```

---

## Entities – Geometry

### St7GetVertexXYZ

---

#### Description

Returns the position of a specified vertex.

#### Syntax

```
long St7GetVertexXYZ(long uID, long VertexNum, double* XYZ)
```

#### Input Parameters

uID

Strand7 model file ID number.

VertexNum

Vertex number.

#### Output Parameters

XYZ [0..2]

The vertex position as a 3 element array, specifying the position according to the XYZ Cartesian convention in the Global Cartesian Coordinate system.

#### Errors

ERR7\_APINotInitialised, ERR7\_APINotLicensed,  
ERR7\_FileNotOpen, ERR7\_InvalidEntityNumber,  
ERR7\_InvalidFileUnit, ERR7\_NoError

### St7GetGeometryFaceOuterLoops

---

#### Description

Returns the outer loops in a specified geometry face, note that a geometry face may have one or two outer loops only.

#### Syntax

```
long St7GetGeometryFaceOuterLoops(long uID, long FaceNum,  
                                long* OuterLoops)
```

#### Input Parameters

uID

Strand7 model file ID number.

FaceNum

The specified face number.

### Output Parameters

OuterLoops [0..1]

[0] The loop number of the first outer loop.

[1] The loop number of the second outer loop, zero if there is no such loop.

### Errors

ERR7\_APINotInitialised, ERR7\_APINotLicensed,  
ERR7\_DataNotFound, ERR7\_FileNotOpen,  
ERR7\_InvalidEntityNumber, ERR7\_InvalidFileUnit,  
ERR7\_NoError

## St7GetNumGeometryFaceCavityLoops

---

### Description

Returns the number of cavity loops in a specified geometry face.

### Syntax

```
long St7GetNumGeometryFaceCavityLoops(long uID, long  
FaceNum, long* NumCavityLoops)
```

### Input Parameters

uID

Strand7 model file ID number.

FaceNum

Face number.

### Output Parameters

NumCavityLoops

Number of cavity loops in the specified face.

### Errors

ERR7\_APINotInitialised, ERR7\_APINotLicensed,  
ERR7\_DataNotFound, ERR7\_FileNotOpen,

---

```
ERR7_InvalidEntityNumber, ERR7_InvalidFileUnit,  
ERR7_NoError
```

## St7GetGeometryFaceCavityLoops

---

### Description

Returns the cavity loop numbers for a specified geometry face. Use St7GetNumGeometryFaceCavityLoops to determinethe number of cavity loops in the specified geometry face.

### Syntax

```
long St7GetGeometryFaceCavityLoops(long uID, long FaceNum,  
                                long MaxCavityLoops, long* Integers)
```

### Input Parameters

uID

Strand7 model file ID number.

FaceNum

Face number.

MaxCavityLoops

Maximum amount of storage allocated for Integers, returns all loops if set greater than or equal to NumCavityLoops.

### Output Parameters

Integers [0 .. MaxCavityLoops-1]

An array containing the cavity loop numbers for the specified face, such that Integers [i-1] contains the i<sup>th</sup> cavity loop number.

### Errors

```
ERR7_APINotInitialised, ERR7_APINotLicensed,  
ERR7_DataNotFound, ERR7_FileNotOpen,  
ERR7_InvalidEntityNumber, ERR7_InvalidFileUnit,  
ERR7_NoError
```

## St7GetNumGeometryFaceEdges

---

### Description

Returns the number of edges in a specified geometry face.

### Syntax

```
long St7GetNumGeometryFaceEdges(long uID, long FaceNum,  
                                long* NumEdges)
```

### Input Parameters

uID

Strand7 model file ID number.

FaceNum

Face number.

### Output Parameters

NumEdges

Number of edges in the specified face.

### Errors

```
ERR7_APINotInitialised, ERR7_APINotLicensed,  
ERR7_DataNotFound, ERR7_FileNotOpen,  
ERR7_InvalidEntityNumber, ERR7_InvalidFileUnit,  
ERR7_NoError
```

## St7GetGeometryFaceEdges

---

### Description

Returns the edge numbers for a specified geometry face. Use *St7GetNumGeometryFaceEdges* to determine the number of edges in the specified geometry face.

### Syntax

```
long St7GetGeometryFaceEdges(long uID, long FaceNum, long  
                                MaxEdges, long* Integers)
```

### Input Parameters

uID

Strand7 model file ID number.

---

FaceNum

Face number.

MaxEdges

Maximum amount of storage allocated for Integers, returns all edges if set greater than or equal to NumEdges.

### Output Parameters

Integers [0 .. MaxEdges-1]

An array containing the edge numbers for the specified face, such that Integers [i-1] contains the  $i^{\text{th}}$  edge number.

### Errors

ERR7\_APINotInitialised, ERR7\_APINotLicensed,  
ERR7\_DataNotFound, ERR7\_FileNotOpen,  
ERR7\_InvalidEntityNumber, ERR7\_InvalidFileUnit,  
ERR7\_NoError

## St7GetGeometryEdgeLength

---

### Description

Returns the length of a specified edge in a given geometry face.

### Syntax

```
long St7GetGeometryEdgeLength(long uID, long EdgeNum,  
                           double* EdgeLength)
```

### Input Parameters

uID

Strand7 model file ID number.

EdgeNum

Edge number.

### Output Parameters

EdgeLength

Length of the specified edge.

## Errors

```
ERR7_APINotInitialised, ERR7_APINotLicensed,  
ERR7_DataNotFound, ERR7_FileNotOpen,  
ERR7_InvalidEntityNumber, ERR7_InvalidFileUnit,  
ERR7_NoError
```

# St7GetNumGeometryFaceVertices

---

## Description

Returns the number of vertices in a given geometry face.

## Syntax

```
long St7GetNumGeometryFaceVertices (long uID, long FaceNum,  
                                    long* NumVertices)
```

## Input Parameters

uID

Strand7 model file ID number.

FaceNum

Face number.

## Output Parameters

NumVertices

Number of vertices in the specified face.

## Errors

```
ERR7_APINotInitialised, ERR7_APINotLicensed,  
ERR7_DataNotFound, ERR7_FileNotOpen,  
ERR7_InvalidEntityNumber, ERR7_InvalidFileUnit,  
ERR7_NoError
```

# St7GetGeometryFaceVertices

---

## Description

Returns the vertex numbers for a specified geometry face. Use *St7GetNumGeometryFaceVertices* to determine the number of vertices for the specified geometry face.

---

## Syntax

```
long St7GetGeometryFaceVertices(long uID, long FaceNum,  
                                long MaxVertices, long* Integers)
```

## Input Parameters

uID

Strand7 model file ID number.

FaceNum

The specified face number.

MaxVertices

Maximum amount of storage allocated for Integers, returns all vertices if set greater than or equal to NumVertices.

## Output Parameters

Integers[0..MaxVertices-1]

An array containing the vertex numbers for the specified face, such that Integers[i-1] contains the i<sup>th</sup> vertex number.

## Errors

ERR7\_APINotInitialised, ERR7\_APINotLicensed,  
ERR7\_DataNotFound, ERR7\_FileNotOpen,  
ERR7\_InvalidEntityNumber, ERR7\_InvalidFileUnit,  
ERR7\_NoError

---

## St7GetGeometryEdgeVertices

### Description

Returns the vertex numbers in a specified geometry edge.

### Syntax

```
long St7GetGeometryEdgeVertices(long uID, long EdgeNum,  
                                long* EdgeVertices)
```

### Input Parameters

uID

Strand7 model file ID number.

EdgeNum

Edge number.

### **Output Parameters**

EdgeVertices[0..1]

A 2 element array containing the start and end vertices for the specified edge.

### **Errors**

ERR7\_APINotInitialised, ERR7\_APINotLicensed,  
ERR7\_DataNotFound, ERR7\_FileNotOpen,  
ERR7\_InvalidEntityNumber, ERR7\_InvalidFileUnit,  
ERR7\_NoError

## **St7GetGeometryFaceSurface**

---

### **Description**

Returns the surface number for a specified geometry face.

### **Syntax**

```
long St7GetGeometryFaceSurface(long uID, long FaceNum,  
                           long* SurfaceNum)
```

### **Input Parameters**

uID

Strand7 model file ID number.

FaceNum

Face number.

### **Output Parameters**

SurfaceNum

Surface number for the specified face.

### **Errors**

ERR7\_APINotInitialised, ERR7\_APINotLicensed,  
ERR7\_DataNotFound, ERR7\_FileNotOpen,  
ERR7\_InvalidEntityNumber, ERR7\_InvalidFileUnit,  
ERR7\_NoError

---

## St7GetGeometrySurfaceType

---

### Description

Returns the type of a specified surface.

### Syntax

```
long St7GetGeometrySurfaceType(long uID, long SurfaceNum,  
                           long* SurfaceType)
```

### Input Parameters

uID

Strand7 model file ID number.

SurfaceNum

The specified surface number.

### Output Parameters

SurfaceType

Type of surface, one of suPlane, suSphere, suTorus, suCone, suBSpline, suRotSur, suPipeSur, suSumSur, suTabCyl, suRuleSur or suCubicSpline.

### Errors

```
ERR7_APINotInitialised, ERR7_APINotLicensed,  
ERR7_DataNotFound, ERR7_FileNotOpen,  
ERR7_InvalidEntityNumber, ERR7_InvalidFileUnit,  
ERR7_NoError
```

---

## St7InvalidateGeometryFace

---

### Description

Marks a specified geometry face as invalid for subsequent deletion using the *St7DeleteInvalidGeometryFaces* function.

### Syntax

```
long St7InvalidateGeometryFace(long uID, long FaceNum)
```

### Input Parameters

uID

Strand7 model file ID number.

FaceNum

Face number to invalidate.

## Errors

ERR7\_APINotInitialised, ERR7\_APINotLicensed,  
ERR7\_DataNotFound, ERR7\_FileNotOpen,  
ERR7\_InvalidEntityNumber, ERR7\_InvalidFileUnit,  
ERR7\_NoError, ERR7\_ResultFileIsOpen

# St7InvalidateGeometryFaceCavityLoopID

---

## Description

Marks a specified cavity loop as invalid for subsequent deletion using the St7DeleteInvalidGeometryFaces function. This function uses the loop ID number to identify the appropriate loop.

## Syntax

```
long St7InvalidateGeometryFaceCavityLoopID(long uID, long  
FaceNum, long LoopNum)
```

## Input Parameters

uID

Strand7 model file ID number.

FaceNum

The specified face number.

LoopNum

The ID number of the loop to be marked for deletion.

## Errors

ERR7\_APINotInitialised, ERR7\_APINotLicensed,  
ERR7\_DataNotFound, ERR7\_FileNotOpen,  
ERR7\_InvalidEntityNumber, ERR7\_InvalidFileUnit,  
ERR7\_InvalidGeometryCavityLoop, ERR7\_NoError,  
ERR7\_ResultFileIsOpen

---

## St7InvalidateGeometryFaceCavityLoopIndex

---

### Description

Marks a specified cavity loop as invalid for subsequent deletion using the St7DeleteInvalidGeometryFaces function. This function uses the loop index number to identify the appropriate loop.

### Syntax

```
long St7InvalidateGeometryFaceCavityLoopIndex(long uID,  
                                long FaceNum, long LoopIndex)
```

### Input Parameters

uID

Strand7 model file ID number.

FaceNum

The specified face number.

LoopIndex

The index number of the loop to be marked for deletion.

### Errors

```
ERR7_APINotInitialised, ERR7_APINotLicensed,  
ERR7_DataNotFound, ERR7_FileNotOpen,  
ERR7_InvalidEntityNumber, ERR7_InvalidFileUnit,  
ERR7_InvalidGeometryCavityLoop, ERR7_NoError,  
ERR7_ResultFileIsOpen
```

---

## St7DeleteInvalidGeometryFaces

---

### Description

Deletes all invalid faces in a specified model.

### Syntax

```
long St7DeleteInvalidGeometryFaces(long uID, long*  
                                    NumFacesDeleted, long* NumCavityLoopsDeleted)
```

### Input Parameters

uID

Strand7 model file ID number.

## Output Parameters

NumFacesDeleted

Number of faces deleted.

NumCavityLoopsDeleted

Number of cavity loops deleted.

## Errors

ERR7\_APINotInitialised, ERR7\_APINotLicensed,  
ERR7\_FileNotOpen, ERR7\_InvalidFileUnit, ERR7\_NoError,  
ERR7\_ResultFileIsOpen

# St7SetCleanGeometryData

---

## Description

Specifies the settings used when performing subsequent geometry clean operations.

## Syntax

```
long St7SetCleanGeometryData(long uID, long* Integers,  
                           double* Doubles)
```

## Input Parameters

uID

Strand7 model file ID number.

Integers [0..4]

[ipGeometryAccuracyType] - Tolerance type, either ztRelative or ztAbsolute.

[ipGeometryFeatureType] - Feature tolerance type, either ztRelative or ztAbsolute.

[ipGeometryActOnWholeModel] - Perform clean on whole model, either btTrue or btFalse.

[ipGeometryFreeEdgesOnly] - Act on free edges only, either btTrue or btFalse.

[ipGeometryDuplicateFaces] - Duplicate face operation, one of dfGeometryLeave, dfGeometryDeleteOne, dfGeometryDeleteBoth.

---

Doubles[0..2]

[ipGeometryAccuracy] - Tolerance value, scaled based on  
Integers[ipGeometryAccuracyType].

[ipGeometryFeatureLength] - Geometry feature length.

[ipGeometryEdgeMergeAngle] - Merging angle for adjacent edges.

## Errors

ERR7\_APINotInitialised, ERR7\_APINotLicensed,  
ERR7\_FileNotOpen, ERR7\_InvalidDuplicateFaceType,  
ERR7\_InvalidFileUnit, ERR7\_InvalidZipTolerance,  
ERR7\_InvalidZipType, ERR7\_NoError

# St7GetCleanGeometryData

---

## Description

Retrieves the current settings used when performing a geometry clean operation.

## Syntax

```
long St7GetCleanGeometryData(long uID, long* Integers,  
double* Doubles)
```

## Input Parameters

uID

Strand7 model file ID number.

## Output Parameters

Integers[0..4]

[ipGeometryAccuracyType] - Tolerance type, either ztRelative or  
ztAbsolute.

[ipGeometryFeatureType] - Feature tolerance type, either ztRelative or  
ztAbsolute.

[ipGeometryActOnWholeModel] - Perform clean on whole model, either  
btTrue or btFalse.

[ipGeometryFreeEdgesOnly] - Act on free edges only, either btTrue or  
btFalse.

[ipGeometryDuplicateFaces] - Duplicate face operation, one of  
dfGeometryLeave, dfGeometryDeleteOne, dfGeometryDeleteBoth.  
Doubles [0..2]

[ipGeometryAccuracy] - Tolerance value, scaled based on  
Integers [ipGeometryAccuracyType].

[ipGeometryFeatureLength] - Geometry feature length.

[ipGeometryEdgeMergeAngle] - Merging angle for adjacent edges.

### Errors

ERR7\_APINotInitialised, ERR7\_APINotLicensed,  
ERR7\_FileNotOpen, ERR7\_InvalidFileUnit, ERR7\_NoError

## St7CleanGeometry

---

### Description

Performs a geometry clean operation on the geometry included in the specified Strand7 model. Cleaning the geometry can be used to improve geometry definitions and is typically recommended before subsequent geometry or meshing operations are conducted. The operation includes a number of different stages including: vertex and curve zipping, duplicate face processing, curve and surface refitting and morphing.

### Syntax

```
long St7CleanGeometry(long uID, long* ChangesMade, long Mode)
```

### Input Parameters

uID

Strand7 model file ID number.

Mode

Controls the display of a progress bar (ieQuietRun or ieProgressRun).

### Output Parameters

ChangesMade

btTrue or btFalse.

---

## Errors

```
ERR7_APINotInitialised, ERR7_APINotLicensed,  
ERR7_FileNotOpen, ERR7_InvalidFileUnit, ERR7_NoError,  
ERR7_ResultFileIsOpen
```

---

## St7GetGeometrySize

### Description

Retrieves the relative overall size of the geometry in the specified Strand7 model.  
This size measure is used when scaling the relative geometry tolerance.

### Syntax

```
long St7GetGeometrySize(long uID, double* Size)
```

### Input Parameters

uID

Strand7 model file ID number.

### Output Parameters

Size

Relative overall geometry size.

### Errors

```
ERR7_APINotInitialised, ERR7_APINotLicensed,  
ERR7_FileNotOpen, ERR7_InvalidFileUnit, ERR7_NoError
```

---

## St7SurfaceMesh

### Description

Performs a surface meshing operation based on the geometry included in the specified Strand7 model.

### Syntax

```
long St7SurfaceMesh(long uID, long* Integers, double*  
                    Doubles, long Mode)
```

### Input Parameters

uID

Strand7 model file ID number.

Integers [0..8]

[ipSurfaceMeshMode] - Meshing mode, either mmAuto or mmCustom.

[ipSurfaceMeshSizeMode] - Mesh size option, either smPercentage or smAbsolute.

[ipSurfaceMeshTargetNodes] - Number of nodes in target element, one of 3, 4, 6 or 8.

[ipSurfaceMeshTargetPropertyID] - Element property definition, one of -1 to use the face property, 0 to use the face number or >0 to use a constant property.

[ipSurfaceMeshAutoCreateProperties] - Create properties as needed, either btTrue or btFalse.

[ipSurfaceMeshMinEdgesPerCircle] - Minimum number of edges per circular edge.

[ipSurfaceMeshApplyTransitioning] - Apply edge transitioning when placing boundary nodes, either btTrue or btFalse.

[ipSurfaceMeshAllowUserStop] - Allow the user to terminate the meshing process, either btTrue or btFalse.

[ipSurfaceMeshConsiderNearVertex] - Allow automesher to base element size on vertices near to, but not on, a surface, either btTrue or btFalse.

Doubles [0..3]

[ipSurfaceMeshSize] - Mesh size, scaled based on Integers [ipSurfaceMeshSizeMode].

[ipSurfaceMeshLengthRatio] - Maximum allowable ratio between the largest and smallest edge on each face.

[ipSurfaceMeshMaximumIncrease] - Rate of increase in edge length between neighbouring elements.

[ipSurfaceMeshOnEdgesLongerThan] - Minimum curve length for the **Min Edges per Circle** parameter to be used.

Mode

Controls the display of a progress bar (ieQuietRun or ieProgressRun).

---

## Errors

```
ERR7_APINotInitialised, ERR7_APINotLicensed,  
ERR7_FileNotOpen, ERR7_InvalidFileUnit,  
ERR7_InvalidSurfaceMeshTargetType, ERR7_MeshingErrors,  
ERR7_NoError, ERR7_ResultFileIsOpen
```

---

# St7SolidTetMesh

## Description

Performs a solid meshing operation based on the surface mesh definitions included in the specified Strand7 model. Surface mesh definitions can be created using the *St7SurfaceMesh* function, but may also be created by other means.

## Syntax

```
long St7SolidTetMesh(long uID, long* Integers, long Mode)
```

### Input Parameters

uID

Strand7 model file ID number.

Integers[0..11]

[ipTetraMeshSize] - Mesh size control, one of msFine, msMedium or msCoarse.

[ipTetraMeshProperty] - Brick property number.

[ipTetraMeshInc] - Brick property number increment for separate solid parts.

[ipTetraMesh10] - Mesh using Tetra10 elements, either btTrue or btFalse.

[ipTetraMeshGroupsAsSolids] - Mesh groups as solids, either btTrue or btFalse.

[ipTetraMeshSmooth] - Smooth elements after meshing, either btTrue or btFalse.

[ipTetraMeshAutoCreateProperties] - Create brick properties as needed.

[ipTetraMeshDeletePlates] - Delete surface plates after meshing.

[ipTetraMeshMultiBodyOption] - action when multiple bodies are detected, one of mbCancelMeshing, mbCavity or mbSeparateSolids.

[ipTetraMeshAllowUserStop] - Allow the user to terminate the meshing process, either btTrue or btFalse.

[ipTetraMeshCheckSelfIntersect] - Check for initial self intersections in the surface plate mesh, either btTrue or btFalse.

#### Mode

Controls the display of a progress bar (ieQuietRun or ieProgressRun).

#### Errors

ERR7\_APINotInitialised, ERR7\_APINotLicensed,  
ERR7\_FileNotOpen, ERR7\_InvalidFileUnit, ERR7\_MeshingErrors,  
ERR7\_NoError, ERR7\_ResultFileIsOpen

## St7MeshFromLoops

---

#### Description

Performs a surface meshing operation on a single face. The definition of this face is specified explicitly using the array inputs for this function.

#### Syntax

```
long St7MeshFromLoops(long uID, long* Integers, double* Doubles, long* Loops, double* Points, long Mode)
```

#### Input Parameters

uID

Strand7 model file ID number.

Integers [0..3]

[ipMeshTargetNodes] - Number of nodes in the target element, one of 3, 4, 6 or 8.

[ipMeshTargetPropertyID] - Plate property number for new elements.

[ipMeshUCSID] - UCS ID number onto which the polygon is projected.

[ipMeshGroupID] - Group ID number for new elements.

Doubles [0..0]

---

[ipMeshPositionUCS] - Location of the elements on the UCS 3 axis.

Loops[..]

[0] - the total number of loops in the polygon.

[1] - the number of points in the first loop in the polygon. This loop is always the outer loop.

[2..1+Loop[1]] - a list of point indices defining the first loop.

[2+Loop[1]] - the number of points in the second loop of the polygon.

Then recursively, where Loop[k] contains the number of points in the  $i^{\text{th}}$  loop;

[k+1..k+Loop[k]] - contains a list of point indices defining the  $i^{\text{th}}$  loop

[k+Loop[k]+1] contains the number of points in the  $(i+1)^{\text{th}}$  loop.

Points[..]

A list of the XY coordinates for the polygon points, with the X and Y coordinates stored contiguously.

[2\*j-2] - the X coordinate of point j.

[2\*j-1] - the Y coordinate of point j.

Mode

Controls the display of a progress bar (ieQuietRun or ieProgressRun).

**Errors**

ERR7\_APINotInitialised, ERR7\_APINotLicensed,  
ERR7\_FileNotOpen, ERR7\_InvalidFileUnit, ERR7\_NoError,  
ERR7\_ResultFileIsOpen

## Entities – Load Paths

### St7SetLoadPath

#### Description

Sets the data for a load path in the specified model. A new load path is created if a new load path ID is specified.

#### Syntax

```
long St7SetLoadPath(long uID, long LoadPathID, long*
    Integers, double* Doubles)
```

#### Input Parameters

uID

Strand7 model file ID number.

LoadPathID

Load path ID number.

Integers[0..5]

[ipLoadPathCase] - Load case number.

[ipLoadPathTemplate] - Load path template number.

[ipLoadPathShape] - Load path shape, one of lpShapeStraight,  
lpShapeCurved, lpShapeQuadratic.

[ipLoadPathSurface] - Load path surface, either lpSurfaceFlat or  
lpSurfaceCurved. Note that this parameter is ignored when lpShapeStraight  
is set in Integers[ipLoadPathShape].

[ipLoadPathTarget] - Load path target entity, one of tyBEAM, tyPLATE,  
tyBRICK or tyNULL to target all entities.

[ipLoadPathDivisions] - Number of divisions along the load path.

Doubles[0..8]

[0..2] - The start XYZ point in the definition of the load path (defined in the  
global coordinate system).

[3..5] - The end XYZ point in the definition of the load path.

---

[ 6 .. 8 ] - The lateral XYZ point in the definition of the load path, used to define the plane of the load path and its curvature (for circular load paths).

## Errors

```
ERR7_APINotInitialised, ERR7_APINotLicensed,  
ERR7_FileNotOpen, ERR7_InvalidEntity, ERR7_InvalidFileUnit,  
ERR7_InvalidLoadCase, ERR7_InvalidLoadPathID,  
ERR7_InvalidLoadPathShape, ERR7_InvalidLoadPathSurface,  
ERR7_InvalidLoadPathTemplateID, ERR7_InvalidNumPathDivs,  
ERR7_InvalidPathDefinition, ERR7_NoError,  
ERR7_ResultFileIsOpen
```

# St7GetLoadPath

---

## Description

Returns the data assigned to the specified load path.

## Syntax

```
long St7GetLoadPath(long uID, long LoadPathID, long*  
Integers, double* Doubles)
```

## Input Parameters

uID

Strand7 model file ID number.

LoadPathID

Load path ID number.

## Output Parameters

Integers[0..5]

[ipLoadPathCase] - Load case number.

[ipLoadPathTemplate] - Load path template number.

[ipLoadPathShape] - Load path shape, one of IpShapeStraight, IpShapeCurved, IpShapeQuadratic.

[ipLoadPathSurface] - Load path surface, either IpSurfaceFlat or IpSurfaceCurved. Note that this parameter is ignored when IpShapeStraight is set in Integers [ipLoadPathShape].

[ipLoadPathTarget] - Load path target entity, one of tyBEAM, tyPLATE, tyBRICK or tyNULL to target all entities.

[ipLoadPathDivisions] - Number of divisions along the load path.

Doubles [0..8]

[0..2] - The start XYZ point in the definition of the load path (defined in the global coordinate system).

[3..5] - The end XYZ point in the definition of the load path.

[6..8] - The lateral XYZ point in the definition of the load path, used to define the plane of the load path and its curvature (for circular load paths).

## Errors

ERR7\_APINotInitialised, ERR7\_APINotLicensed,  
ERR7\_FileNotOpen, ERR7\_InvalidFileUnit, ERR7\_NoError

## St7DeleteLoadPath

---

### Description

Deletes the specified load path.

### Syntax

```
long St7DeleteLoadPath(long uID, long LoadPathID)
```

### Input Parameters

uID

Strand7 model file ID number.

LoadPathID

Load path ID number.

### Errors

ERR7\_APINotInitialised, ERR7\_APINotLicensed,  
ERR7\_FileNotOpen, ERR7\_InvalidFileUnit,  
ERR7\_InvalidLoadPathID, ERR7\_NoError, ERR7\_ResultFileIsOpen

---

## Nodal Attributes – Set

### St7SetNodeID

---

#### Description

Sets the ID number of the specified node.

#### Syntax

```
long St7SetNodeID(long uID, long NodeNum, long NodeID)
```

#### Input Parameters

uID

Strand7 model file ID number.

NodeNum

The specified node number.

NodeID

The ID number for the specified node,

#### Errors

```
ERR7_APINotInitialised, ERR7_APINotLicensed,  
ERR7_FileNotOpen, ERR7_InvalidEntityNumber,  
ERR7_InvalidFileUnit, ERR7_NoError, ERR7_ResultFileIsOpen
```

### St7SetNodeRestraint6

---

#### Description

Sets the restraint conditions at the given node in the specified UCS.

#### Syntax

```
long St7SetNodeRestraint6(long uID, long NodeNum, long  
CaseNum, long UCSId, long* Status, double* Doubles)
```

#### Input Parameters

uID

Strand7 model file ID number.

NodeNum

Node number.

CaseNum

Freedom case number.

UCSID

UCS ID number.

Status[0..5]

A 6 element array describing the restraint conditions for the six DoF at the specified node. Status[i-1] = btTrue indicates that the  $i^{\text{th}}$  DoF is restrained. The DoF are restrained according to the 123456 axis convention in the specified UCS.

Doubles[0..5]

A 6 element array describing the enforced displacement conditions for the six DoF at the specified node. Doubles[i-1] describes the displacement of the  $i^{\text{th}}$  DoF according to the 123456 axis convention in the specified UCS.

## Errors

ERR7\_APINotInitialised, ERR7\_APINotLicensed,  
ERR7\_FileNotOpen, ERR7\_InvalidEntityNumber,  
ERR7\_InvalidFileUnit, ERR7\_InvalidFreedomCase,  
ERR7\_InvalidUCSID, ERR7\_NoError, ERR7\_ResultFileIsOpen

## St7SetNodeForce3

---

### Description

Sets the point force acting on the specified node in the Global Cartesian Coordinate system.

### Syntax

```
long St7SetNodeForce3(long uID, long NodeNum, long CaseNum,  
                      double* Doubles)
```

### Input Parameters

uID

Strand7 model file ID number.

NodeNum

---

The specified node number.

CaseNum

The specified load case number.

Doubles [0..2]

A 3 element array describing the nodal force in the XYZ Cartesian coordinate system for the specified node.

## Errors

```
ERR7_APINotInitialised, ERR7_APINotLicensed,  
ERR7_FileNotOpen, ERR7_InvalidEntityNumber,  
ERR7_InvalidFileUnit, ERR7_InvalidFreedomCase,  
ERR7_InvalidLoadCase, ERR7_InvalidUCSID, ERR7_NoError,  
ERR7_ResultFileIsOpen
```

# St7SetNodeMoment3

---

## Description

Sets the point moment acting on the specified node in the Global Cartesian Coordinate system.

## Syntax

```
long St7SetNodeMoment3(long uID, long NodeNum, long CaseNum,  
                      double* Doubles)
```

## Input Parameters

uID

Strand7 model file ID number.

NodeNum

The specified node number.

CaseNum

The specified load case number.

Doubles [0..2]

A 3 element array describing the nodal moments about the XYZ Cartesian coordinate system for the specified node.

## Errors

```
ERR7_APINotInitialised, ERR7_APINotLicensed,  
ERR7_FileNotOpen, ERR7_InvalidEntityNumber,  
ERR7_InvalidFileUnit, ERR7_InvalidFreedomCase,  
ERR7_InvalidLoadCase, ERR7_InvalidUCSID, ERR7_NoError,  
ERR7_ResultFileIsOpen
```

# St7SetNodeTemperature1

---

## Description

Sets the temperature at the specified node.

## Syntax

```
long St7SetNodeTemperature1(long uID, long NodeNum, long  
CaseNum, double* Doubles)
```

## Input Parameters

uID

Strand7 model file ID number.

NodeNum

The specified node number.

CaseNum

The specified load case number.

Doubles [0]

The nodal temperature value at the specified node.

## Errors

```
ERR7_APINotInitialised, ERR7_APINotLicensed,  
ERR7_DataNotFound, ERR7_FileNotOpen,  
ERR7_InvalidAttributeType, ERR7_InvalidEntity,  
ERR7_InvalidEntityNumber, ERR7_InvalidFileUnit,  
ERR7_InvalidFreedomCase, ERR7_InvalidLoadCase,  
ERR7_InvalidLoadID, ERR7_InvalidUCSID, ERR7_NoError,  
ERR7_ResultFileIsOpen
```

---

## St7SetNodeTemperatureType1

---

### Description

Sets the type of temperature at the specified node.

### Syntax

```
long St7SetNodeTemperatureType1(long uID, long NodeNum,  
                               long CaseNum, long tType)
```

### Input Parameters

uID

Strand7 model file ID number.

NodeNum

The specified node number.

CaseNum

The specified load case number.

tType

The type of temperature attribute applied at the specified node:

tReferenceTemperature, tFixedTemperature, tInitialTemperature or  
tTableTemperature. If required, use *St7SetNodeTemperatureTable* to set the  
table.

### Errors

```
ERR7_APINotInitialised, ERR7_APINotLicensed,  
ERR7_DataNotFound, ERR7_FileNotOpen,  
ERR7_InvalidAttributeType, ERR7_InvalidEntity,  
ERR7_InvalidEntityNumber, ERR7_InvalidFileUnit,  
ERR7_InvalidFreedomCase, ERR7_InvalidLoadCase,  
ERR7_InvalidLoadID, ERR7_InvalidTemperatureType,  
ERR7_InvalidUCSID, ERR7_NoError, ERR7_ResultFileIsOpen
```

---

## St7SetNodeTemperatureTable

---

### Description

Specifies the table to be associated with the temperature at the given node. A table can only be assigned for nodes with the appropriate table temperature type, as set using the *St7SetNodeTemperatureType1* function.

## Syntax

```
long St7SetNodeTemperatureTable(long uID, long NodeNum,  
                                long CaseNum, long TableID)
```

## Input Parameters

uID

Strand7 model file ID number.

NodeNum

The specified node number.

CaseNum

The specified load case number.

TableID

The ID number of the Temperature vs Time table to be associated with the temperature attribute for the specified node.

## Errors

```
ERR7_APINotInitialised, ERR7_APINotLicensed,  
ERR7_DataNotFound, ERR7_FileNotOpen,  
ERR7_InvalidAttributeType, ERR7_InvalidEntity,  
ERR7_InvalidEntityNumber, ERR7_InvalidFileUnit,  
ERR7_InvalidFreedomCase, ERR7_InvalidLoadCase,  
ERR7_InvalidLoadID, ERR7_InvalidTableType,  
ERR7_InvalidUCSID, ERR7_NoError, ERR7_ResultFileIsOpen,  
ERR7_TableDoesNotExist
```

# St7SetNodeKTranslation3F

---

## Description

Sets the translational stiffness acting at the specified node.

## Syntax

```
long St7SetNodeKTranslation3F(long uID, long NodeNum, long  
                               CaseNum, long UCSId, double* Doubles)
```

## Input Parameters

uID

Strand7 model file ID number.

---

NodeNum

The specified node number.

CaseNum

The specified freedom case number.

UCSID

The ID number for the specified UCS.

Doubles[0..2]

A 3 element array describing the translational stiffnesses for the specified node. Doubles [i-1] describes the stiffness for the i<sup>th</sup> translational DoF according to the 123 axis definition in the specified UCS.

## Errors

ERR7\_APINotInitialised, ERR7\_APINotLicensed,  
ERR7\_FileNotOpen, ERR7\_InvalidEntityNumber,  
ERR7\_InvalidFileUnit, ERR7\_InvalidFreedomCase,  
ERR7\_InvalidLoadCase, ERR7\_InvalidUCSID, ERR7\_NoError,  
ERR7\_ResultFileIsOpen

# St7SetNodeKRotation3F

---

## Description

Sets the rotational stiffness acting at the specified node.

## Syntax

```
long St7SetNodeKRotation3F(long uID, long NodeNum, long  
CaseNum, long UCSId, double* Doubles)
```

## Input Parameters

uID

Strand7 model file ID number.

NodeNum

The specified node number.

CaseNum

The specified freedom case number.

UCSID

The ID number for the specified UCS.

Doubles [0..2]

A 3 element array describing the rotational stiffnesses for the specified node.

Doubles [i-1] describes the stiffness for the  $i^{\text{th}}$  rotational DoF according to the 456 axis definition in the specified UCS.

## Errors

```
ERR7_APINotInitialised, ERR7_APINotLicensed,  
ERR7_FileNotOpen, ERR7_InvalidEntityNumber,  
ERR7_InvalidFileUnit, ERR7_InvalidFreedomCase,  
ERR7_InvalidLoadCase, ERR7_InvalidUCSID, ERR7_NoError,  
ERR7_ResultFileIsOpen
```

# St7SetNodeTMass3

---

## Description

Sets the translational mass assigned to the specified node. Translational masses are active in all load and freedom cases in the model.

## Syntax

```
long St7SetNodeTMass3(long uID, long NodeNum, double*  
                      Doubles)
```

## Input Parameters

uID

Strand7 model file ID number.

NodeNum

The specified node number.

Doubles [0..2]

A 3 element array describing the translational mass for the specified node.

Doubles [i-1] describes the translational mass for the  $i^{\text{th}}$  translational DoF according to the XYZ Cartesian axis convention.

## Errors

```
ERR7_APINotInitialised, ERR7_APINotLicensed,  
ERR7_FileNotOpen, ERR7_InvalidEntityNumber,
```

---

```
ERR7_InvalidFileUnit, ERR7_InvalidFreedomCase,
ERR7_InvalidLoadCase, ERR7_InvalidUCSID, ERR7_NoError,
ERR7_ResultFileIsOpen
```

## St7SetNodeRMass3

---

### Description

Sets the rotational mass assigned to the specified node. Rotational masses are active in all load and freedom cases in the model

### Syntax

```
long St7SetNodeRMass3(long uID, long NodeNum, long UCSId,
                      double* Doubles)
```

### Input Parameters

uID

Strand7 model file ID number.

NodeNum

The specified node number.

UCSID

The ID number for the specified UCS.

Doubles [0..2]

A 3 element array describing the rotational mass for the specified node.

Doubles [i-1] describes the rotational mass for the  $i^{\text{th}}$  rotational DoF according to the 456 axis convention in the specified UCS.

### Errors

```
ERR7_APINotInitialised, ERR7_APINotLicensed,
ERR7_FileNotOpen, ERR7_InvalidEntityNumber,
ERR7_InvalidFileUnit, ERR7_InvalidFreedomCase,
ERR7_InvalidLoadCase, ERR7_InvalidUCSID, ERR7_NoError,
ERR7_ResultFileIsOpen
```

## St7SetNodeNSMass5

---

### Description

Sets the non-structural mass at the specified node. Unlike translational and rotational masses, non-structural mass can include an offset in addition to a dynamic scaling factor that controls the contribution when performing transient or frequency based dynamic analysis. Non-structural masses are active for all freedom cases.

### Syntax

```
long St7SetNodeNSMass5(long uID, long NodeNum, long CaseNum,  
double* Doubles)
```

### Input Parameters

uID

Strand7 model file ID number.

NodeNum

The specified node number.

CaseNum

The specified load case number.

Doubles[0..4]

[0] - The non-structural mass at the specified node.

[1] - The dynamic factor at the specified node. This factor is used to scale the non-structural mass when performing dynamic analysis.

[2..4] - A 3 element array describing the offset in the XYZ Cartesian coordinate system.

### Errors

```
ERR7_APINotInitialised, ERR7_APINotLicensed,  
ERR7_FileNotOpen, ERR7_InvalidEntityNumber,  
ERR7_InvalidFileUnit, ERR7_InvalidFreedomCase,  
ERR7_InvalidLoadCase, ERR7_InvalidUCSID, ERR7_NoError,  
ERR7_ResultFileIsOpen
```

---

## St7SetNodeKDamping3F

---

### Description

Sets the translational damping coefficients at the specified node.

### Syntax

```
long St7SetNodeKDamping3F(long uID, long NodeNum, long  
CaseNum, long UCSId, double* Doubles)
```

### Input Parameters

uID

Strand7 model file ID number.

NodeNum

The specified node number.

CaseNum

The specified load case number.

UCSId

The ID number for the specified UCS.

Doubles [0..2]

A 3 element array describing the damping factors for the specified node.

Doubles [i-1] describes the damping factor for the i<sup>th</sup> translational DoF according to the 123 axis definition in the specified UCS.

### Errors

```
ERR7_APINotInitialised, ERR7_APINotLicensed,  
ERR7_FileNotOpen, ERR7_InvalidEntityNumber,  
ERR7_InvalidFileUnit, ERR7_InvalidFreedomCase,  
ERR7_InvalidLoadCase, ERR7_InvalidUCSID, ERR7_NoError,  
ERR7_ResultFileIsOpen
```

---

## St7SetNodeHeatSource1

---

### Description

Sets the heat source at the specified node.

## Syntax

```
long St7SetNodeHeatSource1(long uID, long NodeNum, long  
CaseNum, double* Doubles)
```

## Input Parameters

uID

Strand7 model file ID number.

NodeNum

The specified node number.

CaseNum

The specified load case number.

Doubles [0]

The heat source value for the specified node.

## Errors

```
ERR7_APINotInitialised, ERR7_APINotLicensed,  
ERR7_DataNotFound, ERR7_FileNotOpen,  
ERR7_InvalidAttributeType, ERR7_InvalidEntity,  
ERR7_InvalidEntityNumber, ERR7_InvalidFileUnit,  
ERR7_InvalidFreedomCase, ERR7_InvalidLoadCase,  
ERR7_InvalidLoadID, ERR7_InvalidUCSID, ERR7_NoError,  
ERR7_ResultFileIsOpen
```

# St7SetNodeHeatSourceTables

---

## Description

Specifies the tables to be associated with the specified nodal heat source. Both Factor vs Time and Factor vs Temperature tables can be assigned.

## Syntax

```
long St7SetNodeHeatSourceTables(long uID, long NodeNum,  
long CaseNum, long* Tables)
```

## Input Parameters

uID

Strand7 model file ID number.

---

NodeNum

The specified node number.

CaseNum

The specified load case number.

Tables [0..1]

[0] - Factor vs Time table ID associated with the heat source for the specified node, use zero for none.

[1] - Factor vs Temperature table ID associated with the heat source for the specified node, use zero for none.

## Errors

```
ERR7_APINotInitialised, ERR7_APINotLicensed,  
ERR7_DataNotFound, ERR7_FileNotOpen,  
ERR7_InvalidAttributeType, ERR7_InvalidEntity,  
ERR7_InvalidEntityNumber, ERR7_InvalidFileUnit,  
ERR7_InvalidFreedomCase, ERR7_InvalidLoadCase,  
ERR7_InvalidLoadID, ERR7_InvalidTableType,  
ERR7_InvalidUCSID, ERR7_NoError, ERR7_ResultFileIsOpen,  
ERR7_TableDoesNotExist
```

## St7SetNodeInitialVelocity3

---

### Description

Sets the initial Global Cartesian velocity components for the specified node. These initial conditions are used when performing transient dynamic analysis.

### Syntax

```
long St7SetNodeInitialVelocity3(long uID, long NodeNum,  
                               long CaseNum, double* Doubles)
```

### Input Parameters

uID

Strand7 model file ID number.

NodeNum

The specified node number.

CaseNum

The specified load case number.

Doubles [0..2]

A 3 element array describing the initial velocity components for the specified node. Doubles [i-1] describes the initial velocity for the  $i^{\text{th}}$  translational DoF according to the XYZ Cartesian axis convention.

## Errors

ERR7\_APINotInitialised, ERR7\_APINotLicensed,  
ERR7\_FileNotOpen, ERR7\_InvalidEntityNumber,  
ERR7\_InvalidFileUnit, ERR7\_InvalidFreedomCase,  
ERR7\_InvalidLoadCase, ERR7\_InvalidUCSID, ERR7\_NoError,  
ERR7\_ResultFileIsOpen

## St7SetNodeAcceleration3

---

### Description

Sets the Global Cartesian acceleration components at the specified node. These acceleration values are not used as initial conditions when performing transient analysis, they are used to generate body forces when acting on masses.

### Syntax

```
long St7SetNodeAcceleration3(long uID, long NodeNum, long  
CaseNum, double* Doubles)
```

### Input Parameters

uID

Strand7 model file ID number.

NodeNum

The specified node number.

CaseNum

The specified load case number.

Doubles [0..2]

A 3 element array describing the acceleration components of the specified node. Doubles [i-1] describes the acceleration for the  $i^{\text{th}}$  translational DoF according to the XYZ Cartesian axis convention.

---

## Errors

```
ERR7_APINotInitialised, ERR7_APINotLicensed,  
ERR7_FileNotOpen, ERR7_InvalidEntityNumber,  
ERR7_InvalidFileUnit, ERR7_InvalidFreedomCase,  
ERR7_InvalidLoadCase, ERR7_InvalidUCSID, ERR7_NoError,  
ERR7_ResultFileIsOpen
```

---

## St7SetNodeResponse

### Description

Assigns a response variable to the specified node. Response variables are only used by the Load Influence Solver.

### Syntax

```
long St7SetNodeResponse(long uID, long NodeNum, long  
CaseNum, long ResponseType, long UCSId, long* Status)
```

### Input Parameters

uID

Strand7 model file ID number.

NodeNum

The specified node number.

CaseNum

The specified load case number.

ResponseType

Type of response variable, either reNodeDisplacement or reNodeReaction.

UCSID

The ID number for the specified UCS.

Status [0..5]

A 6 element array describing the active DoFs for the response variable in the UCS axis system. Each element may be set to btTrue or btFalse to enable or disable the corresponding DoF.

## Errors

```
ERR7_APINotInitialised, ERR7_APINotLicensed,  
ERR7_DataNotFound, ERR7_FileNotOpen, ERR7_InvalidBeamEnd,  
ERR7_InvalidEntityNumber, ERR7_InvalidFileUnit,  
ERR7_InvalidLoadCase, ERR7_InvalidResponseType,  
ERR7_NoError, ERR7_ResultFileIsOpen
```

---

## Nodal Attributes – Get

### St7GetNodeID

---

#### Description

Returns the ID number assigned to the specified node.

#### Syntax

```
long St7GetNodeID(long uID, long NodeNum, long* NodeID)
```

#### Input Parameters

uID

Strand7 model file ID number.

NodeNum

The specified node number.

#### Output Parameters

NodeID

The ID number for the specified node.

#### Errors

```
ERR7_APINotInitialised, ERR7_APINotLicensed,  
ERR7_FileNotOpen, ERR7_InvalidEntityNumber,  
ERR7_InvalidFileUnit, ERR7_NoError, ERR7_ResultFileIsOpen
```

### St7GetNodeRestraint6

---

#### Description

Returns the restraint conditions assigned to the specified node. The UCS in which these restraints were applied is also returned.

#### Syntax

```
long St7GetNodeRestraint6(long uID, long NodeNum, long  
CaseNum, long* UCSId, long* Status, double* Doubles)
```

#### Input Parameters

uID

Strand7 model file ID number.

NodeNum

Node number.

CaseNum

Freedom case number.

### **Output Parameters**

UCSID

UCS ID number.

Status [0..5]

A 6 element array describing the restraint conditions for the six DoF at the specified node. Status[i-1] = btTrue indicates that the i<sup>th</sup> DoF is restrained. The DoF are restrained according to the 123456 axis convention in the specified UCS.

Doubles [0..5]

A 6 element array describing the enforced displacement conditions for the six DoF at the specified node. Doubles[i-1] describes the displacement of the i<sup>th</sup> DoF according to the 123456 axis convention in the specified UCS.

### **Errors**

ERR7\_APINotInitialised, ERR7\_APINotLicensed,  
ERR7\_DataNotFound, ERR7\_FileNotOpen,  
ERR7\_InvalidAttributeType, ERR7\_InvalidEntity,  
ERR7\_InvalidEntityNumber, ERR7\_InvalidFileUnit,  
ERR7\_InvalidFreedomCase, ERR7\_InvalidLoadCase,  
ERR7\_InvalidLoadID, ERR7\_NoError, ERR7\_ResultFileIsOpen

## **St7GetNodeForce3**

---

### **Description**

Returns the point force applied to the specified node in the Global Cartesian Coordinate system.

### **Syntax**

```
long St7GetNodeForce3(long uID, long NodeNum, long CaseNum,  
double* Doubles)
```

---

## **Input Parameters**

uID

Strand7 model file ID number.

NodeNum

The specified node number.

CaseNum

The specified load case number.

## **Output Parameters**

Doubles[0..2]

A 3 element array describing the nodal force in the XYZ Cartesian coordinate system for the specified node.

## **Errors**

ERR7\_APINotInitialised, ERR7\_APINotLicensed,  
ERR7\_DataNotFound, ERR7\_FileNotOpen,  
ERR7\_InvalidAttributeType, ERR7\_InvalidEntity,  
ERR7\_InvalidEntityNumber, ERR7\_InvalidFileUnit,  
ERR7\_InvalidFreedomCase, ERR7\_InvalidLoadCase,  
ERR7\_InvalidLoadID, ERR7\_NoError, ERR7\_ResultFileIsOpen

---

## **St7GetNodeMoment3**

### **Description**

Returns the point moment applied at the specified node in the Global Cartesian Coordinate system.

### **Syntax**

```
long St7GetNodeMoment3(long uID, long NodeNum, long CaseNum,  
double* Doubles)
```

## **Input Parameters**

uID

Strand7 model file ID number.

NodeNum

The specified node number.

CaseNum

The specified load case number.

### Output Parameters

Doubles [0..2]

A 3 element array describing the nodal moments about the XYZ Cartesian coordinate system for the specified node.

### Errors

ERR7\_APINotInitialised, ERR7\_APINotLicensed,  
ERR7\_DataNotFound, ERR7\_FileNotOpen,  
ERR7\_InvalidAttributeType, ERR7\_InvalidEntity,  
ERR7\_InvalidEntityNumber, ERR7\_InvalidFileUnit,  
ERR7\_InvalidFreedomCase, ERR7\_InvalidLoadCase,  
ERR7\_InvalidLoadID, ERR7\_NoError, ERR7\_ResultFileIsOpen

## St7GetNodeTemperature1

---

### Description

Returns the temperature value applied at the specified node.

### Syntax

```
long St7GetNodeTemperature1(long uID, long NodeNum, long  
CaseNum, double* Doubles)
```

### Input Parameters

uID

Strand7 model file ID number.

NodeNum

The specified node number.

CaseNum

The specified load case number.

### Output Parameters

Doubles [0]

The nodal temperature value at the specified node.

---

## Errors

```
ERR7_APINotInitialised, ERR7_APINotLicensed,  
ERR7_DataNotFound, ERR7_FileNotOpen,  
ERR7_InvalidAttributeType, ERR7_InvalidEntity,  
ERR7_InvalidEntityNumber, ERR7_InvalidFileUnit,  
ERR7_InvalidFreedomCase, ERR7_InvalidLoadCase,  
ERR7_InvalidLoadID, ERR7_NoError, ERR7_ResultFileIsOpen
```

---

# St7GetNodeTemperatureType1

## Description

Returns the temperature type assigned at the specified node.

## Syntax

```
long St7GetNodeTemperatureType1(long uID, long NodeNum,  
                                long CaseNum, long* tType)
```

## Input Parameters

uID

Strand7 model file ID number.

NodeNum

The specified node number.

CaseNum

The specified load case number.

## Output Parameters

tType

The type of temperature attribute applied at the specified node, one of tReferenceTemperature, tFixedTemperature, tInitialTemperature or tTableTemperature. Use St7GetNodeTemperatureTable to return the table.

## Errors

```
ERR7_APINotInitialised, ERR7_APINotLicensed,  
ERR7_DataNotFound, ERR7_FileNotOpen,  
ERR7_InvalidAttributeType, ERR7_InvalidEntity,  
ERR7_InvalidEntityNumber, ERR7_InvalidFileUnit,  
ERR7_InvalidFreedomCase, ERR7_InvalidLoadCase,  
ERR7_InvalidLoadID, ERR7_NoError, ERR7_ResultFileIsOpen
```

## St7GetNodeTemperatureTable

---

### Description

Returns the table associated with the temperature at the specified node.

### Syntax

```
long St7GetNodeTemperatureTable(long uID, long NodeNum,  
                                long CaseNum, long* TableID)
```

### Input Parameters

uID

Strand7 model file ID number.

NodeNum

The specified node number.

CaseNum

The specified load case number.

### Output Parameters

TableID

The ID number of the table associated with the temperature attribute for the specified node, zero for none.

### Errors

```
ERR7_APINotInitialised, ERR7_APINotLicensed,  
ERR7_DataNotFound, ERR7_FileNotOpen,  
ERR7_InvalidAttributeType, ERR7_InvalidEntity,  
ERR7_InvalidEntityNumber, ERR7_InvalidFileUnit,  
ERR7_InvalidFreedomCase, ERR7_InvalidLoadCase,  
ERR7_InvalidLoadID, ERR7_NoError, ERR7_ResultFileIsOpen
```

## St7GetNodeKTranslation3F

---

### Description

Returns the translational stiffness components assigned to the specified node.

### Syntax

```
long St7GetNodeKTranslation3F(long uID, long NodeNum, long  
                                CaseNum, long* UCSId, double* Doubles)
```

---

## **Input Parameters**

uID

Strand7 model file ID number.

NodeNum

The specified node number.

CaseNum

The specified freedom case number.

## **Output Parameters**

UCSId

The ID number of the specified UCS.

Doubles [0..2]

A 3 element array describing the translational stiffnesses for the specified node. Doubles [i-1] describes the stiffness for the  $i^{\text{th}}$  translational DoF according to the 123 axis definition in the specified UCS.

## **Errors**

ERR7\_APINotInitialised, ERR7\_APINotLicensed,  
ERR7\_DataNotFound, ERR7\_FileNotOpen,  
ERR7\_InvalidAttributeType, ERR7\_InvalidEntity,  
ERR7\_InvalidEntityNumber, ERR7\_InvalidFileUnit,  
ERR7\_InvalidFreedomCase, ERR7\_InvalidLoadCase,  
ERR7\_InvalidLoadID, ERR7\_NoError, ERR7\_ResultFileIsOpen

---

# **St7GetNodeKRotation3F**

## **Description**

Returns the rotational stiffness components assigned to the specified node.

## **Syntax**

```
long St7GetNodeKRotation3F(long uID, long NodeNum, long  
CaseNum, long* UCSId, double* Doubles)
```

## **Input Parameters**

uID

Strand7 model file ID number.

NodeNum

The specified node number.

CaseNum

The specified freedom case number.

## Output Parameters

UCSID

The ID number of the specified UCS.

Doubles [0..2]

A 3 element array describing the rotational stiffnesses for the specified node.

Doubles [i-1] describes the stiffness for the i<sup>th</sup> rotational DoF according to the 456 axis definition in the specified UCS.

## Errors

```
ERR7_APINotInitialised, ERR7_APINotLicensed,  
ERR7_DataNotFound, ERR7_FileNotOpen,  
ERR7_InvalidAttributeType, ERR7_InvalidEntity,  
ERR7_InvalidEntityNumber, ERR7_InvalidFileUnit,  
ERR7_InvalidFreedomCase, ERR7_InvalidLoadCase,  
ERR7_InvalidLoadID, ERR7_NoError, ERR7_ResultFileIsOpen
```

# St7GetNodeTMass3

---

## Description

Returns the translational mass components assigned to the specified node.  
Translational masses are active for all load and freedom cases.

## Syntax

```
long St7GetNodeTMass3(long uID, long NodeNum, double*  
Doubles)
```

## Input Parameters

uID

Strand7 model file ID number.

NodeNum

The specified node number.

---

## Output Parameters

Doubles [0..2]

A 3 element array describing the translational mass for the specified node.  
Doubles [i-1] describes the translational mass for the i<sup>th</sup> translational DoF according to the XYZ Cartesian axis convention.

## Errors

```
ERR7_APINotInitialised, ERR7_APINotLicensed,  
ERR7_DataNotFound, ERR7_FileNotOpen,  
ERR7_InvalidAttributeType, ERR7_InvalidEntity,  
ERR7_InvalidEntityNumber, ERR7_InvalidFileUnit,  
ERR7_InvalidFreedomCase, ERR7_InvalidLoadCase,  
ERR7_InvalidLoadID, ERR7_NoError, ERR7_ResultFileIsOpen
```

# St7GetNodeRMass3

---

## Description

Returns the rotational mass components assigned to the specified node.  
Rotational masses are active for all load and freedom cases.

## Syntax

```
long St7GetNodeRMass3(long uID, long NodeNum, long* UCSId,  
                      double* Doubles)
```

## Input Parameters

uID

Strand7 model file ID number.

NodeNum

The specified node number.

## Output Parameters

UCSId

The ID number of the specified UCS.

Doubles [0..2]

A 3 element array describing the rotational mass for the specified node.  
Doubles [i-1] describes the rotational mass for the i<sup>th</sup> rotational DoF according to the 456 axis convention in the specified UCS.

## Errors

```
ERR7_APINotInitialised, ERR7_APINotLicensed,  
ERR7_DataNotFound, ERR7_FileNotOpen,  
ERR7_InvalidAttributeType, ERR7_InvalidEntity,  
ERR7_InvalidEntityNumber, ERR7_InvalidFileUnit,  
ERR7_InvalidFreedomCase, ERR7_InvalidLoadCase,  
ERR7_InvalidLoadID, ERR7_NoError, ERR7_ResultFileIsOpen
```

## St7GetNodeNSMass5

---

### Description

Returns the non-structural mass components assigned to the specified node. Unlike translational and rotational masses, non-structural mass can include an offset in addition to a dynamic scaling factor that controls the contribution when performing transient or frequency based dynamic analysis. Non-structural masses are active for all freedom cases.

### Syntax

```
long St7GetNodeNSMass5(long uID, long NodeNum, long CaseNum,  
double* Doubles)
```

### Input Parameters

uID

Strand7 model file ID number.

NodeNum

The specified node number.

CaseNum

The specified load case number.

### Output Parameters

Doubles[0..4]

[0] - The non-structural mass at the specified node.

[1] - The dynamic factor at the specified node. This factor is used to scale the non-structural mass when performing dynamic analysis.

[2..4] - A 3 element array describing the offset in the XYZ Cartesian coordinate system.

---

## Errors

```
ERR7_APINotInitialised, ERR7_APINotLicensed,  
ERR7_DataNotFound, ERR7_FileNotOpen,  
ERR7_InvalidAttributeType, ERR7_InvalidEntity,  
ERR7_InvalidEntityNumber, ERR7_InvalidFileUnit,  
ERR7_InvalidFreedomCase, ERR7_InvalidLoadCase,  
ERR7_InvalidLoadID, ERR7_NoError, ERR7_ResultFileIsOpen
```

---

# St7getNodeKDamping3F

---

## Description

Returns the translational damping coefficients assigned at the specified node.

## Syntax

```
long St7getNodeKDamping3F(long uID, long NodeNum, long  
CaseNum, long* UCSId, double* Doubles)
```

## Input Parameters

uID

Strand7 model file ID number.

NodeNum

The node number.

CaseNum

The load case number.

## Output Parameters

UCSId

The UCS ID number.

Doubles[0..2]

A 3 element array describing the damping factors for the specified node.

Doubles[i-1] describes the damping factor for the  $i^{\text{th}}$  translational DoF according to the 123 axis definition in the specified UCS.

## Errors

```
ERR7_APINotInitialised, ERR7_APINotLicensed,  
ERR7_DataNotFound, ERR7_FileNotOpen,  
ERR7_InvalidAttributeType, ERR7_InvalidEntity,
```

```
ERR7_InvalidEntityNumber, ERR7_InvalidFileUnit,  
ERR7_InvalidFreedomCase, ERR7_InvalidLoadCase,  
ERR7_InvalidLoadID, ERR7_NoError, ERR7_ResultFileIsOpen
```

## St7GetNodeHeatSource1

---

### Description

Returns the heat source assigned at the specified node.

### Syntax

```
long St7GetNodeHeatSource1(long uID, long NodeNum, long  
CaseNum, double* Doubles)
```

### Input Parameters

uID

Strand7 model file ID number.

NodeNum

The node number.

CaseNum

The load case number.

### Output Parameters

Doubles[0]

The heat source value for the specified node.

### Errors

```
ERR7_APINotInitialised, ERR7_APINotLicensed,  
ERR7_DataNotFound, ERR7_FileNotOpen,  
ERR7_InvalidAttributeType, ERR7_InvalidEntity,  
ERR7_InvalidEntityNumber, ERR7_InvalidFileUnit,  
ERR7_InvalidFreedomCase, ERR7_InvalidLoadCase,  
ERR7_InvalidLoadID, ERR7_NoError, ERR7_ResultFileIsOpen
```

---

# St7GetNodeHeatSourceTables

---

## Description

Returns the tables associated with the heat source at the specified node. Both Factor vs Time and Factor vs Temperature tables can be defined.

## Syntax

```
long St7GetNodeHeatSourceTables(long uID, long NodeNum,  
                                long CaseNum, long* Tables)
```

## Input Parameters

uID

Strand7 model file ID number.

NodeNum

The node number.

CaseNum

The load case number.

## Output Parameters

Tables [0..1]

[0] - Factor vs Time table ID associated with the heat source for the specified node, use zero for none.

[1] - Factor vs Temperature table ID associated with the heat source for the specified node, use zero for none.

## Errors

```
ERR7_APINotInitialised, ERR7_APINotLicensed,  
ERR7_DataNotFound, ERR7_FileNotOpen,  
ERR7_InvalidAttributeType, ERR7_InvalidEntity,  
ERR7_InvalidEntityNumber, ERR7_InvalidFileUnit,  
ERR7_InvalidFreedomCase, ERR7_InvalidLoadCase,  
ERR7_InvalidLoadID, ERR7_NoError, ERR7_ResultFileIsOpen
```

## St7GetNodeInitialVelocity3

---

### Description

Returns the initial velocity components assigned at the specified node. These initial conditions are used when performing transient dynamic analysis.

### Syntax

```
long St7GetNodeInitialVelocity3(long uID, long NodeNum,  
                           long CaseNum, double* Doubles)
```

### Input Parameters

uID

Strand7 model file ID number.

NodeNum

The node number.

CaseNum

The load case number.

### Output Parameters

Doubles [0..2]

A 3 element array describing the initial velocity components for the specified node. Doubles [i-1] describes the initial velocity for the  $i^{\text{th}}$  translational DoF according to the XYZ Cartesian axis convention.

### Errors

ERR7\_APINotInitialised, ERR7\_APINotLicensed,  
ERR7\_DataNotFound, ERR7\_FileNotOpen,  
ERR7\_InvalidAttributeType, ERR7\_InvalidEntity,  
ERR7\_InvalidEntityNumber, ERR7\_InvalidFileUnit,  
ERR7\_InvalidFreedomCase, ERR7\_InvalidLoadCase,  
ERR7\_InvalidLoadID, ERR7\_NoError, ERR7\_ResultFileIsOpen

## St7GetNodeAcceleration3

---

### Description

Returns the acceleration components assigned at the specified node. These acceleration values are not used as initial conditions when performing transient analysis, they are used to generate body forces when acting on masses.

---

## Syntax

```
long St7GetNodeAcceleration3(long uID, long NodeNum, long  
CaseNum, double* Doubles)
```

## Input Parameters

uID

Strand7 model file ID number.

NodeNum

The node number.

CaseNum

The load case number.

## Output Parameters

Doubles[0..2]

A 3 element array describing the acceleration components of the specified node. Doubles [i-1] describes the acceleration for the  $i^{\text{th}}$  translational DoF according to the XYZ Cartesian axis convention.

## Errors

```
ERR7_APINotInitialised, ERR7_APINotLicensed,  
ERR7_DataNotFound, ERR7_FileNotOpen,  
ERR7_InvalidAttributeType, ERR7_InvalidEntity,  
ERR7_InvalidEntityNumber, ERR7_InvalidFileUnit,  
ERR7_InvalidFreedomCase, ERR7_InvalidLoadCase,  
ERR7_InvalidLoadID, ERR7_NoError, ERR7_ResultFileIsOpen
```

---

# St7getNodeResponse

## Description

Returns the response variable assigned at the specified node. . Response variables are only used by the Load Influence Solver.

## Syntax

```
long St7getNodeResponse(long uID, long NodeNum, long  
CaseNum, long* ResponseType, long* UCSId, long*  
Status)
```

## Input Parameters

uID

Strand7 model file ID number.

NodeNum

The node number.

CaseNum

The load case number.

## Output Parameters

ResponseType

Type of response variable, either reNodeDisplacement or reNodeReaction.

UCSId

The ID number for the specified UCS.

Status [0..5]

A 6 element array describing the active DoFs for the response variable in the UCS axis system. Each element may be set to btTrue or btFalse to enable or disable the corresponding DoF.

## Errors

ERR7\_APINotInitialised, ERR7\_APINotLicensed,  
ERR7\_DataNotFound, ERR7\_FileNotOpen, ERR7\_InvalidBeamEnd,  
ERR7\_InvalidEntityNumber, ERR7\_InvalidFileUnit,  
ERR7\_InvalidLoadCase, ERR7\_InvalidResponseType,  
ERR7\_NoError, ERR7\_ResultFileIsOpen

---

## Beam Attributes – Set

### St7SetBeamID

---

#### Description

Sets the ID number of the specified beam.

#### Syntax

```
long St7SetBeamID(long uID, long BeamNum, long BeamID)
```

#### Input Parameters

uID

Strand7 model file ID number.

BeamNum

The beam number.

BeamID

The beam ID number.

#### Errors

```
ERR7_APINotInitialised, ERR7_APINotLicensed,  
ERR7_FileNotOpen, ERR7_InvalidEntityNumber,  
ERR7_InvalidFileUnit, ERR7_NoError, ERR7_ResultFileIsOpen
```

### St7SetBeamReferenceAngle1

---

#### Description

Sets the reference angle for the specified beam. This angle controls the local rotation of the beam cross-section from the default orientation, about the beam length. See *Beam Local Coordinates* for further information.

#### Syntax

```
long St7SetBeamReferenceAngle1(long uID, long BeamNum,  
double* Doubles)
```

#### Input Parameters

uID

Strand7 model file ID number.

BeamNum

The beam number.

Doubles[0]

The reference angle used to align the beam principal axis system, see *Beam Local Coordinates*.

## Errors

ERR7\_APINotInitialised, ERR7\_APINotLicensed,  
ERR7\_FileNotOpen, ERR7\_InvalidEntityNumber,  
ERR7\_InvalidFileUnit, ERR7\_InvalidFreedomCase,  
ERR7\_InvalidLoadCase, ERR7\_InvalidUCSID, ERR7\_NoError,  
ERR7\_ResultFileIsOpen

# St7SetBeamConnectionUCS

---

## Description

Sets the UCS used in the connection element formulation at the specified beam end. The translational and rotational stiffness components are distributed according to the 123 axis convention in the specified UCS. This attribute is only applicable to beams of connection element type.

## Syntax

```
long St7SetBeamConnectionUCS(long uID, long BeamNum, long  
BeamEnd, long UCSId)
```

## Input Parameters

uID

Strand7 model file ID number.

BeamNum

The beam number.

BeamEnd

Beam end identifier, either 1 or 2.

UCSID

The UCS ID number.

---

## Errors

```
ERR7_APINotInitialised, ERR7_APINotLicensed,  
ERR7_FileNotOpen, ERR7_InvalidEntityNumber,  
ERR7_InvalidFileUnit, ERR7_InvalidFreedomCase,  
ERR7_InvalidLoadCase, ERR7_InvalidUCSID, ERR7_NoError,  
ERR7_ResultFileIsOpen
```

---

## St7SetBeamTaper2

### Description

Sets the taper properties for the specified beam.

### Syntax

```
long St7SetBeamTaper2(long uID, long BeamNum, long  
TaperAxis, long TaperType, double* Doubles)
```

### Input Parameters

uID

Strand7 model file ID number.

BeamNum

The beam number.

TaperAxis

The local beam axis to be tapered: axLocalX or axLocalY. See *Beam Local Coordinates* for further information.

TaperType

The type of beam taper; one of btTop, btSymm or btBottom.

Doubles[0..1]

A 2 element array that specifies the taper ratios at either beam end. The dimension of the beam section is scaled by this value to calculate the tapered shape.

### Errors

```
ERR7_APINotInitialised, ERR7_APINotLicensed,  
ERR7_FileNotOpen, ERR7_InvalidEntityNumber,  
ERR7_InvalidFileUnit, ERR7_InvalidFreedomCase,
```

```
ERR7_InvalidLoadCase, ERR7_InvalidUCSID, ERR7_NoError,  
ERR7_ResultFileIsOpen
```

## St7SetBeamOffset2

---

### Description

Sets the offsets for the specified beam.

### Syntax

```
long St7SetBeamOffset2(long uID, long BeamNum, double*  
                      Doubles)
```

### Input Parameters

uID

Strand7 model file ID number.

BeamNum

The beam number.

Doubles [0..1]

A 2 element array describing the beam offsets. Doubles [i-1] describes the offset in the *i*<sup>th</sup> principal axis direction, see *Beam Local Coordinates*.

### Errors

```
ERR7_APINotInitialised, ERR7_APINotLicensed,  
ERR7_FileNotOpen, ERR7_InvalidEntityNumber,  
ERR7_InvalidFileUnit, ERR7_InvalidFreedomCase,  
ERR7_InvalidLoadCase, ERR7_InvalidTaperAxis,  
ERR7_InvalidTaperRatio, ERR7_InvalidTaperType,  
ERR7_InvalidUCSID, ERR7_NoError, ERR7_ResultFileIsOpen
```

## St7SetBeamSupport2F

---

### Description

Sets the elastic support value assigned to the specified beam.

### Syntax

```
long St7SetBeamSupport2F(long uID, long BeamNum, long  
                        CaseNum, long Status, double* Doubles)
```

---

## **Input Parameters**

uID

Strand7 model file ID number.

BeamNum

The beam number.

CaseNum

The freedom case number.

Status

Compression-only flag, either btTrue or btFalse.

Doubles [0..1]

A 2 element array describing the elastic support conditions for the specified beam. Doubles [i-1] describes the elastic support in the i<sup>th</sup> principal axis direction, see *Beam Local Coordinates*.

## **Errors**

ERR7\_APINotInitialised, ERR7\_APINotLicensed,  
ERR7\_FileNotOpen, ERR7\_InvalidEntityNumber,  
ERR7\_InvalidFileUnit, ERR7\_InvalidFreedomCase,  
ERR7\_InvalidLoadCase, ERR7\_InvalidUCSID, ERR7\_NoError,  
ERR7\_ResultFileIsOpen

---

# **St7SetBeamSectionFactor7**

## **Description**

Sets the beam section factors for the specified beam. These factors are used to scale the beam section data contained in the associated beam property.

## **Syntax**

```
long St7SetBeamSectionFactor7(long uID, long BeamNum,  
                           double* Doubles)
```

## **Input Parameters**

uID

Strand7 model file ID number.

BeamNum

The beam number.

Doubles [0..6]

[0] - 1-axis shear stiffness factor.

[1] - 2-axis shear stiffness factor.

[2] - Axial stiffness factor.

[3] - 1-axis bending stiffness factor.

[4] - 2-axis bending stiffness factor.

[5] - Torsional stiffness factor.

[6] - Mass factor.

## Errors

```
ERR7_APINotInitialised, ERR7_APINotLicensed,  
ERR7_FileNotOpen, ERR7_InvalidEntityNumber,  
ERR7_InvalidFileUnit, ERR7_InvalidFreedomCase,  
ERR7_InvalidLoadCase, ERR7_InvalidUCSID, ERR7_NoError,  
ERR7_ResultFileIsOpen
```

## St7SetBeamTRelease3

---

### Description

Sets the translational end release conditions at the specified beam.

### Syntax

```
long St7SetBeamTRelease3(long uID, long BeamNum, long  
BeamEnd, long* Status, double* Doubles)
```

### Input Parameters

uID

Strand7 model file ID number.

BeamNum

The beam number.

BeamEnd

Beam end identifier, either 1 or 2.

---

Status[0..2]

Status[i-1] - describes the release conditions of the specified beam end for the i<sup>th</sup> principal axis direction, see *Beam Local Coordinates* – one of kBeamEndRelReleased, kBeamEndRelFixed or kBeamEndRelPartial.

Doubles[0..2]

A 3 element array containing the partial stiffnesses to be used in the case of partial end release conditions.

## Errors

ERR7\_APINotInitialised, ERR7\_APINotLicensed,  
ERR7\_FileNotOpen, ERR7\_InvalidBeamEnd,  
ERR7\_InvalidEntityNumber, ERR7\_InvalidFileUnit,  
ERR7\_InvalidFreedomCase, ERR7\_InvalidLoadCase,  
ERR7\_InvalidUCSID, ERR7\_NoError, ERR7\_ResultFileIsOpen

# St7SetBeamRRelease3

---

## Description

Sets the rotational end release conditions at the specified beam.

## Syntax

```
long St7SetBeamRRelease3(long uID, long BeamNum, long  
BeamEnd, long* Status, double* Doubles)
```

## Input Parameters

uID

Strand7 model file ID number.

BeamNum

The beam number.

BeamEnd

Beam end identifier, either 1 or 2.

Status[0..2]

Status[i-1] describes the release conditions of the specified beam end for the i<sup>th</sup> principal axis direction, see *Beam Local Coordinates* – one of kBeamEndRelReleased, kBeamEndRelFixed or kBeamEndRelPartial.

Doubles [0..2]

A 3 element array containing the partial stiffnesses to be used in the case of partial end release conditions.

### Errors

ERR7\_APINotInitialised, ERR7\_APINotLicensed,  
ERR7\_FileNotOpen, ERR7\_InvalidBeamEnd,  
ERR7\_InvalidEntityNumber, ERR7\_InvalidFileUnit,  
ERR7\_InvalidFreedomCase, ERR7\_InvalidLoadCase,  
ERR7\_InvalidUCSID, ERR7\_NoError, ERR7\_ResultFileIsOpen

## St7SetBeamCableFreeLength1

---

### Description

Sets the free cable length for the specified beam. This is the unstressed cable length and is only active for beam of type cable.

### Syntax

```
long St7SetBeamCableFreeLength1(long uID, long BeamNum,  
                               double* Doubles)
```

### Input Parameters

uID

Strand7 model file ID number.

BeamNum

The beam number.

Doubles [0]

The free cable length.

### Errors

ERR7\_APINotInitialised, ERR7\_APINotLicensed,  
ERR7\_FileNotOpen, ERR7\_InvalidEntityNumber,  
ERR7\_InvalidFileUnit, ERR7\_InvalidFreedomCase,  
ERR7\_InvalidLoadCase, ERR7\_InvalidUCSID, ERR7\_NoError,  
ERR7\_ResultFileIsOpen

---

## St7SetBeamRadius1

---

### Description

Sets the bend radius of the specified beam. This attribute is only active for beams of type pipe.

### Syntax

```
long St7SetBeamRadius1(long uID, long BeamNum, long BeamDir,  
double* Doubles)
```

### Input Parameters

uID

Strand7 model file ID number.

BeamNum

The beam number.

BeamDir

The axis of the bend: axPrincipal1 or axPrincipal2. The beam will be bent in the axis direction specified, not about the axis, see *Beam Local Coordinates*.

Doubles [0]

The radius of curvature of the bend.

### Errors

```
ERR7_APINotInitialised, ERR7_APINotLicensed,  
ERR7_FileNotOpen, ERR7_InvalidBeamDir,  
ERR7_InvalidEntityNumber, ERR7_InvalidFileUnit,  
ERR7_InvalidFreedomCase, ERR7_InvalidLoadCase,  
ERR7_InvalidUCSID, ERR7_NoError, ERR7_ResultFileIsOpen
```

---

## St7SetPipePressure2AF

---

### Description

Sets the internal and external pipe pressure for the specified beam. This attribute is only active for beam of type pipe.

### Syntax

```
long St7SetPipePressure2AF(long uID, long BeamNum, long  
CaseNum, long Status, double* Doubles)
```

## Input Parameters

uID

Strand7 model file ID number.

BeamNum

The beam number.

CaseNum

The load case number.

Status

Model a pipe with closed ends: btTrue or btFalse. An additional force component is assigned at the beam ends to account for the pressure acting on a close-ended pipe.

Doubles[0..1]

A 2 element array describing the inner and outer radial pressures acting on the element surface respectively.

## Errors

ERR7\_APINotInitialised, ERR7\_APINotLicensed,  
ERR7\_FileNotOpen, ERR7\_InvalidEntityNumber,  
ERR7\_InvalidFileUnit, ERR7\_InvalidFreedomCase,  
ERR7\_InvalidLoadCase, ERR7\_InvalidUCSID, ERR7\_NoError,  
ERR7\_ResultFileIsOpen

# St7SetPipeTemperature2OT

---

## Description

Sets the internal and external pipe temperatures for the specified beam. This attribute is only active for beams of type pipe.

## Syntax

```
long St7SetPipeTemperature2OT(long uID, long BeamNum, long  
CaseNum, long Status, double* Doubles)
```

## Input Parameters

uID

Strand7 model file ID number.

---

BeamNum

The beam number.

CaseNum

The load case number.

Status

Set the external temperature equal to the nodal temperatures at each end:  
btTrue or btFalse. In the case of unequal end temperatures the average  
temperature is used.

Doubles[0..1]

A 2 element array describing the inner and outer surface temperatures  
respectively.

## Errors

ERR7\_APINotInitialised, ERR7\_APINotLicensed,  
ERR7\_FileNotOpen, ERR7\_InvalidEntityNumber,  
ERR7\_InvalidFileUnit, ERR7\_InvalidFreedomCase,  
ERR7\_InvalidLoadCase, ERR7\_InvalidUCSID, ERR7\_NoError,  
ERR7\_ResultFileIsOpen

# St7SetBeamStringGroup1

---

## Description

Assigns the specified beam to a string group. The string group attribute is only active for truss elements and will ensure that the axial force in all members is equal.

## Syntax

```
long St7SetBeamStringGroup1(long uID, long BeamNum, long  
StringID)
```

## Input Parameters

uID

Strand7 model file ID number.

BeamNum

The beam number.

StringID

The ID number of the string group.

### Errors

```
ERR7_APINotInitialised, ERR7_APINotLicensed,  
ERR7_FileNotOpen, ERR7_InvalidEntityNumber,  
ERR7_InvalidFileUnit, ERR7_InvalidFreedomCase,  
ERR7_InvalidLoadCase, ERR7_InvalidStringID,  
ERR7_InvalidUCSID, ERR7_NoError, ERR7_ResultFileIsOpen
```

## St7SetBeamPreLoad1

---

### Description

Sets the pre-load conditions for the specified beam.

### Syntax

```
long St7SetBeamPreLoad1(long uID, long BeamNum, long  
CaseNum, long LoadType, double* Doubles)
```

### Input Parameters

uID

Strand7 model file ID number.

BeamNum

The beam number.

CaseNum

The load case number.

LoadType

The type of pre-load, plBeamPreTension or plBeamPreStrain.

Doubles [0]

The pre-load value.

### Errors

```
ERR7_APINotInitialised, ERR7_APINotLicensed,  
ERR7_FileNotOpen, ERR7_InvalidEntityNumber,  
ERR7_InvalidFileUnit, ERR7_InvalidFreedomCase,  
ERR7_InvalidLoadCase, ERR7_InvalidPreLoadType,  
ERR7_InvalidUCSID, ERR7_NoError, ERR7_ResultFileIsOpen
```

---

## St7SetBeamTempGradient2

---

### Description

Sets the temperature gradient for the specified beam.

### Syntax

```
long St7SetBeamTempGradient2(long uID, long BeamNum, long  
CaseNum, double* Doubles)
```

### Input Parameters

uID

Strand7 model file ID number.

BeamNum

The beam number.

CaseNum

The load case number.

Doubles[0..1]

A 2 element array describing the temperature gradient in the 1-axis and 2-axis directions in the beam principal axis system, see *Beam Local Coordinates*.

### Errors

```
ERR7_APINotInitialised, ERR7_APINotLicensed,  
ERR7_FileNotOpen, ERR7_InvalidEntityNumber,  
ERR7_InvalidFileUnit, ERR7_InvalidFreedomCase,  
ERR7_InvalidLoadCase, ERR7_InvalidUCSID, ERR7_NoError,  
ERR7_ResultFileIsOpen
```

---

## St7SetBeamCFL4ID

---

### Description

Assigns point force data for the specified beam element. The force is applied according to the beam principal axis system.

### Syntax

```
long St7SetBeamCFL4ID(long uID, long BeamNum, long CaseNum,  
long ID, double* Doubles)
```

## Input Parameters

uID

Strand7 model file ID number.

BeamNum

Beam number.

CaseNum

Load case number.

ID

Point force ID number.

Doubles [0..3]

[0..2] - The force components in the beam principal axis system.

[3] - The relative length position at which the force is applied, see *Beam Local Coordinates*.

## Errors

ERR7\_APINotInitialised, ERR7\_APINotLicensed,  
ERR7\_FileNotOpen, ERR7\_InvalidBeamPosition,  
ERR7\_InvalidEntityNumber, ERR7\_InvalidFileUnit,  
ERR7\_InvalidFreedomCase, ERR7\_InvalidLoadCase,  
ERR7\_InvalidLoadID, ERR7\_InvalidUCSID, ERR7\_NoError,  
ERR7\_ResultFileIsOpen

# St7SetBeamCFG4ID

---

## Description

Assigns point force data for the specified beam element. The force is applied according to the Global Cartesian Coordinate system.

## Syntax

```
long St7SetBeamCFG4ID(long uID, long BeamNum, long CaseNum,  
                      long ID, double* Doubles)
```

## Input Parameters

uID

Strand7 model file ID number.

---

BeamNum

Beam number.

CaseNum

Load case number.

ID

Point force ID number.

Doubles[0..3]

[0..2] - The force components in the Global Cartesian Coordinate system.

[3] - The relative length position at which the force is applied, see *Beam Local Coordinates*.

## Errors

ERR7\_APINotInitialised, ERR7\_APINotLicensed,  
ERR7\_FileNotOpen, ERR7\_InvalidBeamPosition,  
ERR7\_InvalidEntityNumber, ERR7\_InvalidFileUnit,  
ERR7\_InvalidFreedomCase, ERR7\_InvalidLoadCase,  
ERR7\_InvalidLoadID, ERR7\_InvalidUCSID, ERR7\_NoError,  
ERR7\_ResultFileIsOpen

# St7SetBeamCML4ID

---

## Description

Assigns point moment data for the specified beam element. The moment is applied according to the beam principal axis system.

## Syntax

```
long St7SetBeamCML4ID(long uID, long BeamNum, long CaseNum,  
                      long ID, double* Doubles)
```

## Input Parameters

uID

Strand7 model file ID number.

BeamNum

Beam number.

CaseNum

Load case number.

ID

Point moment ID number.

Doubles[0..3]

[0..2] - The moment components in the beam principal axis system.

[3] - The relative length position at which the moment is applied, see *Beam Local Coordinates*.

## Errors

ERR7\_APINotInitialised, ERR7\_APINotLicensed,  
ERR7\_FileNotOpen, ERR7\_InvalidBeamPosition,  
ERR7\_InvalidEntityNumber, ERR7\_InvalidFileUnit,  
ERR7\_InvalidFreedomCase, ERR7\_InvalidLoadCase,  
ERR7\_InvalidLoadID, ERR7\_InvalidUCSID, ERR7\_NoError,  
ERR7\_ResultFileIsOpen

## St7SetBeamCMG4ID

---

### Description

Assigns point moment data for the specified beam element. The moment is applied according to the Global Cartesian Coordinate system.

### Syntax

```
long St7SetBeamCMG4ID(long uID, long BeamNum, long CaseNum,  
                      long ID, double* Doubles)
```

### Input Parameters

uID

Strand7 model file ID number.

BeamNum

Beam number.

CaseNum

Load case number.

ID

Point moment ID number.

---

Doubles[0..3]

[0..2] - The moment components in the Global Cartesian Coordinate system.

[3] - The relative length position at which the moment is applied, see *Beam Local Coordinates*.

## Errors

ERR7\_APINotInitialised, ERR7\_APINotLicensed,  
ERR7\_FileNotOpen, ERR7\_InvalidBeamPosition,  
ERR7\_InvalidEntityNumber, ERR7\_InvalidFileUnit,  
ERR7\_InvalidFreedomCase, ERR7\_InvalidLoadCase,  
ERR7\_InvalidLoadID, ERR7\_InvalidUCSID, ERR7\_NoError,  
ERR7\_ResultFileIsOpen

# St7SetBeamDLL6ID

---

## Description

Assigns distributed load data for the specified beam element. The force is applied according to the beam principal axis system.

## Syntax

```
long St7SetBeamDLL6ID(long uID, long BeamNum, long BeamDir,  
                      long CaseNum, long DLType, long ID, double* Doubles)
```

## Input Parameters

uID

Strand7 model file ID number.

BeamNum

Beam number.

BeamDir

Principal axis direction, either 1, 2 or 3, see *Beam Local Coordinates*.

CaseNum

Load case number.

DLType

Distributed load type, one of kConstantDL, kLinearDL, kTriangularDL, kThreePoint0DL, kThreePoint1DL or kTrapezoidalDL.

ID

Distributed load ID number.

Doubles[0..5]

A 6 element array describing the distributed load. See *Beam Distribution Types* for additional information.

## Errors

```
ERR7_APINotInitialised, ERR7_APINotLicensed,  
ERR7_FileNotOpen, ERR7_InvalidBeamDir,  
ERR7_InvalidBeamLoadType, ERR7_InvalidBeamPosition,  
ERR7_InvalidEntityNumber, ERR7_InvalidFileUnit,  
ERR7_InvalidFreedomCase, ERR7_InvalidLoadCase,  
ERR7_InvalidLoadID, ERR7_InvalidUCSID, ERR7_NoError,  
ERR7_ResultFileIsOpen
```

## St7SetBeamDML6ID

---

### Description

Assigns distributed moment data for the specified beam element. The moment is applied according to the beam principal axis system.

### Syntax

```
long St7SetBeamDML6ID(long uID, long BeamNum, long BeamDir,  
                      long CaseNum, long DLType, long ID, double* Doubles)
```

### Input Parameters

uID

Strand7 model file ID number.

BeamNum

Beam number.

BeamDir

Principal axis direction, one of 1,2 or 3, see *Beam Local Coordinates*.

CaseNum

---

Load case number.

DLType

Distributed load type, one of kConstantDL, kLinearDL, kTriangularDL, kThreePoint0DL, kThreePoint1DL or kTrapezoidalDL.

ID

Distributed moment ID number.

Doubles[0..5]

A 6 element array describing the distributed moment. See *Beam Distribution Types* for additional information.

## Errors

```
ERR7_APINotInitialised, ERR7_APINotLicensed,  
ERR7_FileNotOpen, ERR7_InvalidBeamDir,  
ERR7_InvalidBeamLoadType, ERR7_InvalidBeamPosition,  
ERR7_InvalidEntityNumber, ERR7_InvalidFileUnit,  
ERR7_InvalidFreedomCase, ERR7_InvalidLoadCase,  
ERR7_InvalidLoadID, ERR7_InvalidUCSID, ERR7_NoError,  
ERR7_ResultFileIsOpen
```

# St7SetBeamDLG6ID

---

## Description

Assigns distributed load data for the specified beam element. The force is applied according to the Global Cartesian Coordinate system.

## Syntax

```
long St7SetBeamDLG6ID(long uID, long BeamNum, long BeamDir,  
                      long ProjectFlag, long CaseNum, long DLType, long ID,  
                      double* Doubles)
```

## Input Parameters

uID

Strand7 model file ID number.

BeamNum

Beam number.

BeamDir

Global axis direction, one of 1, 2 or 3, see *Beam Local Coordinates*.

ProjectFlag

btTrue or btFalse.

CaseNum

Load case number.

DLTType

Distributed load type, one of kConstantDL, kLinearDL, kTriangularDL, kThreePoint0DL, kThreePoint1DL or kTrapezoidalDL.

ID

Distributed load ID number.

Doubles[0..5]

A 6 element array describing the distributed load. See *Beam Distribution Types* for additional information.

## Errors

```
ERR7_APINotInitialised, ERR7_APINotLicensed,  
ERR7_FileNotOpen, ERR7_InvalidBeamDir,  
ERR7_InvalidBeamLoadType, ERR7_InvalidBeamPosition,  
ERR7_InvalidEntityNumber, ERR7_InvalidFileUnit,  
ERR7_InvalidFreedomCase, ERR7_InvalidLoadCase,  
ERR7_InvalidLoadID, ERR7_InvalidUCSID, ERR7_NoError,  
ERR7_ResultFileIsOpen
```

## St7SetBeamNSMass10ID

---

### Description

Assigns non-structural mass properties for the specified beam.

### Syntax

```
long St7SetBeamNSMass10ID(long uID, long BeamNum, long  
CaseNum, long DLTType, long ID, double* Doubles)
```

### Input Parameters

uID

Strand7 model file ID number.

---

BeamNum

The beam number.

CaseNum

The load case number.

DLTType

Distributed mass type, one of kConstantDL, kLinearDL, kTriangularDL,  
kThreePoint0DL, kThreePoint1DL or kTrapezoidalDL.

ID

The mass distribution ID number.

Doubles[0..9]

[0..6] - The distributed mass parameters. See *Beam Distribution Types* for  
additional information.

[7..9] - Offset vectors according to the UCS axis system.

## Errors

ERR7\_APINotInitialised, ERR7\_APINotLicensed,  
ERR7\_FileNotOpen, ERR7\_InvalidBeamLoadType,  
ERR7\_InvalidBeamPosition, ERR7\_InvalidEntityNumber,  
ERR7\_InvalidFileUnit, ERR7\_InvalidFreedomCase,  
ERR7\_InvalidLoadCase, ERR7\_InvalidLoadID, ERR7\_InvalidUCSID,  
ERR7\_NoError, ERR7\_ResultFileIsOpen

## St7SetBeamConvection2

---

### Description

Sets the thermal convection coefficient and ambient temperature for the specified beam. The convection is assumed to occur uniformly over the beam cross-section.

### Syntax

```
long St7SetBeamConvection2(long uID, long BeamNum, long  
BeamEnd, long CaseNum, double* Doubles)
```

### Input Parameters

uID

Strand7 model file ID number.

BeamNum

The beam number.

BeamEnd

The beam end number, see *Beam Local Coordinates*.

CaseNum

The load case number.

Doubles [0..1]

[0] - Convection coefficient.

[1] - Ambient temperature.

### Errors

```
ERR7_APINotInitialised, ERR7_APINotLicensed,  
ERR7_DataNotFound, ERR7_FileNotOpen,  
ERR7_InvalidAttributeType, ERR7_InvalidBeamEnd,  
ERR7_InvalidEntity, ERR7_InvalidEntityNumber,  
ERR7_InvalidFileUnit, ERR7_InvalidFreedomCase,  
ERR7_InvalidLoadCase, ERR7_InvalidLoadID, ERR7_InvalidUCSID,  
ERR7_NoError, ERR7_ResultFileIsOpen
```

## St7SetBeamConvectionTables

---

### Description

Specifies the tables to be associated with thermal convection properties for the specified beam. A Factor vs Temperature table may apply to the convection coefficient and Factor vs Time tables may apply to both the convection coefficient and ambient temperature.

### Syntax

```
long St7SetBeamConvectionTables(long uID, long BeamNum,  
                                long BeamEnd, long CaseNum, long* Tables)
```

### Input Parameters

uID

Strand7 model file ID number.

---

BeamNum

The beam number.

BeamEnd

The beam end number, see *Beam Local Coordinates*.

CaseNum

The load case number.

Tables [0..2]

[0] - Factor vs Time table ID associated with the ambient temperature, use zero for none.

[1] - Factor vs Temperature table ID associated with the convection coefficient, use zero for none.

[2] - Factor vs Time table ID associated with the convection coefficient, use zero for none.

## Errors

```
ERR7_APINotInitialised, ERR7_APINotLicensed,  
ERR7_DataNotFound, ERR7_FileNotOpen,  
ERR7_InvalidAttributeType, ERR7_InvalidEntity,  
ERR7_InvalidEntityNumber, ERR7_InvalidFileUnit,  
ERR7_InvalidFreedomCase, ERR7_InvalidLoadCase,  
ERR7_InvalidLoadID, ERR7_InvalidTableType,  
ERR7_InvalidUCSID, ERR7_NoError, ERR7_ResultFileIsOpen,  
ERR7_TableDoesNotExist
```

## St7SetBeamRadiation2

---

### Description

Sets the thermal radiation coefficient and ambient temperature for the specified beam.

### Syntax

```
long St7SetBeamRadiation2(long uID, long BeamNum, long  
BeamEnd, long CaseNum, double* Doubles)
```

### Input Parameters

uID

Strand7 model file ID number.

BeamNum

The beam number.

BeamEnd

The beam end number, see *Beam Local Coordinates*.

CaseNum

The load case number.

Doubles [0..1]

[0] - Radiation coefficient.

[1] - Ambient temperature.

## Errors

```
ERR7_APINotInitialised, ERR7_APINotLicensed,  
ERR7_DataNotFound, ERR7_FileNotOpen,  
ERR7_InvalidAttributeType, ERR7_InvalidBeamEnd,  
ERR7_InvalidEntity, ERR7_InvalidEntityNumber,  
ERR7_InvalidFileUnit, ERR7_InvalidFreedomCase,  
ERR7_InvalidLoadCase, ERR7_InvalidLoadID, ERR7_InvalidUCSID,  
ERR7_NoError, ERR7_ResultFileIsOpen
```

# St7SetBeamRadiationTables

---

## Description

Specifies the tables associated with the thermal radiation properties of the specified beam. A Factor vs Temperature table may apply to the radiation coefficient and Factor vs Time tables may apply to both the radiation coefficient and ambient temperature.

## Syntax

```
long St7SetBeamRadiationTables(long uID, long BeamNum, long  
BeamEnd, long CaseNum, long* Tables)
```

## Input Parameters

uID

Strand7 model file ID number.

---

BeamNum

The beam number.

BeamEnd

The beam end number, see *Beam Local Coordinates*.

CaseNum

The load case number.

Tables [0..2]

[0] - Factor vs Time table ID associated with the ambient temperature, use zero for none.

[1] - Factor vs Temperature table ID associated with the radiation coefficient, use zero for none.

[2] - Factor vs Time table ID associated with the radiation coefficient, use zero for none.

## Errors

```
ERR7_APINotInitialised, ERR7_APINotLicensed,  
ERR7_DataNotFound, ERR7_FileNotOpen,  
ERR7_InvalidAttributeType, ERR7_InvalidBeamEnd,  
ERR7_InvalidEntity, ERR7_InvalidEntityNumber,  
ERR7_InvalidFileUnit, ERR7_InvalidFreedomCase,  
ERR7_InvalidLoadCase, ERR7_InvalidLoadID,  
ERR7_InvalidTableType, ERR7_InvalidUCSID, ERR7_NoError,  
ERR7_ResultFileIsOpen, ERR7_TableDoesNotExist
```

# St7SetBeamFlux1

---

## Description

Sets the heat flux for the specified beam.

## Syntax

```
long St7SetBeamFlux1(long uID, long BeamNum, long BeamEnd,  
                     long CaseNum, double* Doubles)
```

## Input Parameters

uID

Strand7 model file ID number.

BeamNum

The beam number.

BeamEnd

The beam end number, see *Beam Local Coordinates*.

CaseNum

The load case number.

Doubles[0]

The heat flux through the beam.

## Errors

```
ERR7_APINotInitialised, ERR7_APINotLicensed,  
ERR7_DataNotFound, ERR7_FileNotOpen,  
ERR7_InvalidAttributeType, ERR7_InvalidBeamEnd,  
ERR7_InvalidEntity, ERR7_InvalidEntityNumber,  
ERR7_InvalidFileUnit, ERR7_InvalidFreedomCase,  
ERR7_InvalidLoadCase, ERR7_InvalidLoadID, ERR7_InvalidUCSID,  
ERR7_NoError, ERR7_ResultFileIsOpen
```

## St7SetBeamFluxTables

---

### Description

Specifies the tables to be associated with the heat flux for the specified beam.  
Both a Factor vs Time and Factor vs Temperature table can be assigned.

### Syntax

```
long St7SetBeamFluxTables(long uID, long BeamNum, long  
                           BeamEnd, long CaseNum, long* Tables)
```

### Input Parameters

uID

Strand7 model file ID number.

BeamNum

The beam number.

BeamEnd

The beam end number, see *Beam Local Coordinates*.

---

CaseNum

The load case number.

Tables[0..1]

[0] - Factor vs Time table ID associated with the heat flux, use zero for none.

[1] - Factor vs Temperature table ID associated with the heat flux, use zero for none.

## Errors

```
ERR7_APINotInitialised, ERR7_APINotLicensed,  
ERR7_DataNotFound, ERR7_FileNotOpen,  
ERR7_InvalidAttributeType, ERR7_InvalidBeamEnd,  
ERR7_InvalidEntity, ERR7_InvalidEntityNumber,  
ERR7_InvalidFileUnit, ERR7_InvalidFreedomCase,  
ERR7_InvalidLoadCase, ERR7_InvalidLoadID,  
ERR7_InvalidTableType, ERR7_InvalidUCSID, ERR7_NoError,  
ERR7_ResultFileIsOpen, ERR7_TableDoesNotExist
```

# St7SetBeamHeatSource1

---

## Description

Sets the thermal heat source value for the specified beam.

## Syntax

```
long St7SetBeamHeatSource1(long uID, long BeamNum, long  
CaseNum, double* Doubles)
```

## Input Parameters

uID

Strand7 model file ID number.

BeamNum

The beam number.

CaseNum

The load case number.

Doubles[0]

The thermal heat source value.

## Errors

```
ERR7_APINotInitialised, ERR7_APINotLicensed,  
ERR7_DataNotFound, ERR7_FileNotOpen,  
ERR7_InvalidAttributeType, ERR7_InvalidEntity,  
ERR7_InvalidEntityNumber, ERR7_InvalidFileUnit,  
ERR7_InvalidFreedomCase, ERR7_InvalidLoadCase,  
ERR7_InvalidLoadID, ERR7_InvalidUCSID, ERR7_NoError,  
ERR7_ResultFileIsOpen
```

# St7SetBeamHeatSourceTables

---

## Description

Specifies the tables to be associated with the thermal heat source for the specified beam. Both a Factor vs Time and Factor vs Temperature table can be assigned.

## Syntax

```
long St7SetBeamHeatSourceTables(long uID, long BeamNum,  
                                long CaseNum, long* Tables)
```

## Input Parameters

uID

Strand7 model file ID number.

BeamNum

The beam number.

CaseNum

The load case number.

Tables[0..1]

[0] - Factor vs Time table ID associated with the beam heat source, use zero for none.

[1] - Factor vs Temperature table ID associated with the beam heat source, use zero for none.

## Errors

```
ERR7_APINotInitialised, ERR7_APINotLicensed,  
ERR7_DataNotFound, ERR7_FileNotOpen,  
ERR7_InvalidAttributeType, ERR7_InvalidEntity,
```

---

```
ERR7_InvalidEntityNumber, ERR7_InvalidFileUnit,  
ERR7_InvalidFreedomCase, ERR7_InvalidLoadCase,  
ERR7_InvalidLoadID, ERR7_InvalidTableType,  
ERR7_InvalidUCSID, ERR7_NoError, ERR7_ResultFileIsOpen,  
ERR7_TableDoesNotExist
```

## St7SetBeamResponse

---

### Description

Assigns a response variable to the specified beam. Response variables are only used by the Load Influence Solver.

### Syntax

```
long St7SetBeamResponse(long uID, long BeamNum, long  
BeamEnd, long CaseNum, long* Status)
```

### Input Parameters

uID

Strand7 model file ID number.

BeamNum

The beam number.

BeamEnd

The beam end number.

CaseNum

The load case number.

Status [0..5]

[ipBeamResponseSF1] - Shear force in the principal 1-axis direction, either btTrue or btFalse.

[ipBeamResponseSF2] - Shear force in the principal 2-axis direction, either btTrue or btFalse.

[ipBeamResponseAxial] - Axial force, either btTrue or btFalse.

[ipBeamResponseBM1] - Bending moment in the principal 1-axis direction, either btTrue or btFalse.

[ipBeamResponseBM2] - Bending moment in the principal 2-axis direction, either btTrue or btFalse.

[ipBeamResponseTorque] Torque, either btTrue or btFalse.

## Errors

```
ERR7_APINotInitialised, ERR7_APINotLicensed,  
ERR7_DataNotFound, ERR7_FileNotOpen, ERR7_InvalidBeamEnd,  
ERR7_InvalidEntityNumber, ERR7_InvalidFileUnit,  
ERR7_InvalidLoadCase, ERR7_InvalidResponseType,  
ERR7_NoError, ERR7_ResultFileIsOpen
```

# St7SetBeamCreepLoadingAge1

---

## Description

Sets the creep loading age for the specified beam. This attribute is only used when performing a creep analysis using the Quasi-Static Solver.

## Syntax

```
long St7SetBeamCreepLoadingAge1(long uID, long BeamNum,  
                                double* Doubles)
```

## Input Parameters

uID

Strand7 model file ID number.

BeamNum

The beam number.

Doubles [0]

The creep loading age in seconds.

## Errors

```
ERR7_APINotInitialised, ERR7_APINotLicensed,  
ERR7_FileNotOpen, ERR7_InvalidEntityNumber,  
ERR7_InvalidFileUnit, ERR7_InvalidFreedomCase,  
ERR7_InvalidLoadCase, ERR7_InvalidUCSID, ERR7_NoError,  
ERR7_ResultFileIsOpen
```

---

# St7SetBeamEndAttachment1

---

## Description

Sets the attachment properties for the specified beam. Attachment attributes can be used to generate attachment links using the *St7ToolAttachParts* function.

## Syntax

```
long St7SetBeamEndAttachment1(long uID, long BeamNum, long  
BeamEnd, long AttachType, long ConnectType, long  
PropNum, double* Doubles)
```

## Input Parameters

uID

Strand7 model file ID number.

BeamNum

Beam number.

BeamEnd

Beam end number, either 1 or 2.

AttachType

Attachment type, one of alDirect, alRigid or alFlexible.

ConnectType

Attachment sub-type, either alMoment or alPinned.

PropNum

Beam property number to be used for flexible type connections.

Doubles[0]

The maximum distance within which the beam can be attached to another element using the attachment link.

## Errors

ERR7\_APINotInitialised, ERR7\_APINotLicensed,  
ERR7\_FileNotOpen, ERR7\_InvalidAttachmentType,  
ERR7\_InvalidBeamEnd, ERR7\_InvalidEntityNumber,  
ERR7\_InvalidFileUnit, ERR7\_InvalidFreedomCase,  
ERR7\_InvalidLoadCase, ERR7\_InvalidUCSID, ERR7\_NoError,  
ERR7\_ResultFileIsOpen

## Beam Attributes – Get

### St7GetBeamID

#### Description

Returns the ID number for the specified beam.

#### Syntax

```
long St7GetBeamID(long uID, long BeamNum, long* BeamID)
```

#### Input Parameters

uID

Strand7 model file ID number.

BeamNum

The beam number

#### Output Parameters

BeamID

The beam ID number.

#### Errors

ERR7\_APINotInitialised, ERR7\_APINotLicensed,  
ERR7\_FileNotOpen, ERR7\_InvalidEntityNumber,  
ERR7\_InvalidFileUnit, ERR7\_NoError, ERR7\_ResultFileIsOpen

## St7GetBeamReferenceAngle1

#### Description

Returns the reference angle for the specified beam. This angle controls the local rotation of the beam cross-section about the beam length, as per the beam local axis system definition. See *Beam Local Coordinates* for further information.

#### Syntax

```
long St7GetBeamReferenceAngle1(long uID, long BeamNum,  
double* Doubles)
```

#### Input Parameters

uID

---

Strand7 model file ID number.

BeamNum

The beam number.

### Output Parameters

Doubles[0]

The reference angle used to align the beam principal axis system, see Beam Local Coordinates.

### Errors

```
ERR7_APINotInitialised, ERR7_APINotLicensed,  
ERR7_DataNotFound, ERR7_FileNotOpen,  
ERR7_InvalidAttributeType, ERR7_InvalidEntity,  
ERR7_InvalidEntityNumber, ERR7_InvalidFileUnit,  
ERR7_InvalidFreedomCase, ERR7_InvalidLoadCase,  
ERR7_InvalidLoadID, ERR7_NoError, ERR7_ResultFileIsOpen
```

## St7GetBeamConnectionUCS

---

### Description

Returns the UCS used to define the connection element formulation for the specified beam end. The translational and rotational stiffness components are distributed according to the 123 axis convention in the specified UCS. This attribute is only applicable to beams of connection element type.

### Syntax

```
long St7GetBeamConnectionUCS(long uID, long BeamNum, long  
BeamEnd, long* UCSId)
```

### Input Parameters

uID

Strand7 model file ID number.

BeamNum

The beam number.

BeamEnd

The beam end number.

## Output Parameters

UCSID

The UCS ID number.

## Errors

ERR7\_APINotInitialised, ERR7\_APINotLicensed,  
ERR7\_DataNotFound, ERR7\_FileNotOpen,  
ERR7\_InvalidAttributeType, ERR7\_InvalidEntity,  
ERR7\_InvalidEntityNumber, ERR7\_InvalidFileUnit,  
ERR7\_InvalidFreedomCase, ERR7\_InvalidLoadCase,  
ERR7\_InvalidLoadID, ERR7\_NoError, ERR7\_ResultFileIsOpen

# St7GetBeamTaper2

---

## Description

Returns the taper properties for the specified beam.

## Syntax

```
long St7GetBeamTaper2(long uID, long BeamNum, long  
                      TaperAxis, long* TaperType, double* Doubles)
```

## Input Parameters

uID

Strand7 model file ID number.

BeamNum

The beam number.

TaperAxis

The local beam axis to be tapered: axLocalX or axLocalY. See *Beam Local Coordinates* for further information.

## Output Parameters

TaperType

The type of beam taper; one of btTop, btSymm or btBottom.

Doubles [0..1]

---

A 2 element array that specifies the taper ratios at either beam end. The dimension of the beam section is scaled by this value to calculate the tapered shape.

## Errors

```
ERR7_APINotInitialised, ERR7_APINotLicensed,  
ERR7_DataNotFound, ERR7_FileNotOpen,  
ERR7_InvalidAttributeType, ERR7_InvalidEntity,  
ERR7_InvalidEntityNumber, ERR7_InvalidFileUnit,  
ERR7_InvalidFreedomCase, ERR7_InvalidLoadCase,  
ERR7_InvalidLoadID, ERR7_InvalidTaperAxis, ERR7_NoError,  
ERR7_ResultFileIsOpen
```

# St7GetBeamOffset2

---

## Description

Returns the offsets assigned to the specified beam.

## Syntax

```
long St7GetBeamOffset2(long uID, long BeamNum, double*  
                      Doubles)
```

## Input Parameters

uID

Strand7 model file ID number.

BeamNum

The beam number.

## Output Parameters

Doubles[0..1]

A 2 element array describing the beam offsets. Doubles[i-1] describes the offset in the i<sup>th</sup> principal axis direction, see *Beam Local Coordinates*.

## Errors

```
ERR7_APINotInitialised, ERR7_APINotLicensed,  
ERR7_DataNotFound, ERR7_FileNotOpen,  
ERR7_InvalidAttributeType, ERR7_InvalidEntity,  
ERR7_InvalidEntityNumber, ERR7_InvalidFileUnit,  
ERR7_InvalidFreedomCase, ERR7_InvalidLoadCase,  
ERR7_InvalidLoadID, ERR7_NoError, ERR7_ResultFileIsOpen
```

## St7GetBeamSupport2F

---

### Description

Returns the elastic support value assigned to the specified beam.

### Syntax

```
long St7GetBeamSupport2F(long uID, long BeamNum, long  
CaseNum, long* Status, double* Doubles)
```

### Input Parameters

uID

Strand7 model file ID number.

BeamNum

The beam number.

CaseNum

The freedom case number.

### Output Parameters

Status

Compression-only option: btTrue or btFalse.

Doubles [0..1]

A 2 element array describing the elastic support conditions for the specified beam. Doubles [i-1] describes the elastic support in the i<sup>th</sup> principal axis direction, see *Beam Local Coordinates*.

### Errors

ERR7\_APINotInitialised, ERR7\_APINotLicensed,  
ERR7\_DataNotFound, ERR7\_FileNotOpen,  
ERR7\_InvalidAttributeType, ERR7\_InvalidEntity,  
ERR7\_InvalidEntityNumber, ERR7\_InvalidFileUnit,  
ERR7\_InvalidFreedomCase, ERR7\_InvalidLoadCase,  
ERR7\_InvalidLoadID, ERR7\_NoError, ERR7\_ResultFileIsOpen

---

# St7GetBeamSectionFactor7

---

## Description

Returns the section factors for the specified beam. These factors are used to scale the beam section data contained in the associated beam property.

## Syntax

```
long St7GetBeamSectionFactor7(long uID, long BeamNum,  
    double* Doubles)
```

## Input Parameters

uID

Strand7 model file ID number.

BeamNum

The beam number.

## Output Parameters

Doubles[0..6]

[0] - 1-axis shear stiffness factor.

[1] - 2-axis shear stiffness factor.

[2] - Axial stiffness factor.

[3] - 1-axis bending stiffness factor.

[4] - 2-axis bending stiffness factor.

[5] - Torsional stiffness factor.

[6] - Mass factor.

## Errors

```
ERR7_APINotInitialised, ERR7_APINotLicensed,  
ERR7_DataNotFound, ERR7_FileNotOpen,  
ERR7_InvalidAttributeType, ERR7_InvalidEntity,  
ERR7_InvalidEntityNumber, ERR7_InvalidFileUnit,  
ERR7_InvalidFreedomCase, ERR7_InvalidLoadCase,  
ERR7_InvalidLoadID, ERR7_NoError, ERR7_ResultFileIsOpen
```

## St7GetBeamTRelease3

---

### Description

Returns the translational end release conditions assigned to the specified beam.

### Syntax

```
long St7GetBeamTRelease3(long uID, long BeamNum, long  
BeamEnd, long* Status, double* Doubles)
```

### Input Parameters

uID

Strand7 model file ID number.

BeamNum

The beam number.

BeamEnd

The beam end identifier, either 1 or 2.

### Output Parameters

Status[0..2]

Status[i-1] describes the release conditions of the specified beam end for the i<sup>th</sup> principal axis direction, see *Beam Local Coordinates* – one of kBeamEndRelReleased, kBeamEndRelFixed or kBeamEndRelPartial.

Doubles[0..2]

A 3 element array containing the partial stiffnesses to be used in the case of partial end release conditions.

### Errors

```
ERR7_APINotInitialised, ERR7_APINotLicensed,  
ERR7_DataNotFound, ERR7_FileNotOpen,  
ERR7_InvalidAttributeType, ERR7_InvalidEntity,  
ERR7_InvalidEntityNumber, ERR7_InvalidFileUnit,  
ERR7_InvalidFreedomCase, ERR7_InvalidLoadCase,  
ERR7_InvalidLoadID, ERR7_NoError, ERR7_ResultFileIsOpen
```

---

## St7GetBeamRRelease3

---

### Description

Returns the rotational end release conditions assigned to the specified beam.

### Syntax

```
long St7GetBeamRRelease3(long uID, long BeamNum, long  
BeamEnd, long* Status, double* Doubles)
```

### Input Parameters

uID

Strand7 model file ID number.

BeamNum

The beam number.

BeamEnd

The beam end identifier, either 1 or 2.

### Output Parameters

Status [0..2]

Status [i-1] describes the release conditions of the specified beam end for the i<sup>th</sup> principal axis direction, see *Beam Local Coordinates* – one of kBeamEndRelReleased, kBeamEndRelFixed or kBeamEndRelPartial.

Doubles [0..2]

A 3 element array containing the partial stiffnesses to be used in the case of partial end release conditions.

### Errors

```
ERR7_APINotInitialised, ERR7_APINotLicensed,  
ERR7_DataNotFound, ERR7_FileNotOpen,  
ERR7_InvalidAttributeType, ERR7_InvalidEntity,  
ERR7_InvalidEntityNumber, ERR7_InvalidFileUnit,  
ERR7_InvalidFreedomCase, ERR7_InvalidLoadCase,  
ERR7_InvalidLoadID, ERR7_NoError, ERR7_ResultFileIsOpen
```

## St7GetBeamCableFreeLength1

---

### Description

Returns the free cable length for the specified beam. This is the unstressed cable length and is only active for beam of type cable.

### Syntax

```
long St7GetBeamCableFreeLength1(long uID, long BeamNum,  
                               double* Doubles)
```

### Input Parameters

uID

Strand7 model file ID number.

BeamNum

The beam number.

### Output Parameters

Doubles [0]

The free cable length.

### Errors

```
ERR7_APINotInitialised, ERR7_APINotLicensed,  
ERR7_DataNotFound, ERR7_FileNotOpen,  
ERR7_InvalidAttributeType, ERR7_InvalidEntity,  
ERR7_InvalidEntityNumber, ERR7_InvalidFileUnit,  
ERR7_InvalidFreedomCase, ERR7_InvalidLoadCase,  
ERR7_InvalidLoadID, ERR7_NoError, ERR7_ResultFileIsOpen
```

## St7GetBeamRadius1

---

### Description

Returns the bend radius for the specified beam. This attribute si only active for beams of type pipe.

### Syntax

```
long St7GetBeamRadius1(long uID, long BeamNum, long*  
                       BeamDir, double* Doubles)
```

---

## **Input Parameters**

uID

Strand7 model file ID number.

BeamNum

The beam number.

## **Output Parameters**

BeamDir

The axis of the bend: axPrincipal1 or axPrincipal2. The beam will be bent in the axis direction specified, not about the axis, see *Beam Local Coordinates*.

Doubles [0]

The radius of curvature of the bend.

## **Errors**

ERR7\_APINotInitialised, ERR7\_APINotLicensed,  
ERR7\_DataNotFound, ERR7\_FileNotOpen,  
ERR7\_InvalidAttributeType, ERR7\_InvalidEntity,  
ERR7\_InvalidEntityNumber, ERR7\_InvalidFileUnit,  
ERR7\_InvalidFreedomCase, ERR7\_InvalidLoadCase,  
ERR7\_InvalidLoadID, ERR7\_NoError, ERR7\_ResultFileIsOpen

---

## **St7GetPipePressure2AF**

### **Description**

Returns the internal and external pressures applied to the specified beam. This attribute is only active for beams of type pipe.

### **Syntax**

```
long St7GetPipePressure2AF(long uID, long BeamNum, long  
CaseNum, long* Status, double* Doubles)
```

## **Input Parameters**

uID

Strand7 model file ID number.

BeamNum

The beam number.

CaseNum

The load case number.

### Output Parameters

Status

Model a pipe with closed ends: btTrue or btFalse. An additional force component is assigned at the beam ends to account for the pressure acting on a close-ended pipe.

Doubles [0..1]

A 2 element array describing the inner and outer radial pressures acting on the element surface respectively.

### Errors

ERR7\_APINotInitialised, ERR7\_APINotLicensed,  
ERR7\_DataNotFound, ERR7\_FileNotOpen,  
ERR7\_InvalidAttributeType, ERR7\_InvalidEntity,  
ERR7\_InvalidEntityNumber, ERR7\_InvalidFileUnit,  
ERR7\_InvalidFreedomCase, ERR7\_InvalidLoadCase,  
ERR7\_InvalidLoadID, ERR7\_NoError, ERR7\_ResultFileIsOpen

## St7GetPipeTemperature2OT

---

### Description

Returns the internal and external temperatures applied to the specified beam.  
This attribute is only active for beams of type pipe.

### Syntax

```
long St7GetPipeTemperature2OT(long uID, long BeamNum, long  
CaseNum, long* Status, double* Doubles)
```

### Input Parameters

uID

Strand7 model file ID number.

BeamNum

The beam number.

CaseNum

The load case number.

---

## Output Parameters

Status

Set the external temperature equal to the nodal temperatures at each end:  
btTrue or btFalse. In the case of unequal end temperatures the average  
temperature is used.

Doubles[0..1]

A 2 element array describing the inner and outer surface temperatures  
respectively.

## Errors

ERR7\_APINotInitialised, ERR7\_APINotLicensed,  
ERR7\_DataNotFound, ERR7\_FileNotOpen,  
ERR7\_InvalidAttributeType, ERR7\_InvalidEntity,  
ERR7\_InvalidEntityNumber, ERR7\_InvalidFileUnit,  
ERR7\_InvalidFreedomCase, ERR7\_InvalidLoadCase,  
ERR7\_InvalidLoadID, ERR7\_NoError, ERR7\_ResultFileIsOpen

---

# St7GetBeamStringGroup1

## Description

Returns the ID number of the string group the specified beam is assigned to. The string group attribute is only active for truss elements and will ensure that the axial force in all members is equal.

## Syntax

```
long St7GetBeamStringGroup1(long uID, long BeamNum, long*  
StringID)
```

## Input Parameters

uID

Strand7 model file ID number.

BeamNum

The beam number.

## Output Parameters

StringID

The ID number of the string group.

## Errors

```
ERR7_APINotInitialised, ERR7_APINotLicensed,  
ERR7_DataNotFound, ERR7_FileNotOpen,  
ERR7_InvalidAttributeType, ERR7_InvalidEntity,  
ERR7_InvalidEntityNumber, ERR7_InvalidFileUnit,  
ERR7_InvalidFreedomCase, ERR7_InvalidLoadCase,  
ERR7_InvalidLoadID, ERR7_NoError, ERR7_ResultFileIsOpen
```

# St7GetBeamPreLoad1

---

## Description

Returns the pre-load assigned to the specified beam.

## Syntax

```
long St7GetBeamPreLoad1(long uID, long BeamNum, long  
CaseNum, long* LoadType, double* Doubles)
```

## Input Parameters

uID

Strand7 model file ID number.

BeamNum

The beam number.

CaseNum

The load case number.

## Output Parameters

LoadType

The type of pre-load: plBeamPreTension or plBeamPreStrain.

Doubles[0]

The pre-load value.

## Errors

```
ERR7_APINotInitialised, ERR7_APINotLicensed,  
ERR7_DataNotFound, ERR7_FileNotOpen,  
ERR7_InvalidAttributeType, ERR7_InvalidEntity,  
ERR7_InvalidEntityNumber, ERR7_InvalidFileUnit,
```

---

```
ERR7_InvalidFreedomCase, ERR7_InvalidLoadCase,  
ERR7_InvalidLoadID, ERR7_NoError, ERR7_ResultFileIsOpen
```

## St7GetBeamTempGradient2

---

### Description

Returns the temperature gradients assigned to the specified beam.

### Syntax

```
long St7GetBeamTempGradient2(long uID, long BeamNum, long  
CaseNum, double* Doubles)
```

### Input Parameters

uID

Strand7 model file ID number.

BeamNum

The beam number.

CaseNum

The load case number.

### Output Parameters

Doubles [0..1]

A 2 element array describing the temperature gradient in the 1-axis and 2-axis directions in the beam principal axis system, see *Beam Local Coordinates*.

### Errors

```
ERR7_APINotInitialised, ERR7_APINotLicensed,  
ERR7_DataNotFound, ERR7_FileNotOpen,  
ERR7_InvalidAttributeType, ERR7_InvalidEntity,  
ERR7_InvalidEntityNumber, ERR7_InvalidFileUnit,  
ERR7_InvalidFreedomCase, ERR7_InvalidLoadCase,  
ERR7_InvalidLoadID, ERR7_NoError, ERR7_ResultFileIsOpen
```

## St7GetBeamCFL4ID

---

### Description

Returns point force data assigned to the specified beam element. The force is applied according to the beam principal axis system.

### Syntax

```
long St7GetBeamCFL4ID(long uID, long BeamNum, long CaseNum,  
                      long ID, double* Doubles)
```

### Input Parameters

uID

Strand7 model file ID number.

BeamNum

Beam number.

CaseNum

Load case number.

ID

Point force ID number.

### Output Parameters

Doubles [0..3]

[0..2] - The force components in the beam principal axis system.

[3] - The relative length position at which the force is applied, see *Beam Local Coordinates*.

### Errors

ERR7\_APINotInitialised, ERR7\_APINotLicensed,  
ERR7\_DataNotFound, ERR7\_FileNotOpen,  
ERR7\_InvalidAttributeType, ERR7\_InvalidEntity,  
ERR7\_InvalidEntityNumber, ERR7\_InvalidFileUnit,  
ERR7\_InvalidFreedomCase, ERR7\_InvalidLoadCase,  
ERR7\_InvalidLoadID, ERR7\_NoError, ERR7\_ResultFileIsOpen

---

# St7GetBeamCFG4ID

---

## Description

Returns point force data assigned to the specified beam element. The force is applied according to the Global Cartesian Coordinate axis system.

## Syntax

```
long St7GetBeamCFG4ID(long uID, long BeamNum, long CaseNum,  
                      long ID, double* Doubles)
```

## Input Parameters

uID

Strand7 model file ID number.

BeamNum

Beam number.

CaseNum

Load case number.

ID

Point force ID number.

## Output Parameters

Doubles[0..3]

[0..2] - The force components in the Global Cartesian Coordinate system.

[3] - The relative length position at which the force is applied, see *Beam Local Coordinates*.

## Errors

```
ERR7_APINotInitialised, ERR7_APINotLicensed,  
ERR7_DataNotFound, ERR7_FileNotOpen,  
ERR7_InvalidAttributeType, ERR7_InvalidEntity,  
ERR7_InvalidEntityNumber, ERR7_InvalidFileUnit,  
ERR7_InvalidFreedomCase, ERR7_InvalidLoadCase,  
ERR7_InvalidLoadID, ERR7_NoError, ERR7_ResultFileIsOpen
```

## St7GetBeamCML4ID

---

### Description

Returns point moment data assigned to the specified beam element. The moment is applied according to the beam principal axis system.

### Syntax

```
long St7GetBeamCML4ID(long uID, long BeamNum, long CaseNum,  
                      long ID, double* Doubles)
```

### Input Parameters

uID

Strand7 model file ID number.

BeamNum

Beam number.

CaseNum

Load case number.

ID

Point moment ID number.

### Output Parameters

Doubles [0..3]

[0..2] - The moment components in the beam principal axis system.

[3] - The relative length position at which the moment is applied, see *Beam Local Coordinates*.

### Errors

ERR7\_APINotInitialised, ERR7\_APINotLicensed,  
ERR7\_DataNotFound, ERR7\_FileNotOpen,  
ERR7\_InvalidAttributeType, ERR7\_InvalidEntity,  
ERR7\_InvalidEntityNumber, ERR7\_InvalidFileUnit,  
ERR7\_InvalidFreedomCase, ERR7\_InvalidLoadCase,  
ERR7\_InvalidLoadID, ERR7\_NoError, ERR7\_ResultFileIsOpen

---

## St7GetBeamCMG4ID

---

### Description

Returns point moment data assigned to the specified beam element. The moment is applied according to the Global Cartesian Coordinate system.

### Syntax

```
long St7GetBeamCMG4ID(long uID, long BeamNum, long CaseNum,  
                      long ID, double* Doubles)
```

### Input Parameters

uID

Strand7 model file ID number.

BeamNum

Beam number.

CaseNum

Load case number.

ID

Point moment ID number.

### Output Parameters

Doubles[0..3]

[0..2] - The moment components in the Global Cartesian Coordinate system.

[3] - The relative length position at which the moment is applied, see *Beam Local Coordinates*.

### Errors

ERR7\_APINotInitialised, ERR7\_APINotLicensed,  
ERR7\_DataNotFound, ERR7\_FileNotOpen,  
ERR7\_InvalidAttributeType, ERR7\_InvalidEntity,  
ERR7\_InvalidEntityNumber, ERR7\_InvalidFileUnit,  
ERR7\_InvalidFreedomCase, ERR7\_InvalidLoadCase,  
ERR7\_InvalidLoadID, ERR7\_NoError, ERR7\_ResultFileIsOpen

## St7GetBeamDLL6ID

---

### Description

Returns distributed load data assigned to the specified beam element. The force is applied according to the beam principal axis system.

### Syntax

```
long St7GetBeamDLL6ID(long uID, long BeamNum, long BeamDir,  
                      long CaseNum, long ID, long* DLType, double* Doubles)
```

### Input Parameters

uID

Strand7 model file ID number.

BeamNum

Beam number.

BeamDir

Principal axis direction, one of 1, 2 or 3, see *Beam Local Coordinates*.

CaseNum

Load case number.

ID

Distributed load ID number.

### Output Parameters

DLType

Distributed load type, one of kConstantDL, kLinearDL, kTriangularDL, kThreePoint0DL, kThreePoint1DL or kTrapezoidalDL.

Doubles [0..5]

A 6 element array describing the distributed load. See *Beam Distribution Types* for additional information.

### Errors

ERR7\_APINotInitialised, ERR7\_APINotLicensed,  
ERR7\_DataNotFound, ERR7\_FileNotOpen,  
ERR7\_InvalidAttributeType, ERR7\_InvalidEntity,  
ERR7\_InvalidEntityNumber, ERR7\_InvalidFileUnit,

---

```
ERR7_InvalidFreedomCase, ERR7_InvalidLoadCase,
ERR7_InvalidLoadID, ERR7_NoError, ERR7_ResultFileIsOpen
```

## St7GetBeamDML6ID

---

### Description

Returns distributed moment data assigned to the specified beam element. The moment is applied according to the beam principal axis system.

### Syntax

```
long St7GetBeamDML6ID(long uID, long BeamNum, long BeamDir,
                      long CaseNum, long ID, long* DLType, double* Doubles)
```

### Input Parameters

uID

Strand7 model file ID number.

BeamNum

Beam number.

BeamDir

Principal axis direction, one of 1, 2 or 3, see *Beam Local Coordinates*.

CaseNum

Load case number.

ID

Distributed moment ID number.

### Output Parameters

DLType

Distributed load type, one of kConstantDL, kLinearDL, kTriangularDL,  
kThreePoint0DL, kThreePoint1DL or kTrapezoidalDL.

Doubles[0..5]

A 6 element array describing the distributed moment. See *Beam Distribution Types* for additional information.

## Errors

```
ERR7_APINotInitialised, ERR7_APINotLicensed,  
ERR7_DataNotFound, ERR7_FileNotOpen,  
ERR7_InvalidAttributeType, ERR7_InvalidEntity,  
ERR7_InvalidEntityNumber, ERR7_InvalidFileUnit,  
ERR7_InvalidFreedomCase, ERR7_InvalidLoadCase,  
ERR7_InvalidLoadID, ERR7_NoError, ERR7_ResultFileIsOpen
```

# St7GetBeamDLG6ID

---

## Description

Returns distributed load data assigned to the specified beam element. The force is applied according to the Global Cartesian Coordinate system.

## Syntax

```
long St7GetBeamDLG6ID(long uID, long BeamNum, long BeamDir,  
                      long CaseNum, long ID, long* ProjectFlag, long* DLType,  
                      double* Doubles)
```

## Input Parameters

uID

Strand7 model file ID number.

BeamNum

Beam number.

BeamDir

Global axis direction, one of 1, 2 or 3, see *Beam Local Coordinates*.

CaseNum

Load case number.

ID

Distributed load ID number.

## Output Parameters

ProjectFlag

btTrue or btFalse.

DLType

---

Distributed load type, one of kConstantDL, kLinearDL, kTriangularDL, kThreePoint0DL, kThreePoint1DL or kTrapezoidalDL.

Doubles[0..5]

A 6 element array describing the distributed load. See *Beam Distribution Types* for additional information.

## Errors

```
ERR7_APINotInitialised, ERR7_APINotLicensed,  
ERR7_DataNotFound, ERR7_FileNotOpen,  
ERR7_InvalidAttributeType, ERR7_InvalidEntity,  
ERR7_InvalidEntityNumber, ERR7_InvalidFileUnit,  
ERR7_InvalidFreedomCase, ERR7_InvalidLoadCase,  
ERR7_InvalidLoadID, ERR7_NoError, ERR7_ResultFileIsOpen
```

# St7GetBeamNSMass10ID

---

## Description

Returns non-structural mass properties assigned to the specified beam element.

## Syntax

```
long St7GetBeamNSMass10ID(long uID, long BeamNum, long  
CaseNum, long ID, long* DLType, double* Doubles)
```

## Input Parameters

uID

Strand7 model file ID number.

BeamNum

The beam number.

CaseNum

The load case number.

ID

The mass distribution ID number.

## Output Parameters

DLType

Distributed mass type, one of kConstantDL, kLinearDL, kTriangularDL,  
kThreePoint0DL, kThreePoint1DL or kTrapezoidalDL.

Doubles [0..9]

[0..6] - The distributed mass parameters. See *Beam Distribution Types* for additional information.

[7..9] - Offset vectors according to the UCS axis system.

### Errors

ERR7\_APINotInitialised, ERR7\_APINotLicensed,  
ERR7\_DataNotFound, ERR7\_FileNotOpen,  
ERR7\_InvalidAttributeType, ERR7\_InvalidEntity,  
ERR7\_InvalidEntityNumber, ERR7\_InvalidFileUnit,  
ERR7\_InvalidFreedomCase, ERR7\_InvalidLoadCase,  
ERR7\_InvalidLoadID, ERR7\_NoError, ERR7\_ResultFileIsOpen

## St7GetBeamConvection2

---

### Description

Returns the thermal convection coefficient and ambient temperature assigned to the specified beam. The convection is assumed to occur uniformly over the beam cross-section.

### Syntax

```
long St7GetBeamConvection2(long uID, long BeamNum, long  
BeamEnd, long CaseNum, double* Doubles)
```

### Input Parameters

uID

Strand7 model file ID number.

BeamNum

The beam number.

BeamEnd

The beam end number, see *Beam Local Coordinates*.

CaseNum

The load case number.

---

## **Output Parameters**

Doubles[0..1]

[0] - Convection coefficient.

[1] - Ambient temperature.

## **Errors**

ERR7\_APINotInitialised, ERR7\_APINotLicensed,  
ERR7\_DataNotFound, ERR7\_FileNotOpen,  
ERR7\_InvalidAttributeType, ERR7\_InvalidEntity,  
ERR7\_InvalidEntityNumber, ERR7\_InvalidFileUnit,  
ERR7\_InvalidFreedomCase, ERR7\_InvalidLoadCase,  
ERR7\_InvalidLoadID, ERR7\_NoError, ERR7\_ResultFileIsOpen

---

# **St7GetBeamConvectionTables**

## **Description**

Returns the tables associated with thermal convection properties for the specified beam. A Factor vs Temperature table may apply to the convection coefficient and Factor vs Time tables may apply to both the convection coefficient and ambient temperature.

## **Syntax**

```
long St7GetBeamConvectionTables(long uID, long BeamNum,  
                                long BeamEnd, long CaseNum, long* Tables)
```

## **Input Parameters**

uID

Strand7 model file ID number.

BeamNum

The beam number.

BeamEnd

The beam end number, see *Beam Local Coordinates*.

CaseNum

The load case number.

## Output Parameters

Tables[0..2]

[0] - Factor vs Time table ID associated with the ambient temperature, use zero for none.

[1] - Factor vs Temperature table ID associated with the convection coefficient, use zero for none.

[2] - Factor vs Time table ID associated with the convection coefficient, use zero for none.

## Errors

ERR7\_APINotInitialised, ERR7\_APINotLicensed,  
ERR7\_DataNotFound, ERR7\_FileNotOpen,  
ERR7\_InvalidAttributeType, ERR7\_InvalidEntity,  
ERR7\_InvalidEntityNumber, ERR7\_InvalidFileUnit,  
ERR7\_InvalidFreedomCase, ERR7\_InvalidLoadCase,  
ERR7\_InvalidLoadID, ERR7\_NoError, ERR7\_ResultFileIsOpen

# St7GetBeamRadiation2

---

## Description

Returns the thermal radiation coefficient and ambient temperature assigned to the specified beam.

## Syntax

```
long St7GetBeamRadiation2(long uID, long BeamNum, long  
                           BeamEnd, long CaseNum, double* Doubles)
```

## Input Parameters

uID

Strand7 model file ID number.

BeamNum

The beam number.

BeamEnd

The beam end number, see *Beam Local Coordinates*.

CaseNum

---

The load case number.

### Output Parameters

Doubles[0..1]

[0] - Radiation coefficient.

[1] - Ambient temperature.

### Errors

ERR7\_APINotInitialised, ERR7\_APINotLicensed,  
ERR7\_DataNotFound, ERR7\_FileNotOpen,  
ERR7\_InvalidAttributeType, ERR7\_InvalidEntity,  
ERR7\_InvalidEntityNumber, ERR7\_InvalidFileUnit,  
ERR7\_InvalidFreedomCase, ERR7\_InvalidLoadCase,  
ERR7\_InvalidLoadID, ERR7\_NoError, ERR7\_ResultFileIsOpen

## St7GetBeamRadiationTables

---

### Description

Returns the tables associated with the thermal radiation properties of the specified beam. A Factor vs Temperature table may apply to the radiation coefficient and Factor vs Time tables may apply to both the radiation coefficient and ambient temperature.

### Syntax

```
long St7GetBeamRadiationTables(long uID, long BeamNum, long  
BeamEnd, long CaseNum, long* Tables)
```

### Input Parameters

uID

Strand7 model file ID number.

BeamNum

The beam number.

BeamEnd

The beam end number, see Beam Local Coordinates.

CaseNum

The load case number.

## Output Parameters

Tables[0..2]

- [0] - Factor vs Time table ID associated with the ambient temperature, use zero for none.
- [1] - Factor vs Temperature table ID associated with the radiation coefficient, use zero for none.
- [2] - Factor vs Time table ID associated with the radiation coefficient, use zero for none.

## Errors

ERR7\_APINotInitialised, ERR7\_APINotLicensed,  
ERR7\_DataNotFound, ERR7\_FileNotOpen,  
ERR7\_InvalidAttributeType, ERR7\_InvalidEntity,  
ERR7\_InvalidEntityNumber, ERR7\_InvalidFileUnit,  
ERR7\_InvalidFreedomCase, ERR7\_InvalidLoadCase,  
ERR7\_InvalidLoadID, ERR7\_NoError, ERR7\_ResultFileIsOpen

# St7GetBeamFlux1

---

## Description

Returns the heat flux assigned to the specified beam.

## Syntax

```
long St7GetBeamFlux1(long uID, long BeamNum, long BeamEnd,  
                      long CaseNum, double* Doubles)
```

## Input Parameters

uID

Strand7 model file ID number.

BeamNum

The beam number.

BeamEnd

The beam end number, see *Beam Local Coordinates*.

CaseNum

The load case number.

---

## **Output Parameters**

Doubles[0]

The heat flux through the beam.

## **Errors**

ERR7\_APINotInitialised, ERR7\_APINotLicensed,  
ERR7\_DataNotFound, ERR7\_FileNotOpen,  
ERR7\_InvalidAttributeType, ERR7\_InvalidEntity,  
ERR7\_InvalidEntityNumber, ERR7\_InvalidFileUnit,  
ERR7\_InvalidFreedomCase, ERR7\_InvalidLoadCase,  
ERR7\_InvalidLoadID, ERR7\_NoError, ERR7\_ResultFileIsOpen

---

# **St7GetBeamFluxTables**

## **Description**

Returns the tables associated with the heat flux for the specified beam. Both a Factor vs Time and Factor vs Temperature table may be assigned.

## **Syntax**

```
long St7GetBeamFluxTables(long uID, long BeamNum, long  
BeamEnd, long CaseNum, long* Tables)
```

## **Input Parameters**

uID

Strand7 model file ID number.

BeamNum

The beam number.

BeamEnd

The beam end number, see *Beam Local Coordinates*.

CaseNum

The load case number.

## **Output Parameters**

Tables[0..1]

[0] - Factor vs Time table ID associated with the heat flux, use zero for none.

[1] - Factor vs Temperature table ID associated with the heat flux, use zero for none.

## Errors

```
ERR7_APINotInitialised, ERR7_APINotLicensed,  
ERR7_DataNotFound, ERR7_FileNotOpen,  
ERR7_InvalidAttributeType, ERR7_InvalidEntity,  
ERR7_InvalidEntityNumber, ERR7_InvalidFileUnit,  
ERR7_InvalidFreedomCase, ERR7_InvalidLoadCase,  
ERR7_InvalidLoadID, ERR7_NoError, ERR7_ResultFileIsOpen
```

## St7GetBeamHeatSource1

---

### Description

Returns the heat source value assigned to the specified beam.

### Syntax

```
long St7GetBeamHeatSource1(long uID, long BeamNum, long  
CaseNum, double* Doubles)
```

### Input Parameters

uID

Strand7 model file ID number.

BeamNum

The beam number.

CaseNum

The load case number.

### Output Parameters

Doubles [0]

The heat source value.

### Errors

```
ERR7_APINotInitialised, ERR7_APINotLicensed,  
ERR7_DataNotFound, ERR7_FileNotOpen,  
ERR7_InvalidAttributeType, ERR7_InvalidEntity,  
ERR7_InvalidEntityNumber, ERR7_InvalidFileUnit,  
ERR7_InvalidFreedomCase, ERR7_InvalidLoadCase,  
ERR7_InvalidLoadID, ERR7_NoError, ERR7_ResultFileIsOpen
```

---

## St7GetBeamHeatSourceTables

---

### Description

Returns the tables associated with the heat source for the specified beam. Both a Factor vs Time and Factor vs Temperature table may be assigned.

### Syntax

```
long St7GetBeamHeatSourceTables(long uID, long BeamNum,  
                                long CaseNum, long* Tables)
```

### Input Parameters

uID

Strand7 model file ID number.

BeamNum

The beam number.

CaseNum

The load case number.

### Output Parameters

Tables [0..1]

[0] - Factor vs Time table ID associated with the beam heat source, use zero for none.

[1] - Factor vs Temperature table ID associated with the beam heat source, use zero for none.

### Errors

```
ERR7_APINotInitialised, ERR7_APINotLicensed,  
ERR7_DataNotFound, ERR7_FileNotOpen,  
ERR7_InvalidAttributeType, ERR7_InvalidEntity,  
ERR7_InvalidEntityNumber, ERR7_InvalidFileUnit,  
ERR7_InvalidFreedomCase, ERR7_InvalidLoadCase,  
ERR7_InvalidLoadID, ERR7_NoError, ERR7_ResultFileIsOpen
```

## St7GetBeamResponse

---

### Description

Returns the response variable assigned for the specified beam. Response variables are only used by the Load Influence Solver.

### Syntax

```
long St7GetBeamResponse(long uID, long BeamNum, long  
BeamEnd, long CaseNum, long* Status)
```

### Input Parameters

uID

Strand7 model file ID number.

BeamNum

The beam number.

BeamEnd

The beam end number, either 1 or 2.

CaseNum

The load case number.

### Output Parameters

Status[0..5]

[ipBeamResponseSF1] - Shear force in the principal 1-axis direction, either btTrue or btFalse.

[ipBeamResponseSF2] - Shear force in the principal 2-axis direction, either btTrue or btFalse.

[ipBeamResponseAxial] - Axial force, either btTrue or btFalse.

[ipBeamResponseBM1] - Bending moment in the principal 1-axis direction, either btTrue or btFalse.

[ipBeamResponseBM2] - Bending moment in the principal 2-axis direction, either btTrue or btFalse.

[ipBeamResponseTorque] Torque, either btTrue or btFalse.

---

## Errors

```
ERR7_APINotInitialised, ERR7_APINotLicensed,  
ERR7_DataNotFound, ERR7_FileNotOpen, ERR7_InvalidBeamEnd,  
ERR7_InvalidEntityNumber, ERR7_InvalidFileUnit,  
ERR7_InvalidLoadCase, ERR7_InvalidResponseType,  
ERR7_NoError, ERR7_ResultFileIsOpen
```

# St7GetBeamCreepLoadingAge1

---

## Description

Returns the creep loading age for the specified beam. This attribute is only used when performing a creep analysis using the Quasi-Static Solver.

## Syntax

```
long St7GetBeamCreepLoadingAge1(long uID, long BeamNum,  
                                double* Doubles)
```

## Input Parameters

uID

Strand7 model file ID number.

BeamNum

The beam number.

## Output Parameters

Doubles[0]

The creep loading age in seconds.

## Errors

```
ERR7_APINotInitialised, ERR7_APINotLicensed,  
ERR7_DataNotFound, ERR7_FileNotOpen,  
ERR7_InvalidAttributeType, ERR7_InvalidEntity,  
ERR7_InvalidEntityNumber, ERR7_InvalidFileUnit,  
ERR7_InvalidFreedomCase, ERR7_InvalidLoadCase,  
ERR7_InvalidLoadID, ERR7_NoError, ERR7_ResultFileIsOpen
```

## St7GetBeamEndAttachment1

---

### Description

Returns the attachment properties for the specified beam. This attribute can be used to generate attachment links using the St7ToolAttachParts function.

### Syntax

```
long St7GetBeamEndAttachment1(long uID, long BeamNum, long  
BeamEnd, long* AttachType, long* ConnectType, long*  
PropNum, double* Doubles)
```

### Input Parameters

uID

Strand7 model file ID number.

BeamNum

Beam number.

BeamEnd

Beam end number.

### Output Parameters

AttachType

Attachment type, one of alDirect, alRigid or alFlexible.

ConnectType

Attachment sub-type, either alMoment or alPinned.

PropNum

Beam property number to be used for flexible type connections.

Doubles [0]

The maximum distance within which the beam can be attached to another element using the attachment link.

### Errors

```
ERR7_APINotInitialised, ERR7_APINotLicensed,  
ERR7_DataNotFound, ERR7_FileNotOpen,  
ERR7_InvalidAttributeType, ERR7_InvalidEntity,  
ERR7_InvalidEntityNumber, ERR7_InvalidFileUnit,
```

---

```
ERR7_InvalidFreedomCase, ERR7_InvalidLoadCase,  
ERR7_InvalidLoadID, ERR7_NoError, ERR7_ResultFileIsOpen
```

## Plate Attributes – Set

### St7SetPlateID

#### Description

Sets the ID number for the specified plate.

#### Syntax

```
long St7SetPlateID(long uID, long PlateNum, long PlateID)
```

#### Input Parameters

uID

Strand7 model file ID number.

PlateNum

The plate number.

PlateID

The plate ID number.

#### Errors

ERR7\_APINotInitialised, ERR7\_APINotLicensed,  
ERR7\_FileNotOpen, ERR7\_InvalidEntityNumber,  
ERR7\_InvalidFileUnit, ERR7\_NoError, ERR7\_ResultFileIsOpen

### St7SetPlateXAngle1

#### Description

Sets the local axis angle for the specified plate. This angle controls the rotation of the plate local XY axes about the local Z axis.

#### Syntax

```
long St7SetPlateXAngle1(long uID, long PlateNum, double* Doubles)
```

#### Input Parameters

uID

Strand7 model file ID number.

---

PlateNum

The plate number.

Doubles[0]

The angle describing the rotation of the plate local axis system about the local Z axis. See *Plate Local Coordinates* for further information.

## Errors

ERR7\_APINotInitialised, ERR7\_APINotLicensed,  
ERR7\_FileNotOpen, ERR7\_InvalidEntityNumber,  
ERR7\_InvalidFileUnit, ERR7\_InvalidFreedomCase,  
ERR7\_InvalidLoadCase, ERR7\_InvalidUCSID, ERR7\_NoError,  
ERR7\_ResultFileIsOpen

# St7SetPlateThickness2

---

## Description

Sets the thickness attribute of the specified plate element, overriding the plate property thickness – see *St7SetPlateThickness* to set the plate property thickness.

## Syntax

```
long St7SetPlateThickness2(long uID, long PlateNum, double*  
                           Doubles)
```

## Input Parameters

uID

Strand7 model file ID number.

PlateNum

The plate number.

Doubles[0..1]

[0] - The membrane thickness of the plate.

[1] - The bending thickness of the plate.

## Errors

ERR7\_APINotInitialised, ERR7\_APINotLicensed,  
ERR7\_FileNotOpen, ERR7\_InvalidEntityNumber,  
ERR7\_InvalidFileUnit, ERR7\_InvalidFreedomCase,

```
ERR7_InvalidLoadCase, ERR7_InvalidUCSID, ERR7_NoError,  
ERR7_ResultFileIsOpen
```

## St7SetPlateOffset1

---

### Description

Sets the offset for the specified plate element. The offset is applied according to the plate local Z axis direction and is uniform over the element surface.

### Syntax

```
long St7SetPlateOffset1(long uID, long PlateNum, double*  
Doubles)
```

### Input Parameters

uID

Strand7 model file ID number.

PlateNum

Plate number.

Doubles[0]

Plate offset in the local Z axis direction.

### Errors

```
ERR7_APINotInitialised, ERR7_APINotLicensed,  
ERR7_FileNotOpen, ERR7_InvalidEntityNumber,  
ERR7_InvalidFileUnit, ERR7_InvalidFreedomCase,  
ERR7_InvalidLoadCase, ERR7_InvalidUCSID, ERR7_NoError,  
ERR7_ResultFileIsOpen
```

## St7SetPlateEdgeSupport1F

---

### Description

Sets the elastic edge support value for the specified plate. The support acts normal to the specified plate edge and is uniform along the edge length.

### Syntax

```
long St7SetPlateEdgeSupport1F(long uID, long PlateNum, long  
CaseNum, long EdgeNum, long Status, double* Doubles)
```

---

## **Input Parameters**

uID

Strand7 model file ID number.

PlateNum

Plate number.

CaseNum

Freedom case number.

EdgeNum

Edge identifier, one of 1, 2, 3 or 4.

Status

Compression-only flag, either btTrue or btFalse.

Doubles[0]

Elastic support value for the specified plate edge.

## **Errors**

ERR7\_APINotInitialised, ERR7\_APINotLicensed,  
ERR7\_FileNotOpen, ERR7\_InvalidEntityNumber,  
ERR7\_InvalidFileUnit, ERR7\_InvalidFreedomCase,  
ERR7\_InvalidLoadCase, ERR7\_InvalidPlateEdge,  
ERR7\_InvalidUCSID, ERR7\_NoError, ERR7\_ResultFileIsOpen

---

## **St7SetPlateFaceSupport1F**

### **Description**

Sets the elastic face support value for the specified plate. The support acts according to the plate local Z axis direction and is constant over the element surface.

### **Syntax**

```
long St7SetPlateFaceSupport1F(long uID, long PlateNum, long  
CaseNum, long Status, double* Doubles)
```

### **Input Parameters**

uID

Strand7 model file ID number.

PlateNum

Plate number.

CaseNum

Freedom case number.

Status

Compression-only flag, either btTrue or btFalse.

Doubles[0]

Elastic support value for the specified plate.

## Errors

```
ERR7_APINotInitialised, ERR7_APINotLicensed,  
ERR7_FileNotOpen, ERR7_InvalidEntityNumber,  
ERR7_InvalidFileUnit, ERR7_InvalidFreedomCase,  
ERR7_InvalidLoadCase, ERR7_InvalidUCSID, ERR7_NoError,  
ERR7_ResultFileIsOpen
```

## St7SetPlateEdgeRelease1

---

### Description

Sets the edge release conditions for the specified plate.

### Syntax

```
long St7SetPlateEdgeRelease1(long uID, long PlateNum, long  
    EdgeNum, long* Status)
```

### Input Parameters

uID

Strand7 model file ID number.

PlateNum

Plate number.

EdgeNum

Edge identifier, one of 1, 2, 3 or 4.

### Output Parameters

Status[0]

---

Release flag, either btTrue or btFalse.

## Errors

```
ERR7_APINotInitialised, ERR7_APINotLicensed,  
ERR7_FileNotOpen, ERR7_InvalidEntityNumber,  
ERR7_InvalidFileUnit, ERR7_InvalidFreedomCase,  
ERR7_InvalidLoadCase, ERR7_InvalidPlateEdge,  
ERR7_InvalidUCSID, ERR7_NoError, ERR7_ResultFileIsOpen
```

# St7SetPlatePreLoad3

---

## Description

Sets the pre-load conditions for the specified plate.

## Syntax

```
long St7SetPlatePreLoad3(long uID, long PlateNum, long  
CaseNum, long LoadType, double* Doubles)
```

## Input Parameters

uID

Strand7 model file ID number.

PlateNum

Plate number.

CaseNum

Load case number.

LoadType

Pre-load type, either plPlatePreStrain or plPlatePreStress.

Doubles [0..2]

A 3 element array describing the pre-load condition. Doubles [i-1] describes the pre-load in the  $i^{th}$  local axis direction.

## Errors

```
ERR7_APINotInitialised, ERR7_APINotLicensed,  
ERR7_FileNotOpen, ERR7_InvalidEntityNumber,  
ERR7_InvalidFileUnit, ERR7_InvalidFreedomCase,  
ERR7_InvalidLoadCase, ERR7_InvalidPreLoadType,  
ERR7_InvalidUCSID, ERR7_NoError, ERR7_ResultFileIsOpen
```

## St7SetPlateTempGradient1

---

### Description

Sets the temperature gradient for the specified plate. The temperature gradient acts according to the plate local Z axis direction and is constant over the element surface. This attribute is only active for static and dynamic structural analysis.

### Syntax

```
long St7SetPlateTempGradient1(long uID, long PlateNum, long  
CaseNum, double* Doubles)
```

### Input Parameters

uID

Strand7 model file ID number.

PlateNum

Plate number.

CaseNum

Load case number.

Doubles[0]

Temperature gradient in the local Z axis direction.

### Errors

ERR7\_APINotInitialised, ERR7\_APINotLicensed,  
ERR7\_FileNotOpen, ERR7\_InvalidEntityNumber,  
ERR7\_InvalidFileUnit, ERR7\_InvalidFreedomCase,  
ERR7\_InvalidLoadCase, ERR7\_InvalidUCSID, ERR7\_NoError,  
ERR7\_ResultFileIsOpen

## St7SetPlatePointForce6

---

### Description

Assigns a point force to the specified plate.

### Syntax

```
long St7SetPlatePointForce6(long uID, long PlateNum, long  
CaseNum, long Position, long ID, double* Doubles)
```

---

## **Input Parameters**

**uID**

Strand7 model file ID number.

**PlateNum**

Plate number.

**CaseNum**

Load case number.

**Position**

Position identifier, either axUCS or axLocal.

**ID**

Local ID number for the point force.

**Doubles[0..5]**

[0..2] - Components of applied force in the Global Cartesian coordinate system.

axUCS:

[3..5] - XYZ position of point force in the Global Cartesian coordinate system.

axLocal:

[3..4] - UV position of point force in the local element coordinate system.

## **Errors**

ERR7\_APINotInitialised, ERR7\_APINotLicensed,  
ERR7\_DataNotFound, ERR7\_FileNotOpen,  
ERR7\_InvalidEntityNumber, ERR7\_InvalidFileUnit,  
ERR7\_InvalidFreedomCase, ERR7\_InvalidLoadCase,  
ERR7\_InvalidLoadID, ERR7\_InvalidPositionType,  
ERR7\_InvalidUCSID, ERR7\_InvalidUVPos, ERR7\_NoError,  
ERR7\_ResultFileIsOpen

## St7SetPlatePointMoment6

---

### Description

Assigns a point moment to the specified plate.

### Syntax

```
long St7SetPlatePointMoment6(long uID, long PlateNum, long  
CaseNum, long Position, long ID, double* Doubles)
```

### Input Parameters

uID

Strand7 model file ID number.

PlateNum

Plate number.

CaseNum

Load case number.

Position

Position identifier, either axUCS or axLocal.

ID

Local ID number for the point moment.

Doubles [0..5]

[0..2] - Components of applied moment in the Global Cartesian coordinate system.

axUCS:

[3..5] - XYZ position of point moment in the Global Cartesian coordinate system.

axLocal:

[3..4] - UV position of point moment in the local element coordinate system.

### Errors

ERR7\_APINotInitialised, ERR7\_APINotLicensed,  
ERR7\_DataNotFound, ERR7\_FileNotOpen,

---

```
ERR7_InvalidEntityNumber, ERR7_InvalidFileUnit,
ERR7_InvalidFreedomCase, ERR7_InvalidLoadCase,
ERR7_InvalidLoadID, ERR7_InvalidPositionType,
ERR7_InvalidUCSID, ERR7_InvalidUVPos, ERR7_NoError,
ERR7_ResultFileIsOpen
```

## St7SetPlateEdgePressure1

---

### Description

Assigns a pressure to the specified plate edge. The pressure is applied in the plane of the element, perpendicular to the plate edge.

### Syntax

```
long St7SetPlateEdgePressure1(long uID, long PlateNum, long
    CaseNum, long EdgeNum, double* Doubles)
```

### Input Parameters

uID

Strand7 model file ID number.

PlateNum

Plate number.

CaseNum

Load case number.

EdgeNum

Edge identifier, one of 1, 2, 3 or 4.

Doubles[0]

Edge pressure for the specified plate edge, with positive pressures directed away from the plate.

### Errors

```
ERR7_APINotInitialised, ERR7_APINotLicensed,
ERR7_FileNotOpen, ERR7_InvalidEntityNumber,
ERR7_InvalidFileUnit, ERR7_InvalidFreedomCase,
ERR7_InvalidLoadCase, ERR7_InvalidPlateEdge,
ERR7_InvalidUCSID, ERR7_NoError, ERR7_ResultFileIsOpen
```

## St7SetPlateEdgeShear1

---

### Description

Assigns a shear stress to the specified plate edge. The shear stress is applied tangential to the plate edge.

### Syntax

```
long St7SetPlateEdgeShear1(long uID, long PlateNum, long  
CaseNum, long EdgeNum, double* Doubles)
```

### Input Parameters

uID

Strand7 model file ID number.

PlateNum

Plate number.

CaseNum

Load case number.

EdgeNum

Edge identifier, one of 1, 2, 3 or 4.

Doubles [0]

Edge shear stress.

### Errors

ERR7\_APINotInitialised, ERR7\_APINotLicensed,  
ERR7\_FileNotOpen, ERR7\_InvalidEntityNumber,  
ERR7\_InvalidFileUnit, ERR7\_InvalidFreedomCase,  
ERR7\_InvalidLoadCase, ERR7\_InvalidPlateEdge,  
ERR7\_InvalidUCSID, ERR7\_NoError, ERR7\_ResultFileIsOpen

## St7SetPlateEdgeNormalShear1

---

### Description

Assigns a normal shear stress to the specified plate edge. The shear stress acts normal to the plate surface at its edge, in the local +Z direction.

---

## Syntax

```
long St7SetPlateEdgeNormalShear1(long uID, long PlateNum,  
                                long CaseNum, long EdgeNum, double* Doubles)
```

## Input Parameters

uID

Strand7 model file ID number.

PlateNum

Plate number.

CaseNum

Load case number.

EdgeNum

Edge identifier, one of 1, 2, 3 or 4.

Doubles [0]

Edge normal shear stress.

## Errors

```
ERR7_APINotInitialised, ERR7_APINotLicensed,  
ERR7_FileNotOpen, ERR7_InvalidEntityNumber,  
ERR7_InvalidFileUnit, ERR7_InvalidFreedomCase,  
ERR7_InvalidLoadCase, ERR7_InvalidPlateEdge,  
ERR7_InvalidUCSID, ERR7_NoError, ERR7_ResultFileIsOpen
```

---

## St7SetPlateNormalPressure1

### Description

Assigns a face pressure to the specified plate. The pressure is applied according to the plate local Z axis direction.

### Syntax

```
long St7SetPlateNormalPressure1(long uID, long PlateNum,  
                                long CaseNum, double* Doubles)
```

### Input Parameters

uID

Strand7 model file ID number.

PlateNum

Plate number.

CaseNum

Load case number.

Doubles [0]

Normal face pressure for the specified plate. Positive pressures are directed in the local Z axis direction.

## Errors

```
ERR7_APINotInitialised, ERR7_APINotLicensed,  
ERR7_FileNotOpen, ERR7_InvalidEntityNumber,  
ERR7_InvalidFileUnit, ERR7_InvalidFreedomCase,  
ERR7_InvalidLoadCase, ERR7_InvalidUCSID, ERR7_NoError,  
ERR7_ResultFileIsOpen
```

## St7SetPlateGlobalPressure3

---

### Description

Assigns a face pressure to the specified plate. The pressure is applied according to the XYZ components specified.

### Syntax

```
long St7SetPlateGlobalPressure3(long uID, long PlateNum,  
                                long ProjectFlag, long CaseNum, double* Doubles)
```

### Input Parameters

uID

Strand7 model file ID number.

PlateNum

Plate number.

ProjectFlag

btTrue or btFalse.

CaseNum

Load case number.

---

Doubles[0..2]

A 3 element array describing the XYZ components of the applied pressure in the Global Cartesian Coordinate system.

### Errors

ERR7\_APINotInitialised, ERR7\_APINotLicensed,  
ERR7\_FileNotOpen, ERR7\_InvalidEntityNumber,  
ERR7\_InvalidFileUnit, ERR7\_InvalidFreedomCase,  
ERR7\_InvalidLoadCase, ERR7\_InvalidUCSID, ERR7\_NoError,  
ERR7\_ResultFileIsOpen

## St7SetPlateShear2

---

### Description

Assigns a face shear stress to the specified plate. The shear stress is applied in the plane of the element.

### Syntax

```
long St7SetPlateShear2 (long uID, long PlateNum, long  
CaseNum, double* Doubles)
```

### Input Parameters

uID

Strand7 model file ID number.

PlateNum

Plate number.

CaseNum

Load case number.

Doubles[0..1]

A 2 element array that describes the applied shear stress according to the local plate XY axis system.

### Errors

ERR7\_APINotInitialised, ERR7\_APINotLicensed,  
ERR7\_FileNotOpen, ERR7\_InvalidEntityNumber,  
ERR7\_InvalidFileUnit, ERR7\_InvalidFreedomCase,

```
ERR7_InvalidLoadCase, ERR7_InvalidUCSID, ERR7_NoError,  
ERR7_ResultFileIsOpen
```

## St7SetPlateNSMass5

---

### Description

Sets the non-structural mass properties for the specified plate.

### Syntax

```
long St7SetPlateNSMass5(long uID, long PlateNum, long  
CaseNum, double* Doubles)
```

### Input Parameters

uID

Strand7 model file ID number.

PlateNum

Plate number.

CaseNum

Load case number.

Doubles[0..5]

[0] - Non-structural mass for the specified plate.

[1] - Dynamic factor for the specified plate. This factor is used to scale the non-structural mass when performing dynamic analyses.

[2..5] - A 3 element array describing the offset in the XYZ Global Cartesian coordinate system.

### Errors

```
ERR7_APINotInitialised, ERR7_APINotLicensed,  
ERR7_FileNotOpen, ERR7_InvalidEntityNumber,  
ERR7_InvalidFileUnit, ERR7_InvalidFreedomCase,  
ERR7_InvalidLoadCase, ERR7_InvalidUCSID, ERR7_NoError,  
ERR7_ResultFileIsOpen
```

---

## St7SetPlateEdgeConvection2

---

### Description

Sets the thermal convection coefficient and ambient temperature for the specified plate edge. This attribute is only used when performing heat transfer analysis.

### Syntax

```
long St7SetPlateEdgeConvection2(long uID, long PlateNum,  
                                long CaseNum, long EdgeNum, double* Doubles)
```

### Input Parameters

uID

Strand7 model file ID number.

PlateNum

Plate number.

CaseNum

Load case number.

EdgeNum

Local edge number, one of 1, 2, 3 or 4.

Doubles[0..1]

[0] - Edge convection coefficient.

[1] - Ambient temperature.

### Errors

```
ERR7_APINotInitialised, ERR7_APINotLicensed,  
ERR7_DataNotFound, ERR7_FileNotOpen,  
ERR7_InvalidAttributeType, ERR7_InvalidEntity,  
ERR7_InvalidEntityNumber, ERR7_InvalidFileUnit,  
ERR7_InvalidFreedomCase, ERR7_InvalidLoadCase,  
ERR7_InvalidLoadID, ERR7_InvalidPlateEdge,  
ERR7_InvalidUCSID, ERR7_NoError, ERR7_ResultFileIsOpen
```

## St7SetPlateEdgeConvectionTables

---

### Description

Specifies the tables associated with edge convection properties for the specified plate edge. A Factor vs Temperature table may apply to the convection coefficient and Factor vs Time tables may apply to both the convection coefficient and ambient temperature.

### Syntax

```
long St7SetPlateEdgeConvectionTables(long uID, long  
PlateNum, long CaseNum, long EdgeNum, long* Tables)
```

### Input Parameters

uID

Strand7 model file ID number.

PlateNum

Plate number.

CaseNum

Load case number.

EdgeNum

Local edge number, one of 1, 2, 3 or 4.

Tables[0..2]

[0] - Factor vs Time table ID associated with the ambient temperature, use zero for none.

[1] - Factor vs Temperature table ID associated with the edge convection coefficient, use zero for none.

[2] - Factor vs Time table ID associated with the edge convection coefficient, use zero for none.

### Errors

ERR7\_APINotInitialised, ERR7\_APINotLicensed,  
ERR7\_DataNotFound, ERR7\_FileNotOpen,  
ERR7\_InvalidAttributeType, ERR7\_InvalidEntity,  
ERR7\_InvalidEntityNumber, ERR7\_InvalidFileUnit,  
ERR7\_InvalidFreedomCase, ERR7\_InvalidLoadCase,  
ERR7\_InvalidLoadID, ERR7\_InvalidTableType,

---

```
ERR7_InvalidPlateEdge, ERR7_InvalidUCSID, ERR7_NoError,
ERR7_ResultFileIsOpen, ERR7_TableDoesNotExist
```

## St7SetPlateEdgeRadiation2

---

### Description

Sets the thermal radiation coefficient and ambient temperature for the specified plate edge.

### Syntax

```
long St7SetPlateEdgeRadiation2(long uID, long PlateNum,
                               long CaseNum, long EdgeNum, double* Doubles)
```

### Input Parameters

uID

Strand7 model file ID number.

PlateNum

Plate number.

CaseNum

Load case number.

EdgeNum

Local edge number, one of 1, 2, 3 or 4.

Doubles[0..1]

[0] - Radiation coefficient.

[1] - Ambient temperature.

### Errors

```
ERR7_APINotInitialised, ERR7_APINotLicensed,
ERR7_DataNotFound, ERR7_FileNotOpen,
ERR7_InvalidAttributeType, ERR7_InvalidEntity,
ERR7_InvalidEntityNumber, ERR7_InvalidFileUnit,
ERR7_InvalidFreedomCase, ERR7_InvalidLoadCase,
ERR7_InvalidLoadID, ERR7_InvalidPlateEdge,
ERR7_InvalidUCSID, ERR7_NoError, ERR7_ResultFileIsOpen
```

## St7SetPlateEdgeRadiationTables

---

### Description

Specifies the tables associated with the edge thermal radiation properties of a specified plate edge. A Factor vs Temperature table may apply to the radiation coefficient and Factor vs Time tables may apply to both the radiation coefficient and ambient temperature.

### Syntax

```
long St7SetPlateEdgeRadiationTables(long uID, long PlateNum,  
                                long CaseNum, long EdgeNum, long* Tables)
```

### Input Parameters

uID

Strand7 model file ID number.

PlateNum

Plate number.

CaseNum

Load case number.

EdgeNum

Local edge number, one of 1, 2, 3 or 4.

Tables[0..2]

[0] - Table ID number for the Factor vs Time table associated with the radiation coefficient.

[1] - Table ID number for the Factor vs Temperature table associated with the radiation coefficient.

[2] - Table ID number for the Factor vs Time table associated with the ambient temperature.

### Errors

ERR7\_APINotInitialised, ERR7\_APINotLicensed,  
ERR7\_DataNotFound, ERR7\_FileNotOpen,  
ERR7\_InvalidAttributeType, ERR7\_InvalidEntity,  
ERR7\_InvalidEntityNumber, ERR7\_InvalidFileUnit,  
ERR7\_InvalidFreedomCase, ERR7\_InvalidLoadCase,  
ERR7\_InvalidLoadID, ERR7\_InvalidPlateEdge,

---

```
ERR7_InvalidTableType, ERR7_InvalidUCSID, ERR7_NoError,
ERR7_ResultFileIsOpen, ERR7_TableDoesNotExist
```

## St7SetPlateFlux1

---

### Description

Sets the heat flux for the specified plate edge.

### Syntax

```
long St7SetPlateFlux1(long uID, long PlateNum, long CaseNum,
                      long EdgeNum, double* Doubles)
```

### Input Parameters

uID

Strand7 model file ID number.

PlateNum

Plate number.

CaseNum

Load case number.

EdgeNum

Local edge number, one of 1, 2, 3 or 4.

Doubles[0]

The heat flux through the plate edge.

### Errors

```
ERR7_APINotInitialised, ERR7_APINotLicensed,
ERR7_DataNotFound, ERR7_FileNotOpen,
ERR7_InvalidAttributeType, ERR7_InvalidEntity,
ERR7_InvalidEntityNumber, ERR7_InvalidFileUnit,
ERR7_InvalidFreedomCase, ERR7_InvalidLoadCase,
ERR7_InvalidLoadID, ERR7_InvalidPlateEdge,
ERR7_InvalidUCSID, ERR7_NoError, ERR7_ResultFileIsOpen
```

## St7SetPlateFluxTables

---

### Description

Specified the tables to be associated with the heat flux for the specified plate edge. Both a Factor vs Time and a Factor vs Temperature table may be assigned.

### Syntax

```
long St7SetPlateFluxTables(long uID, long PlateNum, long  
CaseNum, long EdgeNum, long* Tables)
```

### Input Parameters

uID

Strand7 model file ID number.

PlateNum

Plate number.

CaseNum

Load case number.

EdgeNum

Local edge number, one of 1, 2, 3 or 4.

Tables[0..1]

[0] - Factor vs Time table ID associated with the edge heat flux, use zero for none.

[1] - Factor vs Temperature table ID associated with the edge heat flux, use zero for none.

### Errors

ERR7\_APINotInitialised, ERR7\_APINotLicensed,  
ERR7\_DataNotFound, ERR7\_FileNotOpen,  
ERR7\_InvalidAttributeType, ERR7\_InvalidEntity,  
ERR7\_InvalidEntityNumber, ERR7\_InvalidFileUnit,  
ERR7\_InvalidFreedomCase, ERR7\_InvalidLoadCase,  
ERR7\_InvalidLoadID, ERR7\_InvalidPlateEdge,  
ERR7\_InvalidTableType, ERR7\_InvalidUCSID, ERR7\_NoError,  
ERR7\_ResultFileIsOpen, ERR7\_TableDoesNotExist

---

## St7SetPlateFaceConvection2

---

### Description

Sets the thermal convection coefficient and ambient temperature for the specified plate face. This attribute is only used when performing heat transfer analysis.

### Syntax

```
long St7SetPlateFaceConvection2(long uID, long PlateNum,  
                                long CaseNum, long Surface, double* Doubles)
```

### Input Parameters

uID

Strand7 model file ID number.

PlateNum

Plate number.

CaseNum

Load case number.

Surface

Local plate surface, either psPlateZMinus or psPlateZPlus.

Doubles[0..1]

[0] - Convection coefficient.

[1] - Ambient temperature.

### Errors

```
ERR7_APINotInitialised, ERR7_APINotLicensed,  
ERR7_DataNotFound, ERR7_FileNotOpen,  
ERR7_InvalidAttributeType, ERR7_InvalidEntity,  
ERR7_InvalidEntityNumber, ERR7_InvalidFileUnit,  
ERR7_InvalidFreedomCase, ERR7_InvalidLoadCase,  
ERR7_InvalidLoadID, ERR7_InvalidPlateSurface,  
ERR7_InvalidUCSID, ERR7_NoError, ERR7_ResultFileIsOpen
```

## St7SetPlateFaceConvectionTables

---

### Description

Specifies the tables associated with thermal convection properties for the specified plate face. A Factor vs Temperature table may apply to the convection coefficient and Factor vs Time tables may apply to both the convection coefficient and ambient temperature.

### Syntax

```
long St7SetPlateFaceConvectionTables(long uID, long  
PlateNum, long CaseNum, long Surface, long* Tables)
```

### Input Parameters

uID

Strand7 model file ID number.

PlateNum

Plate number.

CaseNum

Load case number.

Surface

Local plate surface number, either psPlateZMinus or psPlateZPlus.

Tables[0..2]

[0] - Factor vs Time table ID associated with the ambient temperature, use zero for none.

[1] - Factor vs Temperature table ID associated with the convection coefficient, use zero for none.

[2] - Factor vs Time table ID associated with the convection coefficient, use zero for none.

### Errors

ERR7\_APINotInitialised, ERR7\_APINotLicensed,  
ERR7\_DataNotFound, ERR7\_FileNotOpen,  
ERR7\_InvalidAttributeType, ERR7\_InvalidEntity,  
ERR7\_InvalidEntityNumber, ERR7\_InvalidFileUnit,  
ERR7\_InvalidFreedomCase, ERR7\_InvalidLoadCase,  
ERR7\_InvalidLoadID, ERR7\_InvalidPlateSurface,

---

```
ERR7_InvalidTableType, ERR7_InvalidUCSID, ERR7_NoError,
ERR7_ResultFileIsOpen, ERR7_TableDoesNotExist
```

## St7SetPlateFaceRadiation2

---

### Description

Sets the thermal radiation coefficient and ambient temperature for the specified plate face.

### Syntax

```
long St7SetPlateFaceRadiation2(long uID, long PlateNum,
                               long CaseNum, long Surface, double* Doubles)
```

### Input Parameters

uID

Strand7 model file ID number.

PlateNum

Plate number.

CaseNum

Load case number.

Surface

Local plate face, either psPlateZMinus or psPlateZPlus.

Doubles[0..1]

[0] - Radiation coefficient.

[1] - Ambient temperature.

### Errors

```
ERR7_APINotInitialised, ERR7_APINotLicensed,
ERR7_DataNotFound, ERR7_FileNotOpen,
ERR7_InvalidAttributeType, ERR7_InvalidEntity,
ERR7_InvalidEntityNumber, ERR7_InvalidFileUnit,
ERR7_InvalidFreedomCase, ERR7_InvalidLoadCase,
ERR7_InvalidLoadID, ERR7_InvalidPlateSurface,
ERR7_InvalidUCSID, ERR7_NoError, ERR7_ResultFileIsOpen
```

## St7SetPlateFaceRadiationTables

---

### Description

Specifies the tables to be associated with the radiation properties of a specified plate face. A Factor vs Temperature table may apply to the radiation coefficient and Factor vs Time tables may apply to both the radiation coefficient and ambient temperature.

### Syntax

```
long St7SetPlateFaceRadiationTables(long uID, long PlateNum,  
                                long CaseNum, long Surface, long* Tables)
```

### Input Parameters

uID

Strand7 model file ID number.

PlateNum

Plate number.

CaseNum

Load case number.

Surface

Local plate surface, either psPlateZMinus or psPlateZPlus.

Tables[0..2]

[0] - Factor vs Time table ID associated with the ambient temperature, use zero for none.

[1] - Factor vs Temperature table ID associated with the radiation coefficient, use zero for none.

[2] - Factor vs Time table ID associated with the radiation coefficient, use zero for none.

### Errors

ERR7\_APINotInitialised, ERR7\_APINotLicensed,  
ERR7\_DataNotFound, ERR7\_FileNotOpen,  
ERR7\_InvalidAttributeType, ERR7\_InvalidEntity,  
ERR7\_InvalidEntityNumber, ERR7\_InvalidFileUnit,  
ERR7\_InvalidFreedomCase, ERR7\_InvalidLoadCase,  
ERR7\_InvalidLoadID, ERR7\_InvalidPlateSurface,

---

```
ERR7_InvalidTableType, ERR7_InvalidUCSID, ERR7_NoError,
ERR7_ResultFileIsOpen, ERR7_TableDoesNotExist
```

## St7SetPlateHeatSource1

---

### Description

Sets the thermal heat source for the specified plate.

### Syntax

```
long St7SetPlateHeatSource1(long uID, long PlateNum, long
CaseNum, double* Doubles)
```

### Input Parameters

uID

Strand7 model file ID number.

PlateNum

Plate number.

CaseNum

Load case number.

Doubles[0]

Thermal heat source value.

### Errors

```
ERR7_APINotInitialised, ERR7_APINotLicensed,
ERR7_DataNotFound, ERR7_FileNotOpen,
ERR7_InvalidAttributeType, ERR7_InvalidEntity,
ERR7_InvalidEntityNumber, ERR7_InvalidFileUnit,
ERR7_InvalidFreedomCase, ERR7_InvalidLoadCase,
ERR7_InvalidLoadID, ERR7_InvalidUCSID, ERR7_NoError,
ERR7_ResultFileIsOpen
```

## St7SetPlateHeatSourceTables

---

### Description

Specifies the tables to be associated with the thermal heat source for the specified plate. Both a Factor vs Time and Factor vs Temperature table may be assigned.

## Syntax

```
long St7SetPlateHeatSourceTables(long uID, long PlateNum,  
                                long CaseNum, long* Tables)
```

## Input Parameters

uID

Strand7 model file ID number.

PlateNum

Plate number.

CaseNum

Load case number.

Tables[0..1]

[0] - Factor vs Time table ID associated with the heat source, use zero for none.

[1] - Factor vs Temperature table ID associated with the heat source, use zero for none.

## Errors

```
ERR7_APINotInitialised, ERR7_APINotLicensed,  
ERR7_DataNotFound, ERR7_FileNotOpen,  
ERR7_InvalidAttributeType, ERR7_InvalidEntity,  
ERR7_InvalidEntityNumber, ERR7_InvalidFileUnit,  
ERR7_InvalidFreedomCase, ERR7_InvalidLoadCase,  
ERR7_InvalidLoadID, ERR7_InvalidTableType,  
ERR7_InvalidUCSID, ERR7_NoError, ERR7_ResultFileIsOpen,  
ERR7_TableDoesNotExist
```

## St7SetPlateSoilStress2

---

### Description

Sets the in-situ soil stress for the specified plate. This attribute is only active for plates of property type soil.

## Syntax

```
long St7SetPlateSoilStress2(long uID, long PlateNum, long  
                            CaseNum, double* Doubles)
```

---

## **Input Parameters**

uID

Strand7 model file ID number.

PlateNum

Plate number.

CaseNum

Load case number.

Doubles[0..1]

A 2 element array containing the initial vertical stress and the horizontal stress ratio.

## **Errors**

```
ERR7_APINotInitialised, ERR7_APINotLicensed,  
ERR7_FileNotOpen, ERR7_InvalidEntityNumber,  
ERR7_InvalidFileUnit, ERR7_InvalidFreedomCase,  
ERR7_InvalidLoadCase, ERR7_InvalidUCSID, ERR7_NoError,  
ERR7_ResultFileIsOpen
```

---

# **St7SetPlateSoilRatio2**

## **Description**

Sets the in-situ soil ratios for the specified plate. This attribute is only active for plates of property type soil.

## **Syntax**

```
long St7SetPlateSoilRatio2(long uID, long PlateNum, long  
CaseNum, double* Doubles)
```

## **Input Parameters**

uID

Strand7 model file ID number.

PlateNum

Plate number.

CaseNum

Load case number.

Doubles[0..1]

A 2 element array containing the overconsolidation ratio and the initial void ratio.

## Errors

ERR7\_APINotInitialised, ERR7\_APINotLicensed,  
ERR7\_FileNotOpen, ERR7\_InvalidEntityNumber,  
ERR7\_InvalidFileUnit, ERR7\_InvalidFreedomCase,  
ERR7\_InvalidLoadCase, ERR7\_InvalidUCSID, ERR7\_NoError,  
ERR7\_ResultFileIsOpen

# St7SetPlateResponse

---

## Description

Assigns a response variable to the specified plate. Response variables are only used by the Load Influence solver.

## Syntax

```
long St7SetPlateResponse(long uID, long PlateNum, long  
CaseNum, long ResponseType, long UCSId, long* Status)
```

## Input Parameters

uID

Strand7 model file ID number.

PlateNum

Plate number.

CaseNum

Load case number.

ResponseType

Response variable type, either rePlateForce or rePlateMoment.

UCSId

UCS ID number.

Status[0..5]

---

A 6 element array describing which force/moment components are flagged as response variables according to the 123 axis convention in the specified UCS - [11, 22, 33, 12, 23, 31].

## Errors

```
ERR7_APINotInitialised, ERR7_APINotLicensed,  
ERR7_DataNotFound, ERR7_FileNotOpen, ERR7_InvalidBeamEnd,  
ERR7_InvalidEntityNumber, ERR7_InvalidFileUnit,  
ERR7_InvalidLoadCase, ERR7_InvalidResponseType,  
ERR7_NoError, ERR7_ResultFileIsOpen
```

# St7SetPlateLoadPatch4

---

## Description

Sets the load patch type for the specified plate. This attribute is only active for plates of property type load patch.

## Syntax

```
long St7SetPlateLoadPatch4(long uID, long PlateNum, long  
PatchType, long EdgeBits, double* Doubles)
```

## Input Parameters

uID

Strand7 model file ID number.

PlateNum

Plate number.

PatchType

Load patch type, one of ptAuto4, ptAuto3, ptAuto2, ptAuto1, ptAngleSplit or ptManual.

EdgeBits

A 32-bit word in which the four least significant bits specify the selection of up to four edges. See *Load Patch Types* for additional information.

Doubles[0..3]

Edge weights, see *Load Patch Types* for additional information.

## Errors

```
ERR7_APINotInitialised, ERR7_APINotLicensed,  
ERR7_DataNotFound, ERR7_FileNotOpen,  
ERR7_InvalidAttributeType, ERR7_InvalidEntity,  
ERR7_InvalidEntityNumber, ERR7_InvalidFileUnit,  
ERR7_InvalidFreedomCase, ERR7_InvalidLoadCase,  
ERR7_InvalidLoadID, ERR7_InvalidPatchType,  
ERR7_InvalidPatchTypeForPlate, ERR7_InvalidPlateEdge,  
ERR7_InvalidUCSID, ERR7_NoError, ERR7_ResultFileIsOpen
```

## St7SetPlateReinforcement2

---

### Description

Assigns the concrete reinforcement properties for the specified plate.

### Syntax

```
long St7SetPlateReinforcement2(long uID, long PlateNum,  
                               long LayoutID, double* Doubles)
```

### Input Parameters

uID

Strand7 model file ID number.

PlateNum

Plate number.

LayoutID

Reinforcement layout ID number.

Doubles[0..1]

A 2 element array describing the angular orientation of the 1-3 and 2-4 reinforcement layers respectively.

### Errors

```
ERR7_APINotInitialised, ERR7_APINotLicensed,  
ERR7_FileNotOpen, ERR7_InvalidEntityNumber,  
ERR7_InvalidFileUnit, ERR7_InvalidFreedomCase,  
ERR7_InvalidLoadCase, ERR7_InvalidLayoutID,  
ERR7_InvalidUCSID, ERR7_NoError, ERR7_ResultFileIsOpen
```

---

## St7SetPlateCreepLoadingAge1

---

### Description

Sets the creep loading age for the specified plate. This attribute is only active when conducting creep analysis using the Quasi-Static solver.

### Syntax

```
long St7SetPlateCreepLoadingAge1(long uID, long PlateNum,  
                                double* Doubles)
```

### Input Parameters

uID

Strand7 model file ID number.

PlateNum

Plate number.

Doubles[0]

Creep loading age in seconds.

### Errors

```
ERR7_APINotInitialised, ERR7_APINotLicensed,  
ERR7_FileNotOpen, ERR7_InvalidEntityNumber,  
ERR7_InvalidFileUnit, ERR7_InvalidFreedomCase,  
ERR7_InvalidLoadCase, ERR7_InvalidUCSID, ERR7_NoError,  
ERR7_ResultFileIsOpen
```

---

## St7SetPlateEdgeAttachment1

---

### Description

Assigns an edge attachment to the specified plate edge. Attachment attributes can be used to generate attachment links using the *St7ToolAttachParts* function.

### Syntax

```
long St7SetPlateEdgeAttachment1(long uID, long PlateNum,  
                               long EdgeNum, long Direction, long AttachType, long  
                               ConnectType, long PropNum, double* Doubles)
```

### Input Parameters

uID

Strand7 model file ID number.

PlateNum

Plate number.

EdgeNum

Local edge number, one of 1, 2, 3 or 4.

Direction

Direction of attachment, one of adPlanar, adPlusZ or adMinusZ.

AttachType

Attachment type, one of alDirect, alRigid or alFlexible.

ConnectType

Attachment sub-type, either alMoment or alPinned.

PropNum

Beam property number used for flexible attachment types.

Doubles [0]

The maximum distance within which the plate edge can be connected to another element using the attachment link.

## Errors

ERR7\_APINotInitialised, ERR7\_APINotLicensed,  
ERR7\_FileNotOpen, ERR7\_InvalidAttachmentDirection,  
ERR7\_InvalidAttachmentType, ERR7\_InvalidEntityNumber,  
ERR7\_InvalidFileUnit, ERR7\_InvalidFreedomCase,  
ERR7\_InvalidLoadCase, ERR7\_InvalidPlateEdge,  
ERR7\_InvalidUCSID, ERR7\_NoError, ERR7\_ResultFileIsOpen

## St7SetPlateFaceAttachment1

---

### Description

Assigns a face attachment to the specified plate face. Attachment attributes can be used to generate attachment links using the St7ToolAttachParts function.

---

## Syntax

```
long St7SetPlateFaceAttachment1(long uID, long PlateNum,  
                                long Surface, long AttachType, long ConnectType, long  
                                PropNum, double* Doubles)
```

## Input Parameters

uID

Strand7 model file ID number.

PlateNum

Plate number.

Surface

Local plate surface, either psPlateZMinus or psPlateZPlus.

AttachType

Attachment type, one of alDirect, alRigid or alFlexible.

ConnectType

Attachment sub-type, either alMoment or alPinned.

PropNum

Beam property number used for flexible attachment types.

Doubles[0]

The maximum distance within which the plate face can be connected to another element using the attachment link.

## Errors

```
ERR7_APINotInitialised, ERR7_APINotLicensed,  
ERR7_FileNotOpen, ERR7_InvalidAttachmentType,  
ERR7_InvalidEntityNumber, ERR7_InvalidFileUnit,  
ERR7_InvalidFreedomCase, ERR7_InvalidLoadCase,  
ERR7_InvalidPlateSurface, ERR7_InvalidUCSID, ERR7_NoError,  
ERR7_ResultFileIsOpen
```

## Plate Attributes – Get

### St7GetPlateID

#### Description

Returns the ID number for the specified plate.

#### Syntax

```
long St7GetPlateID(long uID, long PlateNum, long* PlateID)
```

#### Input Parameters

uID

Strand7 model file ID number.

PlateNum

Plate number.

#### Output Parameters

PlateID

Plate ID number.

#### Errors

```
ERR7_APINotInitialised, ERR7_APINotLicensed,  
ERR7_FileNotOpen, ERR7_InvalidEntityNumber,  
ERR7_InvalidFileUnit, ERR7_NoError, ERR7_ResultFileIsOpen
```

### St7GetPlateXAngle1

#### Description

Returns the local axis angle for the specified plate. This angle controls the rotations of the plate local XY axes about the local Z axis.

#### Syntax

```
long St7GetPlateXAngle1(long uID, long PlateNum, double*  
Doubles)
```

#### Input Parameters

uID

Strand7 model file ID number.

---

PlateNum

Plate number.

### Output Parameters

Doubles[0]

The angle describing the rotation of the plate local axis system about the local Z axis. See *Plate Local Coordinates* for further information.

### Errors

ERR7\_APINotInitialised, ERR7\_APINotLicensed,  
ERR7\_DataNotFound, ERR7\_FileNotOpen,  
ERR7\_InvalidAttributeType, ERR7\_InvalidEntity,  
ERR7\_InvalidEntityNumber, ERR7\_InvalidFileUnit,  
ERR7\_InvalidFreedomCase, ERR7\_InvalidLoadCase,  
ERR7\_InvalidLoadID, ERR7\_NoError, ERR7\_ResultFileIsOpen

## St7GetPlateThickness2

---

### Description

Returns the thickness attribute of the specified plate, if the thickness attribute is set – see *St7GetPlateThickness* to get the default plate property thickness.

### Syntax

```
long St7GetPlateThickness2(long uID, long PlateNum, double*  
                           Doubles)
```

### Input Parameters

uID

Strand7 model file ID number.

PlateNum

Plate number.

### Output Parameters

Doubles[0..1]

[ 0 ] - Plate membrane thickness.

[ 1 ] - Plate bending thickness.

## Errors

```
ERR7_APINotInitialised, ERR7_APINotLicensed,  
ERR7_DataNotFound, ERR7_FileNotOpen,  
ERR7_InvalidAttributeType, ERR7_InvalidEntity,  
ERR7_InvalidEntityNumber, ERR7_InvalidFileUnit,  
ERR7_InvalidFreedomCase, ERR7_InvalidLoadCase,  
ERR7_InvalidLoadID, ERR7_NoError, ERR7_ResultFileIsOpen
```

# St7GetPlateOffset1

---

## Description

Returns the offset for the specified plate. The offset is applied according to the plate local Z axis direction and is uniform over the element surface.

## Syntax

```
long St7GetPlateOffset1(long uID, long PlateNum, double*  
    Doubles)
```

## Input Parameters

uID

Strand7 model file ID number.

PlateNum

Plate number.

## Output Parameters

Doubles [0]

Plate offset in the local Z axis direction.

## Errors

```
ERR7_APINotInitialised, ERR7_APINotLicensed,  
ERR7_DataNotFound, ERR7_FileNotOpen,  
ERR7_InvalidAttributeType, ERR7_InvalidEntity,  
ERR7_InvalidEntityNumber, ERR7_InvalidFileUnit,  
ERR7_InvalidFreedomCase, ERR7_InvalidLoadCase,  
ERR7_InvalidLoadID, ERR7_NoError, ERR7_ResultFileIsOpen
```

---

## St7GetPlateEdgeSupport1F

---

### Description

Returns the elastic support applied at the specified plate edge. The support acts normal to the specified edge and is uniform along the edge length.

### Syntax

```
long St7GetPlateEdgeSupport1F(long uID, long PlateNum, long  
CaseNum, long EdgeNum, long* Status, double* Doubles)
```

### Input Parameters

uID

Strand7 model file ID number.

PlateNum

Plate number.

CaseNum

Load case number.

EdgeNum

Local edge number, one of 1, 2, 3 or 4.

### Output Parameters

Status

Compression-only flag, either btTrue or btFalse.

Doubles[0]

Elastic support value.

### Errors

```
ERR7_APINotInitialised, ERR7_APINotLicensed,  
ERR7_DataNotFound, ERR7_FileNotOpen,  
ERR7_InvalidAttributeType, ERR7_InvalidEntity,  
ERR7_InvalidEntityNumber, ERR7_InvalidFileUnit,  
ERR7_InvalidFreedomCase, ERR7_InvalidLoadCase,  
ERR7_InvalidLoadID, ERR7_NoError, ERR7_ResultFileIsOpen
```

## St7GetPlateFaceSupport1F

---

### Description

Returns the elastic support applied at the specified plate face. The support acts according to the local plate Z axis direction and is constant over the element surface.

### Syntax

```
long St7GetPlateFaceSupport1F(long uID, long PlateNum, long CaseNum, long* Status, double* Doubles)
```

### Input Parameters

uID

Strand7 model file ID number.

PlateNum

Plate number.

CaseNum

Load case number.

### Output Parameters

Status

Compression-only flag, either btTrue or btFalse.

Doubles [0]

Elastic support value.

### Errors

```
ERR7_APINotInitialised, ERR7_APINotLicensed,  
ERR7_DataNotFound, ERR7_FileNotOpen,  
ERR7_InvalidAttributeType, ERR7_InvalidEntity,  
ERR7_InvalidEntityNumber, ERR7_InvalidFileUnit,  
ERR7_InvalidFreedomCase, ERR7_InvalidLoadCase,  
ERR7_InvalidLoadID, ERR7_NoError, ERR7_ResultFileIsOpen
```

## St7GetPlateEdgeRelease1

---

### Description

Returns the edge release condition for the specified plate edge

---

## Syntax

```
long St7GetPlateEdgeRelease1(long uID, long PlateNum, long  
                           EdgeNum, long* Status)
```

## Input Parameters

uID

Strand7 model file ID number.

PlateNum

Plate number.

EdgeNum

Local edge number, either 1, 2, 3 or 4.

## Output Parameters

Status[0]

Edge release condition, either btTrue or btFalse.

## Errors

```
ERR7_APINotInitialised, ERR7_APINotLicensed,  
ERR7_DataNotFound, ERR7_FileNotOpen,  
ERR7_InvalidAttributeType, ERR7_InvalidEntity,  
ERR7_InvalidEntityNumber, ERR7_InvalidFileUnit,  
ERR7_InvalidFreedomCase, ERR7_InvalidLoadCase,  
ERR7_InvalidLoadID, ERR7_NoError, ERR7_ResultFileIsOpen
```

---

## St7GetPlatePreLoad3

### Description

Returns the pre-load conditions for the specified plate.

### Syntax

```
long St7GetPlatePreLoad3(long uID, long PlateNum, long  
                         CaseNum, long* LoadType, double* Doubles)
```

### Input Parameters

uID

Strand7 model file ID number.

PlateNum

Plate number.

CaseNum

Load case number.

### Output Parameters

LoadType

Pre-load type, either piPlatePreStrain or piPlatePreStress.

Doubles[0..2]

A 3 element array describing the pre-load condition. Doubles[i-1] describes the pre-load in the i<sup>th</sup> local axis direction.

### Errors

ERR7\_APINotInitialised, ERR7\_APINotLicensed,  
ERR7\_DataNotFound, ERR7\_FileNotOpen,  
ERR7\_InvalidAttributeType, ERR7\_InvalidEntity,  
ERR7\_InvalidEntityNumber, ERR7\_InvalidFileUnit,  
ERR7\_InvalidFreedomCase, ERR7\_InvalidLoadCase,  
ERR7\_InvalidLoadID, ERR7\_NoError, ERR7\_ResultFileIsOpen

## St7GetPlateTempGradient1

---

### Description

Returns the temperature gradient for the specified plate face. The temperature gradient acts according to the plate local Z axis direction and is constant over the element surface. This attribute is only active for static and dynamic structural analysis.

### Syntax

```
long St7GetPlateTempGradient1(long uID, long PlateNum, long  
CaseNum, double* Doubles)
```

### Input Parameters

uID

Strand7 model file ID number.

PlateNum

Plate number.

CaseNum

---

Load case number.

### Output Parameters

Doubles [0]

Temperature gradient in the local Z axis direction.

### Errors

ERR7\_APINotInitialised, ERR7\_APINotLicensed,  
ERR7\_DataNotFound, ERR7\_FileNotOpen,  
ERR7\_InvalidAttributeType, ERR7\_InvalidEntity,  
ERR7\_InvalidEntityNumber, ERR7\_InvalidFileUnit,  
ERR7\_InvalidFreedomCase, ERR7\_InvalidLoadCase,  
ERR7\_InvalidLoadID, ERR7\_NoError, ERR7\_ResultFileIsOpen

## St7GetPlatePointForce6

---

### Description

Returns the point force assigned to the specified plate.

### Syntax

```
long St7GetPlatePointForce6(long uID, long PlateNum, long  
CaseNum, long Position, long ID, double* Doubles)
```

### Input Parameters

uID

Strand7 model file ID number.

PlateNum

Plate number.

CaseNum

Load case number.

Position

Position identifier, either axUCS or axLocal.

ID

Local ID number for the point force.

## Output Parameters

Doubles [0..5]

[0..2] - Components of applied force in the Global Cartesian coordinate system.

axUCS:

[3..5] - XYZ position of point force in the Global Cartesian coordinate system.

axLocal:

[3..4] - UV position of point force in the local element coordinate system.

## Errors

```
ERR7_APINotInitialised, ERR7_APINotLicensed,  
ERR7_DataNotFound, ERR7_FileNotOpen,  
ERR7_InvalidAttributeType, ERR7_InvalidEntity,  
ERR7_InvalidEntityNumber, ERR7_InvalidFileUnit,  
ERR7_InvalidFreedomCase, ERR7_InvalidLoadCase,  
ERR7_InvalidLoadID, ERR7_InvalidPositionType, ERR7_NoError,  
ERR7_ResultFileIsOpen
```

# St7GetPlatePointMoment6

---

## Description

Returns the point moment assigned to the specified plate.

## Syntax

```
long St7GetPlatePointMoment6(long uID, long PlateNum, long  
CaseNum, long Position, long ID, double* Doubles)
```

## Input Parameters

uID

Strand7 model file ID number.

PlateNum

Plate number.

CaseNum

Load case number.

---

Position

Position identifier, either axUCS or axLocal.

ID

Local ID number for the point moment.

### Output Parameters

Doubles [0..5]

[0..2] - Components of applied moment in the Global Cartesian coordinate system.

axUCS:

[3..5] - XYZ position of point moment in the Global Cartesian coordinate system.

axLocal:

[3..4] - UV position of point moment in the local element coordinate system.

### Errors

ERR7\_APINotInitialised, ERR7\_APINotLicensed,  
ERR7\_DataNotFound, ERR7\_FileNotOpen,  
ERR7\_InvalidAttributeType, ERR7\_InvalidEntity,  
ERR7\_InvalidEntityNumber, ERR7\_InvalidFileUnit,  
ERR7\_InvalidFreedomCase, ERR7\_InvalidLoadCase,  
ERR7\_InvalidLoadID, ERR7\_InvalidPositionType, ERR7\_NoError,  
ERR7\_ResultFileIsOpen

## St7GetPlateEdgePressure1

---

### Description

Returns the edge pressure assigned to the specified plate edge. The pressure is applied in the plane of the element, perpendicular to the plate edge.

### Syntax

```
long St7GetPlateEdgePressure1(long uID, long PlateNum, long  
CaseNum, long EdgeNum, double* Doubles)
```

### Input Parameters

uID

Strand7 model file ID number.

PlateNum

Plate number

CaseNum

Load case number.

EdgeNum

Local edge number, one of 1, 2, 3 or 4.

### Output Parameters

Doubles [0]

Edge pressure for the plate edge, with positive pressure directed away from the plate.

### Errors

ERR7\_APINotInitialised, ERR7\_APINotLicensed,  
ERR7\_DataNotFound, ERR7\_FileNotOpen,  
ERR7\_InvalidAttributeType, ERR7\_InvalidEntity,  
ERR7\_InvalidEntityNumber, ERR7\_InvalidFileUnit,  
ERR7\_InvalidFreedomCase, ERR7\_InvalidLoadCase,  
ERR7\_InvalidLoadID, ERR7\_NoError, ERR7\_ResultFileIsOpen

## St7GetPlateEdgeShear1

---

### Description

Returns the shear stress assigned to the specified plate edge. The shear stress is applied tangential to the plate edge.

### Syntax

```
long St7GetPlateEdgeShear1(long uID, long PlateNum, long  
CaseNum, long EdgeNum, double* Doubles)
```

### Input Parameters

uID

Strand7 model file ID number.

PlateNum

Plate number.

---

CaseNum

Load case number.

EdgeNum

Local edge number, one of 1, 2, 3 or 4.

### Output Parameters

Doubles [0]

Edge shear stress.

### Errors

ERR7\_APINotInitialised, ERR7\_APINotLicensed,  
ERR7\_DataNotFound, ERR7\_FileNotOpen,  
ERR7\_InvalidAttributeType, ERR7\_InvalidEntity,  
ERR7\_InvalidEntityNumber, ERR7\_InvalidFileUnit,  
ERR7\_InvalidFreedomCase, ERR7\_InvalidLoadCase,  
ERR7\_InvalidLoadID, ERR7\_NoError, ERR7\_ResultFileIsOpen

## St7GetPlateEdgeNormalShear1

---

### Description

Returns the shear stress assigned to the specified plate edge. The shear stress acts normal to the plate surface at its edge, in the local +Z direction.

### Syntax

```
long St7GetPlateEdgeNormalShear1(long uID, long PlateNum,  
                                long CaseNum, long EdgeNum, double* Doubles)
```

### Input Parameters

uID

Strand7 model file ID number.

PlateNum

Plate number.

CaseNum

Load case number.

EdgeNum

Local edge number, one of 1, 2, 3 or 4.

## Output Parameters

Doubles [0]

Edge normal shear stress.

## Errors

ERR7\_APINotInitialised, ERR7\_APINotLicensed,  
ERR7\_DataNotFound, ERR7\_FileNotOpen,  
ERR7\_InvalidAttributeType, ERR7\_InvalidEntity,  
ERR7\_InvalidEntityNumber, ERR7\_InvalidFileUnit,  
ERR7\_InvalidFreedomCase, ERR7\_InvalidLoadCase,  
ERR7\_InvalidLoadID, ERR7\_NoError, ERR7\_ResultFileIsOpen

# St7GetPlateNormalPressure1

---

## Description

Returns the normal pressure assigned to the specified plate. The pressure acts according to the plate local Z axis direction.

## Syntax

```
long St7GetPlateNormalPressure1(long uID, long PlateNum,  
                                long CaseNum, double* Doubles)
```

## Input Parameters

uID

Strand7 model file ID number.

PlateNum

Plate number.

CaseNum

Load case number.

## Output Parameters

Doubles [0]

Plate normal pressure.

## Errors

ERR7\_APINotInitialised, ERR7\_APINotLicensed,  
ERR7\_DataNotFound, ERR7\_FileNotOpen,  
ERR7\_InvalidAttributeType, ERR7\_InvalidEntity,

---

```
ERR7_InvalidEntityNumber, ERR7_InvalidFileUnit,  
ERR7_InvalidFreedomCase, ERR7_InvalidLoadCase,  
ERR7_InvalidLoadID, ERR7_NoError, ERR7_ResultFileIsOpen
```

## St7GetPlateGlobalPressure3

---

### Description

Returns the global pressure components assigned to the specified plate.

### Syntax

```
long St7GetPlateGlobalPressure3(long uID, long PlateNum,  
                                long CaseNum, long* ProjectFlag, double* Doubles)
```

### Input Parameters

uID

Strand7 model file ID number.

PlateNum

Plate number.

CaseNum

Load case number.

### Output Parameters

ProjectFlag

btTrue or btFalse.

Doubles[0..2]

A 3 element array describing the XYZ components of the applied pressure in the Global Cartesian Coordinate system.

### Errors

```
ERR7_APINotInitialised, ERR7_APINotLicensed,  
ERR7_DataNotFound, ERR7_FileNotOpen,  
ERR7_InvalidAttributeType, ERR7_InvalidEntity,  
ERR7_InvalidEntityNumber, ERR7_InvalidFileUnit,  
ERR7_InvalidFreedomCase, ERR7_InvalidLoadCase,  
ERR7_InvalidLoadID, ERR7_NoError, ERR7_ResultFileIsOpen
```

## St7GetPlateShear2

---

### Description

Returns the shear stress assigned to the specified plate face. The shear stress is applied in the plane of the element.

### Syntax

```
long St7GetPlateShear2(long uID, long PlateNum, long  
CaseNum, double* Doubles)
```

### Input Parameters

uID

Strand7 model file ID number.

PlateNum

Plate number.

CaseNum

Load case number.

### Output Parameters

Doubles [0..1]

A 2 element array that describes the applied shear stress according to the local plate XY axis system.

### Errors

```
ERR7_APINotInitialised, ERR7_APINotLicensed,  
ERR7_DataNotFound, ERR7_FileNotOpen,  
ERR7_InvalidAttributeType, ERR7_InvalidEntity,  
ERR7_InvalidEntityNumber, ERR7_InvalidFileUnit,  
ERR7_InvalidFreedomCase, ERR7_InvalidLoadCase,  
ERR7_InvalidLoadID, ERR7_NoError, ERR7_ResultFileIsOpen
```

## St7GetPlateNSMass5

---

### Description

Returns the non-structural mass assigned to the specified plate.

---

## Syntax

```
long St7GetPlateNSMass5(long uID, long PlateNum, long  
CaseNum, double* Doubles)
```

## Input Parameters

uID

Strand7 model file ID number.

PlateNum

Plate number.

CaseNum

Load case number.

## Output Parameters

Doubles[0..5]

[ 0 ] - Non-structural mass for the specified plate.

[ 1 ] - Dynamic factor for the specified plate. This factor is used to scale the non-structural mass when performing dynamic analyses.

[ 2 .. 5 ] - A 3 element array describing the offset in the XYZ Global Cartesian coordinate system.

## Errors

```
ERR7_APINotInitialised, ERR7_APINotLicensed,  
ERR7_DataNotFound, ERR7_FileNotOpen,  
ERR7_InvalidAttributeType, ERR7_InvalidEntity,  
ERR7_InvalidEntityNumber, ERR7_InvalidFileUnit,  
ERR7_InvalidFreedomCase, ERR7_InvalidLoadCase,  
ERR7_InvalidLoadID, ERR7_NoError, ERR7_ResultFileIsOpen
```

---

## St7GetPlateEdgeConvection2

### Description

Returns the edge thermal convection coefficient and ambient temperature assigned to the specified plate. This attribute is only used when performing heat transfer analysis.

## Syntax

```
long St7GetPlateEdgeConvection2(long uID, long PlateNum,  
                                long CaseNum, long EdgeNum, double* Doubles)
```

## Input Parameters

uID

Strand7 model file ID number.

PlateNum

Plate number.

CaseNum

Load case number.

EdgeNum

Local edge number, one of 1, 2, 3 or 4.

## Output Parameters

Doubles [0..1]

[0] - Convection coefficient.

[1] - Ambient temperature.

## Errors

```
ERR7_APINotInitialised, ERR7_APINotLicensed,  
ERR7_DataNotFound, ERR7_FileNotOpen,  
ERR7_InvalidAttributeType, ERR7_InvalidEntity,  
ERR7_InvalidEntityNumber, ERR7_InvalidFileUnit,  
ERR7_InvalidFreedomCase, ERR7_InvalidLoadCase,  
ERR7_InvalidLoadID, ERR7_NoError, ERR7_ResultFileIsOpen
```

## St7GetPlateEdgeConvectionTables

---

### Description

Returns the tables associated with thermal convection properties assigned to the specified plate edge. A Factor vs Temperature table may apply to the convection coefficient and Factor vs Time tables may apply to both the convection coefficient and ambient temperature.

---

## Syntax

```
long St7GetPlateEdgeConvectionTables(long uID, long
PlateNum, long CaseNum, long EdgeNum, long* Tables)
```

## Input Parameters

uID

Strand7 model file ID number.

PlateNum

Plate number.

CaseNum

Load case number.

EdgeNum

Local edge number, one of 1, 2, 3 or 4.

## Output Parameters

Tables[0..2]

[0] - Factor vs Time table ID associated with the ambient temperature, use zero for none.

[1] - Factor vs Temperature table ID associated with the edge convection coefficient, use zero for none.

[2] - Factor vs Time table ID associated with the edge convection coefficient, use zero for none.

## Errors

```
ERR7_APINotInitialised, ERR7_APINotLicensed,
ERR7_DataNotFound, ERR7_FileNotOpen,
ERR7_InvalidAttributeType, ERR7_InvalidEntity,
ERR7_InvalidEntityNumber, ERR7_InvalidFileUnit,
ERR7_InvalidFreedomCase, ERR7_InvalidLoadCase,
ERR7_InvalidLoadID, ERR7_NoError, ERR7_ResultFileIsOpen
```

## St7GetPlateEdgeRadiation2

---

### Description

Returns the thermal radiation coefficient and ambient temperature assigned to the specified plate edge.

### Syntax

```
long St7GetPlateEdgeRadiation2(long uID, long PlateNum,  
                               long CaseNum, long EdgeNum, double* Doubles)
```

### Input Parameters

uID

Strand7 model file ID number.

PlateNum

Plate number.

CaseNum

Load case number.

EdgeNum

Local edge number.

### Output Parameters

Doubles [0..1]

[0] - Radiation coefficient.

[1] - Ambient temperature.

### Errors

ERR7\_APINotInitialised, ERR7\_APINotLicensed,  
ERR7\_DataNotFound, ERR7\_FileNotOpen,  
ERR7\_InvalidAttributeType, ERR7\_InvalidEntity,  
ERR7\_InvalidEntityNumber, ERR7\_InvalidFileUnit,  
ERR7\_InvalidFreedomCase, ERR7\_InvalidLoadCase,  
ERR7\_InvalidLoadID, ERR7\_NoError, ERR7\_ResultFileIsOpen

---

## St7GetPlateEdgeRadiationTables

---

### Description

Returns the tables associated with the thermal radiation properties assigned to a specified plate edge. A Factor vs Temperature table may apply to the radiation coefficient and Factor vs Time tables may apply to both the radiation coefficient and ambient temperature.

### Syntax

```
long St7GetPlateEdgeRadiationTables(long uID, long PlateNum,  
                                    long CaseNum, long EdgeNum, long* Tables)
```

### Input Parameters

uID

Strand7 model file ID number.

PlateNum

Plate number.

CaseNum

Load case number.

EdgeNum

Local edge number, one of 1, 2, 3 or 4.

### Output Parameters

Tables[0..2]

[0] - Table ID number for the Factor vs Time table associated with the radiation coefficient.

[1] - Table ID number for the Factor vs Temperature table associated with the radiation coefficient.

[2] - Table ID number for the Factor vs Time table associated with the ambient temperature.

### Errors

ERR7\_APINotInitialised, ERR7\_APINotLicensed,  
ERR7\_DataNotFound, ERR7\_FileNotOpen,  
ERR7\_InvalidAttributeType, ERR7\_InvalidEntity,  
ERR7\_InvalidEntityNumber, ERR7\_InvalidFileUnit,

```
ERR7_InvalidFreedomCase, ERR7_InvalidLoadCase,  
ERR7_InvalidLoadID, ERR7_NoError, ERR7_ResultFileIsOpen
```

## St7GetPlateFlux1

---

### Description

Returns the heat flux assigned to the specified plate edge.

### Syntax

```
long St7GetPlateFlux1(long uID, long PlateNum, long CaseNum,  
                      long EdgeNum, double* Doubles)
```

### Input Parameters

uID

Strand7 model file ID number.

PlateNum

Plate number.

CaseNum

Load case number.

EdgeNum

Local edge number, one of 1, 2, 3 or 4.

### Output Parameters

Doubles [0]

The heat flux through the plate edge.

### Errors

```
ERR7_APINotInitialised, ERR7_APINotLicensed,  
ERR7_DataNotFound, ERR7_FileNotOpen,  
ERR7_InvalidAttributeType, ERR7_InvalidEntity,  
ERR7_InvalidEntityNumber, ERR7_InvalidFileUnit,  
ERR7_InvalidFreedomCase, ERR7_InvalidLoadCase,  
ERR7_InvalidLoadID, ERR7_NoError, ERR7_ResultFileIsOpen
```

---

## St7GetPlateFluxTables

---

### Description

Returns the tables associated with the heat flux assigned to the specified plate edge. Both a Factor vs Time and Factor vs Temperature table may be assigned.

### Syntax

```
long St7GetPlateFluxTables(long uID, long PlateNum, long  
CaseNum, long EdgeNum, long* Tables)
```

### Input Parameters

uID

Strand7 model file ID number.

PlateNum

Plate number.

CaseNum

Load case number.

EdgeNum

Local edge number, one of 1, 2, 3 or 4.

### Output Parameters

Tables[0..1]

[0] - Factor vs Time table ID associated with the edge heat flux, use zero for none.

[1] - Factor vs Temperature table ID associated with the edge heat flux, use zero for none.

### Errors

```
ERR7_APINotInitialised, ERR7_APINotLicensed,  
ERR7_DataNotFound, ERR7_FileNotOpen,  
ERR7_InvalidAttributeType, ERR7_InvalidEntity,  
ERR7_InvalidEntityNumber, ERR7_InvalidFileUnit,  
ERR7_InvalidFreedomCase, ERR7_InvalidLoadCase,  
ERR7_InvalidLoadID, ERR7_NoError, ERR7_ResultFileIsOpen
```

## St7GetPlateFaceConvection2

---

### Description

Returns the thermal convection coefficient and ambient temperature assigned to the specified plate. This attribute is only used when performing heat transfer analysis.

### Syntax

```
long St7GetPlateFaceConvection2(long uID, long PlateNum,  
                                long CaseNum, long Surface, double* Doubles)
```

### Input Parameters

uID

Strand7 model file ID number.

PlateNum

Plate number.

CaseNum

Load case number.

Surface

Local plate surface, either psPlateZMinus or psPlateZPlus.

### Output Parameters

Doubles[0..1]

[0] - Convection coefficient.

[1] - Ambient temperature.

### Errors

ERR7\_APINotInitialised, ERR7\_APINotLicensed,  
ERR7\_DataNotFound, ERR7\_FileNotOpen,  
ERR7\_InvalidAttributeType, ERR7\_InvalidEntity,  
ERR7\_InvalidEntityNumber, ERR7\_InvalidFileUnit,  
ERR7\_InvalidFreedomCase, ERR7\_InvalidLoadCase,  
ERR7\_InvalidLoadID, ERR7\_NoError, ERR7\_ResultFileIsOpen

---

## St7GetPlateFaceConvectionTables

---

### Description

Returns the tables associated with thermal convection properties assigned to the specified plate. A Factor vs Temperature table may apply to the convection coefficient and Factor vs Time tables may apply to both the convection coefficient and ambient temperature.

### Syntax

```
long St7GetPlateFaceConvectionTables(long uID, long  
PlateNum, long CaseNum, long Surface, long* Tables)
```

### Input Parameters

uID

Strand7 model file ID number.

PlateNum

Plate number.

CaseNum

Load case number.

Surface

Local plate surface, either psPlateZMinus or psPlateZPlus.

### Output Parameters

Tables [0 .. 2]

[0] - Factor vs Time table ID associated with the ambient temperature, use zero for none.

[1] - Factor vs Temperature table ID associated with the convection coefficient, use zero for none.

[2] - Factor vs Time table ID associated with the convection coefficient, use zero for none.

### Errors

ERR7\_APINotInitialised, ERR7\_APINotLicensed,  
ERR7\_DataNotFound, ERR7\_FileNotOpen,  
ERR7\_InvalidAttributeType, ERR7\_InvalidEntity,  
ERR7\_InvalidEntityNumber, ERR7\_InvalidFileUnit,

```
ERR7_InvalidFreedomCase, ERR7_InvalidLoadCase,  
ERR7_InvalidLoadID, ERR7_NoError, ERR7_ResultFileIsOpen
```

## St7GetPlateFaceRadiation2

---

### Description

Returns the thermal radiation coefficient and ambient temperature assigned to the specified plate.

### Syntax

```
long St7GetPlateFaceRadiation2(long uID, long PlateNum,  
                               long CaseNum, long Surface, double* Doubles)
```

### Input Parameters

uID

Strand7 model file ID number.

PlateNum

Plate number.

CaseNum

Load case number.

Surface

Local plate surface, either psPlateZMinus or psPlateZPlus.

### Output Parameters

Doubles [0..1]

[0] - Radiation coefficient.

[1] - Ambient temperature.

### Errors

```
ERR7_APINotInitialised, ERR7_APINotLicensed,  
ERR7_DataNotFound, ERR7_FileNotOpen,  
ERR7_InvalidAttributeType, ERR7_InvalidEntity,  
ERR7_InvalidEntityNumber, ERR7_InvalidFileUnit,  
ERR7_InvalidFreedomCase, ERR7_InvalidLoadCase,  
ERR7_InvalidLoadID, ERR7_NoError, ERR7_ResultFileIsOpen
```

---

## St7GetPlateFaceRadiationTables

---

### Description

Returns the tables associated with the thermal radiation properties assigned to a specified plate. A Factor vs Temperature table may apply to the radiation coefficient and Factor vs Time tables may apply to both the radiation coefficient and ambient temperature.

### Syntax

```
long St7GetPlateFaceRadiationTables(long uID, long PlateNum,  
                                    long CaseNum, long Surface, long* Tables)
```

### Input Parameters

uID

Strand7 model file ID number.

PlateNum

Plate number.

CaseNum

Load case number.

Surface

Local plate surface, either psPlateZMinus or psPlateZPlus.

### Output Parameters

Tables [0..2]

[0] - Factor vs Time table ID associated with the ambient temperature, use zero for none.

[1] - Factor vs Temperature table ID associated with the radiation coefficient, use zero for none.

[2] - Factor vs Time table ID associated with the radiation coefficient, use zero for none.

### Errors

ERR7\_APINotInitialised, ERR7\_APINotLicensed,  
ERR7\_DataNotFound, ERR7\_FileNotOpen,  
ERR7\_InvalidAttributeType, ERR7\_InvalidEntity,  
ERR7\_InvalidEntityNumber, ERR7\_InvalidFileUnit,

```
ERR7_InvalidFreedomCase, ERR7_InvalidLoadCase,  
ERR7_InvalidLoadID, ERR7_NoError, ERR7_ResultFileIsOpen
```

## St7GetPlateHeatSource1

---

### Description

Returns the thermal heat source assigned to the specified plate.

### Syntax

```
long St7GetPlateHeatSource1(long uID, long PlateNum, long  
CaseNum, double* Doubles)
```

### Input Parameters

uID

Strand7 model file ID number.

PlateNum

Plate number.

CaseNum

Load case number.

### Output Parameters

Doubles[0]

Thermal heat source.

### Errors

```
ERR7_APINotInitialised, ERR7_APINotLicensed,  
ERR7_DataNotFound, ERR7_FileNotOpen,  
ERR7_InvalidAttributeType, ERR7_InvalidEntity,  
ERR7_InvalidEntityNumber, ERR7_InvalidFileUnit,  
ERR7_InvalidFreedomCase, ERR7_InvalidLoadCase,  
ERR7_InvalidLoadID, ERR7_NoError, ERR7_ResultFileIsOpen
```

---

## St7GetPlateHeatSourceTables

---

### Description

Returns the tables associated with the thermal heat source assigned to the specified plate. Both a Factor vs Time and Factor vs Temperature table may be assigned.

### Syntax

```
long St7GetPlateHeatSourceTables (long uID, long PlateNum,  
                                long CaseNum, long* Tables)
```

### Input Parameters

uID

Strand7 model file ID number.

PlateNum

Plate number.

CaseNum

Load case number.

### Output Parameters

Tables[0..1]

[0] - Factor vs Time table ID associated with the heat source, use zero for none.

[1] - Factor vs Temperature table ID associated with the heat source, use zero for none.

### Errors

```
ERR7_APINotInitialised, ERR7_APINotLicensed,  
ERR7_DataNotFound, ERR7_FileNotOpen,  
ERR7_InvalidAttributeType, ERR7_InvalidEntity,  
ERR7_InvalidEntityNumber, ERR7_InvalidFileUnit,  
ERR7_InvalidFreedomCase, ERR7_InvalidLoadCase,  
ERR7_InvalidLoadID, ERR7_NoError, ERR7_ResultFileIsOpen
```

## St7GetPlateSoilStress2

---

### Description

Returns the in-situ soil stress assigned to the specified plate. This attribute is only active for plates of property type soil.

### Syntax

```
long St7GetPlateSoilStress2(long uID, long PlateNum, long  
CaseNum, double* Doubles)
```

### Input Parameters

uID

Strand7 model file ID number.

PlateNum

Plate number.

CaseNum

Load case number.

### Output Parameters

Doubles [0..1]

A 2 element array containing the initial vertical stress and the horizontal stress ratio.

### Errors

```
ERR7_APINotInitialised, ERR7_APINotLicensed,  
ERR7_DataNotFound, ERR7_FileNotOpen,  
ERR7_InvalidAttributeType, ERR7_InvalidEntity,  
ERR7_InvalidEntityNumber, ERR7_InvalidFileUnit,  
ERR7_InvalidFreedomCase, ERR7_InvalidLoadCase,  
ERR7_InvalidLoadID, ERR7_NoError, ERR7_ResultFileIsOpen
```

## St7GetPlateSoilRatio2

---

### Description

Returns the in-situ soil ratios assigned to the specified plate. This attribute is only active for plates of property type soil.

---

## Syntax

```
long St7GetPlateSoilRatio2(long uID, long PlateNum, long  
CaseNum, double* Doubles)
```

## Input Parameters

uID

Strand7 model file ID number.

PlateNum

Plate number.

CaseNum

Load case number.

## Output Parameters

Doubles[0..1]

A 2 element array containing the overconsolidation ratio and the initial void ratio.

## Errors

```
ERR7_APINotInitialised, ERR7_APINotLicensed,  
ERR7_DataNotFound, ERR7_FileNotOpen,  
ERR7_InvalidAttributeType, ERR7_InvalidEntity,  
ERR7_InvalidEntityNumber, ERR7_InvalidFileUnit,  
ERR7_InvalidFreedomCase, ERR7_InvalidLoadCase,  
ERR7_InvalidLoadID, ERR7_NoError, ERR7_ResultFileIsOpen
```

---

## St7GetPlateResponse

### Description

Returns the response variable assigned to the specified plate. Response variables are only used by the Load Influence solver.

### Syntax

```
long St7GetPlateResponse(long uID, long PlateNum, long  
CaseNum, long* ResponseType, long* UCSId, long*  
Status)
```

### Input Parameters

uID

Strand7 model file ID number.

PlateNum

Plate number.

CaseNum

Load case number.

### Output Parameters

ResponseType

Response variable type, either rePlateForce or rePlateMoment.

UCSId

UCS ID number.

Status[0..5]

A 6 element array describing which force/moment components are flagged as response variables according to the 123 axis convention in the specified UCS - [11, 22, 33, 12, 23, 31].

### Errors

ERR7\_APINotInitialised, ERR7\_APINotLicensed,  
ERR7\_DataNotFound, ERR7\_FileNotOpen, ERR7\_InvalidBeamEnd,  
ERR7\_InvalidEntityNumber, ERR7\_InvalidFileUnit,  
ERR7\_InvalidLoadCase, ERR7\_InvalidResponseType,  
ERR7\_NoError, ERR7\_ResultFileIsOpen

## St7GetPlateLoadPatch4

---

### Description

Returns the load patch type assigned to the specified plate. This attribute is only active for plates of property type load patch.

### Syntax

```
long St7GetPlateLoadPatch4(long uID, long PlateNum, long*  
                           PatchType, long* EdgeBits, double* Doubles)
```

### Input Parameters

uID

Strand7 model file ID number.

---

PlateNum

Plate number.

### Output Parameters

PatchType

Load patch type, one of ptAuto4, ptAuto3, ptAuto2, ptAuto1, ptAngleSplit or ptManual.

EdgeBits

A 32-bit word in which the four least significant bits specify the selection of up to four edges. See *Load Patch Types* for additional information.

Doubles[0..3]

Edge weights, see *Load Patch Types* for additional information.

### Errors

```
ERR7_APINotInitialised, ERR7_APINotLicensed,  
ERR7_DataNotFound, ERR7_FileNotOpen,  
ERR7_InvalidAttributeType, ERR7_InvalidEntity,  
ERR7_InvalidEntityNumber, ERR7_InvalidFileUnit,  
ERR7_InvalidFreedomCase, ERR7_InvalidLoadCase,  
ERR7_InvalidLoadID, ERR7_NoError, ERR7_ResultFileIsOpen
```

## St7GetPlateReinforcement2

---

### Description

Returns the concrete reinforcement conditions for the specified plate.

### Syntax

```
long St7GetPlateReinforcement2(long uID, long PlateNum,  
                               long* LayoutID, double* Doubles)
```

### Input Parameters

uID

Strand7 model file ID number.

PlateNum

Plate number.

### Output Parameters

LayoutID

Layout ID number.

Doubles [0..1]

A 2 element array describing the angular orientation of the 1-3 and 2-4 reinforcement layers respectively.

### Errors

ERR7\_APINotInitialised, ERR7\_APINotLicensed,  
ERR7\_DataNotFound, ERR7\_FileNotOpen,  
ERR7\_InvalidAttributeType, ERR7\_InvalidEntity,  
ERR7\_InvalidEntityNumber, ERR7\_InvalidFileUnit,  
ERR7\_InvalidFreedomCase, ERR7\_InvalidLoadCase,  
ERR7\_InvalidLoadID, ERR7\_NoError, ERR7\_ResultFileIsOpen

## St7GetPlateCreepLoadingAge1

---

### Description

Returns the creep loading age assigned to the specified plate. This attribute is only active when conducting creep analysis using the Quasi-Static solver.

### Syntax

```
long St7GetPlateCreepLoadingAge1 (long uID, long PlateNum,  
                                double* Doubles)
```

### Input Parameters

uID

Strand7 model file ID number.

PlateNum

Plate number.

### Output Parameters

Doubles [0]

Creep loading age in seconds.

### Errors

ERR7\_APINotInitialised, ERR7\_APINotLicensed,  
ERR7\_DataNotFound, ERR7\_FileNotOpen,

---

```
ERR7_InvalidAttributeType, ERR7_InvalidEntity,
ERR7_InvalidEntityNumber, ERR7_InvalidFileUnit,
ERR7_InvalidFreedomCase, ERR7_InvalidLoadCase,
ERR7_InvalidLoadID, ERR7_NoError, ERR7_ResultFileIsOpen
```

## St7GetPlateEdgeAttachment1

---

### Description

Returns the attachment assigned to the specified plate edge. Attachment attributes can be used to generate attachment links using the *St7ToolAttachParts* function.

### Syntax

```
long St7GetPlateEdgeAttachment1(long uID, long PlateNum,
                                long EdgeNum, long* Direction, long* AttachType, long*
                                ConnectType, long* PropNum, double* Doubles)
```

### Input Parameters

uID

Strand7 model file ID number.

PlateNum

Plate number.

EdgeNum

Local edge number, one of 1, 2, 3 or 4.

### Output Parameters

Direction

Direction of attachment, one of adPlanar, adPlusZ or adMinusZ.

AttachType

Attachment type, one of alDirect, alRigid or alFlexible.

ConnectType

Attachment sub-type, either alMoment or alPinned.

PropNum

Beam property number used for flexible attachment types.

Doubles[0]

The maximum distance within which the plate edge can be connected to another element using the attachment link.

### Errors

ERR7\_APINotInitialised, ERR7\_APINotLicensed,  
ERR7\_DataNotFound, ERR7\_FileNotOpen,  
ERR7\_InvalidAttributeType, ERR7\_InvalidEntity,  
ERR7\_InvalidEntityNumber, ERR7\_InvalidFileUnit,  
ERR7\_InvalidFreedomCase, ERR7\_InvalidLoadCase,  
ERR7\_InvalidLoadID, ERR7\_NoError, ERR7\_ResultFileIsOpen

## St7GetPlateFaceAttachment1

---

### Description

Returns the attachment assigned to the specified plate face. Attachment attributes can be used to generate attachment links using the *St7ToolAttachParts* function.

### Syntax

```
long St7GetPlateFaceAttachment1(long uID, long PlateNum,  
                                long Surface, long* AttachType, long* ConnectType,  
                                long* PropNum, double* Doubles)
```

### Input Parameters

uID

Strand7 model file ID number.

PlateNum

Plate number.

Surface

Local plate surface, either psPlateZMinus or psPlateZPlus.

### Output Parameters

AttachType

Attachment type, one of alDirect, alRigid or alFlexible.

ConnectType

Attachment sub-type, either alMoment or alPinned.

---

PropNum

Beam property number used for flexible attachment types.

Doubles[0]

The maximum distance within which the plate face can be connected to another element using the attachment link.

## Errors

```
ERR7_APINotInitialised, ERR7_APINotLicensed,  
ERR7_DataNotFound, ERR7_FileNotOpen,  
ERR7_InvalidAttributeType, ERR7_InvalidEntity,  
ERR7_InvalidEntityNumber, ERR7_InvalidFileUnit,  
ERR7_InvalidFreedomCase, ERR7_InvalidLoadCase,  
ERR7_InvalidLoadID, ERR7_NoError, ERR7_ResultFileIsOpen
```

## Brick Attributes – Set

### St7SetBrickID

#### Description

Sets the ID number for the specified brick.

#### Syntax

```
long St7SetBrickID(long uID, long BrickNum, long BrickID)
```

#### Input Parameters

uID

Strand7 model file ID number.

BrickNum

Brick number.

BrickID

Brick ID number.

#### Errors

ERR7\_APINotInitialised, ERR7\_APINotLicensed,  
ERR7\_FileNotOpen, ERR7\_InvalidEntityNumber,  
ERR7\_InvalidFileUnit, ERR7\_NoError, ERR7\_ResultFileIsOpen

## St7SetBrickLocalAxes1

#### Description

Aligns the brick local axis system with a specified UCS. See *Brick Local Coordinates* for further information.

#### Syntax

```
long St7SetBrickLocalAxes1(long uID, long BrickNum, long  
UCSId)
```

#### Input Parameters

uID

Strand7 model file ID number.

---

BrickNum

Brick number.

UCSID

UCS ID number.

## Errors

ERR7\_APINotInitialised, ERR7\_APINotLicensed,  
ERR7\_FileNotOpen, ERR7\_InvalidEntityNumber,  
ERR7\_InvalidFileUnit, ERR7\_InvalidFreedomCase,  
ERR7\_InvalidLoadCase, ERR7\_InvalidUCSID, ERR7\_NoError,  
ERR7\_ResultFileIsOpen

# St7SetBrickSupport1F

---

## Description

Sets the elastic support conditions for the specified brick face. The support acts normal to the plane of the face and is constant over the surface.

## Syntax

```
long St7SetBrickSupport1F(long uID, long BrickNum, long  
                           FaceNum, long CaseNum, long Status, double* Doubles)
```

## Input Parameters

uID

Strand7 model file ID number.

BrickNum

Brick number.

FaceNum

Local face number, see *Brick Local Coordinates*.

CaseNum

Load case number.

Status

Compression-only support, either btTrue or btFalse.

Doubles[0]

Elastic support value.

### Errors

```
ERR7_APINotInitialised, ERR7_APINotLicensed,  
ERR7_FileNotOpen, ERR7_InvalidBrickFace,  
ERR7_InvalidEntityNumber, ERR7_InvalidFileUnit,  
ERR7_InvalidFreedomCase, ERR7_InvalidLoadCase,  
ERR7_InvalidUCSID, ERR7_NoError, ERR7_ResultFileIsOpen
```

## St7SetBrickPreLoad3

---

### Description

Sets the pre-load conditions for the specified brick. The pre-loads are applied according to the orientation of the brick local axis system.

### Syntax

```
long St7SetBrickPreLoad3(long uID, long BrickNum, long  
CaseNum, long LoadType, double* Doubles)
```

### Input Parameters

uID

Strand7 model file ID number.

BrickNum

Brick number.

CaseNum

Load case number.

LoadType

plBrickPreStress or plBrickPreStrain.

Doubles [0..2]

A 3 element array describing the pre-load magnitudes according to the orientation of the local brick axis system.

### Errors

```
ERR7_APINotInitialised, ERR7_APINotLicensed,  
ERR7_FileNotOpen, ERR7_InvalidEntityNumber,  
ERR7_InvalidFileUnit, ERR7_InvalidFreedomCase,
```

---

```
ERR7_InvalidLoadCase, ERR7_InvalidPreLoadType,  
ERR7_InvalidUCSID, ERR7_NoError, ERR7_ResultFileIsOpen
```

## St7SetBrickPointForce6

---

### Description

Assigns a point force to the specified brick face.

### Syntax

```
long St7SetBrickPointForce6(long uID, long BrickNum, long  
FaceNum, long CaseNum, long Position, long ID, double*  
Doubles)
```

### Input Parameters

uID

Strand7 model file ID number.

BrickNum

Brick number.

FaceNum

Local face number. See *Brick Local Coordinates* for additional information.

CaseNum

Load case number.

Position

Position identifier, either axUCS or axLocal.

ID

Point force ID number.

Doubles[0..5]

[0..2] - Components of applied force in the Global Cartesian coordinate system.

axUCS:

[3..5] - XYZ position of applied force in the Global Cartesian coordinate system.

axLocal:

[3..4] - UV position of applied force in the local element coordinate system.

## Errors

```
ERR7_APINotInitialised, ERR7_APINotLicensed,  
ERR7_DataNotFound, ERR7_FileNotOpen, ERR7_InvalidBrickFace,  
ERR7_InvalidEntityNumber, ERR7_InvalidFileUnit,  
ERR7_InvalidFreedomCase, ERR7_InvalidLoadCase,  
ERR7_InvalidLoadID, ERR7_InvalidPositionType,  
ERR7_InvalidUCSID, ERR7_InvalidUVPos, ERR7_NoError,  
ERR7_ResultFileIsOpen
```

## St7SetBrickNormalPressure1

---

### Description

Assigns a pressure to the specified brick face. The pressure acts into the element, normal to the plane of the face and is constant over the surface.

### Syntax

```
long St7SetBrickNormalPressure1(long uID, long BrickNum,  
                                long FaceNum, long CaseNum, double* Doubles)
```

### Input Parameters

uID

Strand7 model file ID number.

BrickNum

Brick number.

FaceNum

Local face number. See *Brick Local Coordinates* for additional information.

CaseNum

Load case number.

Doubles [0]

Normal pressure.

---

## Errors

```
ERR7_APINotInitialised, ERR7_APINotLicensed,  
ERR7_FileNotOpen, ERR7_InvalidBrickFace,  
ERR7_InvalidEntityNumber, ERR7_InvalidFileUnit,  
ERR7_InvalidFreedomCase, ERR7_InvalidLoadCase,  
ERR7_InvalidUCSID, ERR7_NoError, ERR7_ResultFileIsOpen
```

# St7SetBrickGlobalPressure3

---

## Description

Assigns a pressure to the specified brick face in the Global Cartesian Coordinate system. The pressure is constant over the face surface.

## Syntax

```
long St7SetBrickGlobalPressure3(long uID, long BrickNum,  
                                long FaceNum, long ProjectFlag, long CaseNum, double*  
                                Doubles)
```

## Input Parameters

uID

Strand7 model file ID number.

BrickNum

Brick number.

FaceNum

Local face number. See *Brick Local Coordinates* for additional information.

ProjectFlag

Either btTrue or btFalse to project the global pressure components.

CaseNum

Load case number.

Doubles[0..2]

A 3 element array describing the XYZ components of the applied pressure in the Global Cartesian Coordinate system.

**Errors**

```
ERR7_APINotInitialised, ERR7_APINotLicensed,  
ERR7_FileNotOpen, ERR7_InvalidBrickFace,  
ERR7_InvalidEntityNumber, ERR7_InvalidFileUnit,  
ERR7_InvalidFreedomCase, ERR7_InvalidLoadCase,  
ERR7_InvalidUCSID, ERR7_NoError, ERR7_ResultFileIsOpen
```

## St7SetBrickShear2

---

**Description**

Assigns a shear stress to the specified brick face. The shear stress acts in the plane of the face and is constant over the surface.

**Syntax**

```
long St7SetBrickShear2(long uID, long BrickNum, long  
FaceNum, long CaseNum, double* Doubles)
```

**Input Parameters**

uID

Strand7 model file ID number.

BrickNum

Brick number.

FaceNum

Local face number. See *Brick Local Coordinates* for additional information.

CaseNum

Load case number.

Doubles [0..1]

A 2 element array describing the shear stress components in the local face XY axis system.

**Errors**

```
ERR7_APINotInitialised, ERR7_APINotLicensed,  
ERR7_FileNotOpen, ERR7_InvalidBrickFace,  
ERR7_InvalidEntityNumber, ERR7_InvalidFileUnit,  
ERR7_InvalidFreedomCase, ERR7_InvalidLoadCase,  
ERR7_InvalidUCSID, ERR7_NoError, ERR7_ResultFileIsOpen
```

---

## St7SetBrickNSMass5

---

### Description

Assigns a non-structural mass to the specified brick.

### Syntax

```
long St7SetBrickNSMass5(long uID, long BrickNum, long  
FaceNum, long CaseNum, double* Doubles)
```

### Input Parameters

uID

Strand7 model file ID number.

BrickNum

Brick number.

FaceNum

Local face number. See *Brick Local Coordinates* for additional information.

CaseNum

Load case number.

Doubles [0..5]

[0] - Non-structural mass for the specified plate.

[1] - Dynamic factor for the specified plate. This factor is used to scale the non-structural mass when performing dynamic analyses.

[2..5] - A 3 element array describing the offset in the XYZ Global Cartesian coordinate system.

### Errors

```
ERR7_APINotInitialised, ERR7_APINotLicensed,  
ERR7_FileNotOpen, ERR7_InvalidBrickFace,  
ERR7_InvalidEntityNumber, ERR7_InvalidFileUnit,  
ERR7_InvalidFreedomCase, ERR7_InvalidLoadCase,  
ERR7_InvalidUCSID, ERR7_NoError, ERR7_ResultFileIsOpen
```

## St7SetBrickConvection2

---

### Description

Assigns the thermal convection coefficient and ambient temperature for the specified brick face. This attribute is only used when performing heat transfer analysis.

### Syntax

```
long St7SetBrickConvection2(long uID, long BrickNum, long  
FaceNum, long CaseNum, double* Doubles)
```

### Input Parameters

uID

Strand7 model file ID number.

BrickNum

Brick number.

FaceNum

Local face number. See *Brick Local Coordinates* for additional information.

CaseNum

Load case number.

Doubles [0..1]

[0] - Convection coefficient.

[1] - Ambient temperature.

### Errors

```
ERR7_APINotInitialised, ERR7_APINotLicensed,  
ERR7_DataNotFound, ERR7_FileNotOpen,  
ERR7_InvalidAttributeType, ERR7_InvalidBrickFace,  
ERR7_InvalidEntity, ERR7_InvalidEntityNumber,  
ERR7_InvalidFileUnit, ERR7_InvalidFreedomCase,  
ERR7_InvalidLoadCase, ERR7_InvalidLoadID, ERR7_InvalidUCSID,  
ERR7_NoError, ERR7_ResultFileIsOpen
```

---

# St7SetBrickConvectionTables

---

## Description

Specifies the tables associated with thermal convection properties assigned to the specified brick face. A Factor vs Temperature table may apply to the convection coefficient and Factor vs Time tables may apply to both the convection coefficient and ambient temperature.

## Syntax

```
long St7SetBrickConvectionTables(long uID, long BrickNum,  
                                long FaceNum, long CaseNum, long* Tables)
```

## Input Parameters

uID

Strand7 model file ID number.

BrickNum

Brick number.

FaceNum

Local face number. See *Brick Local Coordinates* for additional information.

CaseNum

Load case number.

Tables [0..2]

[0] - Factor vs Time table ID associated with the ambient temperature, zero for none.

[1] - Factor vs Temperature table ID associated with the convection coefficient, zero for none.

[2] - Factor vs Time table ID associated with the convection coefficient, zero for none.

## Errors

```
ERR7_APINotInitialised, ERR7_APINotLicensed,  
ERR7_DataNotFound, ERR7_FileNotOpen,  
ERR7_InvalidAttributeType, ERR7_InvalidBrickFace,  
ERR7_InvalidEntity, ERR7_InvalidEntityNumber,  
ERR7_InvalidFileUnit, ERR7_InvalidFreedomCase,  
ERR7_InvalidLoadCase, ERR7_InvalidLoadID,
```

```
ERR7_InvalidTableType, ERR7_InvalidUCSID, ERR7_NoError,  
ERR7_ResultFileIsOpen, ERR7_TableDoesNotExist
```

## St7SetBrickRadiation2

---

### Description

Assigns the thermal radiation coefficient and ambient temperature for the specified brick face.

### Syntax

```
long St7SetBrickRadiation2(long uID, long BrickNum, long  
FaceNum, long CaseNum, double* Doubles)
```

### Input Parameters

uID

Strand7 model file ID number.

BrickNum

Brick number.

FaceNum

Local face number. See Local Bricks Faces for additional information.

CaseNum

Load case number.

Doubles [0..1]

[0] - Radiation coefficient.

[1] - Ambient temperature.

### Errors

```
ERR7_APINotInitialised, ERR7_APINotLicensed,  
ERR7_DataNotFound, ERR7_FileNotOpen,  
ERR7_InvalidAttributeType, ERR7_InvalidBrickFace,  
ERR7_InvalidEntity, ERR7_InvalidEntityNumber,  
ERR7_InvalidFileUnit, ERR7_InvalidFreedomCase,  
ERR7_InvalidLoadCase, ERR7_InvalidLoadID, ERR7_InvalidUCSID,  
ERR7_NoError, ERR7_ResultFileIsOpen
```

---

# St7SetBrickRadiationTables

---

## Description

Specifies the tables associated with the thermal radiation properties assigned to a specified brick face. A Factor vs Temperature table may apply to the radiation coefficient and Factor vs Time tables may apply to both the radiation coefficient and ambient temperature.

## Syntax

```
long St7SetBrickRadiationTables(long uID, long BrickNum,  
                                long FaceNum, long CaseNum, long* Tables)
```

## Input Parameters

uID

Strand7 model file ID number.

BrickNum

Brick number.

FaceNum

Local face number. See *Brick Local Coordinates* for additional information.

CaseNum

Load case number.

Tables [0..2]

[0] - Factor vs Time table ID associated with the ambient temperature, use zero for none.

[1] - Factor vs Temperature table ID associated with the radiation coefficient, use zero for none.

[2] - Factor vs Time table ID associated with the radiation coefficient, use zero for none.

## Errors

```
ERR7_APINotInitialised, ERR7_APINotLicensed,  
ERR7_DataNotFound, ERR7_FileNotOpen,  
ERR7_InvalidAttributeType, ERR7_InvalidBrickFace,  
ERR7_InvalidEntity, ERR7_InvalidEntityNumber,  
ERR7_InvalidFileUnit, ERR7_InvalidFreedomCase,  
ERR7_InvalidLoadCase, ERR7_InvalidLoadID,
```

```
ERR7_InvalidTableType, ERR7_InvalidUCSID, ERR7_NoError,  
ERR7_ResultFileIsOpen, ERR7_TableDoesNotExist
```

## St7SetBrickFlux1

---

### Description

Assigns a heat flux to the specified brick face.

### Syntax

```
long St7SetBrickFlux1(long uID, long BrickNum, long FaceNum,  
long CaseNum, double* Doubles)
```

### Input Parameters

uID

Strand7 model file ID number.

BrickNum

Brick number.

FaceNum

Local face number. See *Brick Local Coordinates* for additional information.

CaseNum

Load case number.

Doubles [0]

The heat flux through the brick face.

### Errors

```
ERR7_APINotInitialised, ERR7_APINotLicensed,  
ERR7_DataNotFound, ERR7_FileNotOpen,  
ERR7_InvalidAttributeType, ERR7_InvalidBrickFace,  
ERR7_InvalidEntity, ERR7_InvalidEntityNumber,  
ERR7_InvalidFileUnit, ERR7_InvalidFreedomCase,  
ERR7_InvalidLoadCase, ERR7_InvalidLoadID, ERR7_InvalidUCSID,  
ERR7_NoError, ERR7_ResultFileIsOpen
```

---

## St7SetBrickFluxTables

---

### Description

Specifies the tables to be associated with the heat flux assigned to the specified brick face. Both Factor vs Time and Factor vs Temperature tables may be assigned.

### Syntax

```
long St7SetBrickFluxTables(long uID, long BrickNum, long FaceNum, long CaseNum, long* Tables)
```

### Input Parameters

uID

Strand7 model file ID number.

BrickNum

Brick number.

FaceNum

Local face number. See *Brick Local Coordinates* for additional information.

CaseNum

Load case number.

Tables[0..1]

[0] - Factor vs Time table ID associated with the heat flux, zero for none.

[1] - Factor vs Temperature table ID associated with the heat flux, zero for none.

### Errors

```
ERR7_APINotInitialised, ERR7_APINotLicensed,  
ERR7_DataNotFound, ERR7_FileNotOpen,  
ERR7_InvalidAttributeType, ERR7_InvalidBrickFace,  
ERR7_InvalidEntity, ERR7_InvalidEntityNumber,  
ERR7_InvalidFileUnit, ERR7_InvalidFreedomCase,  
ERR7_InvalidLoadCase, ERR7_InvalidLoadID,  
ERR7_InvalidTableType, ERR7_InvalidUCSID, ERR7_NoError,  
ERR7_ResultFileIsOpen, ERR7_TableDoesNotExist
```

## St7SetBrickHeatSource1

---

### Description

Assigns a thermal heat source to the specified brick.

### Syntax

```
long St7SetBrickHeatSource1(long uID, long BrickNum, long  
CaseNum, double* Doubles)
```

### Input Parameters

uID

Strand7 model file ID number.

BrickNum

Brick number.

CaseNum

Load case number.

Doubles[0]

Thermal heat source value.

### Errors

```
ERR7_APINotInitialised, ERR7_APINotLicensed,  
ERR7_DataNotFound, ERR7_FileNotOpen,  
ERR7_InvalidAttributeType, ERR7_InvalidEntity,  
ERR7_InvalidEntityNumber, ERR7_InvalidFileUnit,  
ERR7_InvalidFreedomCase, ERR7_InvalidLoadCase,  
ERR7_InvalidLoadID, ERR7_InvalidUCSID, ERR7_NoError,  
ERR7_ResultFileIsOpen
```

## St7SetBrickHeatSourceTables

---

### Description

Specifies the tables to be associated with the heat source assigned to the specified brick. Both a Factor vs Time and Factor vs Temperature table may be assigned.

---

## Syntax

```
long St7SetBrickHeatSourceTables(long uID, long BrickNum,  
                                long CaseNum, long* Tables)
```

## Input Parameters

uID

Strand7 model file ID number.

BrickNum

Brick number.

CaseNum

Load case number.

Tables[0..1]

[0] - Factor vs Time table ID associated with the heat source, use zero for none.

[1] - Factor vs Temperature table ID associated with the heat source, use zero for none.

## Errors

```
ERR7_APINotInitialised, ERR7_APINotLicensed,  
ERR7_DataNotFound, ERR7_FileNotOpen,  
ERR7_InvalidAttributeType, ERR7_InvalidEntity,  
ERR7_InvalidEntityNumber, ERR7_InvalidFileUnit,  
ERR7_InvalidFreedomCase, ERR7_InvalidLoadCase,  
ERR7_InvalidLoadID, ERR7_InvalidTableType,  
ERR7_InvalidUCSID, ERR7_NoError, ERR7_ResultFileIsOpen,  
ERR7_TableDoesNotExist
```

---

## St7SetBrickSoilStress2

### Description

Assigns the in-situ soil stress for the specified brick. This attribute is only active for bricks of property type soil.

### Syntax

```
long St7SetBrickSoilStress2(long uID, long BrickNum, long  
                            CaseNum, double* Doubles)
```

## Input Parameters

uID

Strand7 model file ID number.

BrickNum

Brick number.

CaseNum

Load case number.

Doubles[0..1]

A 2 element array containing the initial vertical stress and the horizontal stress ratio.

## Errors

ERR7\_APINotInitialised, ERR7\_APINotLicensed,  
ERR7\_FileNotOpen, ERR7\_InvalidEntityNumber,  
ERR7\_InvalidFileUnit, ERR7\_InvalidFreedomCase,  
ERR7\_InvalidLoadCase, ERR7\_InvalidUCSID, ERR7\_NoError,  
ERR7\_ResultFileIsOpen

# St7SetBrickSoilRatio2

---

## Description

Assigns the in-situ soil ratios for the specified brick. This attribute is only active for bricks of property type soil.

## Syntax

```
long St7SetBrickSoilRatio2(long uID, long BrickNum, long  
CaseNum, double* Doubles)
```

## Input Parameters

uID

Strand7 model file ID number.

BrickNum

Brick number.

CaseNum

Load case number.

---

Doubles[0..1]

A 2 element array containing the overconsolidation ratio and the initial void ratio.

## Errors

ERR7\_APINotInitialised, ERR7\_APINotLicensed,  
ERR7\_FileNotOpen, ERR7\_InvalidEntityNumber,  
ERR7\_InvalidFileUnit, ERR7\_InvalidFreedomCase,  
ERR7\_InvalidLoadCase, ERR7\_InvalidUCSID, ERR7\_NoError,  
ERR7\_ResultFileIsOpen

# St7SetBrickResponse

---

## Description

Assigns a response variable to the specified brick. Response variables are only used by the Load Influence solver.

## Syntax

```
long St7SetBrickResponse(long uID, long BrickNum, long  
CaseNum, long UCSId, long* Status)
```

## Input Parameters

uID

Strand7 model file ID number.

BrickNum

Brick number.

CaseNum

Load case number.

UCSID

UCS ID number.

Status[0..5]

A 6 element array describing which stress components are flagged as response variables according to the 123 axis convention in the specified UCS, [11, 22, 33, 12, 23, 31].

## Errors

```
ERR7_APINotInitialised, ERR7_APINotLicensed,  
ERR7_DataNotFound, ERR7_FileNotOpen, ERR7_InvalidBeamEnd,  
ERR7_InvalidEntityNumber, ERR7_InvalidFileUnit,  
ERR7_InvalidLoadCase, ERR7_InvalidResponseType,  
ERR7_NoError, ERR7_ResultFileIsOpen
```

# St7SetBrickCreepLoadingAge1

---

## Description

Assigns a creep loading age for the specified brick. This attribute is only used when performing creep analysis using the Quasi-Static solver.

## Syntax

```
long St7SetBrickCreepLoadingAge1 (long uID, long BrickNum,  
double* Doubles)
```

## Input Parameters

uID

Strand7 model file ID number.

BrickNum

Brick number.

Doubles [0]

Creep loading age in seconds.

## Errors

```
ERR7_APINotInitialised, ERR7_APINotLicensed,  
ERR7_FileNotOpen, ERR7_InvalidEntityNumber,  
ERR7_InvalidFileUnit, ERR7_InvalidFreedomCase,  
ERR7_InvalidLoadCase, ERR7_InvalidUCSID, ERR7_NoError,  
ERR7_ResultFileIsOpen
```

# St7SetBrickFaceAttachment1

---

## Description

Assigns an attachment to the specified brick face. Attachment attributes can be used to generate attachment links using the *St7ToolAttachParts* function.

---

## Syntax

```
long St7SetBrickFaceAttachment1(long uID, long BrickNum,  
                                long FaceNum, long AttachType, long ConnectType, long  
                                PropNum, double* Doubles)
```

## Input Parameters

uID

Strand7 model file ID number.

BrickNum

Brick number.

FaceNum

Local face number. See *Brick Local Coordinates* for additional information.

AttachType

Attachment type, one of alDirect, alRigid or alFlexible.

ConnectType

Attachment sub-type, either alMoment or alPinned.

PropNum

Beam property number used for flexible attachment types.

Doubles[0]

The maximum distance within which the brick face can be connected to another element using the attachment link.

## Errors

```
ERR7_APINotInitialised, ERR7_APINotLicensed,  
ERR7_FileNotOpen, ERR7_InvalidEntityNumber,  
ERR7_InvalidFileUnit, ERR7_InvalidFreedomCase,  
ERR7_InvalidLoadCase, ERR7_InvalidUCSID, ERR7_NoError,  
ERR7_ResultFileIsOpen
```

## Brick Attributes – Get

### St7GetBrickID

#### Description

Returns the ID number assigned to the specified brick.

#### Syntax

```
long St7GetBrickID(long uID, long BrickNum, long* BrickID)
```

#### Input Parameters

uID

Strand7 model file ID number.

BrickNum

Brick number.

#### Output Parameters

BrickID

ID number.

#### Errors

```
ERR7_APINotInitialised, ERR7_APINotLicensed,  
ERR7_FileNotOpen, ERR7_InvalidEntityNumber,  
ERR7_InvalidFileUnit, ERR7_NoError, ERR7_ResultFileIsOpen
```

## St7GetBrickLocalAxes1

#### Description

Returns the UCS used as the local axis system for the specified brick.

#### Syntax

```
long St7GetBrickLocalAxes1(long uID, long BrickNum, long*  
UCSId)
```

#### Input Parameters

uID

Strand7 model file ID number.

---

BrickNum

Brick number.

### Output Parameters

UCSID

UCS ID number.

### Errors

ERR7\_APINotInitialised, ERR7\_APINotLicensed,  
ERR7\_DataNotFound, ERR7\_FileNotOpen,  
ERR7\_InvalidAttributeType, ERR7\_InvalidEntity,  
ERR7\_InvalidEntityNumber, ERR7\_InvalidFileUnit,  
ERR7\_InvalidFreedomCase, ERR7\_InvalidLoadCase,  
ERR7\_InvalidLoadID, ERR7\_NoError, ERR7\_ResultFileIsOpen

## St7GetBrickSupport1F

---

### Description

Returns the elastic support assigned to the specified brick face. The support acts normal to the plane of the face and is constant over the surface.

### Syntax

```
long St7GetBrickSupport1F(long uID, long BrickNum, long  
FaceNum, long CaseNum, long* Status, double* Doubles)
```

### Input Parameters

uID

Strand7 model file ID number.

BrickNum

Brick number.

FaceNum

Local face number. See *Brick Local Coordinates* for additional information.

CaseNum

Load case number.

### Output Parameters

Status

Compression-only support, either btTrue or btFalse.

Doubles [0]

Elastic support value.

## Errors

```
ERR7_APINotInitialised, ERR7_APINotLicensed,  
ERR7_DataNotFound, ERR7_FileNotOpen,  
ERR7_InvalidAttributeType, ERR7_InvalidEntity,  
ERR7_InvalidEntityNumber, ERR7_InvalidFileUnit,  
ERR7_InvalidFreedomCase, ERR7_InvalidLoadCase,  
ERR7_InvalidLoadID, ERR7_NoError, ERR7_ResultFileIsOpen
```

## St7GetBrickPreLoad3

---

### Description

Returns the pre-load conditions assigned to the specified brick. The pre-loads are applied according to the orientation of the brick local axis system.

### Syntax

```
long St7GetBrickPreLoad3(long uID, long BrickNum, long  
CaseNum, long* LoadType, double* Doubles)
```

### Input Parameters

uID

Strand7 model file ID number.

BrickNum

Brick number.

CaseNum

Load case number.

### Output Parameters

LoadType

plBrickPreStress or plBrickPreStrain.

Doubles [0..2]

A 3 element array describing the pre-load magnitudes according to the orientation of the local brick axis system.

---

## Errors

```
ERR7_APINotInitialised, ERR7_APINotLicensed,  
ERR7_DataNotFound, ERR7_FileNotOpen,  
ERR7_InvalidAttributeType, ERR7_InvalidEntity,  
ERR7_InvalidEntityNumber, ERR7_InvalidFileUnit,  
ERR7_InvalidFreedomCase, ERR7_InvalidLoadCase,  
ERR7_InvalidLoadID, ERR7_NoError, ERR7_ResultFileIsOpen
```

---

# St7GetBrickPointForce6

## Description

Returns the point force assigned to the specified brick face.

## Syntax

```
long St7GetBrickPointForce6(long uID, long BrickNum, long  
FaceNum, long CaseNum, long Position, long ID, double*  
Doubles)
```

## Input Parameters

uID

Strand7 model file ID number.

BrickNum

Brick number.

FaceNum

Local face number. See *Brick Local Coordinates* for additional information.

CaseNum

Load case number.

Position

Position identifier, either axUCS or axLocal.

ID

Point force ID number.

## Output Parameters

Doubles[0..5]

[0..2] - Components of applied force in the Global Cartesian coordinate system.

axUCS:

[3..5] - XYZ position of applied force in the Global Cartesian coordinate system.

axLocal:

[3..4] - UV position of applied force in the local element coordinate system.

## Errors

```
ERR7_APINotInitialised, ERR7_APINotLicensed,  
ERR7_DataNotFound, ERR7_FileNotOpen,  
ERR7_InvalidAttributeType, ERR7_InvalidBrickFace,  
ERR7_InvalidEntity, ERR7_InvalidEntityNumber,  
ERR7_InvalidFileUnit, ERR7_InvalidFreedomCase,  
ERR7_InvalidLoadCase, ERR7_InvalidLoadID,  
ERR7_InvalidPositionType, ERR7_NoError,  
ERR7_ResultFileIsOpen
```

# St7GetBrickNormalPressure1

---

## Description

Returns the pressure assigned to the specified brick face. The pressure acts into the element, normal to the plane of the face and is constant over the surface.

## Syntax

```
long St7GetBrickNormalPressure1(long uID, long BrickNum,  
                                long FaceNum, long CaseNum, double* Doubles)
```

## Input Parameters

uID

Strand7 model file ID number.

BrickNum

Brick number.

FaceNum

Local face number. See *Brick Local Coordinates* for additional information.

CaseNum

---

Load case number.

### Output Parameters

Doubles[0]

Normal pressure value.

### Errors

ERR7\_APINotInitialised, ERR7\_APINotLicensed,  
ERR7\_DataNotFound, ERR7\_FileNotOpen,  
ERR7\_InvalidAttributeType, ERR7\_InvalidEntity,  
ERR7\_InvalidEntityNumber, ERR7\_InvalidFileUnit,  
ERR7\_InvalidFreedomCase, ERR7\_InvalidLoadCase,  
ERR7\_InvalidLoadID, ERR7\_NoError, ERR7\_ResultFileIsOpen

## St7GetBrickGlobalPressure3

---

### Description

Returns the pressure assigned to the specified brick face in the Global Cartesian Coordinate system. The pressure is constant over the face surface.

### Syntax

```
long St7GetBrickGlobalPressure3(long uID, long BrickNum,  
                                long FaceNum, long CaseNum, long* ProjectFlag, double*  
                                Doubles)
```

### Input Parameters

uID

Strand7 model file ID number.

BrickNum

Brick number.

FaceNum

Local face number. See *Brick Local Coordinates* for additional information.

CaseNum

Load case number.

### Output Parameters

ProjectFlag

Either btTrue or btFalse to project the global pressure components.

Doubles [0..2]

A 3 element array describing the XYZ components of the applied pressure in the Global Cartesian Coordinate system.

### Errors

ERR7\_APINotInitialised, ERR7\_APINotLicensed,  
ERR7\_DataNotFound, ERR7\_FileNotOpen,  
ERR7\_InvalidAttributeType, ERR7\_InvalidEntity,  
ERR7\_InvalidEntityNumber, ERR7\_InvalidFileUnit,  
ERR7\_InvalidFreedomCase, ERR7\_InvalidLoadCase,  
ERR7\_InvalidLoadID, ERR7\_NoError, ERR7\_ResultFileIsOpen

## St7GetBrickShear2

---

### Description

Returns the shear stress assigned to the specified brick face. The shear stress acts in the plane of the face and is constant over the surface.

### Syntax

```
long St7GetBrickShear2(long uID, long BrickNum, long  
FaceNum, long CaseNum, double* Doubles)
```

### Input Parameters

uID

Strand7 model file ID number.

BrickNum

Brick number.

FaceNum

Local face number. See *Brick Local Coordinates* for additional information.

CaseNum

Load case number.

### Output Parameters

Doubles [0..1]

---

A 2 element array describing the shear stress components in the local face XY axis system.

## Errors

```
ERR7_APINotInitialised, ERR7_APINotLicensed,  
ERR7_DataNotFound, ERR7_FileNotOpen,  
ERR7_InvalidAttributeType, ERR7_InvalidEntity,  
ERR7_InvalidEntityNumber, ERR7_InvalidFileUnit,  
ERR7_InvalidFreedomCase, ERR7_InvalidLoadCase,  
ERR7_InvalidLoadID, ERR7_NoError, ERR7_ResultFileIsOpen
```

# St7GetBrickNSMass5

---

## Description

Returns the non-structural mass assigned to the specified brick.

## Syntax

```
long St7GetBrickNSMass5(long uID, long BrickNum, long  
FaceNum, long CaseNum, double* Doubles)
```

## Input Parameters

uID

Strand7 model file ID number.

BrickNum

Brick number.

FaceNum

Local face number. See *Brick Local Coordinates* for additional information.

CaseNum

Load case number.

## Output Parameters

Doubles[0..5]

[0] - Non-structural mass for the specified plate.

[1] - Dynamic factor for the specified plate. This factor is used to scale the non-structural mass when performing dynamic analyses.

[2..5] - A 3 element array describing the offset in the XYZ Global Cartesian coordinate system.

## Errors

```
ERR7_APINotInitialised, ERR7_APINotLicensed,  
ERR7_DataNotFound, ERR7_FileNotOpen,  
ERR7_InvalidAttributeType, ERR7_InvalidEntity,  
ERR7_InvalidEntityNumber, ERR7_InvalidFileUnit,  
ERR7_InvalidFreedomCase, ERR7_InvalidLoadCase,  
ERR7_InvalidLoadID, ERR7_NoError, ERR7_ResultFileIsOpen
```

## St7GetBrickConvection2

---

### Description

Returns the thermal convection coefficient and ambient temperature assigned to the specified brick face. This attribute is only used when performing heat transfer analysis.

### Syntax

```
long St7GetBrickConvection2(long uID, long BrickNum, long  
FaceNum, long CaseNum, double* Doubles)
```

### Input Parameters

uID

Strand7 model file ID number.

BrickNum

Brick number.

FaceNum

Local face number. See *Brick Local Coordinates* for additional information.

CaseNum

Load case number.

### Output Parameters

Doubles[0..1]

[0] - Convection coefficient.

[1] - Ambient temperature.

---

## Errors

```
ERR7_APINotInitialised, ERR7_APINotLicensed,  
ERR7_DataNotFound, ERR7_FileNotOpen,  
ERR7_InvalidAttributeType, ERR7_InvalidEntity,  
ERR7_InvalidEntityNumber, ERR7_InvalidFileUnit,  
ERR7_InvalidFreedomCase, ERR7_InvalidLoadCase,  
ERR7_InvalidLoadID, ERR7_NoError, ERR7_ResultFileIsOpen
```

---

## St7GetBrickConvectionTables

### Description

Returns the tables associated with thermal convection properties assigned to the specified brick face. A Factor vs Temperature table may apply to the convection coefficient and Factor vs Time tables may apply to both the convection coefficient and ambient temperature.

### Syntax

```
long St7GetBrickConvectionTables(long uID, long BrickNum,  
                                long FaceNum, long CaseNum, long* Tables)
```

### Input Parameters

uID

Strand7 model file ID number.

BrickNum

Brick number.

FaceNum

Local face number. See *Brick Local Coordinates* for additional information.

CaseNum

Load case number.

### Output Parameters

Tables[0..2]

[0] - Factor vs Time table ID associated with the ambient temperature, zero for none.

[1] - Factor vs Temperature table ID associated with the convection coefficient, zero for none.

[2] - Factor vs Time table ID associated with the convection coefficient, zero for none.

## Errors

```
ERR7_APINotInitialised, ERR7_APINotLicensed,  
ERR7_DataNotFound, ERR7_FileNotOpen,  
ERR7_InvalidAttributeType, ERR7_InvalidEntity,  
ERR7_InvalidEntityNumber, ERR7_InvalidFileUnit,  
ERR7_InvalidFreedomCase, ERR7_InvalidLoadCase,  
ERR7_InvalidLoadID, ERR7_NoError, ERR7_ResultFileIsOpen
```

## St7GetBrickRadiation2

---

### Description

Returns the thermal radiation coefficient and ambient temperature assigned to the specified brick face.

### Syntax

```
long St7GetBrickRadiation2(long uID, long BrickNum, long  
FaceNum, long CaseNum, double* Doubles)
```

### Input Parameters

uID

Strand7 model file ID number.

BrickNum

Brick number.

FaceNum

Local face number. See *Brick Local Coordinates* for additional information.

CaseNum

Load case number.

### Output Parameters

Doubles[0..1]

[0] - Radiation coefficient.

[1] - Ambient temperature.

---

## Errors

```
ERR7_APINotInitialised, ERR7_APINotLicensed,  
ERR7_DataNotFound, ERR7_FileNotOpen,  
ERR7_InvalidAttributeType, ERR7_InvalidEntity,  
ERR7_InvalidEntityNumber, ERR7_InvalidFileUnit,  
ERR7_InvalidFreedomCase, ERR7_InvalidLoadCase,  
ERR7_InvalidLoadID, ERR7_NoError, ERR7_ResultFileIsOpen
```

# St7GetBrickRadiationTables

---

## Description

Returns the tables associated with the thermal radiation properties assigned to a specified brick face. A Factor vs Temperature table may apply to the radiation coefficient and Factor vs Time tables may apply to both the radiation coefficient and ambient temperature.

## Syntax

```
long St7GetBrickRadiationTables(long uID, long BrickNum,  
                                long FaceNum, long CaseNum, long* Tables)
```

## Input Parameters

uID

Strand7 model file ID number.

BrickNum

Brick number.

FaceNum

Local face number. See *Brick Local Coordinates* for additional information.

CaseNum

Load case number.

## Output Parameters

Tables[0..2]

[0] - Factor vs Time table ID associated with the ambient temperature, use zero for none.

[1] - Factor vs Temperature table ID associated with the radiation coefficient, use zero for none.

[2] - Factor vs Time table ID associated with the radiation coefficient, use zero for none.

## Errors

```
ERR7_APINotInitialised, ERR7_APINotLicensed,  
ERR7_DataNotFound, ERR7_FileNotOpen,  
ERR7_InvalidAttributeType, ERR7_InvalidEntity,  
ERR7_InvalidEntityNumber, ERR7_InvalidFileUnit,  
ERR7_InvalidFreedomCase, ERR7_InvalidLoadCase,  
ERR7_InvalidLoadID, ERR7_NoError, ERR7_ResultFileIsOpen
```

## St7GetBrickFlux1

---

### Description

Returns the heat flux assigned to the specified brick face.

### Syntax

```
long St7GetBrickFlux1(long uID, long BrickNum, long FaceNum,  
                      long CaseNum, double* Doubles)
```

### Input Parameters

uID

Strand7 model file ID number.

BrickNum

Brick number.

FaceNum

Local face number. See *Brick Local Coordinates* for additional information.

CaseNum

Load case number.

### Output Parameters

Doubles[0]

The heat flux through the brick face.

### Errors

```
ERR7_APINotInitialised, ERR7_APINotLicensed,  
ERR7_DataNotFound, ERR7_FileNotOpen,
```

---

```
ERR7_InvalidAttributeType, ERR7_InvalidEntity,
ERR7_InvalidEntityNumber, ERR7_InvalidFileUnit,
ERR7_InvalidFreedomCase, ERR7_InvalidLoadCase,
ERR7_InvalidLoadID, ERR7_NoError, ERR7_ResultFileIsOpen
```

## St7GetBrickFluxTables

---

### Description

Returns the tables associated with the heat flux assigned to the specified brick face. Both Factor vs Time and Factor vs Temperature tables may be assigned. This attribute is only used when performing heat transfer analysis.

### Syntax

```
long St7GetBrickFluxTables(long uID, long BrickNum, long
                           FaceNum, long CaseNum, long* Tables)
```

### Input Parameters

uID

Strand7 model file ID number.

BrickNum

Brick number.

FaceNum

Local face number. See *Brick Local Coordinates* for additional information.

CaseNum

Load case number.

### Output Parameters

Tables[0..1]

[0] - Factor vs Time table ID associated with the heat flux, zero for none.

[1] - Factor vs Temperature table ID associated with the heat flux, zero for none.

### Errors

```
ERR7_APINotInitialised, ERR7_APINotLicensed,
ERR7_DataNotFound, ERR7_FileNotOpen,
ERR7_InvalidAttributeType, ERR7_InvalidEntity,
```

```
ERR7_InvalidEntityNumber, ERR7_InvalidFileUnit,  
ERR7_InvalidFreedomCase, ERR7_InvalidLoadCase,  
ERR7_InvalidLoadID, ERR7_NoError, ERR7_ResultFileIsOpen
```

## St7GetBrickHeatSource1

---

### Description

Returns the thermal heat source assigned to the specified brick. This attribute is only used when performing heat transfer analysis.

### Syntax

```
long St7GetBrickHeatSource1(long uID, long BrickNum, long  
CaseNum, double* Doubles)
```

### Input Parameters

uID

Strand7 model file ID number.

BrickNum

Brick number.

CaseNum

Load case number.

### Output Parameters

Doubles[0]

Thermal heat source value.

### Errors

```
ERR7_APINotInitialised, ERR7_APINotLicensed,  
ERR7_DataNotFound, ERR7_FileNotOpen,  
ERR7_InvalidAttributeType, ERR7_InvalidEntity,  
ERR7_InvalidEntityNumber, ERR7_InvalidFileUnit,  
ERR7_InvalidFreedomCase, ERR7_InvalidLoadCase,  
ERR7_InvalidLoadID, ERR7_NoError, ERR7_ResultFileIsOpen
```

---

## St7GetBrickHeatSourceTables

---

### Description

Returns the tables associated with the thermal heat source assigned to the specified brick. This attribute is only used when performing heat transfer analysis.

### Syntax

```
long St7GetBrickHeatSourceTables(long uID, long BrickNum,  
                                long CaseNum, long* Tables)
```

### Input Parameters

uID

Strand7 model file ID number.

BrickNum

Brick number.

CaseNum

Load case number.

### Output Parameters

Tables[0..1]

[0] - Factor vs Time table ID associated with the heat source, use zero for none.

[1] - Factor vs Temperature table ID associated with the heat source, use zero for none.

### Errors

```
ERR7_APINotInitialised, ERR7_APINotLicensed,  
ERR7_DataNotFound, ERR7_FileNotOpen,  
ERR7_InvalidAttributeType, ERR7_InvalidEntity,  
ERR7_InvalidEntityNumber, ERR7_InvalidFileUnit,  
ERR7_InvalidFreedomCase, ERR7_InvalidLoadCase,  
ERR7_InvalidLoadID, ERR7_NoError, ERR7_ResultFileIsOpen
```

## St7GetBrickSoilStress2

---

### Description

Returns the in-situ soil stress assigned to the specified brick. This attribute is only active for bricks of property type soil.

### Syntax

```
long St7GetBrickSoilStress2(long uID, long BrickNum, long CaseNum, double* Doubles)
```

### Input Parameters

uID

Strand7 model file ID number.

BrickNum

Brick number.

CaseNum

Load case number.

### Output Parameters

Doubles [0..1]

A 2 element array containing the initial vertical stress and the horizontal stress ratio.

### Errors

```
ERR7_APINotInitialised, ERR7_APINotLicensed,  
ERR7_DataNotFound, ERR7_FileNotOpen,  
ERR7_InvalidAttributeType, ERR7_InvalidEntity,  
ERR7_InvalidEntityNumber, ERR7_InvalidFileUnit,  
ERR7_InvalidFreedomCase, ERR7_InvalidLoadCase,  
ERR7_InvalidLoadID, ERR7_NoError, ERR7_ResultFileIsOpen
```

## St7GetBrickSoilRatio2

---

### Description

Returns the in-situ soil ratios for the specified brick. This attribute is only active for bricks of property type soil.

---

## Syntax

```
long St7GetBrickSoilRatio2(long uID, long BrickNum, long  
CaseNum, double* Doubles)
```

## Input Parameters

uID

Strand7 model file ID number.

BrickNum

Brick number.

CaseNum

Load case number.

## Output Parameters

Doubles[0..1]

A 2 element array containing the overconsolidation ratio and the initial void ratio.

## Errors

```
ERR7_APINotInitialised, ERR7_APINotLicensed,  
ERR7_DataNotFound, ERR7_FileNotOpen,  
ERR7_InvalidAttributeType, ERR7_InvalidEntity,  
ERR7_InvalidEntityNumber, ERR7_InvalidFileUnit,  
ERR7_InvalidFreedomCase, ERR7_InvalidLoadCase,  
ERR7_InvalidLoadID, ERR7_NoError, ERR7_ResultFileIsOpen
```

---

## St7GetBrickResponse

## Description

Returns the response variable assigned to the specified brick. Response variables are only used by the Load Influence solver.

## Syntax

```
long St7GetBrickResponse(long uID, long BrickNum, long  
CaseNum, long* UCSId, long* Status)
```

## Input Parameters

uID

Strand7 model file ID number.

BrickNum

Brick number.

CaseNum

Load case number.

### Output Parameters

UCSId

UCS ID number.

Status[0..5]

A 6 element array describing which stress components are flagged as response variables – lists the 11, 22, 33, 12, 23, 31 components in the 123 axis convention in the specified UCS.

### Errors

```
ERR7_APINotInitialised, ERR7_APINotLicensed,  
ERR7_DataNotFound, ERR7_FileNotOpen, ERR7_InvalidBeamEnd,  
ERR7_InvalidEntityNumber, ERR7_InvalidFileUnit,  
ERR7_InvalidLoadCase, ERR7_InvalidResponseType,  
ERR7_NoError, ERR7_ResultFileIsOpen
```

## St7GetBrickCreepLoadingAge1

---

### Description

Returns the creep loading age assigned to the specified brick. This attribute is only used when performing creep analysis using the Quasi-Static solver.

### Syntax

```
long St7GetBrickCreepLoadingAge1(long uID, long BrickNum,  
                                double* Doubles)
```

### Input Parameters

uID

Strand7 model file ID number.

BrickNum

Brick number.

---

## **Output Parameters**

Doubles[0]

Creep loading age in seconds.

## **Errors**

ERR7\_APINotInitialised, ERR7\_APINotLicensed,  
ERR7\_DataNotFound, ERR7\_FileNotOpen,  
ERR7\_InvalidAttributeType, ERR7\_InvalidEntity,  
ERR7\_InvalidEntityNumber, ERR7\_InvalidFileUnit,  
ERR7\_InvalidFreedomCase, ERR7\_InvalidLoadCase,  
ERR7\_InvalidLoadID, ERR7\_NoError, ERR7\_ResultFileIsOpen

---

# **St7GetBrickFaceAttachment1**

## **Description**

Returns the attachment conditions assigned to the specified brick face.  
Attachment attributes can be used to generate attachment links using the  
*St7ToolAttachParts* function.

## **Syntax**

```
long St7GetBrickFaceAttachment1(long uID, long BrickNum,  
                                long FaceNum, long* AttachType, long* ConnectType,  
                                long* PropNum, double* Doubles)
```

## **Input Parameters**

uID

Strand7 model file ID number.

BrickNum

Brick number.

FaceNum

Local face number. See *Brick Local Coordinates* for additional information.

## **Output Parameters**

AttachType

Attachment type, one of alDirect, alRigid or alFlexible.

ConnectType

Attachment sub-type, either alMoment or alPinned.

PropNum

Beam property number used for flexible attachment types.

Doubles [ 0 ]

The maximum distance within which the brick face can be connected to another element using the attachment link.

### Errors

```
ERR7_APINotInitialised, ERR7_APINotLicensed,  
ERR7_DataNotFound, ERR7_FileNotOpen,  
ERR7_InvalidAttributeType, ERR7_InvalidEntity,  
ERR7_InvalidEntityNumber, ERR7_InvalidFileUnit,  
ERR7_InvalidFreedomCase, ERR7_InvalidLoadCase,  
ERR7_InvalidLoadID, ERR7_NoError, ERR7_ResultFileIsOpen
```

---

## Vertex Attributes – Set

### St7SetVertexType

---

#### Description

Sets the type for the specified vertex.

#### Syntax

```
long St7SetVertexType(long uID, long VertexNum, long  
VertexType)
```

#### Input Parameters

uID

Strand7 model file ID number.

VertexNum

Vertex number.

VertexType

Vertex type, either vtFree or vtFixed.

#### Errors

```
ERR7_APINotInitialised, ERR7_APINotLicensed,  
ERR7_FileNotOpen, ERR7_InvalidEntityNumber,  
ERR7_InvalidVertexType, ERR7_InvalidFileUnit, ERR7_NoError,  
ERR7_ResultFileIsOpen
```

### St7SetVertexID

---

#### Description

Assigns an ID number to the specified vertex.

#### Syntax

```
long St7SetVertexID(long uID, long VertexNum, long  
VertexID)
```

#### Input Parameters

uID

Strand7 model file ID number.

VertexNum

Vertex number.

VertexID

Vertex ID number.

## Errors

ERR7\_APINotInitialised, ERR7\_APINotLicensed,  
ERR7\_FileNotOpen, ERR7\_InvalidEntityNumber,  
ERR7\_InvalidFileUnit, ERR7\_NoError, ERR7\_ResultFileIsOpen

# St7SetVertexMeshSize1

---

## Description

Assigns a desired mesh size at the specified vertex. This value is used to control the local mesh resolution when using the surface automeshing tools.

## Syntax

```
long St7SetVertexMeshSize1(long uID, long VertexNum,  
                           double* Doubles)
```

## Input Parameters

uID

Strand7 model file ID number.

VertexNum

Vertex number.

Doubles [0]

Desired mesh size at the specified vertex. This value is used to determine the desired edge length of adjacent plate elements generated during surface auto-meshing.

## Errors

ERR7\_APINotInitialised, ERR7\_APINotLicensed,  
ERR7\_FileNotOpen, ERR7\_InvalidEntityNumber,  
ERR7\_InvalidFileUnit, ERR7\_NoError, ERR7\_ResultFileIsOpen

---

## St7SetVertexRestraint6

---

### Description

Assigns structural restraint conditions at the specified vertex.

### Syntax

```
long St7SetVertexRestraint6(long uID, long VertexNum, long  
CaseNum, long UCSId, long* Status, double* Doubles)
```

### Input Parameters

uID

Strand7 model file ID number.

VertexNum

Vertex number.

CaseNum

Load case number.

UCSId

UCS ID number.

Status [0..5]

An array describing the restraint conditions for the six DoF at the specified vertex. Status[i-1] = btTrue indicates that the i<sup>th</sup> DoF is restrained. The DoF are restrained according to the 123456 axis convention in the specified UCS.

Doubles [0..5]

An array describing the enforced displacement conditions for the six DoF at the specified vertex. Doubles[i-1] describes the displacement of the i<sup>th</sup> DoF according to the 123456 axis convention in the specified UCS.

### Errors

ERR7\_APINotInitialised, ERR7\_APINotLicensed,  
ERR7\_FileNotOpen, ERR7\_InvalidEntityNumber,  
ERR7\_InvalidFileUnit, ERR7\_InvalidFreedomCase,  
ERR7\_InvalidUCSID, ERR7\_NoError, ERR7\_ResultFileIsOpen

## St7SetVertexForce3

---

### Description

Assigns a point force to the specified vertex.

### Syntax

```
long St7SetVertexForce3(long uID, long VertexNum, long  
CaseNum, double* Doubles)
```

### Input Parameters

uID

Strand7 model file ID number.

VertexNum

Vertex number.

CaseNum

Load case number.

Doubles[0..2]

A 3 element array describing the force in the XYZ Cartesian coordinate system for the specified vertex.

### Errors

ERR7\_APINotInitialised, ERR7\_APINotLicensed,  
ERR7\_FileNotOpen, ERR7\_InvalidEntityNumber,  
ERR7\_InvalidFileUnit, ERR7\_InvalidFreedomCase,  
ERR7\_InvalidLoadCase, ERR7\_InvalidUCSID, ERR7\_NoError,  
ERR7\_ResultFileIsOpen

## St7SetVertexMoment3

---

### Description

Assigns a point moment to the specified vertex.

### Syntax

```
long St7SetVertexMoment3(long uID, long VertexNum, long  
CaseNum, double* Doubles)
```

---

## **Input Parameters**

uID

Strand7 model file ID number.

VertexNum

Vertex number.

CaseNum

Load case number.

Doubles[0..2]

A 3 element array describing the moments about the XYZ Cartesian coordinate system for the specified vertex.

## **Errors**

ERR7\_APINotInitialised, ERR7\_APINotLicensed,  
ERR7\_FileNotOpen, ERR7\_InvalidEntityNumber,  
ERR7\_InvalidFileUnit, ERR7\_InvalidFreedomCase,  
ERR7\_InvalidLoadCase, ERR7\_InvalidUCSID, ERR7\_NoError,  
ERR7\_ResultFileIsOpen

---

# **St7SetVertexTemperature1**

## **Description**

Assigns a temperature to the specified vertex. This attribute is used when performing both structural and heat transfer analysis.

## **Syntax**

```
long St7SetVertexTemperature1(long uID, long VertexNum,  
                           long CaseNum, double* Doubles)
```

## **Input Parameters**

uID

Strand7 model file ID number.

VertexNum

Vertex number.

CaseNum

Load case number.

Doubles [0]

Temperature value at the specified vertex.

## Errors

ERR7\_APINotInitialised, ERR7\_APINotLicensed,  
ERR7\_DataNotFound, ERR7\_FileNotOpen,  
ERR7\_InvalidAttributeType, ERR7\_InvalidEntity,  
ERR7\_InvalidEntityNumber, ERR7\_InvalidFileUnit,  
ERR7\_InvalidFreedomCase, ERR7\_InvalidLoadCase,  
ERR7\_InvalidLoadID, ERR7\_InvalidUCSID, ERR7\_NoError,  
ERR7\_ResultFileIsOpen

## St7SetVertexTemperatureType1

---

### Description

Sets the temperature type assigned at the specified vertex. This attribute is used when performing both structural and heat transfer analysis.

### Syntax

```
long St7SetVertexTemperatureType1(long uID, long VertexNum,  
                                long CaseNum, long tType)
```

### Input Parameters

uID

Strand7 model file ID number.

VertexNum

Vertex number.

CaseNum

Load case number.

tType

The type of temperature attribute applied at the specified node, one of  
tReferenceTemperature, tFixedTemperature, tInitialTemperature or  
tTableTemperature.

### Errors

ERR7\_APINotInitialised, ERR7\_APINotLicensed,  
ERR7\_DataNotFound, ERR7\_FileNotOpen,

---

```
ERR7_InvalidAttributeType, ERR7_InvalidEntity,
ERR7_InvalidEntityNumber, ERR7_InvalidFileUnit,
ERR7_InvalidFreedomCase, ERR7_InvalidLoadCase,
ERR7_InvalidLoadID, ERR7_InvalidTemperatureType,
ERR7_InvalidUCSID, ERR7_NoError, ERR7_ResultFileIsOpen
```

## St7SetVertexTemperatureTable

---

### Description

Specifies the table to be associated with the temperature assigned to the specified vertex. This attribute is used when performing both structural and heat transfer analysis.

### Syntax

```
long St7SetVertexTemperatureTable(long uID, long VertexNum,
                                 long CaseNum, long TableID)
```

### Input Parameters

uID

Strand7 model file ID number.

VertexNum

Vertex number.

CaseNum

Load case number.

TableID

ID number for the Factor vs Time table.

### Errors

```
ERR7_APINotInitialised, ERR7_APINotLicensed,
ERR7_DataNotFound, ERR7_FileNotOpen,
ERR7_InvalidAttributeType, ERR7_InvalidEntity,
ERR7_InvalidEntityNumber, ERR7_InvalidFileUnit,
ERR7_InvalidFreedomCase, ERR7_InvalidLoadCase,
ERR7_InvalidLoadID, ERR7_InvalidTableType,
ERR7_InvalidUCSID, ERR7_NoError, ERR7_ResultFileIsOpen,
ERR7_TableDoesNotExist
```

## St7SetVertexKTranslation3F

---

### Description

Assigns a translational stiffness to the specified vertex.

### Syntax

```
long St7SetVertexKTranslation3F(long uID, long VertexNum,  
                               long CaseNum, long UCSId, double* Doubles)
```

### Input Parameters

uID

Strand7 model file ID number.

VertexNum

Vertex number.

CaseNum

Freedom case number.

UCSId

UCS ID number.

Doubles [0..2]

A 3 element array describing the translational stiffnesses for the specified vertex. Doubles [i-1] describes the stiffness for the i<sup>th</sup> translational DoF according to the 123 axis definition in the specified UCS.

### Errors

```
ERR7_APINotInitialised, ERR7_APINotLicensed,  
ERR7_FileNotOpen, ERR7_InvalidEntityNumber,  
ERR7_InvalidFileUnit, ERR7_InvalidFreedomCase,  
ERR7_InvalidLoadCase, ERR7_InvalidUCSID, ERR7_NoError,  
ERR7_ResultFileIsOpen
```

## St7SetVertexKRotation3F

---

### Description

Assigns a rotational stiffness to the specified vertex.

---

## Syntax

```
long St7SetVertexKRotation3F(long uID, long VertexNum, long  
CaseNum, long UCSId, double* Doubles)
```

## Input Parameters

uID

Strand7 model file ID number.

VertexNum

Vertex number.

CaseNum

Freedom case number.

UCSId

UCS ID number.

Doubles[0..2]

A 3 element array describing the rotational stiffnesses for the specified vertex.  
Doubles[i-1] describes the stiffness for the  $i^{\text{th}}$  rotational DoF according to  
the 456 axis definition in the specified UCS.

## Errors

```
ERR7_APINotInitialised, ERR7_APINotLicensed,  
ERR7_FileNotOpen, ERR7_InvalidEntityNumber,  
ERR7_InvalidFileUnit, ERR7_InvalidFreedomCase,  
ERR7_InvalidLoadCase, ERR7_InvalidUCSID, ERR7_NoError,  
ERR7_ResultFileIsOpen
```

---

## St7SetVertexTMass3

### Description

Assigns a translational mass to the specified vertex.

### Syntax

```
long St7SetVertexTMass3(long uID, long VertexNum, double*  
Doubles)
```

### Input Parameters

uID

Strand7 model file ID number.

VertexNum

Vertex number.

Doubles [0..2]

A 3 element array describing the translational mass for the specified vertex.

Doubles [i-1] describes the translational mass for the i<sup>th</sup> translational DoF according to the XYZ Cartesian axis convention.

## Errors

```
ERR7_APINotInitialised, ERR7_APINotLicensed,  
ERR7_FileNotOpen, ERR7_InvalidEntityNumber,  
ERR7_InvalidFileUnit, ERR7_InvalidFreedomCase,  
ERR7_InvalidLoadCase, ERR7_InvalidUCSID, ERR7_NoError,  
ERR7_ResultFileIsOpen
```

## St7SetVertexRMass3

---

### Description

Assigns a rotational mass to the specified vertex.

### Syntax

```
long St7SetVertexRMass3(long uID, long VertexNum, long  
UCSID, double* Doubles)
```

### Input Parameters

uID

Strand7 model file ID number.

VertexNum

Vertex number.

UCSID

UCS ID number.

Doubles [0..2]

A 3 element array describing the rotational mass for the specified vertex.

Doubles [i-1] describes the rotational mass for the i<sup>th</sup> rotational DoF according to the 456 axis convention in the specified UCS.

---

## Errors

```
ERR7_APINotInitialised, ERR7_APINotLicensed,  
ERR7_FileNotOpen, ERR7_InvalidEntityNumber,  
ERR7_InvalidFileUnit, ERR7_InvalidFreedomCase,  
ERR7_InvalidLoadCase, ERR7_InvalidUCSID, ERR7_NoError,  
ERR7_ResultFileIsOpen
```

---

## St7SetVertexNSMass5

### Description

Assigns a non-structural mass to the specified vertex.

### Syntax

```
long St7SetVertexNSMass5(long uID, long VertexNum, long  
CaseNum, double* Doubles)
```

### Input Parameters

uID

Strand7 model file ID number.

VertexNum

Vertex number.

CaseNum

Load case number.

Doubles[0..4]

[0] - Non-structural mass at the specified vertex.

[1] - Dynamic factor for the specified vertex. This factor is used to scale the non-structural mass when performing dynamic analysis.

[2..4] - A 3 element array describing the offset in the XYZ Cartesian coordinate system.

### Errors

```
ERR7_APINotInitialised, ERR7_APINotLicensed,  
ERR7_FileNotOpen, ERR7_InvalidEntityNumber,  
ERR7_InvalidFileUnit, ERR7_InvalidFreedomCase,  
ERR7_InvalidLoadCase, ERR7_InvalidUCSID, ERR7_NoError,  
ERR7_ResultFileIsOpen
```

## St7SetVertexKDamping3F

---

### Description

Assigns the translational damping coefficients for the specified vertex.

### Syntax

```
long St7SetVertexKDamping3F(long uID, long VertexNum, long  
CaseNum, long UCSId, double* Doubles)
```

### Input Parameters

uID

Strand7 model file ID number.

VertexNum

Vertex number.

CaseNum

Load case number.

UCSId

UCS ID number.

Doubles [0..2]

A 3 element array describing the damping factors for the specified vertex.

Doubles [i-1] describes the damping factor for the  $i^{\text{th}}$  translational DoF according to the 123 axis definition in the specified UCS.

### Errors

```
ERR7_APINotInitialised, ERR7_APINotLicensed,  
ERR7_FileNotOpen, ERR7_InvalidEntityNumber,  
ERR7_InvalidFileUnit, ERR7_InvalidFreedomCase,  
ERR7_InvalidLoadCase, ERR7_InvalidUCSID, ERR7_NoError,  
ERR7_ResultFileIsOpen
```

## St7SetVertexHeatSource1

---

### Description

Assigns a thermal heat source to the specified vertex. This attribute is only used when performing heat transfer analysis.

---

## Syntax

```
long St7SetVertexHeatSource1(long uID, long VertexNum, long  
CaseNum, double* Doubles)
```

## Input Parameters

uID

Strand7 model file ID number.

VertexNum

Vertex number.

CaseNum

Load case number.

Doubles[0]

Heat source value.

## Errors

```
ERR7_APINotInitialised, ERR7_APINotLicensed,  
ERR7_DataNotFound, ERR7_FileNotOpen,  
ERR7_InvalidAttributeType, ERR7_InvalidEntity,  
ERR7_InvalidEntityNumber, ERR7_InvalidFileUnit,  
ERR7_InvalidFreedomCase, ERR7_InvalidLoadCase,  
ERR7_InvalidLoadID, ERR7_InvalidUCSID, ERR7_NoError,  
ERR7_ResultFileIsOpen
```

---

## St7SetVertexHeatSourceTables

### Description

Specifies the tables to be associated with the thermal source assigned to the specified vertex. Both Factor vs Time and Factor vs Temperature tables may be assigned. This attribute is only used when performing heat transfer analysis.

### Syntax

```
long St7SetVertexHeatSourceTables(long uID, long VertexNum,  
long CaseNum, long* Tables)
```

### Input Parameters

uID

Strand7 model file ID number.

VertexNum

Vertex number.

CaseNum

Load case number.

Tables[0..1]

[0] - Factor vs Time table ID associated with the heat source, use zero for none.

[1] - Factor vs Temperature table ID associated with the heat source, use zero for none.

### Errors

ERR7\_APINotInitialised, ERR7\_APINotLicensed,  
ERR7\_DataNotFound, ERR7\_FileNotOpen,  
ERR7\_InvalidAttributeType, ERR7\_InvalidEntity,  
ERR7\_InvalidEntityNumber, ERR7\_InvalidFileUnit,  
ERR7\_InvalidFreedomCase, ERR7\_InvalidLoadCase,  
ERR7\_InvalidLoadID, ERR7\_InvalidTableType,  
ERR7\_InvalidUCSID, ERR7\_NoError, ERR7\_ResultFileIsOpen,  
ERR7\_TableDoesNotExist

---

## Vertex Attributes – Get

### St7GetVertexType

---

#### Description

Returns the type assigned to the specified vertex.

#### Syntax

```
long St7GetVertexType(long uID, long VertexNum, long*  
VertexType)
```

#### Input Parameters

uID

Strand7 model file ID number.

VertexNum

Vertex number.

#### Output Parameters

VertexType

Vertex type, either vtFree or vtFixed.

#### Errors

ERR7\_APINotInitialised, ERR7\_APINotLicensed,  
ERR7\_FileNotOpen, ERR7\_InvalidEntityNumber,  
ERR7\_InvalidFileUnit, ERR7\_NoError

## St7GetVertexID

---

#### Description

Returns the ID number assigned to the specified vertex.

#### Syntax

```
long St7GetVertexID(long uID, long VertexNum, long*  
VertexID)
```

#### Input Parameters

uID

Strand7 model file ID number.

VertexNum

Vertex number.

### Output Parameters

VertexID

Vertex ID number.

### Errors

ERR7\_APINotInitialised, ERR7\_APINotLicensed,  
ERR7\_FileNotOpen, ERR7\_InvalidEntityNumber,  
ERR7\_InvalidFileUnit, ERR7\_NoError, ERR7\_ResultFileIsOpen

## St7GetVertexMeshSize1

---

### Description

Returns the desired mesh size assigned to the specified vertex. This value is used to control the local mesh resolution when using the surface automeshing tools.

### Syntax

```
long St7GetVertexMeshSize1(long uID, long VertexNum,  
                           double* Doubles)
```

### Input Parameters

uID

Strand7 model file ID number.

VertexNum

Vertex number.

### Output Parameters

Doubles [0]

Desired mesh size at the specified vertex. This value is used to determine the desired edge length of adjacent plate elements generated during surface auto-meshing.

### Errors

ERR7\_APINotInitialised, ERR7\_APINotLicensed,  
ERR7\_FileNotOpen, ERR7\_InvalidEntityNumber,  
ERR7\_InvalidFileUnit, ERR7\_NoError

---

## St7GetVertexRestraint6

---

### Description

Returns the restraint conditions assigned at the specified vertex.

### Syntax

```
long St7GetVertexRestraint6(long uID, long VertexNum, long  
CaseNum, long* UCSId, long* Status, double* Doubles)
```

### Input Parameters

uID

Strand7 model file ID number.

VertexNum

Vertex number.

CaseNum

Load case number.

### Output Parameters

UCSId

UCS ID number.

Status[0..5]

An array describing the restraint conditions for the six DoF at the specified vertex. Status[i-1] = btTrue indicates that the i<sup>th</sup> DoF is restrained. The DoF are restrained according to the 123456 axis convention in the specified UCS.

Doubles[0..5]

An array describing the enforced displacement conditions for the six DoF at the specified vertex. Doubles[i-1] describes the displacement of the i<sup>th</sup> DoF according to the 123456 axis convention in the specified UCS.

### Errors

```
ERR7_APINotInitialised, ERR7_APINotLicensed,  
ERR7_DataNotFound, ERR7_FileNotOpen,  
ERR7_InvalidAttributeType, ERR7_InvalidEntity,  
ERR7_InvalidEntityNumber, ERR7_InvalidFileUnit,
```

```
ERR7_InvalidFreedomCase, ERR7_InvalidLoadCase,  
ERR7_InvalidLoadID, ERR7_NoError, ERR7_ResultFileIsOpen
```

## St7GetVertexForce3

---

### Description

Returns the point force assigned to the specified vertex.

### Syntax

```
long St7GetVertexForce3(long uID, long VertexNum, long  
CaseNum, double* Doubles)
```

### Input Parameters

uID

Strand7 model file ID number.

VertexNum

Vertex number.

CaseNum

Load case number.

### Output Parameters

Doubles[0..2]

A 3 element array describing the force in the XYZ Cartesian coordinate system for the specified vertex.

### Errors

```
ERR7_APINotInitialised, ERR7_APINotLicensed,  
ERR7_DataNotFound, ERR7_FileNotOpen,  
ERR7_InvalidAttributeType, ERR7_InvalidEntity,  
ERR7_InvalidEntityNumber, ERR7_InvalidFileUnit,  
ERR7_InvalidFreedomCase, ERR7_InvalidLoadCase,  
ERR7_InvalidLoadID, ERR7_NoError, ERR7_ResultFileIsOpen
```

## St7GetVertexMoment3

---

### Description

Returns the point moment assigned at the specified vertex.

---

## Syntax

```
long St7GetVertexMoment3(long uID, long VertexNum, long  
CaseNum, double* Doubles)
```

## Input Parameters

uID

Strand7 model file ID number.

VertexNum

Vertex number.

CaseNum

Load case number.

## Output Parameters

Doubles[0..2]

A 3 element array describing the moments about the XYZ Cartesian coordinate system for the specified vertex.

## Errors

```
ERR7_APINotInitialised, ERR7_APINotLicensed,  
ERR7_DataNotFound, ERR7_FileNotOpen,  
ERR7_InvalidAttributeType, ERR7_InvalidEntity,  
ERR7_InvalidEntityNumber, ERR7_InvalidFileUnit,  
ERR7_InvalidFreedomCase, ERR7_InvalidLoadCase,  
ERR7_InvalidLoadID, ERR7_NoError, ERR7_ResultFileIsOpen
```

---

## St7GetVertexTemperature1

### Description

Returns the temperature assigned to the specified vertex. This attribute is used when conducting both structural and heat transfer analysis.

## Syntax

```
long St7GetVertexTemperature1(long uID, long VertexNum,  
long CaseNum, double* Doubles)
```

## Input Parameters

uID

Strand7 model file ID number.

VertexNum

Vertex number.

CaseNum

Load case number.

### **Output Parameters**

Doubles [0]

Applied temperature value.

### **Errors**

ERR7\_APINotInitialised, ERR7\_APINotLicensed,  
ERR7\_DataNotFound, ERR7\_FileNotOpen,  
ERR7\_InvalidAttributeType, ERR7\_InvalidEntity,  
ERR7\_InvalidEntityNumber, ERR7\_InvalidFileUnit,  
ERR7\_InvalidFreedomCase, ERR7\_InvalidLoadCase,  
ERR7\_InvalidLoadID, ERR7\_NoError, ERR7\_ResultFileIsOpen

## **St7GetVertexTemperatureType1**

---

### **Description**

Returns the temperature type assigned to the specified vertex. This attribute is used when performing both structural and heat transfer analysis.

### **Syntax**

```
long St7GetVertexTemperatureType1(long uID, long VertexNum,  
                                long CaseNum, long* tType)
```

### **Input Parameters**

uID

Strand7 model file ID number.

VertexNum

Vertex number.

CaseNum

Load case number.

### **Output Parameters**

tType

---

The type of temperature attribute applied at the specified node, one of tReferenceTemperature, tFixedTemperature, tInitialTemperature or tTableTemperature.

## Errors

```
ERR7_APINotInitialised, ERR7_APINotLicensed,  
ERR7_DataNotFound, ERR7_FileNotOpen,  
ERR7_InvalidAttributeType, ERR7_InvalidEntity,  
ERR7_InvalidEntityNumber, ERR7_InvalidFileUnit,  
ERR7_InvalidFreedomCase, ERR7_InvalidLoadCase,  
ERR7_InvalidLoadID, ERR7_NoError, ERR7_ResultFileIsOpen
```

# St7GetVertexTemperatureTable

---

## Description

Returns the table associated with the specified vertex. This attribute is used when performing both structural and heat transfer analysis.

## Syntax

```
long St7GetVertexTemperatureTable(long uID, long VertexNum,  
                                 long CaseNum, long* TableID)
```

## Input Parameters

uID

Strand7 model file ID number.

VertexNum

Vertex number.

CaseNum

Load case number.

## Output Parameters

TableID

ID number for the Factor vs Time table associated with the assigned temperature.

## Errors

```
ERR7_APINotInitialised, ERR7_APINotLicensed,  
ERR7_DataNotFound, ERR7_FileNotOpen,  
ERR7_InvalidAttributeType, ERR7_InvalidEntity,
```

```
ERR7_InvalidEntityNumber, ERR7_InvalidFileUnit,  
ERR7_InvalidFreedomCase, ERR7_InvalidLoadCase,  
ERR7_InvalidLoadID, ERR7_NoError, ERR7_ResultFileIsOpen
```

## St7GetVertexKTranslation3F

---

### Description

Returns the translational stiffness assigned to the specified vertex.

### Syntax

```
long St7GetVertexKTranslation3F(long uID, long VertexNum,  
                                long CaseNum, long* UCSId, double* Doubles)
```

### Input Parameters

uID

Strand7 model file ID number.

VertexNum

Vertex number.

CaseNum

Freedom case number.

### Output Parameters

UCSId

UCS ID number.

Doubles[0..2]

A 3 element array describing the translational stiffnesses for the specified vertex. Doubles[i-1] describes the stiffness for the i<sup>th</sup> translational DoF according to the 123 axis definition in the specified UCS.

### Errors

```
ERR7_APINotInitialised, ERR7_APINotLicensed,  
ERR7_DataNotFound, ERR7_FileNotOpen,  
ERR7_InvalidAttributeType, ERR7_InvalidEntity,  
ERR7_InvalidEntityNumber, ERR7_InvalidFileUnit,  
ERR7_InvalidFreedomCase, ERR7_InvalidLoadCase,  
ERR7_InvalidLoadID, ERR7_NoError, ERR7_ResultFileIsOpen
```

---

## St7GetVertexKRotation3F

---

### Description

Returns the rotational stiffness assigned to the specified vertex.

### Syntax

```
long St7GetVertexKRotation3F(long uID, long VertexNum, long  
CaseNum, long* UCSId, double* Doubles)
```

### Input Parameters

uID

Strand7 model file ID number.

VertexNum

Vertex number.

CaseNum

Freedom case number.

### Output Parameters

UCSId

UCS ID number.

Doubles[0..2]

A 3 element array describing the rotational stiffnesses for the specified vertex.

Doubles[i-1] describes the stiffness for the i<sup>th</sup> rotational DoF according to the 456 axis definition in the specified UCS.

### Errors

```
ERR7_APINotInitialised, ERR7_APINotLicensed,  
ERR7_DataNotFound, ERR7_FileNotOpen,  
ERR7_InvalidAttributeType, ERR7_InvalidEntity,  
ERR7_InvalidEntityNumber, ERR7_InvalidFileUnit,  
ERR7_InvalidFreedomCase, ERR7_InvalidLoadCase,  
ERR7_InvalidLoadID, ERR7_NoError, ERR7_ResultFileIsOpen
```

---

## St7GetVertexTMass3

---

### Description

Returns the translational mass assigned to the specified vertex.

## Syntax

```
long St7GetVertexTMass3(long uID, long VertexNum, double* Doubles)
```

## Input Parameters

uID

Strand7 model file ID number.

VertexNum

Vertex number.

## Output Parameters

Doubles [0..2]

A 3 element array describing the translational mass for the specified vertex.

Doubles [i-1] describes the translational mass for the  $i^{\text{th}}$  translational DoF according to the XYZ Cartesian axis convention.

## Errors

```
ERR7_APINotInitialised, ERR7_APINotLicensed,  
ERR7_DataNotFound, ERR7_FileNotOpen,  
ERR7_InvalidAttributeType, ERR7_InvalidEntity,  
ERR7_InvalidEntityNumber, ERR7_InvalidFileUnit,  
ERR7_InvalidFreedomCase, ERR7_InvalidLoadCase,  
ERR7_InvalidLoadID, ERR7_NoError, ERR7_ResultFileIsOpen
```

# St7GetVertexRMass3

---

## Description

Returns the rotational mass assigned to the specified vertex.

## Syntax

```
long St7GetVertexRMass3(long uID, long VertexNum, long* UCSId, double* Doubles)
```

## Input Parameters

uID

Strand7 model file ID number.

VertexNum

Vertex number.

---

## Output Parameters

UCSID

UCS ID number.

Doubles[0..2]

A 3 element array describing the rotational mass for the specified vertex.

Doubles[i-1] describes the rotational mass for the i<sup>th</sup> rotational DoF according to the 456 axis convention in the specified UCS.

## Errors

```
ERR7_APINotInitialised, ERR7_APINotLicensed,  
ERR7_DataNotFound, ERR7_FileNotOpen,  
ERR7_InvalidAttributeType, ERR7_InvalidEntity,  
ERR7_InvalidEntityNumber, ERR7_InvalidFileUnit,  
ERR7_InvalidFreedomCase, ERR7_InvalidLoadCase,  
ERR7_InvalidLoadID, ERR7_NoError, ERR7_ResultFileIsOpen
```

---

# St7GetVertexNSMass5

## Description

Returns the non-structural mass assigned to the specified vertex.

## Syntax

```
long St7GetVertexNSMass5(long uID, long VertexNum, long  
CaseNum, double* Doubles)
```

## Input Parameters

uID

Strand7 model file ID number.

VertexNum

Vertex number.

CaseNum

Load case number.

## Output Parameters

Doubles[0..4]

[0] - Non-structural mass at the specified vertex.

[1] - Dynamic factor for the specified vertex. This factor is used to scale the non-structural mass when performing dynamic analysis.

[2..4] - A 3 element array describing the offset in the XYZ Cartesian coordinate system.

## Errors

```
ERR7_APINotInitialised, ERR7_APINotLicensed,  
ERR7_DataNotFound, ERR7_FileNotOpen,  
ERR7_InvalidAttributeType, ERR7_InvalidEntity,  
ERR7_InvalidEntityNumber, ERR7_InvalidFileUnit,  
ERR7_InvalidFreedomCase, ERR7_InvalidLoadCase,  
ERR7_InvalidLoadID, ERR7_NoError, ERR7_ResultFileIsOpen
```

## St7GetVertexKDamping3F

---

### Description

Returns the translational damping coefficients assigned to the specified vertex.

### Syntax

```
long St7GetVertexKDamping3F(long uID, long VertexNum, long  
CaseNum, long* UCSId, double* Doubles)
```

### Input Parameters

uID

Strand7 model file ID number.

VertexNum

Vertex number.

CaseNum

Freedom case number.

### Output Parameters

UCSId

UCS ID number.

Doubles [0..2]

---

A 3 element array describing the damping factors for the specified vertex.  
Doubles [i-1] describes the damping factor for the i<sup>th</sup> translational DoF  
according to the 123 axis definition in the specified UCS.

## Errors

```
ERR7_APINotInitialised, ERR7_APINotLicensed,  
ERR7_DataNotFound, ERR7_FileNotOpen,  
ERR7_InvalidAttributeType, ERR7_InvalidEntity,  
ERR7_InvalidEntityNumber, ERR7_InvalidFileUnit,  
ERR7_InvalidFreedomCase, ERR7_InvalidLoadCase,  
ERR7_InvalidLoadID, ERR7_NoError, ERR7_ResultFileIsOpen
```

# St7GetVertexHeatSource1

---

## Description

Returns the thermal heat source assigned to the specified vertex. This attribute is only used when performing heat transfer analysis.

## Syntax

```
long St7GetVertexHeatSource1(long uID, long VertexNum, long  
CaseNum, double* Doubles)
```

## Input Parameters

uID

Strand7 model file ID number.

VertexNum

Vertex number.

CaseNum

Load case number.

## Output Parameters

Doubles [0]

Heat source value.

## Errors

```
ERR7_APINotInitialised, ERR7_APINotLicensed,  
ERR7_DataNotFound, ERR7_FileNotOpen,  
ERR7_InvalidAttributeType, ERR7_InvalidEntity,  
ERR7_InvalidEntityNumber, ERR7_InvalidFileUnit,
```

```
ERR7_InvalidFreedomCase, ERR7_InvalidLoadCase,  
ERR7_InvalidLoadID, ERR7_NoError, ERR7_ResultFileIsOpen
```

## St7GetVertexHeatSourceTables

---

### Description

Returns the tables associated with the heat source assigned to the specified vertex. Both Factor vs Time and Factor vs Temperature tables may be assigned. This attribute is only used when performing heat transfer analysis.

### Syntax

```
long St7GetVertexHeatSourceTables(long uID, long VertexNum,  
                                long CaseNum, long* Tables)
```

### Input Parameters

uID

Strand7 model file ID number.

VertexNum

Vertex number.

CaseNum

Load case number.

### Output Parameters

Tables[0..1]

[0] - Factor vs Time table ID associated with the heat source, use zero for none.

[1] - Factor vs Temperature table ID associated with the heat source, use zero for none.

### Errors

```
ERR7_APINotInitialised, ERR7_APINotLicensed,  
ERR7_DataNotFound, ERR7_FileNotOpen,  
ERR7_InvalidAttributeType, ERR7_InvalidEntity,  
ERR7_InvalidEntityNumber, ERR7_InvalidFileUnit,  
ERR7_InvalidFreedomCase, ERR7_InvalidLoadCase,  
ERR7_InvalidLoadID, ERR7_NoError, ERR7_ResultFileIsOpen
```

---

## Edge Attributes – Set

### St7SetGeometryEdgeType

---

#### Description

Sets the type for the specified geometry edge.

#### Syntax

```
long St7SetGeometryEdgeType(long uID, long EdgeNum, long  
EdgeType)
```

#### Input Parameters

uID

Strand7 model file ID number.

EdgeNum

Edge number.

EdgeType

Edge type, either etInterpolated or etNonInterpolated.

#### Errors

```
ERR7_APINotInitialised, ERR7_APINotLicensed,  
ERR7_FileNotOpen, ERR7_InvalidEntityNumber,  
ERR7_InvalidFileUnit, ERR7_NoError, ERR7_ResultFileIsOpen,  
ERR7_InvalidGeometryEdgeType
```

### St7SetGeometryEdgeRelease1

---

#### Description

Sets the edge release condition on the specified geometry edge.

#### Syntax

```
long St7SetGeometryEdgeRelease1(long uID, long EdgeNum,  
long* Status)
```

#### Input Parameters

uID

Strand7 model file ID number.

EdgeNum

Edge number.

Status

btTrue or btFalse.

## Errors

ERR7\_APINotInitialised, ERR7\_APINotLicensed,  
ERR7\_FileNotOpen, ERR7\_InvalidEntityNumber,  
ERR7\_InvalidFileUnit, ERR7\_InvalidFreedomCase,  
ERR7\_InvalidLoadCase, ERR7\_InvalidUCSID, ERR7\_NoError,  
ERR7\_ResultFileIsOpen

# St7SetGeometryEdgeSupport1F

---

## Description

Assigns an elastic edge support to the specified geometry edge.

## Syntax

```
long St7SetGeometryEdgeSupport1F(long uID, long EdgeNum,
                                long CaseNum, long Status, double* Doubles)
```

## Input Parameters

uID

Strand7 model file ID number.

EdgeNum

Edge number.

CaseNum

Freedom case number.

Status

Compression-only flag, either btTrue or btFalse.

Doubles [0]

Elastic support value.

---

## Errors

```
ERR7_APINotInitialised, ERR7_APINotLicensed,  
ERR7_FileNotOpen, ERR7_InvalidEntityNumber,  
ERR7_InvalidFileUnit, ERR7_InvalidFreedomCase,  
ERR7_InvalidLoadCase, ERR7_InvalidUCSID, ERR7_NoError,  
ERR7_ResultFileIsOpen
```

---

# St7SetGeometryEdgePressure1

---

## Description

Assigns a pressure to the specified geometry edge.

## Syntax

```
long St7SetGeometryEdgePressure1(long uID, long EdgeNum,  
                                long CaseNum, double* Doubles)
```

## Input Parameters

uID

Strand7 model file ID number.

EdgeNum

Edge number.

CaseNum

Load case number.

Doubles [0]

Edge pressure value.

## Errors

```
ERR7_APINotInitialised, ERR7_APINotLicensed,  
ERR7_FileNotOpen, ERR7_InvalidEntityNumber,  
ERR7_InvalidFileUnit, ERR7_InvalidFreedomCase,  
ERR7_InvalidLoadCase, ERR7_InvalidUCSID, ERR7_NoError,  
ERR7_ResultFileIsOpen
```

## St7SetGeometryEdgeShear1

---

### Description

Assigns a shear stress to the specified geometry edge.

### Syntax

```
long St7SetGeometryEdgeShear1(long uID, long EdgeNum, long  
CaseNum, double* Doubles)
```

### Input Parameters

uID

Strand7 model file ID number.

EdgeNum

Edge number.

CaseNum

Load case number.

Doubles[0]

Shear stress value.

### Errors

```
ERR7_APINotInitialised, ERR7_APINotLicensed,  
ERR7_FileNotOpen, ERR7_InvalidEntityNumber,  
ERR7_InvalidFileUnit, ERR7_InvalidFreedomCase,  
ERR7_InvalidLoadCase, ERR7_InvalidUCSID, ERR7_NoError,  
ERR7_ResultFileIsOpen
```

## St7SetGeometryEdgeNormalShear1

---

### Description

Assigns a normal shear stress to the specified geometry edge.

### Syntax

```
long St7SetGeometryEdgeNormalShear1(long uID, long EdgeNum,  
long CaseNum, double* Doubles)
```

### Input Parameters

uID

---

Strand7 model file ID number.  
EdgeNum

Edge number.  
CaseNum  
Load case number.  
Doubles[0]  
Normal shear stress value.

## Errors

ERR7\_APINotInitialised, ERR7\_APINotLicensed,  
ERR7\_FileNotOpen, ERR7\_InvalidEntityNumber,  
ERR7\_InvalidFileUnit, ERR7\_InvalidFreedomCase,  
ERR7\_InvalidLoadCase, ERR7\_InvalidUCSID, ERR7\_NoError,  
ERR7\_ResultFileIsOpen

# St7SetGeometryEdgeConvection2

---

## Description

Assigns thermal convection coefficient and ambient temperature to the specified geometry edge. This attribute is only used when performing heat transfer analysis.

## Syntax

```
long St7SetGeometryEdgeConvection2(long uID, long EdgeNum,  
                                    long CaseNum, double* Doubles)
```

## Input Parameters

uID  
Strand7 model file ID number.  
EdgeNum  
Edge number.  
CaseNum  
Load case number.  
Doubles[0..1]

[0] - Convection coefficient.

[1] - Ambient temperature.

### Errors

```
ERR7_APINotInitialised, ERR7_APINotLicensed,  
ERR7_DataNotFound, ERR7_FileNotOpen,  
ERR7_InvalidAttributeType, ERR7_InvalidEntity,  
ERR7_InvalidEntityNumber, ERR7_InvalidFileUnit,  
ERR7_InvalidFreedomCase, ERR7_InvalidLoadCase,  
ERR7_InvalidLoadID, ERR7_InvalidUCSID, ERR7_NoError,  
ERR7_ResultFileIsOpen
```

## St7SetGeometryEdgeConvectionTables

---

### Description

Specifies the tables associated with the thermal convection properties assigned to a specified geometry edge. A Factor vs Temperature table may apply to the convection coefficient and Factor vs Time tables may apply to both the convection coefficient and ambient temperature.

### Syntax

```
long St7SetGeometryEdgeConvectionTables(long uID, long  
EdgeNum, long CaseNum, long* Tables)
```

### Input Parameters

uID

Strand7 model file ID number.

EdgeNum

Edge number.

CaseNum

Load case number.

Tables[0..2]

[0] - Factor vs Time table ID associated with the ambient temperature, use zero for none.

[1] - Factor vs Temperature table ID associated with the convection coefficient, use zero for none.

---

[ 2 ] - Factor vs Time table ID associated with the convection coefficient, use zero for none.

## Errors

```
ERR7_APINotInitialised, ERR7_APINotLicensed,  
ERR7_DataNotFound, ERR7_FileNotOpen,  
ERR7_InvalidAttributeType, ERR7_InvalidEntity,  
ERR7_InvalidEntityNumber, ERR7_InvalidFileUnit,  
ERR7_InvalidFreedomCase, ERR7_InvalidLoadCase,  
ERR7_InvalidLoadID, ERR7_InvalidTableType,  
ERR7_InvalidUCSID, ERR7_NoError, ERR7_ResultFileIsOpen,  
ERR7_TableDoesNotExist
```

# St7SetGeometryEdgeRadiation2

---

## Description

Assigns the thermal radiation coefficient and ambient temperature for the specified geometry edge.

## Syntax

```
long St7SetGeometryEdgeRadiation2(long uID, long EdgeNum,  
                                long CaseNum, double* Doubles)
```

## Input Parameters

uID

Strand7 model file ID number.

EdgeNum

Edge number.

CaseNum

Load case number.

Doubles[0..1]

[ 0 ] - Radiation coefficient.

[ 1 ] - Ambient temperature.

## Errors

```
ERR7_APINotInitialised, ERR7_APINotLicensed,  
ERR7_DataNotFound, ERR7_FileNotOpen,
```

```
ERR7_InvalidAttributeType, ERR7_InvalidEntity,  
ERR7_InvalidEntityNumber, ERR7_InvalidFileUnit,  
ERR7_InvalidFreedomCase, ERR7_InvalidLoadCase,  
ERR7_InvalidLoadID, ERR7_InvalidUCSID, ERR7_NoError,  
ERR7_ResultFileIsOpen
```

## St7SetGeometryEdgeRadiationTables

---

### Description

Specifies the tables associated with the thermal radiation properties assigned to a specified geometry edge. A Factor vs Temperature table may apply to the radiation coefficient and Factor vs Time tables may apply to both the radiation coefficient and ambient temperature.

### Syntax

```
long St7SetGeometryEdgeRadiationTables(long uID, long  
EdgeNum, long CaseNum, long* Tables)
```

### Input Parameters

uID

Strand7 model file ID number.

EdgeNum

Edge number.

CaseNum

Load case number.

Tables[0..2]

[0] - Factor vs Time table ID associated with the ambient temperature, use zero for none.

[1] - Factor vs Temperature table ID associated with the radiation coefficient, use zero for none.

[2] - Factor vs Time table ID associated with the radiation coefficient, use zero for none.

### Errors

```
ERR7_APINotInitialised, ERR7_APINotLicensed,  
ERR7_DataNotFound, ERR7_FileNotOpen,
```

---

```
ERR7_InvalidAttributeType, ERR7_InvalidEntity,
ERR7_InvalidEntityNumber, ERR7_InvalidFileUnit,
ERR7_InvalidFreedomCase, ERR7_InvalidLoadCase,
ERR7_InvalidLoadID, ERR7_InvalidTableType,
ERR7_InvalidUCSID, ERR7_NoError, ERR7_ResultFileIsOpen,
ERR7_TableDoesNotExist
```

## St7SetGeometryEdgeFlux1

---

### Description

Assigns a heat flux to the specified geometry edge.

### Syntax

```
long St7SetGeometryEdgeFlux1(long uID, long EdgeNum, long
                             CaseNum, double* Doubles)
```

### Input Parameters

uID

Strand7 model file ID number.

EdgeNum

Edge number.

CaseNum

Load case number.

Doubles[0]

The heat flux through the edge.

### Errors

```
ERR7_APINotInitialised, ERR7_APINotLicensed,
ERR7_DataNotFound, ERR7_FileNotOpen,
ERR7_InvalidAttributeType, ERR7_InvalidEntity,
ERR7_InvalidEntityNumber, ERR7_InvalidFileUnit,
ERR7_InvalidFreedomCase, ERR7_InvalidLoadCase,
ERR7_InvalidLoadID, ERR7_InvalidUCSID, ERR7_NoError,
ERR7_ResultFileIsOpen
```

## St7SetGeometryEdgeFluxTables

---

### Description

Specifies the tables associated with the heat flux assigned to the specified geometry edge. Both Factor vs Time and Factor vs Temperature tables may be assigned. This attribute is only used when performing heat transfer analysis.

### Syntax

```
long St7SetGeometryEdgeFluxTables(long uID, long EdgeNum,  
                                long CaseNum, long* Tables)
```

### Input Parameters

uID

Strand7 model file ID number.

EdgeNum

Edge number.

CaseNum

Load case number.

Tables[0..1]

[0] - Factor vs Time table ID associated with the edge heat flux, use zero for none.

[1] - Factor vs Temperature table ID associated with the edge heat flux, use zero for none.

### Errors

ERR7\_APINotInitialised, ERR7\_APINotLicensed,  
ERR7\_DataNotFound, ERR7\_FileNotOpen,  
ERR7\_InvalidAttributeType, ERR7\_InvalidEntity,  
ERR7\_InvalidEntityNumber, ERR7\_InvalidFileUnit,  
ERR7\_InvalidFreedomCase, ERR7\_InvalidLoadCase,  
ERR7\_InvalidLoadID, ERR7\_InvalidTableType,  
ERR7\_InvalidUCSID, ERR7\_NoError, ERR7\_ResultFileIsOpen,  
ERR7\_TableDoesNotExist

---

# St7SetGeometryEdgeAttachment1

---

## Description

Assigns an attachment condition to the specified geometry edge. Attachment attributes can be used to generate attachment links using the *St7ToolAttachParts* function.

## Syntax

```
long St7SetGeometryEdgeAttachment1(long uID, long EdgeNum,  
                                long Direction, long AttachType, long ConnectType,  
                                long PropNum, double* Doubles)
```

## Input Parameters

uID

Strand7 model file ID number.

EdgeNum

Edge number.

Direction

Direction of attachment, one of adPlanar, adPlusZ or adMinusZ.

AttachType

Attachment type, one of alDirect, alRigid or alFlexible.

ConnectType

Attachment sub-type, either alMoment or alPinned.

PropNum

Beam property number used for flexible attachment types.

Doubles[0]

The maximum distance within which the edge can be connected to another element using the attachment link.

## Errors

ERR7\_APINotInitialised, ERR7\_APINotLicensed,  
ERR7\_FileNotOpen, ERR7\_InvalidAttachmentDirection,  
ERR7\_InvalidAttachmentType, ERR7\_InvalidEntityNumber,  
ERR7\_InvalidFileUnit, ERR7\_InvalidFreedomCase,

ERR7\_InvalidLoadCase, ERR7\_InvalidUCSID, ERR7\_NoError,  
ERR7\_ResultFileIsOpen

---

## Edge Attributes – Get

### St7GetGeometryEdgeType

---

#### Description

Returns the type assigned to the specified geometry edge.

#### Syntax

```
long St7GetGeometryEdgeType(long uID, long EdgeNum, long*  
    EdgeType)
```

#### Input Parameters

uID

Strand7 model file ID number.

EdgeNum

Edge number.

#### Output Parameters

EdgeType

Edge type, either etInterpolated or etNonInterpolated.

#### Errors

ERR7\_APINotInitialised, ERR7\_APINotLicensed,  
ERR7\_FileNotOpen, ERR7\_InvalidEntityNumber,  
ERR7\_InvalidFileUnit, ERR7\_NoError

### St7GetGeometryEdgeRelease1

---

#### Description

Returns the edge release conditions assigned to the specified geometry edge.

#### Syntax

```
long St7GetGeometryEdgeRelease1(long uID, long EdgeNum,  
    long* Status)
```

#### Input Parameters

uID

Strand7 model file ID number.

EdgeNum

Edge number.

### Output Parameters

Status

btTrue or btFalse.

### Errors

```
ERR7_APINotInitialised, ERR7_APINotLicensed,  
ERR7_DataNotFound, ERR7_FileNotOpen,  
ERR7_InvalidAttributeType, ERR7_InvalidEntity,  
ERR7_InvalidEntityNumber, ERR7_InvalidFileUnit,  
ERR7_InvalidFreedomCase, ERR7_InvalidLoadCase,  
ERR7_InvalidLoadID, ERR7_NoError, ERR7_ResultFileIsOpen
```

## St7GetGeometryEdgeSupport1F

---

### Description

Returns the elastic support assigned to the specified geometry edge.

### Syntax

```
long St7GetGeometryEdgeSupport1F(long uID, long EdgeNum,  
                                long CaseNum, long* Status, double* Doubles)
```

### Input Parameters

uID

Strand7 model file ID number.

EdgeNum

Edge number.

CaseNum

Freedom case number.

### Output Parameters

Status

Compression-only flag, either btTrue or btFalse.

Doubles[0]

---

Elastic support value.

## Errors

```
ERR7_APINotInitialised, ERR7_APINotLicensed,  
ERR7_DataNotFound, ERR7_FileNotOpen,  
ERR7_InvalidAttributeType, ERR7_InvalidEntity,  
ERR7_InvalidEntityNumber, ERR7_InvalidFileUnit,  
ERR7_InvalidFreedomCase, ERR7_InvalidLoadCase,  
ERR7_InvalidLoadID, ERR7_NoError, ERR7_ResultFileIsOpen
```

# St7GetGeometryEdgePressure1

---

## Description

Returns the edge pressure assigned to the specified geometry edge.

## Syntax

```
long St7GetGeometryEdgePressure1(long uID, long EdgeNum,  
                                long CaseNum, double* Doubles)
```

## Input Parameters

uID

Strand7 model file ID number.

EdgeNum

Edge number.

CaseNum

Load case number.

## Output Parameters

Doubles [0]

Edge pressure value.

## Errors

```
ERR7_APINotInitialised, ERR7_APINotLicensed,  
ERR7_DataNotFound, ERR7_FileNotOpen,  
ERR7_InvalidAttributeType, ERR7_InvalidEntity,  
ERR7_InvalidEntityNumber, ERR7_InvalidFileUnit,  
ERR7_InvalidFreedomCase, ERR7_InvalidLoadCase,  
ERR7_InvalidLoadID, ERR7_NoError, ERR7_ResultFileIsOpen
```

## St7GetGeometryEdgeShear1

---

### Description

Returns the shear stress assigned to the specified geometry edge.

### Syntax

```
long St7GetGeometryEdgeShear1(long uID, long EdgeNum, long  
CaseNum, double* Doubles)
```

### Input Parameters

uID

Strand7 model file ID number.

EdgeNum

Edge number.

CaseNum

Load case number.

### Output Parameters

Doubles[0]

Shear stress value.

### Errors

```
ERR7_APINotInitialised, ERR7_APINotLicensed,  
ERR7_DataNotFound, ERR7_FileNotOpen,  
ERR7_InvalidAttributeType, ERR7_InvalidEntity,  
ERR7_InvalidEntityNumber, ERR7_InvalidFileUnit,  
ERR7_InvalidFreedomCase, ERR7_InvalidLoadCase,  
ERR7_InvalidLoadID, ERR7_NoError, ERR7_ResultFileIsOpen
```

## St7GetGeometryEdgeNormalShear1

---

### Description

Returns the normal shear stress assigned to the specified geometry edge.

### Syntax

```
long St7GetGeometryEdgeNormalShear1(long uID, long EdgeNum,  
long CaseNum, double* Doubles)
```

---

## **Input Parameters**

uID

Strand7 model file ID number.

EdgeNum

Edge number.

CaseNum

Load case number.

## **Output Parameters**

Doubles[0]

Normal shear stress value.

## **Errors**

```
ERR7_APINotInitialised, ERR7_APINotLicensed,  
ERR7_DataNotFound, ERR7_FileNotOpen,  
ERR7_InvalidAttributeType, ERR7_InvalidEntity,  
ERR7_InvalidEntityNumber, ERR7_InvalidFileUnit,  
ERR7_InvalidFreedomCase, ERR7_InvalidLoadCase,  
ERR7_InvalidLoadID, ERR7_NoError, ERR7_ResultFileIsOpen
```

---

## **St7GetGeometryEdgeConvection2**

### **Description**

Returns the thermal convection coefficient and ambient temperature assigned to the specified geometry edge. This attribute is only used when performing heat transfer analysis.

### **Syntax**

```
long St7GetGeometryEdgeConvection2(long uID, long EdgeNum,  
                                long CaseNum, double* Doubles)
```

## **Input Parameters**

uID

Strand7 model file ID number.

EdgeNum

Edge number.

CaseNum

Load case number.

### Output Parameters

Doubles [0..1]

[0] - Convection coefficient.

[1] - Ambient temperature.

### Errors

ERR7\_APINotInitialised, ERR7\_APINotLicensed,  
ERR7\_DataNotFound, ERR7\_FileNotOpen,  
ERR7\_InvalidAttributeType, ERR7\_InvalidEntity,  
ERR7\_InvalidEntityNumber, ERR7\_InvalidFileUnit,  
ERR7\_InvalidFreedomCase, ERR7\_InvalidLoadCase,  
ERR7\_InvalidLoadID, ERR7\_NoError, ERR7\_ResultFileIsOpen

## St7GetGeometryEdgeConvectionTables

---

### Description

Returns the tables associated with the thermal convection properties assigned to a specified geometry edge. A Factor vs Temperature table may apply to the convection coefficient and Factor vs Time tables may apply to both the convection coefficient and ambient temperature.

### Syntax

```
long St7GetGeometryEdgeConvectionTables(long uID, long  
EdgeNum, long CaseNum, long* Tables)
```

### Input Parameters

uID

Strand7 model file ID number.

EdgeNum

Edge number.

CaseNum

Load case number.

---

## Output Parameters

Tables[0..2]

[0] - Factor vs Time table ID associated with the ambient temperature, use zero for none.

[1] - Factor vs Temperature table ID associated with the convection coefficient, use zero for none.

[2] - Factor vs Time table ID associated with the convection coefficient, use zero for none.

## Errors

ERR7\_APINotInitialised, ERR7\_APINotLicensed,  
ERR7\_DataNotFound, ERR7\_FileNotOpen,  
ERR7\_InvalidAttributeType, ERR7\_InvalidEntity,  
ERR7\_InvalidEntityNumber, ERR7\_InvalidFileUnit,  
ERR7\_InvalidFreedomCase, ERR7\_InvalidLoadCase,  
ERR7\_InvalidLoadID, ERR7\_NoError, ERR7\_ResultFileIsOpen

---

# St7GetGeometryEdgeRadiation2

## Description

Returns the thermal radiation coefficient and ambient temperature assigned to the specified geometry edge.

## Syntax

```
long St7GetGeometryEdgeRadiation2(long uID, long EdgeNum,  
                                long CaseNum, double* Doubles)
```

## Input Parameters

uID

Strand7 model file ID number.

EdgeNum

Edge number.

CaseNum

Load case number.

## Output Parameters

Doubles[0..1]

[0] - Radiation coefficient.

[1] - Ambient temperature.

### Errors

```
ERR7_APINotInitialised, ERR7_APINotLicensed,  
ERR7_DataNotFound, ERR7_FileNotOpen,  
ERR7_InvalidAttributeType, ERR7_InvalidEntity,  
ERR7_InvalidEntityNumber, ERR7_InvalidFileUnit,  
ERR7_InvalidFreedomCase, ERR7_InvalidLoadCase,  
ERR7_InvalidLoadID, ERR7_NoError, ERR7_ResultFileIsOpen
```

## St7GetGeometryEdgeRadiationTables

---

### Description

Returns the tables associated with the thermal radiation properties assigned to a specified geometry edge. A Factor vs Temperature table may apply to the radiation coefficient and Factor vs Time tables may apply to both the radiation coefficient and ambient temperature.

### Syntax

```
long St7GetGeometryEdgeRadiationTables(long uID, long  
EdgeNum, long CaseNum, long* Tables)
```

### Input Parameters

uID

Strand7 model file ID number.

EdgeNum

Edge number.

CaseNum

Load case number.

### Output Parameters

Tables[0..2]

[0] - Factor vs Time table ID associated with the ambient temperature, use zero for none.

[1] - Factor vs Temperature table ID associated with the radiation coefficient, use zero for none.

---

[2] - Factor vs Time table ID associated with the radiation coefficient, use zero for none.

## Errors

```
ERR7_APINotInitialised, ERR7_APINotLicensed,  
ERR7_DataNotFound, ERR7_FileNotOpen,  
ERR7_InvalidAttributeType, ERR7_InvalidEntity,  
ERR7_InvalidEntityNumber, ERR7_InvalidFileUnit,  
ERR7_InvalidFreedomCase, ERR7_InvalidLoadCase,  
ERR7_InvalidLoadID, ERR7_NoError, ERR7_ResultFileIsOpen
```

# St7GetGeometryEdgeFlux1

---

## Description

Returns the heat flux assigned to the specified geometry edge.

## Syntax

```
long St7GetGeometryEdgeFlux1(long uID, long EdgeNum, long  
CaseNum, double* Doubles)
```

## Input Parameters

uID

Strand7 model file ID number.

EdgeNum

Edge number.

CaseNum

Load case number.

## Output Parameters

Doubles[0]

The heat flux through the edge.

## Errors

```
ERR7_APINotInitialised, ERR7_APINotLicensed,  
ERR7_DataNotFound, ERR7_FileNotOpen,  
ERR7_InvalidAttributeType, ERR7_InvalidEntity,  
ERR7_InvalidEntityNumber, ERR7_InvalidFileUnit,  
ERR7_InvalidFreedomCase, ERR7_InvalidLoadCase,  
ERR7_InvalidLoadID, ERR7_NoError, ERR7_ResultFileIsOpen
```

## St7GetGeometryEdgeFluxTables

---

### Description

Returns the tables associated with the heat flux assigned to the specified geometry edge. Both Factor vs Time and Factor vs Temperature tables may be assigned. This attribute is only used when performing heat transfer analysis.

### Syntax

```
long St7GetGeometryEdgeFluxTables(long uID, long EdgeNum,  
                                long CaseNum, long* Tables)
```

### Input Parameters

uID

Strand7 model file ID number.

EdgeNum

Edge number.

CaseNum

Load case number.

### Output Parameters

Tables[0..1]

[0] - Factor vs Time table ID associated with the edge heat flux, use zero for none.

[1] - Factor vs Temperature table ID associated with the edge heat flux, use zero for none.

### Errors

ERR7\_APINotInitialised, ERR7\_APINotLicensed,  
ERR7\_DataNotFound, ERR7\_FileNotOpen,  
ERR7\_InvalidAttributeType, ERR7\_InvalidEntity,  
ERR7\_InvalidEntityNumber, ERR7\_InvalidFileUnit,  
ERR7\_InvalidFreedomCase, ERR7\_InvalidLoadCase,  
ERR7\_InvalidLoadID, ERR7\_NoError, ERR7\_ResultFileIsOpen

---

# St7GetGeometryEdgeAttachment1

---

## Description

Returns the edge attachment conditions assigned to the specified geometry edge. Attachment attributes can be used to generate the attachment attribute using the *St7ToolAttachParts* function.

## Syntax

```
long St7GetGeometryEdgeAttachment1(long uID, long EdgeNum,  
                                long* Direction, long* AttachType, long* ConnectType,  
                                long* PropNum, double* Doubles)
```

## Input Parameters

uID

Strand7 model file ID number.

EdgeNum

Edge number.

## Output Parameters

Direction

Direction of attachment, one of adPlanar, adPlusZ or adMinusZ.

AttachType

Attachment type, one of alDirect, alRigid or alFlexible.

ConnectType

Attachment sub-type, either alMoment or alPinned.

PropNum

Beam property number used for flexible attachment types.

Doubles [0]

The maximum distance within which the brick face can be connected to another element using the attachment link.

## Errors

ERR7\_APINotInitialised, ERR7\_APINotLicensed,  
ERR7\_DataNotFound, ERR7\_FileNotOpen,  
ERR7\_InvalidAttributeType, ERR7\_InvalidEntity,  
ERR7\_InvalidEntityNumber, ERR7\_InvalidFileUnit,

```
ERR7_InvalidFreedomCase, ERR7_InvalidLoadCase,  
ERR7_InvalidLoadID, ERR7_NoError, ERR7_ResultFileIsOpen
```

---

## Face Attributes – Set

### St7SetGeometryFaceProperty

---

#### Description

Assigns a property number to the specified geometry face.

#### Syntax

```
long St7SetGeometryFaceProperty(long uID, long FaceNum,  
                               long PropNum)
```

#### Input Parameters

uID

Strand7 model file ID number.

FaceNum

Face number.

PropNum

Property number.

#### Errors

```
ERR7_APINotInitialised, ERR7_APINotLicensed,  
ERR7_FileNotOpen, ERR7_InvalidEntityNumber,  
ERR7_InvalidPropertyName, ERR7_InvalidFileUnit,  
ERR7_NoError, ERR7_ResultFileIsOpen
```

### St7SetGeometryFaceID

---

#### Description

Assigns an ID number to the specified geometry face.

#### Syntax

```
long St7SetGeometryFaceID(long uID, long FaceNum, long  
                           FaceID)
```

#### Input Parameters

uID

Strand7 model file ID number.

FaceNum

Face number.

FaceID

Face ID number.

## Errors

ERR7\_APINotInitialised, ERR7\_APINotLicensed,  
ERR7\_FileNotOpen, ERR7\_InvalidEntityNumber,  
ERR7\_InvalidFileUnit, ERR7\_NoError, ERR7\_ResultFileIsOpen

## St7SetGeometryFaceOffset1

---

### Description

Assigns an offset to the specified geometry face. This value is constant over the surface.

### Syntax

```
long St7SetGeometryFaceOffset1(long uID, long FaceNum,  
                           double* Doubles)
```

### Input Parameters

uID

Strand7 model file ID number.

FaceNum

Face number.

Doubles [0]

Offset value.

## Errors

ERR7\_APINotInitialised, ERR7\_APINotLicensed,  
ERR7\_FileNotOpen, ERR7\_InvalidEntityNumber,  
ERR7\_InvalidFileUnit, ERR7\_InvalidFreedomCase,  
ERR7\_InvalidLoadCase, ERR7\_InvalidUCSID, ERR7\_NoError,  
ERR7\_ResultFileIsOpen

---

## **St7SetGeometryFaceSupport1F**

---

### **Description**

Assigns an elastic support condition to the specified geometry face.

### **Syntax**

```
long St7SetGeometryFaceSupport1F(long uID, long FaceNum,  
                                long CaseNum, long Status, double* Doubles)
```

### **Input Parameters**

uID

Strand7 model file ID number.

FaceNum

Face number.

CaseNum

Freedom case number.

Status

Compression-only flag, either btTrue or btFalse.

Doubles [0]

Elastic support value.

### **Errors**

```
ERR7_APINotInitialised, ERR7_APINotLicensed,  
ERR7_FileNotOpen, ERR7_InvalidEntityNumber,  
ERR7_InvalidFileUnit, ERR7_InvalidFreedomCase,  
ERR7_InvalidLoadCase, ERR7_InvalidUCSID, ERR7_NoError,  
ERR7_ResultFileIsOpen
```

---

## **St7SetGeometryFaceTempGradient1**

---

### **Description**

Assigns a temperature gradient to the specified geometry face. This attribute is only used when performing structural analysis.

## Syntax

```
long St7SetGeometryFaceTempGradient1(long uID, long FaceNum,  
                                     long CaseNum, double* Doubles)
```

## Input Parameters

uID

Strand7 model file ID number.

FaceNum

Face number.

CaseNum

Load case number.

Doubles [0]

Temperature gradient.

## Errors

```
ERR7_APINotInitialised, ERR7_APINotLicensed,  
ERR7_FileNotOpen, ERR7_InvalidEntityNumber,  
ERR7_InvalidFileUnit, ERR7_InvalidFreedomCase,  
ERR7_InvalidLoadCase, ERR7_InvalidUCSID, ERR7_NoError,  
ERR7_ResultFileIsOpen
```

# St7SetGeometryFaceNormalPressure1

---

## Description

Assigns a normal pressure to the specified geometry face.

## Syntax

```
long St7SetGeometryFaceNormalPressure1(long uID, long  
                                         FaceNum, long CaseNum, double* Doubles)
```

## Input Parameters

uID

Strand7 model file ID number.

FaceNum

Face number.

---

CaseNum

Load case number.

Doubles [0]

Normal pressure value.

## Errors

ERR7\_APINotInitialised, ERR7\_APINotLicensed,  
ERR7\_FileNotOpen, ERR7\_InvalidEntityNumber,  
ERR7\_InvalidFileUnit, ERR7\_InvalidFreedomCase,  
ERR7\_InvalidLoadCase, ERR7\_InvalidUCSID, ERR7\_NoError,  
ERR7\_ResultFileIsOpen

# St7SetGeometryFaceGlobalPressure3

---

## Description

Assigns a pressure to the specified geometry face in the Global Cartesian Coordinate system.

## Syntax

```
long St7SetGeometryFaceGlobalPressure3(long uID, long  
FaceNum, long ProjectFlag, long CaseNum, double*  
Doubles)
```

## Input Parameters

uID

Strand7 model file ID number.

FaceNum

Face number.

ProjectFlag

btTrue or btFalse.

CaseNum

Load case number.

Doubles [0..2]

A 3 element array describing the XYZ pressure components in the Global Cartesian Coordinate system.

**Errors**

```
ERR7_APINotInitialised, ERR7_APINotLicensed,  
ERR7_FileNotOpen, ERR7_InvalidEntityNumber,  
ERR7_InvalidFileUnit, ERR7_InvalidFreedomCase,  
ERR7_InvalidLoadCase, ERR7_InvalidUCSID, ERR7_NoError,  
ERR7_ResultFileIsOpen
```

## St7SetGeometryFaceNSMass5

---

**Description**

Assigns a non-structural mass to the specified geometry face.

**Syntax**

```
long St7SetGeometryFaceNSMass5(long uID, long FaceNum, long  
CaseNum, double* Doubles)
```

**Input Parameters**

uID

Strand7 model file ID number.

FaceNum

Face number.

CaseNum

Load case number.

Doubles [0..4]

[0] - Non-structural mass for the specified face.

[1] - Dynamic factor for the specified face. This factor is used to scale the non-structural mass when performing dynamic analysis.

[2..4] - A 3 element array describing the offset in the XYZ Cartesian coordinate system.

**Errors**

```
ERR7_APINotInitialised, ERR7_APINotLicensed,  
ERR7_FileNotOpen, ERR7_InvalidEntityNumber,  
ERR7_InvalidFileUnit, ERR7_InvalidFreedomCase,  
ERR7_InvalidLoadCase, ERR7_InvalidUCSID, ERR7_NoError,  
ERR7_ResultFileIsOpen
```

---

## St7SetGeometryFaceConvection2

---

### Description

Assigns the thermal convection coefficient and ambient temperature for the specified geometry face. This attribute is only used when performing heat transfer analysis.

### Syntax

```
long St7SetGeometryFaceConvection2(long uID, long FaceNum,  
                                    long CaseNum, long Surface, double* Doubles)
```

### Input Parameters

uID

Strand7 model file ID number.

FaceNum

Face number.

CaseNum

Load case number.

Surface

Local plate surface, either psPlateZMinus or psPlateZPlus.

Doubles[0..1]

[0] - Convection coefficient.

[1] - Ambient temperature.

### Errors

ERR7\_APINotInitialised, ERR7\_APINotLicensed,  
ERR7\_DataNotFound, ERR7\_FileNotOpen,  
ERR7\_InvalidAttributeType, ERR7\_InvalidEntity,  
ERR7\_InvalidEntityNumber, ERR7\_InvalidFaceSurface,  
ERR7\_InvalidFileUnit, ERR7\_InvalidFreedomCase,  
ERR7\_InvalidLoadCase, ERR7\_InvalidLoadID, ERR7\_InvalidUCSID,  
ERR7\_NoError, ERR7\_ResultFileIsOpen

## St7SetGeometryFaceConvectionTables

---

### Description

Specifies the tables associated with the thermal convection properties assigned to a specified geometry face. A Factor vs Temperature table may apply to the convection coefficient and Factor vs Time tables may apply to both the convection coefficient and ambient temperature.

### Syntax

```
long St7SetGeometryFaceConvectionTables(long uID, long  
FaceNum, long CaseNum, long Surface, long* Tables)
```

### Input Parameters

uID

Strand7 model file ID number.

FaceNum

Face number.

CaseNum

Load case number.

Surface

Local plate surface, either psPlateZMinus or psPlateZPlus.

Tables[0..2]

[0] - Factor vs Time table ID associated with the ambient temperature, use zero for none.

[1] - Factor vs Temperature table ID associated with the convection coefficient, use zero for none.

[2] - Factor vs Time table ID associated with the convection coefficient, use zero for none.

### Errors

ERR7\_APINotInitialised, ERR7\_APINotLicensed,  
ERR7\_DataNotFound, ERR7\_FileNotOpen,  
ERR7\_InvalidAttributeType, ERR7\_InvalidEntity,  
ERR7\_InvalidEntityNumber, ERR7\_InvalidFaceSurface,  
ERR7\_InvalidFileUnit, ERR7\_InvalidFreedomCase,  
ERR7\_InvalidLoadCase, ERR7\_InvalidLoadID,

---

```
ERR7_InvalidTableType, ERR7_InvalidUCSID, ERR7_NoError,
ERR7_ResultFileIsOpen, ERR7_TableDoesNotExist
```

## St7SetGeometryFaceRadiation2

---

### Description

Assigns the thermal radiation coefficient and ambient temperature for the specified geometry face.

### Syntax

```
long St7SetGeometryFaceRadiation2(long uID, long FaceNum,
                                  long CaseNum, long Surface, double* Doubles)
```

### Input Parameters

uID

Strand7 model file ID number.

FaceNum

Face number.

CaseNum

Load case number.

Surface

Local plate surface, psPlateZMinus or psPlateZPlus.

Doubles[0..1]

[0] - Radiation coefficient.

[1] - Ambient temperature.

### Errors

```
ERR7_APINotInitialised, ERR7_APINotLicensed,
ERR7_DataNotFound, ERR7_FileNotOpen,
ERR7_InvalidAttributeType, ERR7_InvalidEntity,
ERR7_InvalidEntityNumber, ERR7_InvalidFaceSurface,
ERR7_InvalidFileUnit, ERR7_InvalidFreedomCase,
ERR7_InvalidLoadCase, ERR7_InvalidLoadID, ERR7_InvalidUCSID,
ERR7_NoError, ERR7_ResultFileIsOpen
```

## St7SetGeometryFaceRadiationTables

---

### Description

Specifies the tables associated with the thermal radiation properties assigned to a specified geometry face. A Factor vs Temperature table may apply to the radiation coefficient and Factor vs Time tables may apply to both the radiation coefficient and ambient temperature.

### Syntax

```
long St7SetGeometryFaceRadiationTables (long uID, long  
FaceNum, long CaseNum, long Surface, long* Tables)
```

### Input Parameters

uID

Strand7 model file ID number.

FaceNum

Face number.

CaseNum

Load case number.

Surface

Local plate surface, psPlateZMinus or psPlateZPlus.

Tables[0..2]

[0] - Factor vs Time table ID associated with the ambient temperature, use zero for none.

[1] - Factor vs Temperature table ID associated with the radiation coefficient, use zero for none.

[2] - Factor vs Time table ID associated with the radiation coefficient, use zero for none.

### Errors

ERR7\_APINotInitialised, ERR7\_APINotLicensed,  
ERR7\_DataNotFound, ERR7\_FileNotOpen,  
ERR7\_InvalidAttributeType, ERR7\_InvalidEntity,  
ERR7\_InvalidEntityNumber, ERR7\_InvalidFaceSurface,  
ERR7\_InvalidFileUnit, ERR7\_InvalidFreedomCase,  
ERR7\_InvalidLoadCase, ERR7\_InvalidLoadID,

---

```
ERR7_InvalidTableType, ERR7_InvalidUCSID, ERR7_NoError,
ERR7_ResultFileIsOpen, ERR7_TableDoesNotExist
```

## St7SetGeometryFaceHeatSource1

---

### Description

Assigns a thermal heat source to the specified geometry face.

### Syntax

```
long St7SetGeometryFaceHeatSource1(long uID, long FaceNum,
                                  long CaseNum, double* Doubles)
```

### Input Parameters

uID

Strand7 model file ID number.

FaceNum

Face number.

CaseNum

Load case number.

Doubles[0]

Heat source value.

### Errors

```
ERR7_APINotInitialised, ERR7_APINotLicensed,
ERR7_DataNotFound, ERR7_FileNotOpen,
ERR7_InvalidAttributeType, ERR7_InvalidEntity,
ERR7_InvalidEntityNumber, ERR7_InvalidFileUnit,
ERR7_InvalidFreedomCase, ERR7_InvalidLoadCase,
ERR7_InvalidLoadID, ERR7_InvalidUCSID, ERR7_NoError,
ERR7_ResultFileIsOpen
```

## St7SetGeometryFaceHeatSourceTables

---

### Description

Specifies the tables associated with the thermal heat source assigned to the specified geometry face. Both Factor vs Time and Factor vs Temperature tables

may be assigned. This attribute is only used when performing heat transfer analysis.

### Syntax

```
long St7SetGeometryFaceHeatSourceTables(long uID, long  
FaceNum, long CaseNum, long* Tables)
```

### Input Parameters

uID

Strand7 model file ID number.

FaceNum

Face number.

CaseNum

Load case number.

Tables[0..1]

[0] - Factor vs Time table ID associated with the thermal heat source, use zero for none.

[1] - Factor vs Temperature table ID associated with the thermal heat source, use zero for none.

### Errors

```
ERR7_APINotInitialised, ERR7_APINotLicensed,  
ERR7_DataNotFound, ERR7_FileNotOpen,  
ERR7_InvalidAttributeType, ERR7_InvalidEntity,  
ERR7_InvalidEntityNumber, ERR7_InvalidFileUnit,  
ERR7_InvalidFreedomCase, ERR7_InvalidLoadCase,  
ERR7_InvalidLoadID, ERR7_InvalidTableType,  
ERR7_InvalidUCSID, ERR7_NoError, ERR7_ResultFileIsOpen,  
ERR7_TableDoesNotExist
```

## St7SetGeometryFaceAttachment1

---

### Description

Assigns an attachment condition to the specified geometry face. Attachment attributes can be used to generate attachment links using the *St7ToolAttachParts* function.

---

## Syntax

```
long St7SetGeometryFaceAttachment1(long uID, long FaceNum,  
                                long Surface, long AttachType, long ConnectType, long  
                                PropNum, double* Doubles)
```

## Input Parameters

uID

Strand7 model file ID number.

FaceNum

Face number.

Surface

Local plate surface, either psPlateZMinus or psPlateZPlus.

AttachType

Attachment type, one of alDirect, alRigid or alFlexible.

ConnectType

Attachment sub-type, either alMoment or alPinned.

PropNum

Beam property number used for flexible attachment types.

Doubles[0]

The maximum distance within which the face can be connected to another element using the attachment link.

## Errors

```
ERR7_APINotInitialised, ERR7_APINotLicensed,  
ERR7_FileNotOpen, ERR7_InvalidAttachmentType,  
ERR7_InvalidEntityNumber, ERR7_InvalidFileUnit,  
ERR7_InvalidFreedomCase, ERR7_InvalidLoadCase,  
ERR7_InvalidPlateSurface, ERR7_InvalidUCSID, ERR7_NoError,  
ERR7_ResultFileIsOpen
```

## Face Attributes – Get

### St7GetGeometryFaceProperty

#### Description

Returns the property assigned to the specified geometry face.

#### Syntax

```
long St7GetGeometryFaceProperty(long uID, long FaceNum,  
                                long* PropNum)
```

#### Input Parameters

uID

Strand7 model file ID number.

FaceNum

Face number.

#### Output Parameters

PropNum

Face property number.

#### Errors

ERR7\_APINotInitialised, ERR7\_APINotLicensed,  
ERR7\_FileNotOpen, ERR7\_InvalidEntityNumber,  
ERR7\_InvalidFileUnit, ERR7\_NoError

## St7GetGeometryFaceID

#### Description

Returns the ID number assigned to the specified geometry face.

#### Syntax

```
long St7GetGeometryFaceID(long uID, long FaceNum, long*  
                           FaceID)
```

#### Input Parameters

uID

Strand7 model file ID number.

---

FaceNum

Face number.

### Output Parameters

FaceID

Face ID number.

### Errors

ERR7\_APINotInitialised, ERR7\_APINotLicensed,  
ERR7\_FileNotOpen, ERR7\_InvalidEntityNumber,  
ERR7\_InvalidFileUnit, ERR7\_NoError, ERR7\_ResultFileIsOpen

## St7GetGeometryFaceOffset1

---

### Description

Returns the offset assigned to the specified geometry face.

### Syntax

```
long St7GetGeometryFaceOffset1(long uID, long FaceNum,
                               double* Doubles)
```

### Input Parameters

uID

Strand7 model file ID number.

FaceNum

Face number.

### Output Parameters

Doubles[0]

Offset value.

### Errors

ERR7\_APINotInitialised, ERR7\_APINotLicensed,  
ERR7\_DataNotFound, ERR7\_FileNotOpen,  
ERR7\_InvalidAttributeType, ERR7\_InvalidEntity,  
ERR7\_InvalidEntityNumber, ERR7\_InvalidFileUnit,  
ERR7\_InvalidFreedomCase, ERR7\_InvalidLoadCase,  
ERR7\_InvalidLoadID, ERR7\_NoError, ERR7\_ResultFileIsOpen

## St7GetGeometryFaceSupport1F

---

### Description

Returns the elastic support condition assigned to the specified geometry face.

### Syntax

```
long St7GetGeometryFaceSupport1F(long uID, long FaceNum,  
                                long CaseNum, long* Status, double* Doubles)
```

### Input Parameters

uID

Strand7 model file ID number.

FaceNum

Face number.

CaseNum

Freedom case number.

### Output Parameters

Status

Compression-only flag, either btTrue or btFalse.

Doubles [0]

Elastic support value.

### Errors

```
ERR7_APINotInitialised, ERR7_APINotLicensed,  
ERR7_DataNotFound, ERR7_FileNotOpen,  
ERR7_InvalidAttributeType, ERR7_InvalidEntity,  
ERR7_InvalidEntityNumber, ERR7_InvalidFileUnit,  
ERR7_InvalidFreedomCase, ERR7_InvalidLoadCase,  
ERR7_InvalidLoadID, ERR7_NoError, ERR7_ResultFileIsOpen
```

## St7GetGeometryFaceTempGradient1

---

### Description

Returns the temperature gradient assigned to the specified geometry face. This attribute is only used when performing structural analysis.

---

## Syntax

```
long St7GetGeometryFaceTempGradient1(long uID, long FaceNum,  
                                     long CaseNum, double* Doubles)
```

## Input Parameters

uID

Strand7 model file ID number.

FaceNum

Face number.

CaseNum

Load case number.

## Output Parameters

Doubles[0]

Temperature gradient.

## Errors

```
ERR7_APINotInitialised, ERR7_APINotLicensed,  
ERR7_DataNotFound, ERR7_FileNotOpen,  
ERR7_InvalidAttributeType, ERR7_InvalidEntity,  
ERR7_InvalidEntityNumber, ERR7_InvalidFileUnit,  
ERR7_InvalidFreedomCase, ERR7_InvalidLoadCase,  
ERR7_InvalidLoadID, ERR7_NoError, ERR7_ResultFileIsOpen
```

---

# St7GetGeometryFaceNormalPressure1

## Description

Returns the normal pressure assigned to the specified geometry face.

## Syntax

```
long St7GetGeometryFaceNormalPressure1(long uID, long  
                                         FaceNum, long CaseNum, double* Doubles)
```

## Input Parameters

uID

Strand7 model file ID number.

FaceNum

Face number.

CaseNum

Load case number.

### Output Parameters

Doubles [0]

Normal pressure value.

### Errors

ERR7\_APINotInitialised, ERR7\_APINotLicensed,  
ERR7\_DataNotFound, ERR7\_FileNotOpen,  
ERR7\_InvalidAttributeType, ERR7\_InvalidEntity,  
ERR7\_InvalidEntityNumber, ERR7\_InvalidFileUnit,  
ERR7\_InvalidFreedomCase, ERR7\_InvalidLoadCase,  
ERR7\_InvalidLoadID, ERR7\_NoError, ERR7\_ResultFileIsOpen

## St7GetGeometryFaceGlobalPressure3

---

### Description

Returns the XYZ pressure components assigned to the specified face in the Global Cartesian Coordinate system.

### Syntax

```
long St7GetGeometryFaceGlobalPressure3 (long uID, long  
FaceNum, long CaseNum, long* ProjectFlag, double*  
Doubles)
```

### Input Parameters

uID

Strand7 model file ID number.

FaceNum

Face number.

CaseNum

Load case number.

### Output Parameters

ProjectFlag

---

btTrue or btFalse.  
Doubles[0..2]

A 3 element array describing the XYZ pressure components in the Global Cartesian Coordinate system.

## Errors

```
ERR7_APINotInitialised, ERR7_APINotLicensed,  
ERR7_DataNotFound, ERR7_FileNotOpen,  
ERR7_InvalidAttributeType, ERR7_InvalidEntity,  
ERR7_InvalidEntityNumber, ERR7_InvalidFileUnit,  
ERR7_InvalidFreedomCase, ERR7_InvalidLoadCase,  
ERR7_InvalidLoadID, ERR7_NoError, ERR7_ResultFileIsOpen
```

# St7GetGeometryFaceNSMass5

---

## Description

Returns the non-structural mass assigned to the specified geometry face.

## Syntax

```
long St7GetGeometryFaceNSMass5(long uID, long FaceNum, long  
CaseNum, double* Doubles)
```

## Input Parameters

uID

Strand7 model file ID number.

FaceNum

Face number.

CaseNum

Load case number.

## Output Parameters

Doubles[0..4]

[0] - Non-structural mass for the specified face.

[1] - Dynamic factor for the specified face. This factor is used to scale the non-structural mass when performing dynamic analysis.

[2..4] - A 3 element array describing the offset in the XYZ Cartesian coordinate system.

### Errors

```
ERR7_APINotInitialised, ERR7_APINotLicensed,  
ERR7_DataNotFound, ERR7_FileNotOpen,  
ERR7_InvalidAttributeType, ERR7_InvalidEntity,  
ERR7_InvalidEntityNumber, ERR7_InvalidFileUnit,  
ERR7_InvalidFreedomCase, ERR7_InvalidLoadCase,  
ERR7_InvalidLoadID, ERR7_NoError, ERR7_ResultFileIsOpen
```

## St7GetGeometryFaceConvection2

---

### Description

Returns the thermal convection coefficient and ambient temperature assigned to the specified geometry face. This attribute is only used when performing heat transfer analysis.

### Syntax

```
long St7GetGeometryFaceConvection2(long uID, long FaceNum,  
                                    long CaseNum, long Surface, double* Doubles)
```

### Input Parameters

uID

Strand7 model file ID number.

FaceNum

Face number.

CaseNum

Load case number.

Surface

Local plate surface, either psPlateZMinus or psPlateZPlus.

### Output Parameters

Doubles[0..1]

[0] - Convection coefficient.

[1] - Ambient temperature.

---

## Errors

```
ERR7_APINotInitialised, ERR7_APINotLicensed,  
ERR7_DataNotFound, ERR7_FileNotOpen,  
ERR7_InvalidAttributeType, ERR7_InvalidEntity,  
ERR7_InvalidEntityNumber, ERR7_InvalidFileUnit,  
ERR7_InvalidFreedomCase, ERR7_InvalidLoadCase,  
ERR7_InvalidLoadID, ERR7_NoError, ERR7_ResultFileIsOpen
```

---

# St7GetGeometryFaceConvectionTables

## Description

Returns the tables associated with the thermal convection properties assigned to a specified geometry face. A Factor vs Temperature table may apply to the convection coefficient and Factor vs Time tables may apply to both the convection coefficient and ambient temperature.

## Syntax

```
long St7GetGeometryFaceConvectionTables(long uID, long  
FaceNum, long CaseNum, long Surface, long* Tables)
```

## Input Parameters

uID

Strand7 model file ID number.

FaceNum

Face number.

CaseNum

Load case number.

Surface

Local plate surface, either psPlateZMinus or psPlateZPlus.

## Output Parameters

Tables[0..2]

[0] - Factor vs Time table ID associated with the ambient temperature, use zero for none.

[1] - Factor vs Temperature table ID associated with the convection coefficient, use zero for none.

[2] - Factor vs Time table ID associated with the convection coefficient, use zero for none.

### Errors

```
ERR7_APINotInitialised, ERR7_APINotLicensed,  
ERR7_DataNotFound, ERR7_FileNotOpen,  
ERR7_InvalidAttributeType, ERR7_InvalidEntity,  
ERR7_InvalidEntityNumber, ERR7_InvalidFileUnit,  
ERR7_InvalidFreedomCase, ERR7_InvalidLoadCase,  
ERR7_InvalidLoadID, ERR7_NoError, ERR7_ResultFileIsOpen
```

## St7GetGeometryFaceRadiation2

---

### Description

Returns the thermal radiation coefficient and ambient temperature assigned to the specified geometry face.

### Syntax

```
long St7GetGeometryFaceRadiation2(long uID, long FaceNum,  
                                long CaseNum, long Surface, double* Doubles)
```

### Input Parameters

uID

Strand7 model file ID number.

FaceNum

Face number.

CaseNum

Load case number.

Surface

Local plate surface, psPlateZMinus or psPlateZPlus.

### Output Parameters

Doubles[0..1]

[0] - Radiation coefficient.

[1] - Ambient temperature.

---

## Errors

```
ERR7_APINotInitialised, ERR7_APINotLicensed,  
ERR7_DataNotFound, ERR7_FileNotOpen,  
ERR7_InvalidAttributeType, ERR7_InvalidEntity,  
ERR7_InvalidEntityNumber, ERR7_InvalidFileUnit,  
ERR7_InvalidFreedomCase, ERR7_InvalidLoadCase,  
ERR7_InvalidLoadID, ERR7_NoError, ERR7_ResultFileIsOpen
```

---

# St7GetGeometryFaceRadiationTables

---

## Description

Returns the tables associated with the thermal radiation properties assigned to a specified geometry face. A Factor vs Temperature table may apply to the radiation coefficient and Factor vs Time tables may apply to both the radiation coefficient and ambient temperature.

## Syntax

```
long St7GetGeometryFaceRadiationTables(long uID, long  
FaceNum, long CaseNum, long Surface, long* Tables)
```

## Input Parameters

uID

Strand7 model file ID number.

FaceNum

Face number.

CaseNum

Load case number.

Surface

Local plate surface, psPlateZMinus or psPlateZPlus.

## Output Parameters

Tables[0..2]

[0] - Factor vs Time table ID associated with the ambient temperature, use zero for none.

[1] - Factor vs Temperature table ID associated with the radiation coefficient, use zero for none.

[2] - Factor vs Time table ID associated with the radiation coefficient, use zero for none.

### Errors

```
ERR7_APINotInitialised, ERR7_APINotLicensed,  
ERR7_DataNotFound, ERR7_FileNotOpen,  
ERR7_InvalidAttributeType, ERR7_InvalidEntity,  
ERR7_InvalidEntityNumber, ERR7_InvalidFileUnit,  
ERR7_InvalidFreedomCase, ERR7_InvalidLoadCase,  
ERR7_InvalidLoadID, ERR7_NoError, ERR7_ResultFileIsOpen
```

## St7GetGeometryFaceHeatSource1

---

### Description

Returns the thermal heat source assigned to the specified geometry face.

### Syntax

```
long St7GetGeometryFaceHeatSource1 (long uID, long FaceNum,  
                                    long CaseNum, double* Doubles)
```

### Input Parameters

uID

Strand7 model file ID number.

FaceNum

Face number.

CaseNum

Load case number.

### Output Parameters

Doubles [0]

Heat source value.

### Errors

```
ERR7_APINotInitialised, ERR7_APINotLicensed,  
ERR7_DataNotFound, ERR7_FileNotOpen,  
ERR7_InvalidAttributeType, ERR7_InvalidEntity,  
ERR7_InvalidEntityNumber, ERR7_InvalidFileUnit,  
ERR7_InvalidFreedomCase, ERR7_InvalidLoadCase,  
ERR7_InvalidLoadID, ERR7_NoError, ERR7_ResultFileIsOpen
```

---

## St7GetGeometryFaceHeatSourceTables

---

### Description

Returns the tables associated with the thermal heat source assigned to the specified geometry face. Both Factor vs Time and Factor vs Temperature tables may be assigned. This attribute is only used when performing heat transfer analysis.

### Syntax

```
long St7GetGeometryFaceHeatSourceTables(long uID, long
                                         FaceNum, long CaseNum, long* Tables)
```

### Input Parameters

uID

Strand7 model file ID number.

FaceNum

Face number.

CaseNum

Load case number.

### Output Parameters

Tables[0..1]

[0] - Factor vs Time table ID associated with the thermal heat source, use zero for none.

[1] - Factor vs Temperature table ID associated with the thermal heat source, use zero for none.

### Errors

ERR7\_APINotInitialised, ERR7\_APINotLicensed,  
ERR7\_DataNotFound, ERR7\_FileNotOpen,  
ERR7\_InvalidAttributeType, ERR7\_InvalidEntity,  
ERR7\_InvalidEntityNumber, ERR7\_InvalidFileUnit,  
ERR7\_InvalidFreedomCase, ERR7\_InvalidLoadCase,  
ERR7\_InvalidLoadID, ERR7\_NoError, ERR7\_ResultFileIsOpen

## St7GetGeometryFaceAttachment1

---

### Description

Returns the attachment conditions assigned to the specified geometry face. Attachment attributes can be used to generate attachment links using the St7ToolAttachParts function.

### Syntax

```
long St7GetGeometryFaceAttachment1(long uID, long FaceNum,  
                                long Surface, long* AttachType, long* ConnectType,  
                                long* PropNum, double* Doubles)
```

### Input Parameters

uID

Strand7 model file ID number.

FaceNum

Face number.

Surface

Local plate surface, either psPlateZMinus or psPlateZPlus.

### Output Parameters

AttachType

Attachment type, one of alDirect, alRigid or alFlexible.

ConnectType

Attachment sub-type, either alMoment or alPinned.

PropNum

Beam property number used for flexible attachment types.

Doubles [0]

The maximum distance within which the face can be connected to another element using the attachment link.

### Errors

ERR7\_APINotInitialised, ERR7\_APINotLicensed,  
ERR7\_DataNotFound, ERR7\_FileNotOpen,  
ERR7\_InvalidAttributeType, ERR7\_InvalidEntity,  
ERR7\_InvalidEntityNumber, ERR7\_InvalidFileUnit,

---

```
ERR7_InvalidFreedomCase, ERR7_InvalidLoadCase,  
ERR7_InvalidLoadID, ERR7_NoError, ERR7_ResultFileIsOpen
```

## Attributes General

### St7SetElementProperty

#### Description

Sets the property for the specified element. The property does not need to be created in advance.

#### Syntax

```
long St7SetElementProperty(long uID, long Entity, long  
EltNum, long PropNum)
```

#### Input Parameters

uID

Strand7 model file ID number.

Entity

Strand7 element type, one of tyBEAM, tyPLATE or tyBRICK.

EltNum

Element number.

PropNum

Property number.

#### Errors

ERR7\_APINotInitialised, ERR7\_APINotLicensed,  
ERR7\_FileNotOpen, ERR7\_InvalidEntity, ERR7\_InvalidFileUnit,  
ERR7\_NoError, ERR7\_ResultFileIsOpen, ERR7\_UnknownError

### St7GetProperty

#### Description

Returns the property assigned to the specified element.

#### Syntax

```
long St7GetProperty(long uID, long Entity, long  
EltNum, long* PropNum)
```

---

## **Input Parameters**

uID

Strand7 model file ID number.

Entity

Strand7 element type, one of tyBEAM, tyPLATE or tyBRICK.

EltNum

Element number.

## **Output Parameters**

PropNum

Property number.

## **Errors**

```
ERR7_APINotInitialised, ERR7_APINotLicensed,  
ERR7_DataNotFound, ERR7_ExceededTotal, ERR7_FileNotOpen,  
ERR7_InvalidEntity, ERR7_InvalidEntityNumber,  
ERR7_InvalidFileUnit, ERR7_NoError
```

---

# **St7SetElementPropertySwitch**

## **Description**

Specifies a property switch for a staged analysis.

## **Syntax**

```
long St7SetElementPropertySwitch(long uID, long Entity,  
                                long EltNum, long PropID, long StageID)
```

## **Input Parameters**

uID

Strand7 model file ID number.

Entity

Strand7 element type, one of tyBEAM, tyPLATE or tyBRICK.

EltNum

Element number.

PropID

Property number.

StageID

Stage ID number.

## Errors

```
ERR7_APINotInitialised, ERR7_APINotLicensed,  
ERR7_FileNotOpen, ERR7_InvalidEntity,  
ERR7_InvalidEntityNumber, ERR7_InvalidFileUnit,  
ERR7_InvalidPropertyNumber, ERR7_NoError,  
ERR7_ResultFileIsOpen, ERR7_StageDoesNotExist,  
ERR7_UnknownError
```

# St7GetElementPropertySequence

---

## Description

Returns the property sequence assigned to a specified element for staged analysis. The St7GetNumStages function can be used to determine the number of stages in the model.

## Syntax

```
long St7GetElementPropertySequence(long uID, long Entity,  
                                long EltNum, long MaxPoints, long* Props, long*  
                                Stages)
```

## Input Parameters

uID

Strand7 model file ID number.

Entity

Strand7 element type, one of tyBEAM, tyPLATE or tyBRICK.

EltNum

Element number.

MaxPoints

Maximum amount of storage allocated for the Props and Stages arrays.

## Output Parameters

Props [0 .. MaxPoints - 1]

---

An array containing the property number assigned at each stage of the analysis.

Stages [0..MaxPoints-1]

An array containing the stage ID number assigned at each stage of the analysis.

## Errors

ERR7\_APINotInitialised, ERR7\_APINotLicensed,  
ERR7\_FileNotOpen, ERR7\_InvalidEntity,  
ERR7\_InvalidEntityNumber, ERR7\_InvalidFileUnit,  
ERR7\_NoError, ERR7\_StageDoesNotExist, ERR7\_UnknownError

# St7DeleteAttribute

---

## Description

Deletes the specified attribute, see *Attribute Types* for further information.

## Syntax

```
long St7DeleteAttribute(long uID, long Entity, long  
EntityNum, long AttributeOrd, long* Integers)
```

## Input Parameters

uID

Strand7 model file ID number.

Entity

Entity type, one of tyNODE, tyBEAM, tyPLATE, tyBRICK, tyVERTEX,  
tyGEOMETRYEDGE, tyGEOMETRYFACE or tyLOADPATH.

EntityNum

Entity number.

AttributeOrd

Attribute identifier, see *Attribute Types* for additional information.

Integers [0..2]

[ 0 ] - Local attribute number, see *Attribute Types* for additional information.

[ 1 ] - Attribute load/freedom case number, see *Attribute Types* for additional information.

[2] - Attribute ID number, see *Attribute Types* for additional information.

## Errors

```
ERR7_APINotInitialised, ERR7_APINotLicensed,  
ERR7_DataNotFound, ERR7_FileNotOpen,  
ERR7_InvalidAttributeType, ERR7_InvalidEntity,  
ERR7_InvalidEntityNumber, ERR7_InvalidFileUnit,  
ERR7_InvalidFreedomCase, ERR7_InvalidLoadCase,  
ERR7_InvalidLoadID, ERR7_NoError, ERR7_ResultFileIsOpen
```

# St7SetEntityGroup

---

## Description

Assigns the specified entity to a given group.

## Syntax

```
long St7SetEntityGroup(long uID, long Entity, long  
EntityNum, long GroupID)
```

## Input Parameters

uID

Strand7 model file ID number.

Entity

Strand7 entity type, one of tyBEAM, tyPLATE, tyBRICK, tyLINK,  
tyGEOMETRYFACE or tyLOADPATH.

EntityNum

Entity number.

GroupID

Group ID number.

## Errors

```
ERR7_APINotInitialised, ERR7_APINotLicensed,  
ERR7_DataNotFound, ERR7_FileNotOpen, ERR7_InvalidEntity,  
ERR7_InvalidFileUnit, ERR7_InvalidLoadPathID, ERR7_NoError,  
ERR7_ResultFileIsOpen, ERR7_UnknownError
```

---

## St7GetEntityGroup

---

### Description

Returns the group number assigned to the specified entity.

### Syntax

```
long St7GetEntityGroup(long uID, long Entity, long  
EntityNum, long* GroupID)
```

### Input Parameters

uID

Strand7 model file ID number.

Entity

Strand7 entity type, one of tyBEAM, tyPLATE, tyBRICK, tyLINK,  
tyGEOMETRYFACE or tyLOADPATH.

EntityNum

Entity number.

### Output Parameters

GroupID

Group ID number.

### Errors

```
ERR7_APINotInitialised, ERR7_APINotLicensed,  
ERR7_DataNotFound, ERR7_ExceededTotal, ERR7_FileNotOpen,  
ERR7_InvalidEntity, ERR7_InvalidEntityNumber,  
ERR7_InvalidFileUnit, ERR7_NoError
```

# Properties – Beams, Plates and Bricks

## St7GetTotalProperties

### Description

Returns the total number and highest property index for each of the Strand7 element types in the specified model.

### Syntax

```
long St7GetTotalProperties(long uID, long* NumProperties,  
                           long* LastProperty)
```

### Input Parameters

uID

Strand7 model file ID number.

### Output Parameters

NumProperties[0..kMaxEntityTotals-1]

[ipBeamPropTotal] - the total number of beam property types.

[ipPlatePropTotal] - the total number of plate property types.

[ipBrickPropTotal] - the total number of brick property types.

[ipPlyPropTotal] - the total number of ply property types.

LastProperty[0..kMaxEntityTotals-1]

[ipBeamPropTotal] - the highest beam property number.

[ipPlatePropTotal] - the highest plate property number.

[ipBrickPropTotal] - the highest brick property number.

[ipPlyPropTotal] - the highest ply property number.

### Errors

ERR7\_APINotInitialised, ERR7\_APINotLicensed,  
ERR7\_FileNotOpen, ERR7\_InvalidFileUnit, ERR7\_NoError

---

## St7GetPropertyNumByIndex

---

### Description

Returns the property number associated with a specified property index. The property indices are stored internally and are based on a contiguous numbering system.

### Syntax

```
long St7GetPropertyNumByIndex(long uID, long Entity, long  
PropIndex, long* PropNum)
```

### Input Parameters

uID

Strand7 model file ID number.

Entity

Property type, one of ptBEAMPROP, ptPLATEPROP, ptBRICKPROP or  
ptPLYPROP.

PropIndex

Property index position.

### Output Parameters

PropNum

Property number.

### Errors

ERR7\_APINotInitialised, ERR7\_APINotLicensed,  
ERR7\_FileNotOpen, ERR7\_InvalidFileUnit, ERR7\_InvalidIndex,  
ERR7\_NoError

---

## St7SetPropertyName

---

### Description

Sets the name of the specified property.

### Syntax

```
long St7SetPropertyName(long uID, long Entity, long PropNum,  
char* PropName)
```

## Input Parameters

uID

Strand7 model file ID number.

Entity

Property type, one of ptBEAMPROP, ptPLATEPROP, ptBRICKPROP or ptPLYPROP.

PropNum

Property number.

PropName

Name of the property.

## Errors

ERR7\_APINotInitialised, ERR7\_APINotLicensed,  
ERR7\_FileNotOpen, ERR7\_InvalidEntity, ERR7\_InvalidFileUnit,  
ERR7\_NoError, ERR7\_ResultFileIsOpen, ERR7\_UnknownProperty

# St7GetPropertyNames

---

## Description

Returns the name of the specified property.

## Syntax

```
long St7GetPropertyNames(long uID, long Entity, long PropNum,  
                         char* PropName, long MaxStringLen)
```

## Input Parameters

uID

Strand7 model file ID number.

Entity

Property type, one of ptBEAMPROP, ptPLATEPROP, ptBRICKPROP or ptPLYPROP.

PropNum

Property number.

MaxStringLen

---

Maximum number of characters allocated for PropName.

### Output Parameters

PropName

Name of the property.

### Errors

ERR7\_APINotInitialised, ERR7\_APINotLicensed,  
ERR7\_FileNotOpen, ERR7\_InvalidEntity, ERR7\_InvalidFileUnit,  
ERR7\_NoError

## St7SetPropertyColour

---

### Description

Sets the colour of the specified property.

### Syntax

```
long St7SetPropertyColour(long uID, long Entity, long  
                           PropNum, long PropCol)
```

### Input Parameters

uID

Strand7 model file ID number.

Entity

Property type, one of ptBEAMPROP, ptPLATEPROP, ptBRICKPROP or  
ptPLYPROP.

PropNum

Property number.

PropCol

Property colour as a 32 bit RGB value.

### Errors

ERR7\_APINotInitialised, ERR7\_APINotLicensed,  
ERR7\_FileNotOpen, ERR7\_InvalidEntity, ERR7\_InvalidFileUnit,  
ERR7\_NoError, ERR7\_ResultFileIsOpen, ERR7\_UnknownProperty

## St7GetPropertyColour

---

### Description

Returns the colour assigned to the specified property.

### Syntax

```
long St7GetPropertyColour(long uID, long Entity, long  
PropNum, long* PropCol)
```

### Input Parameters

uID

Strand7 model file ID number.

Entity

Property type, one of ptBEAMPROP, ptPLATEPROP, ptBRICKPROP or  
ptPLYPROP.

PropNum

Property number.

### Output Parameters

PropCol

Property colour as a 32 bit RGB value.

### Errors

ERR7\_APINotInitialised, ERR7\_APINotLicensed,  
ERR7\_FileNotOpen, ERR7\_InvalidEntity, ERR7\_InvalidFileUnit,  
ERR7\_NoError, ERR7\_UnknownProperty

## St7SetPropertyTable

---

### Description

Assigns a table to the specified material property value.

### Syntax

```
long St7SetPropertyTable(long uID, long ptType, long  
PropNum, long TableID)
```

### Input Parameters

uID

---

Strand7 model file ID number.

ptType

Property table type, see *Table Types* for additional information.

PropNum

Property number.

TableID

Table ID number, zero for none.

## Errors

ERR7\_APINotInitialised, ERR7\_APINotLicensed,  
ERR7\_FileNotOpen, ERR7\_IncompatibleTableType,  
ERR7\_InvalidFileUnit, ERR7\_InvalidTableSetting,  
ERR7\_NoError, ERR7\_ResultFileIsOpen, ERR7\_TableDoesNotExist,  
ERR7\_UnknownProperty

# St7GetPropertyTable

---

## Description

Returns the table assigned to the specified material property value.

## Syntax

```
long St7GetPropertyTable(long uID, long ptType, long  
PropNum, long* TableID)
```

## Input Parameters

uID

Strand7 model file ID number.

ptType

Property table type, see *Table Types* for additional information.

PropNum

Property number.

## Output Parameters

TableID

Table ID number, zero for none.

## Errors

```
ERR7_APINotInitialised, ERR7_APINotLicensed,  
ERR7_FileNotOpen, ERR7_IncompatibleTableType,  
ERR7_InvalidFileUnit, ERR7_InvalidTableSetting,  
ERR7_NoError, ERR7_UnknownProperty, ERR7_TableDoesNotExist
```

# St7SetPropertyCreepID

---

## Description

Assigns the creep definition to the specified property.

## Syntax

```
long St7SetPropertyCreepID(long uID, long Entity, long  
PropNum, long CreepID)
```

## Input Parameters

uID

Strand7 model file ID number.

Entity

Property type, one of ptBEAMPROP, ptPLATEPROP or ptBRICKPROP.

PropNum

Property number.

CreepID

ID of creep property, zero for none.

## Errors

```
ERR7_APINotInitialised, ERR7_APINotLicensed,  
ERR7_FileNotOpen, ERR7_InvalidCreepID, ERR7_InvalidEntity,  
ERR7_InvalidFileUnit, ERR7_NoError, ERR7_ResultFileIsOpen,  
ERR7_UnknownProperty
```

# St7GetPropertyCreepID

---

## Description

Returns the creep definition of the specified property.

---

## Syntax

```
long St7GetPropertyCreepID(long uID, long Entity, long  
                           PropNum, long* CreepID)
```

## Input Parameters

uID

Strand7 model file ID number.

Entity

Property type, one of ptBEAMPROP, ptPLATEPROP or ptBRICKPROP.

PropNum

Property number.

## Output Parameters

CreepID

ID of creep property, zero for none.

## Errors

```
ERR7_APINotInitialised, ERR7_APINotLicensed,  
ERR7_FileNotOpen, ERR7_InvalidEntity, ERR7_InvalidFileUnit,  
ERR7_NoError, ERR7_UnknownProperty
```

---

# St7SetMaterialName

## Description

Sets the name of the material referenced by the specified property.

## Syntax

```
long St7SetMaterialName(long uID, long Entity, long PropNum,  
                        char* MaterialName)
```

## Input Parameters

uID

Strand7 model file ID number.

Entity

Property type, one of ptBEAMPROP, ptPLATEPROP, ptBRICKPROP or  
ptPLYPROP.

PropNum

Property number.

MaterialName

Name of the material.

## Errors

ERR7\_APINotInitialised, ERR7\_APINotLicensed,  
ERR7\_FileNotOpen, ERR7\_InvalidEntity, ERR7\_InvalidFileUnit,  
ERR7\_NoError, ERR7\_ResultFileIsOpen, ERR7\_UnknownProperty

## St7GetMaterialName

---

### Description

Returns the name of the material referenced by the specified property.

### Syntax

```
long St7GetMaterialName(long uID, long Entity, long PropNum,  
                        char* MaterialName, long MaxStringLen)
```

### Input Parameters

uID

Strand7 model file ID number.

Entity

Property type, one of ptBEAMPROP, ptPLATEPROP, ptBRICKPROP or  
ptPLYPROP.

PropNum

Property number.

MaxStringLen

Maximum number of characters allocated for MaterialName.

### Output Parameters

MaterialName

Name of the material.

---

## Errors

```
ERR7_APINotInitialised, ERR7_APINotLicensed,  
ERR7_FileNotOpen, ERR7_InvalidEntity, ERR7_InvalidFileUnit,  
ERR7_NoError, ERR7_UnknownProperty
```

---

## St7SetHardeningType

### Description

Sets the hardening model used for the specified property. This option is only used when a Stress vs Strain table is assigned to the specified property.

### Syntax

```
long St7SetHardeningType(long uID, long Entity, long  
PropNum, long HardType)
```

### Input Parameters

uID

Strand7 model file ID number.

Entity

Property type, use ptBEAMPROP.

PropNum

Property number.

HardType

Type of hardening, one of htIsotropic, htKinematic or htTakeda.

### Errors

```
ERR7_APINotInitialised, ERR7_APINotLicensed,  
ERR7_FileNotOpen, ERR7_InvalidEntity, ERR7_InvalidFileUnit,  
ERR7_InvalidHardeningType, ERR7_NoError,  
ERR7_ResultFileIsOpen, ERR7_UnknownProperty
```

---

## St7GetHardeningType

### Description

Returns the hardening model used for the specified property. This option is only used when a Stress vs Strain table is assigned to the specified property.

## Syntax

```
long St7GetHardeningType(long uID, long Entity, long  
PropNum, long* HardType)
```

## Input Parameters

uID

Strand7 model file ID number.

Entity

Property type, use ptBEAMPROP.

PropNum

Property number.

## Output Parameters

HardType

Type of hardening, one of htIsotropic, htKinematic or htTakeda.

## Errors

```
ERR7_APINotInitialised, ERR7_APINotLicensed,  
ERR7_FileNotOpen, ERR7_InvalidEntity, ERR7_InvalidFileUnit,  
ERR7_NoError, ERR7_UnknownProperty
```

# St7SetTimeDependentModType

---

## Description

Sets the type of temperature/time dependence for the specified property. This setting controls the scaling used to update the material modulus values. This option is only used when an associated Factor vs Temperature/Time table is assigned to the specified property.

## Syntax

```
long St7SetTimeDependentModType(long uID, long Entity, long  
PropNum, long ModType)
```

## Input Parameters

uID

Strand7 model file ID number.

Entity

---

Property type, one of ptBEAMPROP, ptPLATEPROP or ptBRICKPROP.

PropNum

Property number.

ModType

Type of temperature/time dependence, either mtElastic or mtPlastic.

## Errors

ERR7\_APINotInitialised, ERR7\_APINotLicensed,  
ERR7\_FileNotOpen, ERR7\_InvalidEntity, ERR7\_InvalidFileUnit,  
ERR7\_InvalidModType, ERR7\_NoError, ERR7\_ResultFileIsOpen,  
ERR7\_UnknownProperty

# St7GetTimeDependentModType

---

## Description

Returns the type of temperature/time dependence assigned to the specified property. This setting controls the scaling used to update the material modulus values. This option is only used when an associated Factor vs Temperature/Time table is assigned to the specified property.

## Syntax

```
long St7GetTimeDependentModType(long uID, long Entity, long  
PropNum, long* ModType)
```

## Input Parameters

uID

Strand7 model file ID number.

Entity

Property type, one of ptBEAMPROP, ptPLATEPROP or ptBRICKPROP.

PropNum

Property number.

## Output Parameters

ModType

Type of temperature/time dependence, either mtElastic or mtPlastic.

## Errors

```
ERR7_APINotInitialised, ERR7_APINotLicensed,  
ERR7_FileNotOpen, ERR7_InvalidEntity, ERR7_InvalidFileUnit,  
ERR7_NoError, ERR7_UnknownProperty
```

# St7SetAlphaTempType

---

## Description

Sets the thermal expansion table type for the specified property.

## Syntax

```
long St7SetAlphaTempType(long uID, long Entity, long  
PropNum, long AlphaTempType)
```

## Input Parameters

uID

Strand7 model file ID number.

Entity

Property type, one of ptBEAMPROP, ptPLATEPROP or ptBRICKPROP.

PropNum

Property number.

AlphaTempType

Table type, either kIntegratedAlpha or kInstantAlpha.

## Errors

```
ERR7_APINotInitialised, ERR7_APINotLicensed,  
ERR7_FileNotOpen, ERR7_InvalidAlphaTempType,  
ERR7_InvalidEntity, ERR7_InvalidFileUnit, ERR7_NoError,  
ERR7_ResultFileIsOpen, ERR7_UnknownProperty
```

# St7GetAlphaTempType

---

## Description

Returns the type of thermal expansion table assigned to the specified property.

---

## Syntax

```
long St7GetAlphaTempType(long uID, long Entity, long  
PropNum, long* AlphaTempType)
```

## Input Parameters

uID

Strand7 model file ID number.

Entity

Property type, one of ptBEAMPROP, ptPLATEPROP or ptBRICKPROP.

PropNum

Property number.

## Output Parameters

AlphaTempType

Table type, either kIntegratedAlpha or kInstantAlpha.

## Errors

```
ERR7_APINotInitialised, ERR7_APINotLicensed,  
ERR7_FileNotOpen, ERR7_InvalidEntity, ERR7_InvalidFileUnit,  
ERR7_NoError, ERR7_UnknownProperty
```

---

## St7NewBeamProperty

### Description

Creates a new beam property.

### Syntax

```
long St7NewBeamProperty(long uID, long PropNum, long  
BeamType, char* PropName)
```

### Input Parameters

uID

Strand7 model file ID number.

PropNum

Property number.

BeamType

Type of beam element, one of kBeamTypeNull, kBeamTypeSpring, kBeamTypeCable, kBeamTypeTruss, kBeamTypeCutoff, kBeamTypeContact, kBeamTypeBeam, kBeamTypeUser, kBeamTypePipe, kBeamTypeConnection.

PropName

Name of the property.

## Errors

```
ERR7_APINotInitialised, ERR7_APINotLicensed,  
ERR7_FileNotOpen, ERR7_InvalidBeamType,  
ERR7_InvalidFileUnit, ERR7_InvalidPropertyNumber,  
ERR7_NoError, ERR7_PropertyAlreadyExists,  
ERR7_ResultFileIsOpen
```

# St7GetBeamPropertyData

---

## Description

Returns the specified beam property.

## Syntax

```
long St7GetBeamPropertyData(long uID, long PropNum, long*  
Integers, double* SectionData, double* BeamMaterial)
```

## Input Parameters

uID

Strand7 model file ID number.

PropNum

Property number.

## Output Parameters

Integers[0..3]

[0] - Type of beam element, one of kBeamTypeNull, kBeamTypeSpring, kBeamTypeCable, kBeamTypeTruss, kBeamTypeCutoff, kBeamTypeContact, kBeamTypeBeam, kBeamTypeUser, kBeamTypePipe, kBeamTypeConnection.

[1] - Type of beam section, one of kNullSection, kCircularSolid, kCircularHollow, kSquareSolid, kSquareHollow, kLipChannel, kTopHatChannel, kLSection, kTSection, kLSection, kZSection, kUserSection,

---

kTrapezoidSolid, kTrapezoidHollow, kTriangleSolid, kTriangleHollow or kCruciform.

[2] - Section mirror type, one of kMirrorNone, kMirrorTop, kMirrorBot, kMirrorLeft, kMirrorRight, kMirrorLeftAndTop, kMirrorLeftAndBot, kMirrorRightAndTop, kMirrorRightAndBot, kMirrorLeftTopOnly, kMirrorLeftBotOnly, kMirrorRightTopOnly or kMirrorRightBotOnly.

[3] - Compatible twist option for mirrored sections, either btTrue or btFalse.

SectionData [0 .. kNumBeamSectionData-1]

[ipAREA] - Section area.

[ipI11] - Second moment of area about the principal 1 axis.

[ipI22] - Second moment of area about the principal 2 axis.

[ipJ] - Torsion constant.

[ipSL1] - Shear centre offset in the principal 1 axis direction.

[ipSL2] - Shear centre offset in the principal 2 axis direction.

[ipSA1] - Shear area in the principal 1 axis direction.

[ipSA2] - Shear area in the principal 2 axis direction.

[ipXBAR] - Centroid offset in the principal 1 axis direction.

[ipYBAR] - Centroid offset in the principal 2 axis direction.

[ipANGLE] - Principal axis 1 angle w.r.t. the local section coordinates.

[ipD1] - Section geometry D1 parameter.

[ipD2] - Section geometry D2 parameter.

[ipD3] - Section geometry D3 parameter.

[ipT1] - Section geometry T1 parameter.

[ipT2] - Section geometry T2 parameter.

[ipT3] - Section geometry T3 parameter.

[ipGapA] - Mirrored section gap parameter A.

[ipGapB] - Mirrored section gap parameter B.

BeamMaterial[0..kNumMaterialData-1]

[ipModulus] - Material modulus.

[ipPoisson] - Material Poisson's ratio.

[ipDensity] - Material density.

## Errors

ERR7\_APINotInitialised, ERR7\_APINotLicensed,  
ERR7\_FileNotOpen, ERR7\_InvalidFileUnit, ERR7\_NoError,  
ERR7\_UnknownProperty

# St7SetBeamSectionName

---

## Description

Sets the section name referenced by the specified beam property.

## Syntax

```
long St7SetBeamSectionName(long uID, long PropNum, char*  
    SectionName)
```

## Input Parameters

uID

Strand7 model file ID number.

PropNum

Property number.

SectionName

Name of the section.

## Errors

ERR7\_APINotInitialised, ERR7\_APINotLicensed,  
ERR7\_FileNotOpen, ERR7\_InvalidFileUnit, ERR7\_NoError,  
ERR7\_ResultFileIsOpen, ERR7\_UnknownProperty

# St7GetBeamSectionName

---

## Description

Returns the name of the section referenced by the specified beam property.

---

## Syntax

```
long St7GetBeamSectionName(long uID, long PropNum, char*
    SectionName, long MaxStringLen)
```

## Input Parameters

uID

Strand7 model file ID number.

PropNum

Property number.

MaxStringLen

Maximum number of characters allocated for SectionName.

## Output Parameters

SectionName

Name of the section.

## Errors

```
ERR7_APINotInitialised, ERR7_APINotLicensed,
ERR7_FileNotOpen, ERR7_InvalidFileUnit, ERR7_NoError,
ERR7_UnknownProperty
```

---

## St7SetBeamPropertyType

### Description

Sets the beam type for the specified beam property.

### Syntax

```
long St7SetBeamPropertyType(long uID, long PropNum, long
    BeamType)
```

## Input Parameters

uID

Strand7 model file ID number.

PropNum

Property number.

BeamType

Type of beam element, one of kBeamTypeNull, kBeamTypeSpring, kBeamTypeCable, kBeamTypeTruss, kBeamTypeCutoff , kBeamTypeContact, kBeamTypeBeam, kBeamTypeUser, kBeamTypePipe, kBeamTypeConnection.

## Errors

ERR7\_APINotInitialised, ERR7\_APINotLicensed,  
ERR7\_FileNotOpen, ERR7\_InvalidBeamType,  
ERR7\_InvalidFileUnit, ERR7\_NoError, ERR7\_ResultFileIsOpen,  
ERR7\_UnknownProperty

# St7SetBeamMirrorOption

---

## Description

Sets the section mirror type for the specified beam property.

## Syntax

```
long St7SetBeamMirrorOption(long uID, long PropNum, long  
MirrorType, long CompatibleTwist, double* Doubles)
```

## Input Parameters

uID

Strand7 model file ID number.

PropNum

Beam property number.

MirrorType

Section mirror type, one of kMirrorNone, kMirrorTop, kMirrorBot, kMirrorLeft, kMirrorRight, kMirrorLeftAndTop, kMirrorLeftAndBot, kMirrorRightAndTop, kMirrorRightAndBot, kMirrorLeftTopOnly, kMirrorLeftBotOnly, kMirrorRightTopOnly or kMirrorRightBotOnly.

CompatibleTwist

Compatible twist option for mirrored sections, either btTrue or btFalse.

Doubles [0..1]

A 2 element array containing the mirror gap parameters A and B respectively.

---

## Errors

```
ERR7_APINotInitialised, ERR7_APINotLicensed,  
ERR7_FileNotOpen, ERR7_InvalidFileUnit,  
ERR7_InvalidMirrorOption, ERR7_NoError,  
ERR7_ResultFileIsOpen, ERR7_SectionCannotBeMirrored,  
ERR7_UnknownProperty
```

---

## St7SetBeamNonlinearType

### Description

Sets the nonlinear material type for the specified beam property.

### Syntax

```
long St7SetBeamNonlinearType(long uID, long PropNum, long  
NonlinType)
```

### Input Parameters

uID

Strand7 model file ID number.

PropNum

Beam property number.

NonlinType

Nonlinear material type, either ntNonlinElastic or ntElastoPlastic.

### Errors

```
ERR7_APINotInitialised, ERR7_APINotLicensed,  
ERR7_FileNotOpen, ERR7_IncompatibleCriterionCombination,  
ERR7_InvalidFileUnit, ERR7_NoError, ERR7_ResultFileIsOpen,  
ERR7_UnknownProperty
```

---

## St7GetBeamNonlinearType

### Description

Returns the nonlinear material type assigned to the specified beam property.

### Syntax

```
long St7GetBeamNonlinearType(long uID, long PropNum, long*  
NonlinType)
```

## Input Parameters

uID

Strand7 model file ID number.

PropNum

Beam property number.

## Output Parameters

NonlinType

Nonlinear material type, either ntNonlinElastic or ntElastoPlastic.

## Errors

ERR7\_APINotInitialised, ERR7\_APINotLicensed,  
ERR7\_FileNotOpen, ERR7\_IncompatibleCriterionCombination,  
ERR7\_InvalidFileUnit, ERR7\_NoError, ERR7\_UnknownProperty

# St7SetBeamSectionPropertyData

---

## Description

Sets the beam section property data for the specified beam property.

## Syntax

```
long St7SetBeamSectionPropertyData(long uID, long PropNum,  
                                long* Integers, double* Doubles)
```

## Input Parameters

uID

Strand7 model file ID number.

PropNum

Beam property number.

Integers[0]

Number of length-wise integration slices.

Doubles[0..10]

[ipAREA] - Section area.

[ipI11] - Second moment of area about the principal 1 axis.

---

[ipI22] - Second moment of area about the principal 2 axis.  
[ipJ] - Torsion constant.  
[ipSL1] - Shear centre offset in the principal 1 axis direction.  
[ipSL2] - Shear centre offset in the principal 2 axis direction.  
[ipSA1] - Shear area in the principal 1 axis direction.  
[ipSA2] - Shear area in the principal 2 axis direction.  
[ipXBAR] - Centroid offset in the principal 1 axis direction.  
[ipYBAR] - Centroid offset in the principal 2 axis direction.  
[ipANGLE] - Principal axis 1 angle w.r.t. the local section coordinates.

## Errors

ERR7\_APINotInitialised, ERR7\_APINotLicensed,  
ERR7\_FileNotOpen, ERR7\_InvalidFileUnit,  
ERR7\_InvalidSectionProperties, ERR7\_NoError,  
ERR7\_ResultFileIsOpen, ERR7\_UnknownProperty

# St7GetBeamSectionPropertyData

---

## Description

Returns the beam section property data assigned to the specified beam property.

## Syntax

```
long St7GetBeamSectionPropertyData(long uID, long PropNum,  
                                long* Integers, double* Doubles)
```

## Input Parameters

uID

Strand7 model file ID number.

PropNum

Beam property number.

## Output Parameters

Integers [0]

Number of length-wise integration slices.

Doubles [0..10]

[ipAREA] - Section area.

[ipI11] - Second moment of area about the principal 1 axis.

[ipI22] - Second moment of area about the principal 2 axis.

[ipJ] - Torsion constant.

[ipSL1] - Shear centre offset in the principal 1 axis direction.

[ipSL2] - Shear centre offset in the principal 2 axis direction.

[ipSA1] - Shear area in the principal 1 axis direction.

[ipSA2] - Shear area in the principal 2 axis direction.

[ipXBAR] - Centroid offset in the principal 1 axis direction.

[ipYBAR] - Centroid offset in the principal 2 axis direction.

[ipANGLE] - Principal axis 1 angle w.r.t. the local section coordinates.

## Errors

ERR7\_APINotInitialised, ERR7\_APINotLicensed,  
ERR7\_DataNotFound, ERR7\_FileNotOpen, ERR7\_InvalidFileUnit,  
ERR7\_NoError, ERR7\_UnknownProperty

# St7SetBeamSectionGeometry

---

## Description

Sets the beam cross section geometry data for the specified beam property.

## Syntax

```
long St7SetBeamSectionGeometry(long uID, long PropNum, long  
SectionType, double* Doubles)
```

## Input Parameters

uID

Strand7 model file ID number.

PropNum

---

Beam property number.

**SectionType**

Type of beam section, one of kNullSection, kCircularSolid, kCircularHollow, kSquareSolid, kSquareHollow, kLipChannel, kTopHatChannel, kISection, kTSection, kLSection, kZSection, kUserSection, kTrapezoidSolid, kTrapezoidHollow, kTriangleSolid, kTriangleHollow or kCruciform.

**Doubles [0..5]**

A 6 element array containing the beam cross section D1, D2, D3, T1, T2 and T3 parameters respectively.

**Errors**

ERR7\_APINotInitialised, ERR7\_APINotLicensed,  
ERR7\_FileNotOpen, ERR7\_InvalidBeamSectionType,  
ERR7\_InvalidFileUnit, ERR7\_NoError, ERR7\_ResultFileIsOpen,  
ERR7\_UnknownProperty

## St7GetBeamSectionGeometry

---

**Description**

Returns the beam cross section data assigned to the specified beam property.

**Syntax**

```
long St7GetBeamSectionGeometry(long uID, long PropNum,  
                           long* SectionType, double* Doubles)
```

**Input Parameters**

uID

Strand7 model file ID number.

PropNum

Beam property number.

**Output Parameters**

SectionType

Type of beam section, one of kNullSection, kCircularSolid, kCircularHollow, kSquareSolid, kSquareHollow, kLipChannel, kTopHatChannel, kISection, kTSection, kLSection, kZSection, kUserSection, kTrapezoidSolid, kTrapezoidHollow, kTriangleSolid, kTriangleHollow or kCruciform.

Doubles [0..5]

A 6 element array containing the beam cross section D1, D2, D3, T1, T2 and T3 parameters respectively.

## Errors

ERR7\_APINotInitialised, ERR7\_APINotLicensed,  
ERR7\_DataNotFound, ERR7\_FileNotOpen, ERR7\_InvalidFileUnit,  
ERR7\_NoError, ERR7\_UnknownProperty

# St7SetBeamSectionNominalDiscretisation

---

## Description

Sets the discretisation values used when discretising the cross-section for nonlinear beam types.

## Syntax

```
long St7SetBeamSectionNominalDiscretisation(long uID, long  
PropNum, long* Integers)
```

## Input Parameters

uID

Strand7 model file ID number.

PropNum

Beam property number.

Integers [0..2]

[0] - nominal divisions used to discretise the beam (along the longest ordinate), or divisions in the x-ordinate when divisions are specified.

[1] - divisions in the y-ordinate used to discretise the beam when divisions are specified.

[2] - btTrue to use nominal divisions, btFalse to specify the divisions in each ordinate explicitly.

## Errors

ERR7\_APINotInitialised, ERR7\_APINotLicensed,  
ERR7\_FileNotOpen, ERR7\_InvalidFileUnit, ERR7\_NoError,  
ERR7\_ResultFileIsOpen, ERR7\_UnknownProperty

---

## St7GetBeamSectionNominalDiscretisation

---

### Description

Returns the discretisation values used when discretising the cross-section for nonlinear beam types.

### Syntax

```
long St7GetBeamSectionNominalDiscretisation(long uID, long  
PropNum, long* Integers)
```

### Input Parameters

uID

Strand7 model file ID number.

PropNum

Beam property number.

### Output Parameters

Integers [0..2]

[0] - nominal divisions used to discretise the beam (along the longest ordinate), or divisions in the x-ordinate when divisions are specified.

[1] - divisions in the y-ordinate used to discretise the beam when divisions are specified.

[2] - btTrue to use nominal divisions, btFalse to specify the divisions in each ordinate explicitly.

### Errors

ERR7\_APINotInitialised, ERR7\_APINotLicensed,  
ERR7\_FileNotOpen, ERR7\_InvalidFileUnit, ERR7\_NoError,  
ERR7\_UnknownProperty

---

## St7SetBeamSectionCircularDiscretisation

---

### Description

Sets the number of circumferential divisions used when discretising circular cross-sections for nonlinear beam types.

## Syntax

```
long St7SetBeamSectionCircularDiscretisation(long uID, long  
PropNum, long* Integers)
```

## Input Parameters

uID

Strand7 model file ID number.

PropNum

Beam property number.

Integers [0]

Number of circumferential divisions used to discretise the circular beam cross-section, one of;

0 - for **Auto** divisions

1 - for 8 divisions

2 - for 16 divisions

3 - for 32 divisions

4 - for 64 divisions.

## Errors

ERR7\_APINotInitialised, ERR7\_APINotLicensed,  
ERR7\_FileNotOpen, ERR7\_InvalidFileUnit, ERR7\_NoError,  
ERR7\_ResultFileIsOpen, ERR7\_UnknownProperty

# St7GetBeamSectionCircularDiscretisation

---

## Description

Returns the number of circumferential divisions used when discretising circular cross-sections for nonlinear beam types.

## Syntax

```
long St7GetBeamSectionCircularDiscretisation(long uID, long  
PropNum, long* Integers)
```

## Input Parameters

uID

---

Strand7 model file ID number.

PropNum

Beam property number.

## Output Parameters

Integers [0]

Number of circumferential divisions used to discretise the circular beam cross-section, one of;

- 0 - for **Auto** divisions
- 1 - for 8 divisions
- 2 - for 16 divisions
- 3 - for 32 divisions
- 4 - for 64 divisions.

## Errors

ERR7\_APINotInitialised, ERR7\_APINotLicensed,  
ERR7\_FileNotOpen, ERR7\_InvalidFileUnit, ERR7\_NoError,  
ERR7\_UnknownProperty

# St7CalculateBeamSectionProperties

---

## Description

Calculates the section properties based on the section geometry assigned for the specified beam property.

## Syntax

```
long St7CalculateBeamSectionProperties(long uID, long  
PropNum, bool DoShear, bool ExactJ)
```

## Input Parameters

uID

Strand7 model file ID number.

PropNum

Beam property number.

#### DoShear

Include the shear area values, either btTrue or btFalse. If the shear areas are included the “thick” beam formulation is used.

#### ExactJ

Perform an accurate calculation for the torsional constant, either btTrue or btFalse. If this flag is set to btFalse a fast but approximate calculation is performed.

### Errors

ERR7\_APINotInitialised, ERR7\_APINotLicensed,  
ERR7\_FileNotOpen, ERR7\_InvalidFileUnit,  
ERR7\_InvalidSectionParameters, ERR7\_NoError,  
ERR7\_ResultFileIsOpen, ERR7\_UnknownProperty

## St7AssignBXS

---

### Description

Assigns a BXS to the specified beam property.

### Syntax

```
long St7AssignBXS(long uID, long PropNum, char* BXSName)
```

### Input Parameters

uID

Strand7 model file ID number.

PropNum

Beam property number.

BXSName

Name of the BXS.

### Errors

ERR7\_APINotInitialised, ERR7\_APINotLicensed,  
ERR7\_FileNotOpen, ERR7\_InvalidFileName,  
ERR7\_InvalidFileUnit, ERR7\_NoError, ERR7\_ResultFileIsOpen,  
ERR7\_UnknownProperty

---

## St7SetSpringDamperData

---

### Description

Sets the spring-damper element parameters for the specified beam property.

### Syntax

```
long St7SetSpringDamperData(long uID, long PropNum, double* Doubles)
```

### Input Parameters

uID

Strand7 model file ID number.

PropNum

Beam property number.

Doubles[0..6]

[ipSpringAxialStiff] - Axial stiffness.

[ipSpringLateralStiff] - Lateral stiffness.

[ipSpringTorsionStiff] - Torsional stiffness.

[ipSpringAxialDamp] - Axial damping.

[ipSpringLateralDamp] - Lateral damping.

[ipSpringTorsionDamp] - Torsional damping.

[ipSpringMass] - Element mass.

### Errors

ERR7\_APINotInitialised, ERR7\_APINotLicensed,  
ERR7\_FileNotOpen, ERR7\_InvalidFileUnit, ERR7\_NoError,  
ERR7\_PropertyNotSpring, ERR7\_ResultFileIsOpen,  
ERR7\_UnknownProperty

---

## St7GetSpringDamperData

---

### Description

Returns the spring-damper element parameters assigned to the specified beam property.

## Syntax

```
long St7GetSpringDamperData(long uID, long PropNum, double*  
    Doubles)
```

## Input Parameters

uID

Strand7 model file ID number.

PropNum

Beam property number.

## Output Parameters

Doubles[0..6]

[ipSpringAxialStiff] - Axial stiffness.

[ipSpringLateralStiff] - Lateral stiffness.

[ipSpringTorsionStiff] - Torsional stiffness.

[ipSpringAxialDamp] - Axial damping.

[ipSpringLateralDamp] - Lateral damping.

[ipSpringTorsionDamp] - Torsional damping.

[ipSpringMass] - Element mass.

## Errors

ERR7\_APINotInitialised, ERR7\_APINotLicensed,  
ERR7\_FileNotOpen, ERR7\_InvalidFileUnit, ERR7\_NoError,  
ERR7\_PropertyNotSpring, ERR7\_UnknownProperty

## St7SetCableData

---

### Description

Sets the cable element parameters for the specified beam property.

### Syntax

```
long St7SetCableData(long uID, long PropNum, long*  
    Integers)
```

---

## **Input Parameters**

uID

Strand7 model file ID number.

PropNum

Beam property number.

Integers[0..0]

[ipCableSegments] - Number of segments used internally to discretise cable.

## **Errors**

ERR7\_APINotInitialised, ERR7\_APINotLicensed,  
ERR7\_FileNotOpen, ERR7\_InvalidFileUnit, ERR7\_NoError,  
ERR7\_PropertyNotCable, ERR7\_ResultFileIsOpen,  
ERR7\_UnknownProperty

---

# **St7GetCableData**

## **Description**

Returns the cable element parameters assigned to the specified beam property.

## **Syntax**

```
long St7GetCableData(long uID, long PropNum, long*  
Integers)
```

## **Input Parameters**

uID

Strand7 model file ID number.

PropNum

Beam property number.

## **Output Parameters**

Integers[0..0]

[ipCableSegments] - Number of segments used internally to discretise cable.

## Errors

```
ERR7_APINotInitialised, ERR7_APINotLicensed,  
ERR7_FileNotOpen, ERR7_InvalidFileUnit, ERR7_NoError,  
ERR7_UnknownProperty
```

# St7SetTrussData

---

## Description

Sets the truss element parameters for the specified beam property.

## Syntax

```
long St7SetTrussData(long uID, long PropNum, long*  
Integers)
```

## Input Parameters

uID

Strand7 model file ID number.

PropNum

Beam property number.

Integers[0..0]

[ipTrussIncludeTorsion] - Include torsion, either btTrue or btFalse.

## Errors

```
ERR7_APINotInitialised, ERR7_APINotLicensed,  
ERR7_FileNotOpen, ERR7_InvalidFileUnit, ERR7_NoError,  
ERR7_PropertyNotTruss, ERR7_ResultFileIsOpen,  
ERR7_UnknownProperty
```

# St7GetTrussData

---

## Description

Returns the truss element parameters for the specified beam property.

## Syntax

```
long St7GetTrussData(long uID, long PropNum, long*  
Integers)
```

---

## **Input Parameters**

uID

Strand7 model file ID number.

PropNum

Beam property number.

## **Output Parameters**

Integers [0..0]

[ipTrussIncludeTorsion] - Include torsion, either btTrue or btFalse.

## **Errors**

ERR7\_APINotInitialised, ERR7\_APINotLicensed,  
ERR7\_FileNotOpen, ERR7\_InvalidFileUnit, ERR7\_NoError,  
ERR7\_PropertyNotTruss, ERR7\_UnknownProperty

---

## **St7SetCutoffBarData**

### **Description**

Sets the cut-off bar parameters for the specified beam property.

### **Syntax**

```
long St7SetCutoffBarData(long uID, long PropNum, long*  
    Integers, double* Doubles)
```

### **Input Parameters**

uID

Strand7 model file ID number.

PropNum

Beam property number.

Integers [0..1]

[ipCutoffType] - Type of cut-off bar, either kBrittleGap or kDuctileGap.

[ipKeepMass] - Use element mass, either btTrue or btFalse.

Doubles [0..1]

[ipCutoffTension] - Tensile force limit.

[ipCutoffCompression] - Compressive force limit.

## Errors

ERR7\_APINotInitialised, ERR7\_APINotLicensed,  
ERR7\_FileNotOpen, ERR7\_InvalidCutoffType,  
ERR7\_InvalidFileUnit, ERR7\_NoError,  
ERR7\_PropertyNotCutOffBar, ERR7\_ResultFileIsOpen,  
ERR7\_UnknownProperty

# St7GetCutoffBarData

---

## Description

Returns the cut-off bar parameters assigned to the specified beam property.

## Syntax

```
long St7GetCutoffBarData(long uID, long PropNum, long*  
    Integers, double* Doubles)
```

## Input Parameters

uID

Strand7 model file ID number.

PropNum

Beam property number.

## Output Parameters

Integers[0..1]

[ipCutoffType] - Type of cut-off bar, either kBrittleGap or kDuctileGap.

[ipKeepMass] - Use element mass, either btTrue or btFalse.

Doubles[0..1]

[ipCutoffTension] - Tensile force limit.

[ipCutoffCompression] - Compressive force limit.

## Errors

ERR7\_APINotInitialised, ERR7\_APINotLicensed,  
ERR7\_FileNotOpen, ERR7\_InvalidFileUnit, ERR7\_NoError,  
ERR7\_PropertyNotCutOffBar, ERR7\_UnknownProperty

---

# St7SetPointContactData

---

## Description

Sets the point contact element parameters for the specified beam property.

## Syntax

```
long St7SetPointContactData(long uID, long PropNum, long*  
    Integers, double* Doubles)
```

## Input Parameters

uID

Strand7 model file ID number.

PropNum

Beam property number.

Integers[0..7]

[ipContactType] - Type of contact element, one of kZeroGapContact, kNormalContact, kTensionContact or kTakeupContact.

[ipContactSubType] - Type of Takeup contact, either kTensionTakeup or kCompressionTakeup.

[ipDynamicStiffness] - Update the stiffness of the contact element, either btTrue or btFalse.

[ipUseInFirstIteration] - Use contact in the first iteration of a nonlinear solution, either btTrue or btFalse.

[ipUpdateDirection] - Update the direction of the contact throughout solution, either btTrue or btFalse.

[ipFrictionModel] - Type of friction model used, either cfElastic or cfPlastic.

[ipFrictionYieldType] - Type of yield, either cyRectangular or cyElliptical.

[ipTensionLateralStiffness] - Use lateral stiffness with kTensionContact elements, either btTrue or btFalse.

Doubles[0..3]

[ipContactStiffness] - Penalty stiffness value. This value is updated dynamically based on the **Update Direction** settings.

[ipFrictionC1] - Lateral friction coefficient in the 1 axis direction.

[ipFrictionC2] - Lateral friction coefficient in the 2 axis direction.

[ipContactMaxTension] - Maximum tensile force value.

## Errors

ERR7\_APINotInitialised, ERR7\_APINotLicensed,  
ERR7\_FileNotOpen, ERR7\_InvalidContactSubType,  
ERR7\_InvalidContactType, ERR7\_InvalidContactYieldType,  
ERR7\_InvalidFileUnit, ERR7\_NoError,  
ERR7\_PropertyNotPointContact, ERR7\_ResultFileIsOpen,  
ERR7\_UnknownProperty

# St7GetPointContactData

---

## Description

Returns the point contact element parameters assigned to the specified beam property.

## Syntax

```
long St7GetPointContactData(long uID, long PropNum, long*  
    Integers, double* Doubles)
```

## Input Parameters

uID

Strand7 model file ID number.

PropNum

Beam property number.

## Output Parameters

Integers[0..7]

[ipContactType] - Type of contact element, one of kZeroGapContact, kNormalContact, kTensionContact or kTakeupContact.

[ipContactSubType] - Type of Takeup contact, either kTensionTakeup or kCompressionTakeup.

---

[ipDynamicStiffness] - Update the stiffness of the contact element, either btTrue or btFalse.

[ipUseInFirstIteration] - Use contact in the first iteration of a nonlinear solution, either btTrue or btFalse.

[ipUpdateDirection] - Update the direction of the contact throughout solution, either btTrue or btFalse.

[ipFrictionModel] - Type of friction model used, either cfElastic or cfPlastic.

[ipFrictionYieldType] - Type of yield, either cyRectangular or cyElliptical.

[ipTensionLateralStiffness] - Use lateral stiffness with kTensionContact elements, either btTrue or btFalse.

Doubles[0..3]

[ipContactStiffness] - Penalty stiffness value. This value is updated dynamically based on the **Update Direction** settings.

[ipFrictionC1] - Lateral friction coefficient in the 1 axis direction.

[ipFrictionC2] - Lateral friction coefficient in the 2 axis direction.

[ipContactMaxTension] - Maximum tensile force value.

## Errors

ERR7\_APINotInitialised, ERR7\_APINotLicensed,  
ERR7\_FileNotOpen, ERR7\_InvalidFileUnit, ERR7\_NoError,  
ERR7\_PropertyNotPointContact, ERR7\_UnknownProperty

# St7SetPipeData

---

## Description

Sets the pipe element parameters for the specified beam property.

## Syntax

```
long St7SetPipeData(long uID, long PropNum, double* Doubles)
```

## Input Parameters

uID

Strand7 model file ID number.

PropNum

Beam property number.

Doubles[0..3]

[ipPipeFlexibility] - Flexibility factor.

[ipPipeFluidDensity] - Density of contained fluid.

[ipPipeOuterDiameter] - Outer diameter.

[ipPipeThickness] - Wall thickness.

## Errors

ERR7\_APINotInitialised, ERR7\_APINotLicensed,  
ERR7\_FileNotOpen, ERR7\_InvalidFileUnit, ERR7\_NoError,  
ERR7\_PropertyNotPipe, ERR7\_ResultFileIsOpen,  
ERR7\_UnknownProperty

## St7GetPipeData

---

### Description

Returns the pipe element parameters for the specified beam property.

### Syntax

```
long St7GetPipeData(long uID, long PropNum, double*  
Doubles)
```

### Input Parameters

uID

Strand7 model file ID number.

PropNum

Beam property number.

### Output Parameters

Doubles[0..3]

[ipPipeFlexibility] - Flexibility factor.

[ipPipeFluidDensity] - Density of contained fluid.

---

[ipPipeOuterDiameter] - Outer diameter.

[ipPipeThickness] - Wall thickness.

## Errors

ERR7\_APINotInitialised, ERR7\_APINotLicensed,  
ERR7\_FileNotOpen, ERR7\_InvalidFileUnit, ERR7\_NoError,  
ERR7\_PropertyNotPipe, ERR7\_UnknownProperty

# St7SetConnectionData

---

## Description

Sets the connection element parameters for the specified beam property.

## Syntax

```
long St7SetConnectionData(long uID, long PropNum, double*  
                           Doubles)
```

## Input Parameters

uID

Strand7 model file ID number.

PropNum

Beam property number.

Doubles[0..5]

A 6 element array describing the element translational and rotational stiffness values according to the 123456 axis convention in the beam's local principal axis system.

A UCS may be assigned to the element ends to override the local principal axis system using *St7SetBeamConnectionUCS*.

## Errors

ERR7\_APINotInitialised, ERR7\_APINotLicensed,  
ERR7\_FileNotOpen, ERR7\_InvalidFileUnit, ERR7\_NoError,  
ERR7\_ResultFileIsOpen, ERR7\_UnknownProperty

## St7GetConnectionData

---

### Description

Returns the connection element parameters for the specified beam property.

### Syntax

```
long St7GetConnectionData(long uID, long PropNum, double*  
    Doubles)
```

### Input Parameters

uID

Strand7 model file ID number.

PropNum

Beam property number.

### Output Parameters

Doubles [0..5]

A 6 element array describing the element translational and rotational stiffness values according to the 123456 axis convention in the UCS assigned to the element.

A UCS may be assigned to the element ends to override the local principal axis system using *St7SetBeamConnectionUCS*.

### Errors

ERR7\_APINotInitialised, ERR7\_APINotLicensed,  
ERR7\_FileNotOpen, ERR7\_InvalidFileUnit, ERR7\_NoError,  
ERR7\_UnknownProperty

## St7SetUserBeamData

---

### Description

Sets the user defined element parameters for the specified beam property.

### Syntax

```
long St7SetUserBeamData(long uID, long PropNum, double*  
    Doubles)
```

### Input Parameters

uID

---

Strand7 model file ID number.

PropNum

Beam property number.

Doubles[0..21]

[0..20] - User defined material matrix K defined by the upper triangular matrix of coefficients  $K_{ij}$  where  $i < j$  and  $i$  varies quickest;  $K_{11}, K_{12}, \dots, K_{22}, K_{23}, \dots, K_{66}$ , respectively.

[21] - Spring mass.

## Errors

ERR7\_APINotInitialised, ERR7\_APINotLicensed,  
ERR7\_FileNotOpen, ERR7\_InvalidFileUnit, ERR7\_NoError,  
ERR7\_PropertyNotUserDefinedBeam, ERR7\_ResultFileIsOpen,  
ERR7\_UnknownProperty

# St7 GetUserBeamData

---

## Description

Returns the user defined element property for the specified beam property.

## Syntax

```
long St7 GetUserBeamData(long uID, long PropNum, double*  
                         Doubles)
```

## Input Parameters

uID

Strand7 model file ID number.

PropNum

Beam property number.

## Output Parameters

Doubles[0..21]

[0..20] - User defined material matrix K defined by the upper triangular matrix of coefficients  $K_{ij}$  where  $i < j$  and  $i$  varies quickest;  $K_{11}, K_{12}, \dots, K_{22}, K_{23}, \dots, K_{66}$ , respectively.

[21] - Spring mass.

## Errors

```
ERR7_APINotInitialised, ERR7_APINotLicensed,  
ERR7_FileNotOpen, ERR7_InvalidFileUnit, ERR7_NoError,  
ERR7_PropertyNotUserDefinedBeam, ERR7_UnknownProperty
```

# St7SetBeamMaterialData

---

## Description

Sets the material properties for the specified beam property.

## Syntax

```
long St7SetBeamMaterialData(long uID, long PropNum, double*  
Doubles)
```

## Input Parameters

uID

Strand7 model file ID number.

PropNum

Beam property number.

Doubles [0..8]

[ipBeamModulus] - Modulus.

[ipBeamShear] - Shear modulus.

[ipBeamPoisson] - Poisson's ratio.

[ipBeamDensity] - Density.

[ipBeamAlpha] - Thermal expansion coefficient.

[ipBeamViscosity] - Viscous damping coefficient.

[ipBeamDampingRatio] - Damping ratio.

[ipBeamConductivity] - Thermal conductivity coefficient.

[ipBeamSpecificHeat] - Specific heat coefficient.

## Errors

```
ERR7_APINotInitialised, ERR7_APINotLicensed,  
ERR7_FileNotOpen, ERR7_InvalidFileUnit,
```

---

```
ERR7_MaterialIsUserDefined, ERR7_NoError,
ERR7_ResultFileIsOpen, ERR7_UnknownProperty
```

## St7GetBeamMaterialData

---

### Description

Returns the material properties assigned to the specified beam property.

### Syntax

```
long St7GetBeamMaterialData(long uID, long PropNum, double*
    Doubles)
```

### Input Parameters

uID

Strand7 model file ID number.

PropNum

Beam property number.

### Output Parameters

Doubles[0..8]

[ipBeamModulus] - Modulus.

[ipBeamShear] - Shear modulus.

[ipBeamPoisson] - Poisson's ratio.

[ipBeamDensity] - Density.

[ipBeamAlpha] - Thermal expansion coefficient.

[ipBeamViscosity] - Viscous damping coefficient.

[ipBeamDampingRatio] - Damping ratio.

[ipBeamConductivity] - Thermal conductivity coefficient.

[ipBeamSpecificHeat] - Specific heat coefficient.

### Errors

```
ERR7_APINotInitialised, ERR7_APINotLicensed,
ERR7_FileNotOpen, ERR7_InvalidFileUnit,
```

ERR7\_MaterialIsUserDefined, ERR7\_NoError,  
ERR7\_UnknownProperty

## St7SetBeamUsePoisson

---

### Description

Sets the specified beam property to use the Poisson's ratio rather than the Shear modulus values supplied.

### Syntax

```
long St7SetBeamUsePoisson(long uID, long PropNum)
```

### Input Parameters

uID

Strand7 model file ID number.

PropNum

Beam property number.

### Errors

ERR7\_APINotInitialised, ERR7\_APINotLicensed,  
ERR7\_FileNotOpen, ERR7\_InvalidFileUnit,  
ERR7\_MaterialIsUserDefined, ERR7\_NoError,  
ERR7\_ResultFileIsOpen, ERR7\_UnknownProperty

## St7SetBeamUseShearMod

---

### Description

Sets the specified beam property to use the Shear modulus rather than the Poisson's ratio values supplied.

### Syntax

```
long St7SetBeamUseShearMod(long uID, long PropNum)
```

### Input Parameters

uID

Strand7 model file ID number.

PropNum

Beam property number.

---

## Errors

```
ERR7_APINotInitialised, ERR7_APINotLicensed,  
ERR7_FileNotOpen, ERR7_InvalidFileUnit,  
ERR7_MaterialIsUserDefined, ERR7_NoError,  
ERR7_ResultFileIsOpen, ERR7_UnknownProperty
```

---

## St7SetBeamUseMomCurv

### Description

Sets the state of the Moment-Curvature option for the specified beam property. A coupled nonlinear beam formulation is available as an alternative to the decoupled Moment-Curvature approach.

### Syntax

```
long St7SetBeamUseMomCurv(long uID, long PropNum, bool  
                           UseMomCurv)
```

### Input Parameters

uID

Strand7 model file ID number.

PropNum

Beam property number.

UseMomCurv

btTrue to use the Moment-Curvature tables assigned.

### Errors

```
ERR7_APINotInitialised, ERR7_APINotLicensed,  
ERR7_FileNotOpen, ERR7_InvalidFileUnit, ERR7_NoError,  
ERR7_ResultFileIsOpen, ERR7_UnknownProperty
```

---

## St7GetBeamUseMomCurv

### Description

Returns the state of the Moment-Curvature option for the specified beam property. A coupled nonlinear beam formulation is available as an alternative to the decoupled Moment-Curvature approach.

## Syntax

```
long St7GetBeamUseMomCurv(long uID, long PropNum, bool*  
    UseMomCurv)
```

## Input Parameters

uID

Strand7 model file ID number.

PropNum

Beam property number.

## Output Parameters

UseMomCurv

bTrue to use the Moment-Curvature tables assigned.

## Errors

```
ERR7_APINotInitialised, ERR7_APINotLicensed,  
ERR7_FileNotOpen, ERR7_InvalidFileUnit, ERR7_NoError,  
ERR7_UnknownProperty
```

# St7NewPlateProperty

---

## Description

Creates a new plate property.

## Syntax

```
long St7NewPlateProperty(long uID, long PropNum, long  
    PlateType, long MaterialType, char* PropName)
```

## Input Parameters

uID

Strand7 model file ID number.

PropNum

Plate property number.

PlateType

Type of plate element, one of kPlateTypeNull, kPlateTypePlaneStress,  
kPlateTypePlaneStrain, kPlateTypeAxisymmetric, kPlateTypePlateShell,  
kPlateTypeShearPanel, kPlateTypeMembrane or kPlateTypeLoadPatch.

---

MaterialType

Type of material, one of kMaterialTypeNull, kMaterialTypeIsotropic,  
kMaterialTypeOrthotropic, kMaterialTypeAnisotropic, kMaterialTypeRubber,  
kMaterialTypeSoil, kMaterialTypeLaminate, kMaterialTypeUserDefined,  
kMaterialTypePly or kMaterialTypeFluid.

PropName

Name of the plate property.

## Errors

```
ERR7_APINotInitialised, ERR7_APINotLicensed,  
ERR7_FileNotOpen, ERR7_IncompatibleMaterialCombination,  
ERR7_InvalidFileUnit, ERR7_InvalidMaterialType,  
ERR7_InvalidPlateType, ERR7_InvalidPropertyNumber,  
ERR7_NoError, ERR7_PropertyAlreadyExists,  
ERR7_ResultFileIsOpen
```

# St7GetPlatePropertyData

---

## Description

Returns the specified plate property data.

## Syntax

```
long St7GetPlatePropertyData(long uID, long PropNum, long*  
    Integers, double* SectionData, double* PlateMaterial)
```

## Input Parameters

uID

Strand7 model file ID number.

PropNum

Plate property number.

## Output Parameters

Integers

This is a dummy variable to allow for future expansion of this function. Any integer variable may be passed and will be returned unchanged.

SectionData[0..1]

A 2 element array describing the membrane and bending thicknesses respectively.

PlateMaterial[0..kNumMaterialData-1]

[ipModulus] - Modulus.

[ipPoisson] - Poisson's ratio.

[ipDensity] - Density.

## Errors

ERR7\_APINotInitialised, ERR7\_APINotLicensed,  
ERR7\_FileNotOpen, ERR7\_InvalidFileUnit,  
ERR7\_MaterialNotIsotropic, ERR7\_NoError,  
ERR7\_UnknownProperty

## St7SetPlatePropertyType

---

### Description

Sets the property type for the specified plate property.

### Syntax

```
long St7SetPlatePropertyType(long uID, long PropNum, long  
PlateType, long MaterialType)
```

### Input Parameters

uID

Strand7 model file ID number.

PropNum

Plate property number.

PlateType

Type of plate element, one of kPlateTypeNull, kPlateTypePlaneStress,  
kPlateTypePlaneStrain, kPlateTypeAxisymmetric, kPlateTypePlateShell,  
kPlateTypeShearPanel, kPlateTypeMembrane or kPlateTypeLoadPatch.

MaterialType

Type of material, one of kMaterialTypeNull, kMaterialTypeIsotropic,  
kMaterialTypeOrthotropic, kMaterialTypeAnisotropic, kMaterialTypeRubber,

---

kMaterialTypeSoil, kMaterialTypeLaminate, kMaterialTypeUserDefined, kMaterialTypePly or kMaterialTypeFluid.

## Errors

```
ERR7_APINotInitialised, ERR7_APINotLicensed,  
ERR7_FileNotOpen, ERR7_IncompatibleMaterialCombination,  
ERR7_InvalidFileUnit, ERR7_InvalidMaterialType,  
ERR7_InvalidPlateType, ERR7_NoError, ERR7_ResultFileIsOpen,  
ERR7_UnknownProperty
```

# St7GetPlatePropertyType

---

## Description

Returns the property type for the specified plate property.

## Syntax

```
long St7GetPlatePropertyType(long uID, long PropNum, long*  
PlateType, long* MaterialType)
```

## Input Parameters

uID

Strand7 model file ID number.

PropNum

Plate property number.

## Output Parameters

PlateType

Type of plate element, one of kPlateTypeNull, kPlateTypePlaneStress, kPlateTypePlaneStrain, kPlateTypeAxisymmetric, kPlateTypePlateShell, kPlateTypeShearPanel, kPlateTypeMembrane or kPlateTypeLoadPatch.

MaterialType

Type of material, one of kMaterialTypeNull, kMaterialTypeIsotropic, kMaterialTypeOrthotropic, kMaterialTypeAnisotropic, kMaterialTypeRubber, kMaterialTypeSoil, kMaterialTypeLaminate, kMaterialTypeUserDefined, kMaterialTypePly or kMaterialTypeFluid.

## Errors

```
ERR7_APINotInitialised, ERR7_APINotLicensed,  
ERR7_FileNotOpen, ERR7_InvalidFileUnit, ERR7_NoError,  
ERR7_UnknownProperty
```

## St7SetPlateNonlinearType

---

### Description

Sets the nonlinear material type for the specified plate property.

### Syntax

```
long St7SetPlateNonlinearType(long uID, long PropNum, long  
NonlinType, long YieldType)
```

### Input Parameters

uID

Strand7 model file ID number.

PropNum

Plate property number.

NonlinType

Nonlinear material type, either ntNonlinElastic or ntElastoPlastic.

YieldType

Yield criterion, one of ycTresca, ycVonMises, ycMaxStress, ycMohrCoulomb or ycDruckerPrager.

### Errors

```
ERR7_APINotInitialised, ERR7_APINotLicensed,  
ERR7_FileNotOpen, ERR7_IncompatibleCriterionCombination,  
ERR7_InvalidFileUnit, ERR7_NoError, ERR7_ResultFileIsOpen,  
ERR7_UnknownProperty
```

## St7GetPlateNonlinearType

---

### Description

Returns the nonlinear material type assigned to the specified plate property.

---

## Syntax

```
long St7GetPlateNonlinearType(long uID, long PropNum, long*
    NonlinType, long* YieldType)
```

## Input Parameters

uID

Strand7 model file ID number.

PropNum

Plate property number.

## Output Parameters

NonlinType

Nonlinear material type, either ntNonlinElastic or ntElastoPlastic.

YieldType

Yield criterion, one of ycTresca, ycVonMises, ycMaxStress, ycMohrCoulomb or ycDruckerPrager.

## Errors

ERR7\_APINotInitialised, ERR7\_APINotLicensed,  
ERR7\_FileNotOpen, ERR7\_IncompatibleCriterionCombination,  
ERR7\_InvalidFileUnit, ERR7\_NoError, ERR7\_UnknownProperty

---

# St7SetPlateThickness

## Description

Sets the thickness for the specified plate property.

## Syntax

```
long St7SetPlateThickness(long uID, long PropNum, double*
    Doubles)
```

## Input Parameters

uID

Strand7 model file ID number.

PropNum

Plate property number.

Doubles [0..1]

A 2 element array containing the membrane and bending thickness values respectively.

## Errors

ERR7\_APINotInitialised, ERR7\_APINotLicensed,  
ERR7\_FileNotOpen, ERR7\_InvalidFileUnit, ERR7\_NoError,  
ERR7\_PlateDoesNotHaveThickness, ERR7\_ResultFileIsOpen,  
ERR7\_UnknownProperty

# St7GetPlateThickness

---

## Description

Returns the thickness assigned to the specified plate property.

## Syntax

```
long St7GetPlateThickness(long uID, long PropNum, double*  
                           Doubles)
```

## Input Parameters

uID

Strand7 model file ID number.

PropNum

Plate property number.

## Output Parameters

Doubles [0..1]

A 2 element array containing the membrane and bending thickness values respectively.

## Errors

ERR7\_APINotInitialised, ERR7\_APINotLicensed,  
ERR7\_FileNotOpen, ERR7\_InvalidFileUnit, ERR7\_NoError,  
ERR7\_PlateDoesNotHaveThickness, ERR7\_UnknownProperty

---

# St7SetPlateIsotropicMaterial

---

## Description

Sets the isotropic material parameters for the specified plate property.

## Syntax

```
long St7SetPlateIsotropicMaterial(long uID, long PropNum,  
double* Doubles)
```

## Input Parameters

uID

Strand7 model file ID number.

PropNum

Plate property number.

Doubles[0..7]

[ipPlateIsoModulus] - Modulus.

[ipPlateIsoPoisson] - Poisson's ratio.

[ipPlateIsoDensity] - Density.

[ipPlateIsoAlpha] - Thermal expansion coefficient.

[ipPlateIsoViscosity] - Viscous damping coefficient.

[ipPlateIsoDampingRatio] - Damping ratio.

[ipPlateIsoConductivity] - Conductivity coefficient.

[ipPlateIsoSpecificHeat] - Specific heat coefficient.

## Errors

```
ERR7_APINotInitialised, ERR7_APINotLicensed,  
ERR7_FileNotOpen, ERR7_InvalidFileUnit,  
ERR7_MaterialNotIsotropic, ERR7_NoError,  
ERR7_ResultFileIsOpen, ERR7_UnknownProperty
```

## St7GetPlateIsotropicMaterial

---

### Description

Returns the isotropic material properties for the specified plate property.

### Syntax

```
long St7GetPlateIsotropicMaterial(long uID, long PropNum,  
double* Doubles)
```

### Input Parameters

uID

Strand7 model file ID number.

PropNum

Plate property number.

### Output Parameters

Doubles [0..7]

[ipPlateIsoModulus] - Modulus.

[ipPlateIsoPoisson] - Poisson's ratio.

[ipPlateIsoDensity] - Density.

[ipPlateIsoAlpha] - Thermal expansion coefficient.

[ipPlateIsoViscosity] - Viscous damping coefficient.

[ipPlateIsoDampingRatio] - Damping ratio.

[ipPlateIsoConductivity] - Conductivity coefficient.

[ipPlateIsoSpecificHeat] - Specific heat coefficient.

### Errors

ERR7\_APINotInitialised, ERR7\_APINotLicensed,  
ERR7\_FileNotOpen, ERR7\_InvalidFileUnit,  
ERR7\_MaterialNotIsotropic, ERR7\_NoError,  
ERR7\_UnknownProperty

---

## St7SetPlateOrthotropicMaterial

---

### Description

Sets the orthotropic material properties for the specified plate property.

### Syntax

```
long St7SetPlateOrthotropicMaterial(long uID, long PropNum,  
double* Doubles)
```

### Input Parameters

uID

Strand7 model file ID number.

PropNum

Plate property number.

Doubles[0..17]

[ipPlateOrthoModulus1] - Modulus in the 1 axis direction.

[ipPlateOrthoModulus2] - Modulus in the 2 axis direction.

[ipPlateOrthoModulus3] - Modulus in the 3 axis direction.

[ipPlateOrthoShear12] - Shear modulus in the 12 axis direction.

[ipPlateOrthoShear23] - Shear modulus in the 23 axis direction.

[ipPlateOrthoShear31] - Shear modulus in the 31 axis direction.

[ipPlateOrthoPoisson12] - Poisson's ratio in the 12 axis direction.

[ipPlateOrthoPoisson23] - Poisson's ratio in the 23 axis direction.

[ipPlateOrthoPoisson31] - Poisson's ratio in 31 axis direction.

[ipPlateOrthoDensity] - Density.

[ipPlateOrthoAlpha1] - Thermal expansion coefficient in the 12 axis direction.

[ipPlateOrthoAlpha2] - Thermal expansion coefficient in the 23 axis direction.

[ipPlateOrthoAlpha3] - Thermal expansion coefficient in the 31 axis direction.

[ipPlateOrthoViscosity] - Viscous damping coefficient.

[ipPlateOrthoDampingRatio] - Damping ratio.

[ipPlateOrthoConductivity1] - Thermal conductivity in the 1 axis direction.

[ipPlateOrthoConductivity2] - Thermal conductivity in the 2 axis direction.

[ipPlateOrthoSpecificHeat] - Specific heat coefficient.

## Errors

ERR7\_APINotInitialised, ERR7\_APINotLicensed,  
ERR7\_FileNotOpen, ERR7\_InvalidFileUnit,  
ERR7\_MaterialNotOrthotropic, ERR7\_NoError,  
ERR7\_ResultFileIsOpen, ERR7\_UnknownProperty

# St7GetPlateOrthotropicMaterial

---

## Description

Returns the orthotropic material properties assigned to the specified plate property.

## Syntax

```
long St7GetPlateOrthotropicMaterial(long uID, long PropNum,  
double* Doubles)
```

## Input Parameters

uID

Strand7 model file ID number.

PropNum

Plate property number.

## Output Parameters

Doubles[0..17]

[ipPlateOrthoModulus1] - Modulus in the 1 axis direction.

---

[ipPlateOrthoModulus2] - Modulus in the 2 axis direction.

[ipPlateOrthoModulus3] - Modulus in the 3 axis direction.

[ipPlateOrthoShear12] - Shear modulus in the 12 axis direction.

[ipPlateOrthoShear23] - Shear modulus in the 23 axis direction.

[ipPlateOrthoShear31] - Shear modulus in the 31 axis direction.

[ipPlateOrthoPoisson12] - Poisson's ratio in the 12 axis direction.

[ipPlateOrthoPoisson23] - Poisson's ratio in the 23 axis direction.

[ipPlateOrthoPoisson31] - Poisson's ratio in 31 axis direction.

[ipPlateOrthoDensity] - Density.

[ipPlateOrthoAlpha1] - Thermal expansion coefficient in the 12 axis direction.

[ipPlateOrthoAlpha2] - Thermal expansion coefficient in the 23 axis direction.

[ipPlateOrthoAlpha3] - Thermal expansion coefficient in the 31 axis direction.

[ipPlateOrthoViscosity] - Viscous damping coefficient.

[ipPlateOrthoDampingRatio] - Damping ratio.

[ipPlateOrthoConductivity1] - Thermal conductivity in the 1 axis direction.

[ipPlateOrthoConductivity2] - Thermal conductivity in the 2 axis direction.

[ipPlateOrthoSpecificHeat] - Specific heat coefficient.

## Errors

ERR7\_APINotInitialised, ERR7\_APINotLicensed,  
ERR7\_FileNotOpen, ERR7\_InvalidFileUnit,  
ERR7\_MaterialNotOrthotropic, ERR7\_NoError,  
ERR7\_UnknownProperty

## St7SetPlateRubberMaterial

---

### Description

Sets the rubber material properties for the specified plate property.

### Syntax

```
long St7SetPlateRubberMaterial(long uID, long PropNum, long  
    RubberType, double* Doubles)
```

### Input Parameters

uID

Strand7 model file ID number.

PropNum

Plate property number.

RubberType

Type of rubber material model, one of kNeoHookean, kMooneyRivlin,  
kGeneralisedMooneyRivlin, kOgden.

Doubles[0..15]

An array describing the rubber material coefficients. The format depends on  
the material sub-type, with different sub-types requiring a varying number of  
rubber coefficients following the common data:

[ipRubberBulk] - Bulk modulus.

[ipRubberDensity] - Density.

[ipRubberAlpha] - Thermal expansion coefficient.

[ipRubberViscosity] - Viscous damping coefficient.

[ipRubberDampingRatio] - Damping ratio.

[ipRubberConductivity] - Conductivity.

[ipRubberSpecificHeat] - Specific heat.

[ipRubberConstC1..ipRubberConstC1+Num] - Rubber coefficients,

where:

Num = 0 (Neo-Hookean)

---

```
Num = 1 (Mooney-Rivlin)
Num = 8 (Generalised Mooney-Rivlin)
Num = 5 (Ogden)
```

## Errors

```
ERR7_APINotInitialised, ERR7_APINotLicensed,
ERR7_FileNotOpen, ERR7_InvalidFileUnit,
ERR7_InvalidRubberModel, ERR7_MaterialNotRubber,
ERR7_NoError, ERR7_ResultFileIsOpen, ERR7_UnknownProperty
```

# St7GetPlateRubberMaterial

---

## Description

Returns the rubber material properties assigned to the specified plate property.

## Syntax

```
long St7GetPlateRubberMaterial(long uID, long PropNum,
                               long* RubberType, double* Doubles)
```

## Input Parameters

uID

Strand7 model file ID number.

PropNum

Plate property number.

## Output Parameters

RubberType

Type of rubber material model, one of kNeoHookean, kMooneyRivlin,  
kGeneralisedMooneyRivlin, kOgden.

Doubles[0..15]

An array describing the rubber material coefficients. The format depends on  
the material sub-type, with different sub-types requiring a varying number of  
rubber coefficients following the common data:

[ipRubberBulk] - Bulk modulus.

[ipRubberDensity] - Density.

[ipRubberAlpha] - Thermal expansion coefficient.

[ipRubberViscosity] - Viscous damping coefficient.  
[ipRubberDampingRatio] - Damping ratio.  
[ipRubberConductivity] - Conductivity.  
[ipRubberSpecificHeat] - Specific heat.  
[ipRubberConstC1..ipRubberConstC1+Num] - Rubber coefficients,

where:

Num = 0 (Neo-Hookean)  
Num = 1 (Mooney-Rivlin)  
Num = 8 (Generalised Mooney-Rivlin)  
Num = 5 (Ogden)

## Errors

ERR7\_APINotInitialised, ERR7\_APINotLicensed,  
ERR7\_FileNotOpen, ERR7\_InvalidFileUnit,  
ERR7\_MaterialNotRubber, ERR7\_NoError, ERR7\_UnknownProperty

## St7SetPlateAnisotropicMaterial

---

### Description

Sets the anisotropic material properties for the specified plate property.

### Syntax

```
long St7SetPlateAnisotropicMaterial(long uID, long PropNum,  
                                     long MatType, double* Doubles)
```

### Input Parameters

uID

Strand7 model file ID number.

PropNum

Plate property number.

MatType

Matrix type, either mtStiffness or mtCompliance.

Doubles [0..22]

- 
- [ 0 .. 5 ] - In-plane components of the anisotropic material stress-strain matrix D defined by the coefficients D<sub>11</sub>, D<sub>12</sub>, D<sub>13</sub>, D<sub>22</sub>, D<sub>23</sub> and D<sub>33</sub>, respectively.
  - [ 6 .. 9 ] - Out-of-plane components of the anisotropic material stress-strain matrix D defined by the coefficients D<sub>14</sub>, D<sub>24</sub>, D<sub>34</sub>, and D<sub>44</sub>, respectively (plane stress and plane strain elements only).
  - [ ipPlateAnisoTransShear1 ] - Transverse shear modulus in the 13 plane (plate/shell elements only).
  - [ ipPlateAnisoTransShear2 ] - Transverse shear modulus in the 23 plane (plate/shell elements only).
  - [ ipPlateAnisoTransShear3 ] - Transverse shear coupling modulus (plate/shell elements only).
  - [ ipPlateAnisoDensity ] - Density.
  - [ ipPlateAnisoAlpha1 ] - Thermal expansion coefficient in the 1 axis direction.
  - [ ipPlateAnisoAlpha2 ] - Thermal expansion coefficient in the 2 axis direction.
  - [ ipPlateAnisoAlpha3 ] - Thermal expansion coefficient in the 3 axis direction.
  - [ ipPlateAnisoAlpha12 ] - Thermal expansion coefficient in the 12 axis direction.
  - [ ipPlateAnisoViscosity ] - Viscous damping coefficient.
  - [ ipPlateAnisoDampingRatio ] - Damping ratio.
  - [ ipPlateAnisoConductivity1 ] - Conductivity coefficient in the 1 axis direction.
  - [ ipPlateAnisoConductivity2 ] - Conductivity coefficient in the 2 axis direction.
  - [ ipPlateAnisoSpecificHeat ] - Specific heat coefficient.

## Errors

ERR7\_APINotInitialised, ERR7\_APINotLicensed,  
ERR7\_FileNotOpen, ERR7\_InvalidFileUnit,

ERR7\_InvalidMatrixType, ERR7\_MaterialNotAnisotropic,  
ERR7\_NoError, ERR7\_ResultFileIsOpen, ERR7\_UnknownProperty

## St7GetPlateAnisotropicMaterial

---

### Description

Returns the anisotropic material properties assigned to the specified plate property.

### Syntax

```
long St7GetPlateAnisotropicMaterial(long uID, long PropNum,  
long* MatType, double* Doubles)
```

### Input Parameters

uID

Strand7 model file ID number.

PropNum

Plate property number.

### Output Parameters

MatType

Matrix type, either mtStiffness or mtCompliance.

Doubles [0..2]

[0..5] - In-plane components of the anisotropic material stress-strain matrix D defined by the coefficients D<sub>11</sub>, D<sub>12</sub>, D<sub>13</sub>, D<sub>22</sub>, D<sub>23</sub> and D<sub>33</sub>, respectively.

[6..9] - Out-of-plane components of the anisotropic material stress-strain matrix D defined by the coefficients D<sub>14</sub>, D<sub>24</sub>, D<sub>34</sub>, and D<sub>44</sub>, respectively (plane stress and plane strain elements only).

[ipPlateAnisoTransShear1] - Transverse shear modulus in the 13 plane.

[ipPlateAnisoTransShear2] - Transverse shear modulus in the 23 plane.

[ipPlateAnisoTransShear3] - Transverse shear coupling modulus.

[ipPlateAnisoDensity] - Density.

[ipPlateAnisoAlpha1] - Thermal expansion coefficient in the 1 axis direction.

---

[ipPlateAnisoAlpha2] - Thermal expansion coefficient in the 2 axis direction.

[ipPlateAnisoAlpha3] - Thermal expansion coefficient in the 3 axis direction.

[ipPlateAnisoAlpha12] - Thermal expansion coefficient in the 12 axis direction.

[ipPlateAnisoViscosity] - Viscous damping coefficient.

[ipPlateAnisoDampingRatio] - Damping ratio.

[ipPlateAnisoConductivity1] - Conductivity coefficient in the 1 axis direction.

[ipPlateAnisoConductivity2] - Conductivity coefficient in the 2 axis direction.

[ipPlateAnisoSpecificHeat] - Specific heat coefficient.

## Errors

ERR7\_APINotInitialised, ERR7\_APINotLicensed,  
ERR7\_FileNotOpen, ERR7\_InvalidFileUnit,  
ERR7\_MaterialNotAnisotropic, ERR7\_NoError,  
ERR7\_UnknownProperty

# St7SetPlateUserDefinedMaterial

---

## Description

Sets the user defined material properties for the specified plate property.

## Syntax

```
long St7SetPlateUserDefinedMaterial(long uID, long PropNum,  
                                long MatType, double* Doubles)
```

## Input Parameters

uID

Strand7 model file ID number.

PropNum

Plate property number.

MatType

Matrix type, either mtStiffness or mtCompliance.

Doubles [0..35]

[0..5] - Material membrane matrix C defined by the coefficients  $C_{11}$ ,  $C_{12}$ ,  $C_{13}$ ,  $C_{22}$ ,  $C_{23}$  and  $C_{33}$ , respectively.

[6..11] - Material bending matrix D defined by the coefficients  $D_{11}$ ,  $D_{12}$ ,  $D_{13}$ ,  $D_{22}$ ,  $D_{23}$  and  $D_{33}$ , respectively.

[12..20] - Material membrane-bending coupling matrix D defined by the coefficients  $D_{11}$ ,  $D_{12}$ ,  $D_{13}$ ,  $D_{22}$ ,  $D_{23}$ ,  $D_{33}$ ,  $D_{21}$ ,  $D_{31}$  and  $D_{32}$  respectively.

[ipPlateUserTransShearxz] - Transverse shear modulus  $G_{13}$ .

[ipPlateUserTransShearyz] - Transverse shear modulus  $G_{23}$ .

[ipPlateUserTransShearcz] - Transverse shear coupling modulus  $G_{c3}$ .

[ipPlateUserDensity] - Density.

[ipPlateUserAlphax] - Thermal expansion coefficient in the 1 axis direction.

[ipPlateUserAlphay] - Thermal expansion coefficient in the 2 axis direction.

[ipPlateUserAlphaxy] - Thermal expansion coefficient in the 12 axis direction.

[ipPlateUserBetax] - Thermal curvature expansion coefficient along the 1 axis direction.

[ipPlateUserBetay] - Thermal curvature expansion coefficient along the 2 axis direction.

[ipPlateUserBetaxy] - Thermal twist expansion coefficient.

[ipPlateUserViscosity] - Viscous damping coefficient.

[ipPlateUserDampingRatio] - Damping ratio.

[ipPlateUserConductivity1] - Conductivity coefficient in the 1 axis direction.

---

[ipPlateUserConductivity2] - Conductivity coefficient in the 2 axis direction.

[ipPlateUserSpecificHeat] - Specific heat coefficient.

## Errors

ERR7\_APINotInitialised, ERR7\_APINotLicensed,  
ERR7\_FileNotOpen, ERR7\_InvalidFileUnit,  
ERR7\_InvalidMatrixType, ERR7\_MaterialNotUserDefined,  
ERR7\_NoError, ERR7\_ResultFileIsOpen, ERR7\_UnknownProperty

# St7GetPlateUserDefinedMaterial

---

## Description

Returns the user defined material properties assigned to the specified plate property.

## Syntax

```
long St7GetPlateUserDefinedMaterial(long uID, long PropNum,  
long* MatType, double* Doubles)
```

## Input Parameters

uID

Strand7 model file ID number.

PropNum

Plate property number.

## Output Parameters

MatType

Matrix type, either mtStiffness or mtCompliance.

Doubles[0..35]

[0..5] - Material membrane matrix C defined by the coefficients  $C_{11}$ ,  $C_{12}$ ,  $C_{13}$ ,  $C_{22}$ ,  $C_{23}$  and  $C_{33}$ , respectively.

[6..11] - Material bending matrix D defined by the coefficients  $D_{11}$ ,  $D_{12}$ ,  $D_{13}$ ,  $D_{22}$ ,  $D_{23}$  and  $D_{33}$ , respectively.

[12..20] - Material membrane-bending coupling matrix D defined by the coefficients  $D_{11}$ ,  $D_{12}$ ,  $D_{13}$ ,  $D_{22}$ ,  $D_{23}$ ,  $D_{33}$ ,  $D_{21}$ ,  $D_{31}$  and  $D_{32}$  respectively.

[ipPlateUserTransShearxz] - Transverse shear modulus  $G_{13}$ .

[ipPlateUserTransShearyz] - Transverse shear modulus  $G_{23}$ .

[ipPlateUserTransShearcz] - Transverse shear modulus  $G_{c3}$ .

[ipPlateUserDensity] - Density.

[ipPlateUserAlphax] - Thermal expansion coefficient in the 1 axis direction.

[ipPlateUserAlphay] - Thermal expansion coefficient in the 2 axis direction.

[ipPlateUserAlphaxy] - Thermal expansion coefficient in the 12 axis direction.

[ipPlateUserBetax] - Thermal curvature expansion coefficient along the 1 axis direction.

[ipPlateUserBetay] - Thermal curvature expansion coefficient along the 2 axis direction.

[ipPlateUserBetaxy] - Thermal twist expansion coefficient.

[ipPlateUserViscosity] - Viscous damping coefficient.

[ipPlateUserDampingRatio] - Damping ratio.

[ipPlateUserConductivity1] - Conductivity coefficient in the 1 axis direction.

[ipPlateUserConductivity2] - Conductivity coefficient in the 2 axis direction.

[ipPlateUserSpecificHeat] - Specific heat coefficient.

## Errors

ERR7\_APINotInitialised, ERR7\_APINotLicensed,  
ERR7\_FileNotOpen, ERR7\_InvalidFileUnit,  
ERR7\_MaterialNotUserDefined, ERR7\_NoError,  
ERR7\_UnknownProperty

---

## St7SetPlateMCDPMaterial

---

### Description

Sets the material properties for the specified Mohr-Coulomb or Drucker-Prager plate property.

### Syntax

```
long St7SetPlateMCDPMaterial(long uID, long PropNum,  
double* Doubles)
```

### Input Parameters

uID

Strand7 model file ID number.

PropNum

Plate property number.

Doubles[0..1]

[ipFrictionAngle] - Friction angle.

[ipCohesion] - Cohesion value.

### Errors

```
ERR7_APINotInitialised, ERR7_APINotLicensed,  
ERR7_FileNotOpen, ERR7_InvalidFileUnit,  
ERR7_InvalidPlateType, ERR7_MaterialNotIsotropic,  
ERR7_NoError, ERR7_ResultFileIsOpen, ERR7_UnknownProperty,  
ERR7_YieldNotMCDP
```

---

## St7GetPlateMCDPMaterial

---

### Description

Returns the material properties assigned to the specified Mohr-Coulomb or Drucker-Prager plate property.

### Syntax

```
long St7GetPlateMCDPMaterial(long uID, long PropNum,  
double* Doubles)
```

### Input Parameters

uID

Strand7 model file ID number.

PropNum

Plate property number.

## Output Parameters

Doubles[0..1]

[ipFrictionAngle] - Friction angle.

[ipCohesion] - Cohesion value.

## Errors

ERR7\_APINotInitialised, ERR7\_APINotLicensed,  
ERR7\_FileNotOpen, ERR7\_InvalidFileUnit,  
ERR7\_InvalidPlateType, ERR7\_MaterialNotIsotropic,  
ERR7\_NoError, ERR7\_UnknownProperty, ERR7\_YieldNotMCDP

# St7SetPlateSoilDCMaterial

---

## Description

Sets the soil material properties for the specified Duncan-Chang plate property.

## Syntax

```
long St7SetPlateSoilDCMaterial(long uID, long PropNum,  
                                long* Integers, double* Doubles)
```

## Input Parameters

uID

Strand7 model file ID number.

PropNum

Plate property number.

Integers[0..1]

[ipSoilDCUsePoisson] - Use Poisson's ratio, either btTrue or btFalse.

[ipSoilDCSetLevel] - Set fluid level, either btTrue or btFalse.

Doubles[0..16]

[ipSoilDCModulusK] - Modulus.

---

[ipSoilDCModulusKUR] - Unloading/reloading modulus.

[ipSoilDCModulusN] - Modulus exponent.

[ipSoilDCPoisson] - Poisson's ratio.

[ipSoilDCBulkK] - Bulk modulus.

[ipSoilDCBulkM] - Bulk modulus exponent.

[ipSoilDCFrictionAngle] - Friction angle.

[ipSoilDCDeltaAngle] - Friction angle change.

[ipSoilDCCohesion] - Cohesion value.

[ipSoilDCFailureRatio] - Failure ratio.

[ipSoilDCFailureMod] - Failure modulus.

[ipSoilDCReferenceP] - Reference pressure.

[ipSoilDCDensity] - Density.

[ipSoilDCHorizontalRatio] - Horizontal stress ratio.

[ipSoilDCConductivity] - Conductivity.

[ipSoilDCSpecificHeat] - Specific heat.

[ipSoilDCFluidLevel] - Fluid level.

## Errors

ERR7\_APINotInitialised, ERR7\_APINotLicensed,  
ERR7\_FileNotOpen, ERR7\_InvalidFileUnit,  
ERR7\_MaterialNotSoil, ERR7\_NoError, ERR7\_ResultFileIsOpen,  
ERR7\_SoilTypeNotDC, ERR7\_UnknownProperty

## St7GetPlateSoilDCMaterial

---

### Description

Returns the soil material properties assigned to the specified Duncan-Chang plate property.

## Syntax

```
long St7GetPlateSoilDCMaterial(long uID, long PropNum,  
                                long* Integers, double* Doubles)
```

## Input Parameters

uID

Strand7 model file ID number.

PropNum

Plate property number.

## Output Parameters

Integers[0..1]

[ipSoilDCUsePoisson] - Use Poisson's ratio, either btTrue or btFalse.

[ipSoilDCSetLevel] - Set fluid level, either btTrue or btFalse.

Doubles[0..16]

[ipSoilDCModulusK] - Modulus.

[ipSoilDCModulusKUR] - Unloading/reloading modulus.

[ipSoilDCModulusN] - Modulus exponent.

[ipSoilDCPoisson] - Poisson's ratio.

[ipSoilDCBulkK] - Bulk modulus.

[ipSoilDCBulkM] - Bulk modulus exponent.

[ipSoilDCFrictionAngle] - Friction angle.

[ipSoilDCDeltaAngle] - Friction angle change.

[ipSoilDCCohesion] - Cohesion value.

[ipSoilDCFailureRatio] - Failure ratio.

[ipSoilDCFailureMod] - Failure modulus.

[ipSoilDCReferenceP] - Reference pressure.

[ipSoilDCDensity] - Density.

[ipSoilDCHorizontalRatio] - Horizontal stress ratio.

---

[ipSoilDCConductivity] - Conductivity.

[ipSoilDCSpecificHeat] - Specific heat.

[ipSoilDCFluidLevel] - Fluid level.

## Errors

ERR7\_APINotInitialised, ERR7\_APINotLicensed,  
ERR7\_FileNotOpen, ERR7\_InvalidFileUnit,  
ERR7\_MaterialNotSoil, ERR7\_NoError, ERR7\_SoilTypeNotDC,  
ERR7\_UnknownProperty

# St7SetPlateSoilCCMaterial

---

## Description

Sets the soil material properties for the specified Cam-Clay plate property.

## Syntax

```
long St7SetPlateSoilCCMaterial(long uID, long PropNum,  
                                long* Integers, double* Doubles)
```

## Input Parameters

uID

Strand7 model file ID number.

PropNum

Plate property number.

Integers[0..3]

[ipSoilCCUsePoisson] - Use Poisson's ratio, either btTrue or btFalse.

[ipSoilCCDrainedState] - Drained state, either btTrue or btFalse.

[ipSoilCCUseOCR] - Overconsolidation, either btTrue or btFalse.

[ipSoilCCSetLevel] - Set fluid level, either btTrue or btFalse.

Doubles[0..14]

[ipSoilCCCriticalStateLine] - Critical state line slope.

[ipSoilCCConsolidationLine] - Normal consolidation line slope.

[ipSoilCCSwellingLine] - Swelling line slope.  
[ipSoilCCDensity] - Density.  
[ipSoilCCPoisson] - Poisson's ratio.  
[ipSoilCCModulusG] - Shear modulus at point A.  
[ipSoilCCModulusB] - Shear modulus at point B.  
[ipSoilCCHorizontalRatio] - Horizontal stress ratio.  
[ipSoilCCER] - Reference void ratio.  
[ipSoilCCPR] - Unit pressure ratio.  
[ipSoilCCPC0] - Initial consolidation pressure.  
[ipSoilCCOCR] - Overconsolidation ratio.  
[ipSoilCCConductivity] - Conductivity.  
[ipSoilCCSpecificHeat] - Specific heat.  
[ipSoilCCFluidLevel] - Fluid level.

## Errors

ERR7\_APINotInitialised, ERR7\_APINotLicensed,  
ERR7\_FileNotOpen, ERR7\_InvalidFileUnit,  
ERR7\_MaterialNotSoil, ERR7\_NoError, ERR7\_ResultFileIsOpen,  
ERR7\_SoilTypeNotCC, ERR7\_UnknownProperty

## St7GetPlateSoilCCMaterial

---

### Description

Returns the soil material properties assigned to the specified Cam-Clay plate property.

### Syntax

```
long St7GetPlateSoilCCMaterial(long uID, long PropNum,  
                                long* Integers, double* Doubles)
```

### Input Parameters

uID

---

Strand7 model file ID number.

PropNum

Plate property number.

## Output Parameters

Integers[0..3]

[ipSoilCCUsePoisson] - Use Poisson's ratio, either btTrue or btFalse.

[ipSoilCCDrainedState] - Drained state, either btTrue or btFalse.

[ipSoilCCUseOCR] - Over-consolidation, either btTrue or btFalse.

[ipSoilCCSetLevel] - Set fluid level, either btTrue or btFalse.

Doubles[0..14]

[ipSoilCCCriticalStateLine] - Critical state line slope.

[ipSoilCCConsolidationLine] - Normal consolidation line slope.

[ipSoilCCSwellingLine] - Swelling line slope.

[ipSoilCCDensity] - Density.

[ipSoilCCPoisson] - Poisson's ratio.

[ipSoilCCModulusG] - Shear modulus at point A.

[ipSoilCCModulusB] - Shear modulus at point B.

[ipSoilCCHorizontalRatio] - Horizontal stress ratio.

[ipSoilCCER] - Reference void ratio.

[ipSoilCCPR] - Unit pressure ratio.

[ipSoilCCPC0] - Initial consolidation pressure.

[ipSoilCCOCR] - Over-consolidation ratio.

[ipSoilCCConductivity] - Conductivity.

[ipSoilCCSpecificHeat] - Specific heat.

[ipSoilCCFluidLevel] - Fluid level.

## Errors

```
ERR7_APINotInitialised, ERR7_APINotLicensed,  
ERR7_FileNotOpen, ERR7_InvalidFileUnit,  
ERR7_MaterialNotSoil, ERR7_NoError, ERR7_SoilTypeNotCC,  
ERR7_UnknownProperty
```

# St7SetPlateSoilMCMaterial

---

## Description

Assigns the Mohr-Coulomb soil parameters for the specified plate property.

## Syntax

```
long St7SetPlateSoilMCMaterial(long uID, long PropNum,  
                                long* Integers, double* Doubles)
```

## Input Parameters

uID

Strand7 model file ID number.

PropNum

Property number.

Integers[0..0]

[ipSoilMCSetLevel] - Set a fluid level, either btTrue or btFalse.

Doubles[0..9]

[ipSoilMCModulus] - Modulus.

[ipSoilMCPoisson] - Poisson's ratio.

[ipSoilMCDensity] - Density.

[ipSoilMCCohesion] - Cohesion value.

[ipSoilMCFrictionAngle] - Friction angle.

[ipSoilMCHorizontalRatio] - Horizontal stress ratio.

[ipSoilMCER] - Void ratio.

[ipSoilMCConductivity] - Conductivity.

---

[ipSoilMCspecificHeat] - Specific heat.

[ipSoilMCFuidLevel] - Fluid level.

## Errors

ERR7\_APINotInitialised, ERR7\_APINotLicensed,  
ERR7\_FileNotOpen, ERR7\_InvalidFileUnit,  
ERR7\_MaterialNotSoil, ERR7\_NoError, ERR7\_ResultFileIsOpen,  
ERR7\_SoilTypeNotMC, ERR7\_UnknownProperty

# St7GetPlateSoilMCMaterial

---

## Description

Returns the Mohr-Coulomb soil parameters assigned to the specified plate property.

## Syntax

```
long St7GetPlateSoilMCMaterial(long uID, long PropNum,  
                                long* Integers, double* Doubles)
```

## Input Parameters

uID

Strand7 model file ID number.

PropNum

Property number.

## Output Parameters

Integers[0..0]

[ipSoilMCSetLevel] - Set a fluid level, either btTrue or btFalse.

Doubles[0..9]

[ipSoilMCModulus] - Modulus.

[ipSoilMCPoisson] - Poisson's ratio.

[ipSoilMCDensity] - Density.

[ipSoilMCCohesion] - Cohesion value.

[ipSoilMCFrictionAngle] - Friction angle.

[ipSoilMCHorizontalRatio] - Horizontal stress ratio.

[ipSoilMCER] - Void ratio.

[ipSoilMCConductivity] - Conductivity.

[ipSoilMCSpecificHeat] - Specific heat.

[ipSoilMCFluidLevel] - Fluid level.

## Errors

ERR7\_APINotInitialised, ERR7\_APINotLicensed,  
ERR7\_FileNotOpen, ERR7\_InvalidFileUnit,  
ERR7\_MaterialNotSoil, ERR7\_NoError, ERR7\_SoilTypeNotMC,  
ERR7\_UnknownProperty

# St7SetPlateSoilDPMaterial

---

## Description

Assigns the Drucker-Prager soil parameters to the specified plate property.

## Syntax

```
long St7SetPlateSoilDPMaterial(long uID, long PropNum,  
                                long* Integers, double* Doubles)
```

## Input Parameters

uID

Strand7 model file ID number.

PropNum

Property number.

Integers[0..0]

[ipSoilDPSetLevel] - Set a fluid level, either btTrue or btFalse.

Doubles[0..9]

[ipSoilDPModulus] - Modulus.

[ipSoilDPPoisson] - Poisson's ratio.

[ipSoilDPDensity] - Density.

---

[ipSoilDP Cohesion] - Cohesion value.  
[ipSoilDP FrictionAngle] - Friction angle.  
[ipSoilDP HorizontalRatio] - Horizontal stress ratio.  
[ipSoilDP E] - Void ratio.  
[ipSoilDP Conductivity] - Conductivity.  
[ipSoilDP SpecificHeat] - Specific heat.  
[ipSoilDP FluidLevel] - Fluid level.

## Errors

ERR7\_APINotInitialised, ERR7\_APINotLicensed,  
ERR7\_FileNotOpen, ERR7\_InvalidFileUnit,  
ERR7\_MaterialNotSoil, ERR7\_NoError, ERR7\_ResultFileIsOpen,  
ERR7\_SoilTypeNotDP, ERR7\_UnknownProperty

# St7GetPlateSoilDPMaterial

---

## Description

Returns the Drucker-Prager soil parameters assigned to the specified plate property.

## Syntax

```
long St7GetPlateSoilDPMaterial(long uID, long PropNum,  
                                long* Integers, double* Doubles)
```

## Input Parameters

uID

Strand7 model file ID number.

PropNum

Property number.

## Output Parameters

Integers[0..0]

[ipSoilDP SetLevel] - Set a fluid level, either btTrue or btFalse.

Doubles[0..9]

[ipSoilDPModulus] - Modulus.  
[ipSoilDPPoisson] - Poisson's ratio.  
[ipSoilDPDensity] - Density.  
[ipSoilDPCohesion] - Cohesion value.  
[ipSoilDPFrictionAngle] - Friction angle.  
[ipSoilDPHorizontalRatio] - Horizontal stress ratio.  
[ipSoilDPVoidRatio] - Void ratio.  
[ipSoilDPConductivity] - Conductivity.  
[ipSoilDPSpecificHeat] - Specific heat.  
[ipSoilDPFluidLevel] - Fluid level.

## Errors

ERR7\_APINotInitialised, ERR7\_APINotLicensed,  
ERR7\_FileNotOpen, ERR7\_InvalidFileUnit,  
ERR7\_MaterialNotSoil, ERR7\_NoError, ERR7\_SoilTypeNotDP,  
ERR7\_UnknownProperty

## St7SetPlateSoilLSMaterial

---

### Description

Sets the linear elastic soil parameters for the specified plate property.

### Syntax

```
long St7SetPlateSoilLSMaterial(long uID, long PropNum,  
                                long* Integers, double* Doubles)
```

### Input Parameters

uID

Strand7 model file ID number.

PropNum

Property number.

Integers [0..0]

---

[ipSoilLSSetLevel] - Set a fluid level, either btTrue or btFalse.  
Doubles[0..7]

[ipSoilLSModulus] - Modulus.

[ipSoilLSPoisson] - Poisson's ratio.

[ipSoilLSDensity] - Density.

[ipSoilLSHorizontalRatio] - Horizontal stress ratio.

[ipSoilLSER] - Void ratio.

[ipSoilLSCconductivity] - Conductivity.

[ipSoilLSSpecificHeat] - Specific heat.

[ipSoilLSFluidLevel] - Fluid level.

## Errors

ERR7\_APINotInitialised, ERR7\_APINotLicensed,  
ERR7\_FileNotOpen, ERR7\_InvalidFileUnit,  
ERR7\_MaterialNotSoil, ERR7\_NoError, ERR7\_ResultFileIsOpen,  
ERR7\_SoilTypeNotLS, ERR7\_UnknownProperty

# St7GetPlateSoilLSMaterial

---

## Description

Returns the linear elastic soil parameters for the specified plate property.

## Syntax

```
long St7GetPlateSoilLSMaterial(long uID, long PropNum,  
                                long* Integers, double* Doubles)
```

## Input Parameters

uID

Strand7 model file ID number.

PropNum

Property number.

## Output Parameters

Integers[0..0]

[ipSoillSSetLevel] - Set a fluid level, either btTrue or btFalse.  
Doubles[0..7]  
[ipSoillSModulus] - Modulus.  
[ipSoillSPoisson] - Poisson's ratio.  
[ipSoillSDensity] - Density.  
[ipSoillSHorizontalRatio] - Horizontal stress ratio.  
[ipSoillSER] - Void ratio.  
[ipSoillSConductivity] - Conductivity.  
[ipSoillSSpecificHeat] - Specific heat.  
[ipSoillSFluidLevel] - Fluid level.

## Errors

ERR7\_APINotInitialised, ERR7\_APINotLicensed,  
ERR7\_FileNotOpen, ERR7\_InvalidFileUnit,  
ERR7\_MaterialNotSoil, ERR7\_NoError, ERR7\_SoilTypeNotLS,  
ERR7\_UnknownProperty

## St7SetPlateFluidMaterial

---

### Description

Sets the material properties for the specified fluid plate property.

### Syntax

```
long St7SetPlateFluidMaterial(long uID, long PropNum,  
                           double* Doubles)
```

### Input Parameters

uID

Strand7 model file ID number.

PropNum

Plate property number.

Doubles[0..7]

---

[ipFluidModulus] - Modulus.  
[ipFluidPenaltyParam] - Penalty parameter.  
[ipFluidDensity] - Density.  
[ipFluidAlpha] - Thermal expansion coefficient.  
[ipFluidViscosity] - Viscous damping coefficient.  
[ipFluidDampingRatio] - Damping ratio.  
[ipFluidConductivity] - Conductivity.  
[ipFluidSpecificHeat] - Specific heat.

## Errors

ERR7\_APINotInitialised, ERR7\_APINotLicensed,  
ERR7\_FileNotOpen, ERR7\_InvalidFileUnit, ERR7\_NoError,  
ERR7\_ResultFileIsOpen, ERR7\_UnknownProperty

# St7GetPlateFluidMaterial

---

## Description

Returns the material properties assigned to the specified fluid plate property.

## Syntax

```
long St7GetPlateFluidMaterial(long uID, long PropNum,  
                           double* Doubles)
```

## Input Parameters

uID

Strand7 model file ID number.

PropNum

Plate property number.

## Output Parameters

Doubles[0..7]

[ipFluidModulus] - Modulus.  
[ipFluidPenaltyParam] - Penalty parameter.

[ipFluidDensity] - Density.  
[ipFluidAlpha] - Thermal expansion coefficient.  
[ipFluidViscosity] - Viscous damping coefficient.  
[ipFluidDampingRatio] - Damping ratio.  
[ipFluidConductivity] - Conductivity.  
[ipFluidSpecificHeat] - Specific heat.

## Errors

ERR7\_APINotInitialised, ERR7\_APINotLicensed,  
ERR7\_FileNotOpen, ERR7\_InvalidFileUnit, ERR7\_NoError,  
ERR7\_UnknownProperty

## St7SetPlateUseReducedInt

---

### Description

Sets the state of the **Reduced Integration** flag for the specified plate property. This option is only used for the 2D and Axisymmetric plate property types.

### Syntax

```
long St7SetPlateUseReducedInt(long uID, long PropNum, bool  
    UseReducedInt)
```

### Input Parameters

uID

Strand7 model file ID number.

PropNum

Plate property number.

UseReducedInt

bTrue to use a reduced order integration scheme.

### Errors

ERR7\_APINotInitialised, ERR7\_APINotLicensed,  
ERR7\_FileNotOpen, ERR7\_InvalidFileUnit, ERR7\_NoError,  
ERR7\_ResultFileIsOpen, ERR7\_UnknownProperty

---

## St7GetPlateUseReducedInt

---

### Description

Returns the state of the **Reduced Integration** flag for the specified plate property. This option is only used for the 2D and Axisymmetric plate property types.

### Syntax

```
long St7GetPlateUseReducedInt(long uID, long PropNum, bool*  
    UseReducedInt)
```

### Input Parameters

uID

Strand7 model file ID number.

PropNum

Plate property number.

### Output Parameters

UseReducedInt

btTrue to use a reduced order integration scheme.

### Errors

ERR7\_APINotInitialised, ERR7\_APINotLicensed,  
ERR7\_FileNotOpen, ERR7\_InvalidFileUnit, ERR7\_NoError,  
ERR7\_UnknownProperty

---

## St7SetPlateLayers

---

### Description

Sets the number of layers used for MNL integrations through the plate thickness. The default is ten, and a maximum of 100 layers may be set.

### Syntax

```
long St7SetPlateLayers(long uID, long PropNum, long  
    NumLayers)
```

### Input Parameters

uID

Strand7 model file ID number.

PropNum

Plate property number.

NumLayers

Number of integration layers.

## Errors

ERR7\_APINotInitialised, ERR7\_APINotLicensed,  
ERR7\_FileNotOpen, ERR7\_InvalidFileUnit, ERR7\_NoError,  
ERR7\_ResultFileIsOpen, ERR7\_UnknownProperty,  
ERR7\_InvalidNumLayers, ERR7\_PlateDoesNotHaveLayers

# St7GetPlateLayers

---

## Description

Returns the number of layers used for MNL integrations through the plate thickness.

## Syntax

```
long St7GetPlateLayers(long uID, long PropNum, long*  
    NumLayers)
```

## Input Parameters

uID

Strand7 model file ID number.

PropNum

Plate property number.

## Output Parameters

NumLayers

Number of integration layers.

## Errors

ERR7\_APINotInitialised, ERR7\_APINotLicensed,  
ERR7\_FileNotOpen, ERR7\_InvalidFileUnit, ERR7\_NoError,  
ERR7\_UnknownProperty, ERR7\_PlateDoesNotHaveLayers

---

## St7NewBrickProperty

---

### Description

Creates a new brick property.

### Syntax

```
long St7NewBrickProperty(long uID, long PropNum, long  
MaterialType, char* PropName)
```

### Input Parameters

uID

Strand7 model file ID number.

PropNum

Brick property number.

MaterialType

Type of brick material, one of kMaterialTypeNull, kMaterialTypeIsotropic,  
kMaterialTypeOrthotropic, kMaterialTypeAnisotropic, kMaterialTypeRubber,  
kMaterialTypeSoil, kMaterialTypeUserDefined, kMaterialTypePly,  
kMaterialTypeFluid.

PropName

Name of the property.

### Errors

```
ERR7_APINotInitialised, ERR7_APINotLicensed,  
ERR7_FileNotOpen, ERR7_InvalidFileUnit,  
ERR7_InvalidMaterialType, ERR7_InvalidPropertyName,  
ERR7_NoError, ERR7_PropertyAlreadyExists,  
ERR7_ResultFileIsOpen
```

---

## St7GetBrickPropertyData

---

### Description

Returns the material data assigned to the specified brick property.

### Syntax

```
long St7GetBrickPropertyData(long uID, long PropNum, long*  
Integers, double* BrickMaterial)
```

## Input Parameters

uID

Strand7 model file ID number.

PropNum

Brick property number.

## Output Parameters

Integers

This is a dummy variable to allow for future expansion of this function. Any integer variable may be passed and will be returned unchanged.

BrickMaterial[0 .. kNumMaterialData-1]

[ipModulus] - Modulus.

[ipPoisson] - Poisson's ratio.

[ipDensity] - Density.

## Errors

ERR7\_APINotInitialised, ERR7\_APINotLicensed,  
ERR7\_FileNotOpen, ERR7\_InvalidFileUnit,  
ERR7\_MaterialNotIsotropic, ERR7\_NoError,  
ERR7\_UnknownProperty

# St7SetBrickPropertyType

---

## Description

Sets the material type for the specified brick property.

## Syntax

```
long St7SetBrickPropertyType(long uID, long PropNum, long  
MaterialType)
```

## Input Parameters

uID

Strand7 model file ID number.

PropNum

Brick property number.

---

### MaterialType

Type of brick material, one of kMaterialTypeNull, kMaterialTypeIsotropic, kMaterialTypeOrthotropic, kMaterialTypeAnisotropic, kMaterialTypeRubber, kMaterialTypeSoil, kMaterialTypeUserDefined, kMaterialTypePly, kMaterialTypeFluid.

### Errors

ERR7\_APINotInitialised, ERR7\_APINotLicensed,  
ERR7\_FileNotOpen, ERR7\_InvalidFileUnit,  
ERR7\_InvalidMaterialType, ERR7\_NoError,  
ERR7\_ResultFileIsOpen, ERR7\_UnknownProperty

## St7GetBrick.PropertyType

---

### Description

Returns the material type for the specified brick property.

### Syntax

```
long St7GetBrick.PropertyType(long uID, long PropNum, long*  
                           MaterialType)
```

### Input Parameters

uID

Strand7 model file ID number.

PropNum

Brick property number.

### Output Parameters

MaterialType

Type of brick material, one of kMaterialTypeNull, kMaterialTypeIsotropic, kMaterialTypeOrthotropic, kMaterialTypeAnisotropic, kMaterialTypeRubber, kMaterialTypeSoil, kMaterialTypeUserDefined, kMaterialTypePly, kMaterialTypeFluid.

### Errors

ERR7\_APINotInitialised, ERR7\_APINotLicensed,  
ERR7\_FileNotOpen, ERR7\_InvalidFileUnit, ERR7\_NoError,  
ERR7\_UnknownProperty

## St7SetBrickNonlinearType

---

### Description

Sets the nonlinear material type for the specified brick property.

### Syntax

```
long St7SetBrickNonlinearType(long uID, long PropNum, long  
NonlinType, long YieldType)
```

### Input Parameters

uID

Strand7 model file ID number.

PropNum

Brick property number.

NonlinType

Nonlinear material type, either ntNonlinElastic or ntElastoPlastic.

YieldType

Yield surface type, one of ycTresca, ycVonMises, ycMaxStress,  
ycMohrCoulomb or ycDruckerPrager.

### Errors

```
ERR7_APINotInitialised, ERR7_APINotLicensed,  
ERR7_FileNotOpen, ERR7_IncompatibleCriterionCombination,  
ERR7_InvalidFileUnit, ERR7_NoError, ERR7_ResultFileIsOpen,  
ERR7_UnknownProperty
```

## St7GetBrickNonlinearType

---

### Description

Returns the nonlinear material type assigned to the specified brick property.

### Syntax

```
long St7GetBrickNonlinearType(long uID, long PropNum, long*  
NonlinType, long* YieldType)
```

### Input Parameters

uID

---

Strand7 model file ID number.

PropNum

Brick property number.

## Output Parameters

NonlinType

Nonlinear material type, either ntNonlinElastic or ntElastoPlastic.

YieldType

Yield surface type, one of ycTresca, ycVonMises, ycMaxStress, ycMohrCoulomb or ycDruckerPrager.

## Errors

ERR7\_APINotInitialised, ERR7\_APINotLicensed,  
ERR7\_FileNotOpen, ERR7\_IncompatibleCriterionCombination,  
ERR7\_InvalidFileUnit, ERR7\_NoError, ERR7\_UnknownProperty

# St7SetBrickIsotropicMaterial

---

## Description

Set the isotropic material properties for the specified brick property.

## Syntax

```
long St7SetBrickIsotropicMaterial(long uID, long PropNum,  
double* Doubles)
```

## Input Parameters

uID

Strand7 model file ID number.

PropNum

Brick property number.

Doubles[0..7]

[ipBrickIsoModulus] - Modulus.

[ipBrickIsoPoisson] - Poisson's ratio.

[ipBrickIsoDensity] - Density.

[ipBrickIsoAlpha] - Thermal expansion coefficient.  
[ipBrickIsoViscosity] - Viscous damping coefficient.  
[ipBrickIsoDampingRatio] - Damping ratio.  
[ipBrickIsoConductivity] - Conductivity coefficient.  
[ipBrickIsoSpecificHeat] - Specific heat coefficient.

## Errors

ERR7\_APINotInitialised, ERR7\_APINotLicensed,  
ERR7\_FileNotOpen, ERR7\_InvalidFileUnit,  
ERR7\_MaterialNotIsotropic, ERR7\_NoError,  
ERR7\_ResultFileIsOpen, ERR7\_UnknownProperty

## St7GetBrickIsotropicMaterial

---

### Description

Returns the isotropic material properties assigned to the specified brick property.

### Syntax

```
long St7GetBrickIsotropicMaterial(long uID, long PropNum,  
double* Doubles)
```

### Input Parameters

uID

Strand7 model file ID number.

PropNum

Brick property number.

### Output Parameters

Doubles[0..7]

[ipBrickIsoModulus] - Modulus.  
[ipBrickIsoPoisson] - Poisson's ratio.  
[ipBrickIsoDensity] - Density.  
[ipBrickIsoAlpha] - Thermal expansion coefficient.  
[ipBrickIsoViscosity] - Viscous damping coefficient.

---

[ipBrickIsoDampingRatio] - Damping ratio.  
[ipBrickIsoConductivity] - Conductivity coefficient.  
[ipBrickIsoSpecificHeat] - Specific heat coefficient.

## Errors

ERR7\_APINotInitialised, ERR7\_APINotLicensed,  
ERR7\_FileNotOpen, ERR7\_InvalidFileUnit,  
ERR7\_MaterialNotIsotropic, ERR7\_NoError,  
ERR7\_UnknownProperty

# St7SetBrickOrthotropicMaterial

---

## Description

Sets the orthotropic material properties for the specified brick property.

## Syntax

```
long St7SetBrickOrthotropicMaterial(long uID, long PropNum,  
double* Doubles)
```

## Input Parameters

uID

Strand7 model file ID number.

PropNum

Brick property number.

Doubles[0..18]

[ipBrickOrthoModulus1] - Modulus in the 1 axis direction.

[ipBrickOrthoModulus2] - Modulus in the 2 axis direction.

[ipBrickOrthoModulus3] - Modulus in the 3 axis direction.

[ipBrickOrthoShear12] - Shear modulus in the 12 axis direction.

[ipBrickOrthoShear23] - Shear modulus in the 23 axis direction.

[ipBrickOrthoShear31] - Shear modulus in the 31 axis direction.

[ipBrickOrthoPoisson12] - Poisson's ratio in the 12 axis direction.

[ipBrickOrthoPoisson23] - Poisson's ratio in the 23 axis direction.

[ipBrickOrthoPoisson31] - Poisson's ratio in the 31 axis direction.

[ipBrickOrthoDensity] - Density.

[ipBrickOrthoAlpha1] - Thermal expansion coefficient in the 1 axis direction.

[ipBrickOrthoAlpha2] - Thermal expansion coefficient in the 2 axis direction.

[ipBrickOrthoAlpha3] - Thermal expansion coefficient in the 3 axis direction.

[ipBrickOrthoViscosity] - Viscous damping coefficient.

[ipBrickOrthoDampingRatio] - Damping ratio.

[ipBrickOrthoConductivity1] - Conductivity coefficient in the 1 axis direction.

[ipBrickOrthoConductivity2] - Conductivity coefficient in the 2 axis direction.

[ipBrickOrthoConductivity3] - Conductivity coefficient in the 3 axis direction.

[ipBrickOrthoSpecificHeat] - Specific heat coefficient.

## Errors

ERR7\_APINotInitialised, ERR7\_APINotLicensed,  
ERR7\_FileNotOpen, ERR7\_InvalidFileUnit,  
ERR7\_MaterialNotOrthotropic, ERR7\_NoError,  
ERR7\_ResultFileIsOpen, ERR7\_UnknownProperty

## St7GetBrickOrthotropicMaterial

---

### Description

Returns the orthotropic material properties assigned to the specified brick property.

### Syntax

```
long St7GetBrickOrthotropicMaterial(long uID, long PropNum,  
double* Doubles)
```

---

## **Input Parameters**

uID

Strand7 model file ID number.

PropNum

Brick property number.

## **Output Parameters**

Doubles[0..18]

[ipBrickOrthoModulus1] - Modulus in the 1 axis direction.

[ipBrickOrthoModulus2] - Modulus in the 2 axis direction.

[ipBrickOrthoModulus3] - Modulus in the 3 axis direction.

[ipBrickOrthoShear12] - Shear modulus in the 12 axis direction.

[ipBrickOrthoShear23] - Shear modulus in the 23 axis direction.

[ipBrickOrthoShear31] - Shear modulus in the 31 axis direction.

[ipBrickOrthoPoisson12] - Poisson's ratio in the 12 axis direction.

[ipBrickOrthoPoisson23] - Poisson's ratio in the 23 axis direction.

[ipBrickOrthoPoisson31] - Poisson's ratio in the 31 axis direction.

[ipBrickOrthoDensity] - Density.

[ipBrickOrthoAlpha1] - Thermal expansion coefficient in the 1 axis direction.

[ipBrickOrthoAlpha2] - Thermal expansion coefficient in the 2 axis direction.

[ipBrickOrthoAlpha3] - Thermal expansion coefficient in the 3 axis direction.

[ipBrickOrthoViscosity] - Viscous damping coefficient.

[ipBrickOrthoDampingRatio] - Damping ratio.

[ipBrickOrthoConductivity1] - Conductivity coefficient in the 1 axis direction.

[ipBrickOrthoConductivity2] - Conductivity coefficient in the 2 axis direction.

[ipBrickOrthoConductivity3] - Conductivity coefficient in the 3 axis direction.

[ipBrickOrthoSpecificHeat] - Specific heat coefficient.

## Errors

ERR7\_APINotInitialised, ERR7\_APINotLicensed,  
ERR7\_FileNotOpen, ERR7\_InvalidFileUnit,  
ERR7\_MaterialNotOrthotropic, ERR7\_NoError,  
ERR7\_UnknownProperty

## St7SetBrickAnisotropicMaterial

---

### Description

Sets the anisotropic material properties for the specified brick property.

### Syntax

```
long St7SetBrickAnisotropicMaterial(long uID, long PropNum,  
                                long MatType, double* Doubles)
```

### Input Parameters

uID

Strand7 model file ID number.

PropNum

Brick property number.

MatType

Matrix type, either mtStiffness or mtCompliance.

Doubles [0..33]

[0..20] - Complete anisotropic material stress-strain matrix D defined by the upper triangular matrix of coefficients  $D_{ij}$  where  $i < j$  and  $i$  varies quickest;  $D_{11}, D_{12}, \dots, D_{22}, \dots, D_{23}, \dots, D_{66}$ , respectively.

[ipBrickUserDensity] - Density.

[ipBrickUserAlpha1] - Thermal expansion coefficient in the 1 axis direction.

---

[ipBrickUserAlpha2] - Thermal expansion coefficient in the 2 axis direction.

[ipBrickUserAlpha3] - Thermal expansion coefficient in the 3 axis direction.

[ipBrickUserAlpha12] - Thermal expansion coefficient in the 12 axis direction.

[ipBrickUserAlpha23] - Thermal expansion coefficient in the 23 axis direction.

[ipBrickUserAlpha31] - Thermal expansion coefficient in the 31 axis direction.

[ipBrickUserViscosity] - Viscous damping coefficient.

[ipBrickUserDampingRatio] - Damping ratio.

[ipBrickUserConductivity1] - Conductivity coefficient in the 1 axis direction.

[ipBrickUserConductivity2] - Conductivity coefficient in the 2 axis direction.

[ipBrickUserConductivity3] - Conductivity coefficient in the 3 axis direction.

[ipBrickUserSpecificHeat] - Specific heat coefficient.

## Errors

ERR7\_APINotInitialised, ERR7\_APINotLicensed,  
ERR7\_FileNotOpen, ERR7\_InvalidFileUnit,  
ERR7\_InvalidMatrixType, ERR7\_MaterialNotAnisotropic,  
ERR7\_NoError, ERR7\_ResultFileIsOpen, ERR7\_UnknownProperty

## St7GetBrickAnisotropicMaterial

---

### Description

Returns the anisotropic material properties assigned to the specified brick property.

## Syntax

```
long St7GetBrickAnisotropicMaterial(long uID, long PropNum,  
                                     long* MatType, double* Doubles)
```

## Input Parameters

uID

Strand7 model file ID number.

PropNum

Brick property number.

## Output Parameters

MatType

Matrix type, either mtStiffness or mtCompliance.

Doubles [0..33]

[0..20] - Complete anisotropic material stress-strain matrix D defined by the upper triangular matrix of coefficients  $D_{ij}$  where  $i < j$  and  $i$  varies quickest;  $D_{11}, D_{12}, \dots, D_{22}, D_{23}, \dots, D_{66}$ , respectively.

[ipBrickUserDensity] - Density.

[ipBrickUserAlpha1] - Thermal expansion coefficient in the 1 axis direction.

[ipBrickUserAlpha2] - Thermal expansion coefficient in the 2 axis direction.

[ipBrickUserAlpha3] - Thermal expansion coefficient in the 3 axis direction.

[ipBrickUserAlpha12] - Thermal expansion coefficient in the 12 axis direction.

[ipBrickUserAlpha23] - Thermal expansion coefficient in the 23 axis direction.

[ipBrickUserAlpha31] - Thermal expansion coefficient in the 31 axis direction.

[ipBrickUserViscosity] - Viscous damping coefficient.

[ipBrickUserDampingRatio] - Damping ratio.

---

[ipBrickUserConductivity1] - Conductivity coefficient in the 1 axis direction.

[ipBrickUserConductivity2] - Conductivity coefficient in the 2 axis direction.

[ipBrickUserConductivity3] - Conductivity coefficient in the 3 axis direction.

[ipBrickUserSpecificHeat] - Specific heat coefficient.

## Errors

ERR7\_APINotInitialised, ERR7\_APINotLicensed,  
ERR7\_FileNotOpen, ERR7\_InvalidFileUnit,  
ERR7\_MaterialNotAnisotropic, ERR7\_NoError,  
ERR7\_UnknownProperty

# St7SetBrickRubberMaterial

---

## Description

Sets the rubber material properties for the specified brick property.

## Syntax

```
long St7SetBrickRubberMaterial(long uID, long PropNum, long  
RubberType, double* Doubles)
```

## Input Parameters

uID

Strand7 model file ID number.

PropNum

Brick property number.

RubberType

Rubber material model type, one of kNeoHookean, kMooneyRivlin or kGeneralisedMooneyRivlin.

Doubles[0..15]

An array describing the rubber material coefficients. The format depends on the material sub-type, with different sub-types requiring a varying number of rubber coefficients following the common data:

[ipRubberBulk] - Bulk modulus.  
[ipRubberDensity] - Density.  
[ipRubberAlpha] - Thermal expansion coefficient.  
[ipRubberViscosity] - Viscous damping coefficient.  
[ipRubberDampingRatio] - Damping ratio.  
[ipRubberConductivity] - Conductivity.  
[ipRubberSpecificHeat] - Specific heat.  
[ipRubberConstC1..ipRubberConstC1+ Num] - Rubber coefficients,

where:

Num = 0 (Neo-Hookean)  
Num = 1 (Mooney-Rivlin)  
Num = 8 (Generalised Mooney-Rivlin)

## Errors

ERR7\_APINotInitialised, ERR7\_APINotLicensed,  
ERR7\_FileNotOpen, ERR7\_InvalidFileUnit,  
ERR7\_InvalidRubberModel, ERR7\_MaterialNotRubber,  
ERR7\_NoError, ERR7\_ResultFileIsOpen, ERR7\_UnknownProperty

## St7GetBrickRubberMaterial

---

### Description

Returns the rubber material properties assigned to the specified brick property.

### Syntax

```
long St7GetBrickRubberMaterial(long uID, long PropNum,  
                                long* RubberType, double* Doubles)
```

### Input Parameters

uID

Strand7 model file ID number.

PropNum

Brick property number.

---

## Output Parameters

RubberType

Rubber material model type, one of kNeoHookean, kMooneyRivlin, kGeneralisedMooneyRivlin.

Doubles[0..15]

An array describing the rubber material coefficients. The format depends on the material sub-type, with different sub-types requiring a varying number of rubber coefficients following the common data:

[ipRubberBulk] - Bulk modulus.

[ipRubberDensity] - Density.

[ipRubberAlpha] - Thermal expansion coefficient.

[ipRubberViscosity] - Viscous damping coefficient.

[ipRubberDampingRatio] - Damping ratio.

[ipRubberConductivity] - Conductivity.

[ipRubberSpecificHeat] - Specific heat.

[ipRubberConstC1..ipRubberConstC1+ Num] - Rubber coefficients,

where:

Num = 0 (Neo-Hookean)

Num = 1 (Mooney-Rivlin)

Num = 8 (Generalised Mooney-Rivlin)

## Errors

ERR7\_APINotInitialised, ERR7\_APINotLicensed,  
ERR7\_FileNotOpen, ERR7\_InvalidFileUnit,  
ERR7\_MaterialNotRubber, ERR7\_NoError, ERR7\_UnknownProperty

---

## St7SetBrickMCDPMaterial

### Description

Sets the Mohr-Coulomb and Drucker-Prager material properties for the specified brick property.

## Syntax

```
long St7SetBrickMCDPMaterial(long uID, long PropNum,  
                           double* Doubles)
```

## Input Parameters

uID

Strand7 model file ID number.

PropNum

Brick property number.

Doubles[0..1]

[ipFrictionAngle] - Friction angle.

[ipCohesion] - Cohesion value.

## Errors

```
ERR7_APINotInitialised, ERR7_APINotLicensed,  
ERR7_FileNotOpen, ERR7_InvalidFileUnit,  
ERR7_MaterialNotIsotropic, ERR7_NoError,  
ERR7_ResultFileIsOpen, ERR7_UnknownProperty,  
ERR7_YieldNotMCDP
```

# St7GetBrickMCDPMaterial

---

## Description

Returns the Mohr-Coulomb and Drucker-Prager material properties assigned to the specified brick property.

## Syntax

```
long St7GetBrickMCDPMaterial(long uID, long PropNum,  
                           double* Doubles)
```

## Input Parameters

uID

Strand7 model file ID number.

PropNum

Brick property number.

---

## Output Parameters

Doubles[0..1]

[ipFrictionAngle] - Friction angle.

[ipCohesion] - Cohesion value.

## Errors

ERR7\_APINotInitialised, ERR7\_APINotLicensed,  
ERR7\_FileNotOpen, ERR7\_InvalidFileUnit,  
ERR7\_MaterialNotIsotropic, ERR7\_NoError,  
ERR7\_UnknownProperty, ERR7\_YieldNotMCDP

---

## St7SetBrickSoilDCMaterial

### Description

Sets the Duncan-Chang soil material properties for the specified brick property.

### Syntax

```
long St7SetBrickSoilDCMaterial(long uID, long PropNum,  
                                long* Integers, double* Doubles)
```

### Input Parameters

uID

Strand7 model file ID number.

PropNum

Brick property number.

Integers[0..1]

[ipSoilDCUsePoisson] - Use Poisson's ratio, either btTrue or btFalse.

[ipSoilDCSetLevel] - Set fluid level, either btTrue or btFalse.

Doubles[0..16]

[ipSoilDCModulusK] - Modulus.

[ipSoilDCModulusKUR] - Unloading/reloading modulus.

[ipSoilDCModulusN] - Modulus exponent.

[ipSoilDCPoisson] - Poisson's ratio.

[ipSoilDCBulkK] - Bulk modulus.  
[ipSoilDCBulkM] - Bulk modulus exponent.  
[ipSoilDCFrictionAngle] - Friction angle.  
[ipSoilDCDeltaAngle] - Friction angle change.  
[ipSoilDCCohesion] - Cohesion value.  
[ipSoilDCFailureRatio] - Failure ratio.  
[ipSoilDCFailureMod] - Failure modulus.  
[ipSoilDCReferenceP] - Reference pressure.  
[ipSoilDCDensity] - Density.  
[ipSoilDCHorizontalRatio] - Horizontal stress ratio.  
[ipSoilDCConductivity] - Conductivity.  
[ipSoilDCSpecificHeat] - Specific heat.  
[ipSoilDCFluidLevel] - Fluid level.

## Errors

ERR7\_APINotInitialised, ERR7\_APINotLicensed,  
ERR7\_FileNotOpen, ERR7\_InvalidFileUnit,  
ERR7\_MaterialNotSoil, ERR7\_NoError, ERR7\_ResultFileIsOpen,  
ERR7\_SoilTypeNotDC, ERR7\_UnknownProperty

## St7GetBrickSoilDCMaterial

---

### Description

Returns the Duncan-Chang soil material properties assigned to the specified brick property.

### Syntax

```
long St7GetBrickSoilDCMaterial(long uID, long PropNum,  
                                long* Integers, double* Doubles)
```

### Input Parameters

uID

---

Strand7 model file ID number.

PropNum

Brick property number.

## Output Parameters

Integers[0..1]

[ipSoilDCUsePoisson] - Use Poisson's ratio, either btTrue or btFalse.

[ipSoilDCSetLevel] - Set fluid level, either btTrue or btFalse.

Doubles[0..16]

[ipSoilDCModulusK] - Modulus.

[ipSoilDCModulusKUR] - Unloading/reloading modulus.

[ipSoilDCModulusN] - Modulus exponent.

[ipSoilDCPoisson] - Poisson's ratio.

[ipSoilDCBulkK] - Bulk modulus.

[ipSoilDCBulkM] - Bulk modulus exponent.

[ipSoilDCFrictionAngle] - Friction angle.

[ipSoilDCDeltaAngle] - Friction angle change.

[ipSoilDCCohesion] - Cohesion value.

[ipSoilDCFailureRatio] - Failure ratio.

[ipSoilDCFailureMod] - Failure modulus.

[ipSoilDCReferenceP] - Reference pressure.

[ipSoilDCDensity] - Density.

[ipSoilDCHorizontalRatio] - Horizontal stress ratio.

[ipSoilDCConductivity] - Conductivity.

[ipSoilDCSpecificHeat] - Specific heat.

[ipSoilDCFluidLevel] - Fluid level.

## Errors

```
ERR7_APINotInitialised, ERR7_APINotLicensed,  
ERR7_FileNotOpen, ERR7_InvalidFileUnit,  
ERR7_MaterialNotSoil, ERR7_NoError, ERR7_SoilTypeNotDC,  
ERR7_UnknownProperty
```

# St7SetBrickSoilCCMaterial

---

## Description

Sets the Cam-Clay soil material properties for the specified brick property.

## Syntax

```
long St7SetBrickSoilCCMaterial(long uID, long PropNum,  
                                long* Integers, double* Doubles)
```

## Input Parameters

uID

Strand7 model file ID number.

PropNum

Brick property number.

Integers[0..3]

[ipSoilCCUsePoisson] - Use Poisson's ratio, either btTrue or btFalse.

[ipSoilCCDrainedState] - Drained state, either btTrue or btFalse.

[ipSoilCCUseOCR] - Overconsolidation, either btTrue or btFalse.

[ipSoilCCSetLevel] - Set fluid level, either btTrue or btFalse.

Doubles[0..14]

[ipSoilCCCCriticalStateLine] - Critical state line slope.

[ipSoilCCConsolidationLine] - Normal consolidation line slope.

[ipSoilCCSwellingLine] - Swelling line slope.

[ipSoilCCDensity] - Density.

[ipSoilCCPoisson] - Poisson's ratio.

---

[ipSoilCCModulusG] - Shear modulus at point A.  
[ipSoilCCModulusB] - Shear modulus at point B.  
[ipSoilCCHorizontalRatio] - Horizontal stress ratio.  
[ipSoilCCER] - Reference void ratio.  
[ipSoilCCPR] - Unit pressure ratio.  
[ipSoilCCPC0] - Initial consolidation pressure.  
[ipSoilCCOCR] - Overconsolidation ratio.  
[ipSoilCCConductivity] - Conductivity.  
[ipSoilCCSpecificHeat] - Specific heat.  
[ipSoilCCFluidLevel] - Fluid level.

## Errors

ERR7\_APINotInitialised, ERR7\_APINotLicensed,  
ERR7\_FileNotOpen, ERR7\_InvalidFileUnit,  
ERR7\_MaterialNotSoil, ERR7\_NoError, ERR7\_ResultFileIsOpen,  
ERR7\_SoilTypeNotCC, ERR7\_UnknownProperty

# St7GetBrickSoilCCMaterial

---

## Description

Returns the Cam-Clay soil material properties assigned to the specified brick property.

## Syntax

```
long St7GetBrickSoilCCMaterial(long uID, long PropNum,  
                                long* Integers, double* Doubles)
```

## Input Parameters

uID

Strand7 model file ID number.

PropNum

Brick property number.

## Output Parameters

Integers[0..3]

[ipSoilCCUsePoisson] - Use Poisson's ratio, either btTrue or btFalse.

[ipSoilCCDrainedState] - Drained state, either btTrue or btFalse.

[ipSoilCCUseOCR] - Over-consolidation, either btTrue or btFalse.

[ipSoilCCSetLevel] - Set fluid level, either btTrue or btFalse.

Doubles[0..14]

[ipSoilCCCriticalStateLine] - Critical state line slope.

[ipSoilCCConsolidationLine] - Normal consolidation line slope.

[ipSoilCCSwellingLine] - Swelling line slope.

[ipSoilCCDensity] - Density.

[ipSoilCCPoisson] - Poisson's ratio.

[ipSoilCCModulusG] - Shear modulus at point A.

[ipSoilCCModulusB] - Shear modulus at point B.

[ipSoilCCHorizontalRatio] - Horizontal stress ratio.

[ipSoilCCER] - Reference void ratio.

[ipSoilCCPR] - Unit pressure ratio.

[ipSoilCCPC0] - Initial consolidation pressure.

[ipSoilCCOCR] - Over-consolidation ratio.

[ipSoilCCConductivity] - Conductivity.

[ipSoilCCSpecificHeat] - Specific heat.

[ipSoilCCFluidLevel] - Fluid level.

## Errors

ERR7\_APINotInitialised, ERR7\_APINotLicensed,  
ERR7\_FileNotOpen, ERR7\_InvalidFileUnit,  
ERR7\_MaterialNotSoil, ERR7\_NoError, ERR7\_SoilTypeNotCC,  
ERR7\_UnknownProperty

---

## St7SetBrickSoilMCMaterial

---

### Description

Assigns the Mohr-Coulomb soil parameters for the specified brick property.

### Syntax

```
long St7SetBrickSoilMCMaterial(long uID, long PropNum,  
                                long* Integers, double* Doubles)
```

### Input Parameters

uID

Strand7 model file ID number.

PropNum

Property number.

Integers[0..0]

[ipSoilMCSetLevel] - Set a fluid level, either btTrue or btFalse.

Doubles[0..9]

[ipSoilMCModulus] - Modulus.

[ipSoilMCPoisson] - Poisson's ratio.

[ipSoilMCDensity] - Density.

[ipSoilMCCohesion] - Cohesion value.

[ipSoilMCFrictionAngle] - Friction angle.

[ipSoilMCHorizontalRatio] - Horizontal stress ratio.

[ipSoilMCER] - Void ratio.

[ipSoilMCConductivity] - Conductivity.

[ipSoilMCSpecificHeat] - Specific heat.

[ipSoilMCFluidLevel] - Fluid level.

### Errors

ERR7\_APINotInitialised, ERR7\_APINotLicensed,  
ERR7\_FileNotOpen, ERR7\_InvalidFileUnit,

```
ERR7_MaterialNotSoil, ERR7_NoError, ERR7_ResultFileIsOpen,  
ERR7_SoilTypeNotMC, ERR7_UnknownProperty
```

## St7GetBrickSoilMCMaterial

---

### Description

Returns the Mohr-Coulomb soil parameters assigned to the specified brick property.

### Syntax

```
long St7GetBrickSoilMCMaterial(long uID, long PropNum,  
long* Integers, double* Doubles)
```

### Input Parameters

uID

Strand7 model file ID number.

PropNum

Property number.

### Output Parameters

Integers[0..0]

[ipSoilMCSetLevel] - Set a fluid level, either btTrue or btFalse.

Doubles[0..9]

[ipSoilMCModulus] - Modulus.

[ipSoilMCPoisson] - Poisson's ratio.

[ipSoilMCDensity] - Density.

[ipSoilMCCohesion] - Cohesion value.

[ipSoilMCFrictionAngle] - Friction angle.

[ipSoilMCHorizontalRatio] - Horizontal stress ratio.

[ipSoilMCER] - Void ratio.

[ipSoilMCConductivity] - Conductivity.

[ipSoilMCSpecificHeat] - Specific heat.

---

[ipSoilMCFluidLevel] - Fluid level.

## Errors

ERR7\_APINotInitialised, ERR7\_APINotLicensed,  
ERR7\_FileNotOpen, ERR7\_InvalidFileUnit,  
ERR7\_MaterialNotSoil, ERR7\_NoError, ERR7\_SoilTypeNotMC,  
ERR7\_UnknownProperty

# St7SetBrickSoilDPMaterial

---

## Description

Assigns the Drucker-Prager soil parameters for the specified brick property.

## Syntax

```
long St7SetBrickSoilDPMaterial(long uID, long PropNum,  
                                long* Integers, double* Doubles)
```

## Input Parameters

uID

Strand7 model file ID number.

PropNum

Property number.

Integers[0..0]

[ipSoilDPSetLevel] - Set a fluid level, either btTrue or btFalse.

Doubles[0..9]

[ipSoilDPModulus] - Modulus.

[ipSoilDPPoisson] - Poisson's ratio.

[ipSoilDPDensity] - Density.

[ipSoilDPCohesion] - Cohesion value.

[ipSoilDPFrictionAngle] - Friction angle.

[ipSoilDPHorizontalRatio] - Horizontal stress ratio.

[ipSoilDPER] - Void ratio.

[ipSoilDPConductivity] - Conductivity.

[ipSoilDPSpecificHeat] - Specific heat.

[ipSoilDPFluidLevel] - Fluid level.

## Errors

```
ERR7_APINotInitialised, ERR7_APINotLicensed,  
ERR7_FileNotOpen, ERR7_InvalidFileUnit,  
ERR7_MaterialNotSoil, ERR7_NoError, ERR7_ResultFileIsOpen,  
ERR7_SoilTypeNotDP, ERR7_UnknownProperty
```

## St7GetBrickSoilDPMaterial

---

### Description

Returns the Drucker-Prager soil parameters assigned to the specified brick property.

### Syntax

```
long St7GetBrickSoilDPMaterial(long uID, long PropNum,  
                                long* Integers, double* Doubles)
```

### Input Parameters

uID

Strand7 model file ID number.

PropNum

Property number.

### Output Parameters

Integers[0..0]

[ipSoilDPSetLevel] - Set a fluid level, either btTrue or btFalse.

Doubles[0..9]

[ipSoilDPModulus] - Modulus.

[ipSoilDPPoisson] - Poisson's ratio.

[ipSoilDPDensity] - Density.

[ipSoilDPCohesion] - Cohesion value.

---

[ipSoilDPFrictionAngle] - Friction angle.  
[ipSoilDPHorizontalRatio] - Horizontal stress ratio.  
[ipSoilDPER] - Void ratio.  
[ipSoilDPCconductivity] - Conductivity.  
[ipSoilDPSpecificHeat] - Specific heat.  
[ipSoilDPFluidLevel] - Fluid level.

## Errors

ERR7\_APINotInitialised, ERR7\_APINotLicensed,  
ERR7\_FileNotOpen, ERR7\_InvalidFileUnit,  
ERR7\_MaterialNotSoil, ERR7\_NoError, ERR7\_SoilTypeNotDP,  
ERR7\_UnknownProperty

# St7SetBrickSoillSMaterial

---

## Description

Assigns the linear elastic soil parameters for the specified brick property.

## Syntax

```
long St7SetBrickSoillSMaterial(long uID, long PropNum,  
                                long* Integers, double* Doubles)
```

## Input Parameters

uID

Strand7 model file ID number.

PropNum

Property number.

Integers[0..0]

[ipSoillSSetLevel] - Set a fluid level, either btTrue or btFalse.

Doubles[0..7]

[ipSoillSModulus] - Modulus.

[ipSoillSPoisson] - Poisson's ratio.

[ipSoilLSDensity] - Density.  
[ipSoilLSHorizontalRatio] - Horizontal stress ratio.  
[ipSoilLSER] - Void ratio.  
[ipSoilLSCconductivity] - Conductivity.  
[ipSoilLSSpecificHeat] - Specific heat.  
[ipSoilLSFluidLevel] - Fluid level.

## Errors

ERR7\_APINotInitialised, ERR7\_APINotLicensed,  
ERR7\_FileNotOpen, ERR7\_InvalidFileUnit,  
ERR7\_MaterialNotSoil, ERR7\_NoError, ERR7\_ResultFileIsOpen,  
ERR7\_SoilTypeNotLS, ERR7\_UnknownProperty

## St7GetBrickSoilLSMaterial

---

### Description

Returns the linear elastic soil parameters assigned to the specified brick property.

### Syntax

```
long St7GetBrickSoilLSMaterial(long uID, long PropNum,  
                                long* Integers, double* Doubles)
```

### Input Parameters

uID

Strand7 model file ID number.

PropNum

Property number.

### Output Parameters

Integers[0..0]

[ipSoilLSSetLevel] - Set a fluid level, either btTrue or btFalse.

Doubles[0..7]

[ipSoilLSModulus] - Modulus.

[ipSoilLSPoisson] - Poisson's ratio.

---

[ipSoilLSDensity] - Density.  
[ipSoilLSHorizontalRatio] - Horizontal stress ratio.  
[ipSoilLSER] - Void ratio.  
[ipSoilLSCconductivity] - Conductivity.  
[ipSoilLSSpecificHeat] - Specific heat.  
[ipSoilLSFluidLevel] - Fluid level.

## Errors

ERR7\_APINotInitialised, ERR7\_APINotLicensed,  
ERR7\_FileNotOpen, ERR7\_InvalidFileUnit,  
ERR7\_MaterialNotSoil, ERR7\_NoError, ERR7\_SoilTypeNotLS,  
ERR7\_UnknownProperty

# St7SetBrickFluidMaterial

---

## Description

Sets the fluid material properties for the specified brick property.

## Syntax

```
long St7SetBrickFluidMaterial(long uID, long PropNum,  
                           double* Doubles)
```

## Input Parameters

uID

Strand7 model file ID number.

PropNum

Brick property number.

Doubles[0..7]

[ipFluidModulus] - Modulus.

[ipFluidPenaltyParam] - Penalty parameter.

[ipFluidDensity] - Density.

[ipFluidAlpha] - Thermal expansion coefficient.

[ipFluidViscosity] - Viscous damping coefficient.

[ipFluidDampingRatio] - Damping ratio.

[ipFluidConductivity] - Conductivity.

[ipFluidSpecificHeat] - Specific heat.

## Errors

ERR7\_APINotInitialised, ERR7\_APINotLicensed,  
ERR7\_FileNotOpen, ERR7\_InvalidFileUnit, ERR7\_NoError,  
ERR7\_ResultFileIsOpen, ERR7\_UnknownProperty

# St7GetBrickFluidMaterial

---

## Description

Returns the fluid material properties assigned to the specified brick property.

## Syntax

```
long St7GetBrickFluidMaterial(long uID, long PropNum,  
double* Doubles)
```

## Input Parameters

uID

Strand7 model file ID number.

PropNum

Brick property number.

## Output Parameters

Doubles[0..7]

[ipFluidModulus] - Modulus.

[ipFluidPenaltyParam] - Penalty parameter.

[ipFluidDensity] - Density.

[ipFluidAlpha] - Thermal expansion coefficient.

[ipFluidViscosity] - Viscous damping coefficient.

[ipFluidDampingRatio] - Damping ratio.

---

[ipFluidConductivity] - Conductivity.

[ipFluidSpecificHeat] - Specific heat.

## Errors

ERR7\_APINotInitialised, ERR7\_APINotLicensed,  
ERR7\_FileNotOpen, ERR7\_InvalidFileUnit, ERR7\_NoError,  
ERR7\_UnknownProperty

# St7SetBrickAddBubbleFunction

---

## Description

Sets the state of the **Add Bubble function** option for the specified brick property.  
This option is only used for Hex8 element types.

## Syntax

```
long St7SetBrickAddBubbleFunction(long uID, long PropNum,  
                                bool AddBubbleFunction)
```

## Input Parameters

uID

Strand7 model file ID number.

PropNum

Brick property number.

AddBubbleFunction

btTrue to add the “bubble” contribution to the element shape functions.

## Errors

ERR7\_APINotInitialised, ERR7\_APINotLicensed,  
ERR7\_FileNotOpen, ERR7\_InvalidFileUnit, ERR7\_NoError,  
ERR7\_ResultFileIsOpen, ERR7\_UnknownProperty

# St7GetBrickAddBubbleFunction

---

## Description

Returns the state of the **Add Bubble function** option for the specified brick property.  
This option is only used for Hex8 element types.

## Syntax

```
long St7GetBrickAddBubbleFunction(long uID, long PropNum,  
bool* AddBubbleFunction)
```

## Input Parameters

uID

Strand7 model file ID number.

PropNum

Brick property number.

## Output Parameters

AddBubbleFunction

bTrue to add the “bubble” contribution to the element shape functions.

## Errors

ERR7\_APINotInitialised, ERR7\_APINotLicensed,  
ERR7\_FileNotOpen, ERR7\_InvalidFileUnit, ERR7\_NoError,  
ERR7\_UnknownProperty

# St7DeleteProperty

---

## Description

Deletes the specified material property.

## Syntax

```
long St7DeleteProperty(long uID, long Entity, long PropNum)
```

## Input Parameters

uID

Strand7 model file ID number.

Entity

Property type, one of ptBEAMPROP, ptPLATEPROP, ptBRICKPROP or  
ptPLYPROP.

PropNum

Entity property number.

---

## Errors

```
ERR7_APINotInitialised, ERR7_APINotLicensed,  
ERR7_FileNotOpen, ERR7_InvalidEntity, ERR7_InvalidFileUnit,  
ERR7_NoError, ERR7_ResultFileIsOpen, ERR7_UnknownProperty
```

# St7DeleteUnusedProperties

---

## Description

Deletes all unused properties in the specified model.

## Syntax

```
long St7DeleteUnusedProperties(long uID, long Entity, long*  
                               NumDeleted)
```

## Input Parameters

uID

Strand7 model file ID number.

Entity

Property type, one of ptBEAMPROP, ptPLATEPROP, ptBRICKPROP or  
ptPLYPROP.

## Output Parameters

NumDeleted

Number of properties deleted.

## Errors

```
ERR7_APINotInitialised, ERR7_APINotLicensed,  
ERR7_FileNotOpen, ERR7_InvalidEntity, ERR7_InvalidFileUnit,  
ERR7_NoError, ERR7_ResultFileIsOpen
```

## Properties – Ply

### St7NewPlyProperty

#### Description

Creates a new ply property.

#### Syntax

```
long St7NewPlyProperty(long uID, long PropNum, char*  
PropName)
```

#### Input Parameters

uID

Strand7 model file ID number.

PropNum

Ply property number.

PropName

Name of the property.

#### Errors

```
ERR7_APINotInitialised, ERR7_APINotLicensed,  
ERR7_FileNotOpen, ERR7_InvalidFileUnit,  
ERR7_InvalidPropertyName, ERR7_NoError,  
ERR7_PropertyAlreadyExists, ERR7_ResultFileIsOpen
```

### St7SetPlyMaterial

#### Description

Sets the material properties for the specified ply property.

#### Syntax

```
long St7SetPlyMaterial(long uID, long PropNum, long*  
Integers, double* Doubles)
```

#### Input Parameters

uID

Strand7 model file ID number.

---

PropNum

Ply property number.

Integers [0..0]

[ipPlyWeaveType] - Weave type, one of wtPlyUniDirectional, wtPlyBiDirectional, wtPlyTriDirectional or wtPlyQuasilotropic.

Doubles [0..20]

[ipPlyModulus1] - Modulus in the 1 axis direction.

[ipPlyModulus2] - Modulus in the 2 axis direction.

[ipPlyPoisson] - Poisson's ratio.

[ipPlyShear12] - Shear modulus in the 12 axis direction.

[ipPlyShear13] - Shear modulus in the 23 axis direction.

[ipPlyShear23] - Shear modulus in the 31 axis direction.

[ipPlyAlpha1] - Thermal expansion coefficient in the 1 axis direction.

[ipPlyAlpha2] - Thermal expansion coefficient in the 2 axis direction.

[ipPlyDensity] - Density.

[ipPlyThickness] - Thickness.

[ipPlyS1Tension] - Tensile stress limit in the 1 axis direction.

[ipPlyS2Tension] - Tensile stress limit in the 2 axis direction.

[ipPlyS1Compression] - Compressive stress limit in the 1 axis direction.

[ipPlyS2Compression] - Compressive stress limit in the 2 axis direction.

[ipPlySShear] - Shear stress limit.

[ipPlyE1Tension] - Tensile strain limit in the 1 axis direction.

[ipPlyE2Tension] - Tensile strain limit in the 2 axis direction.

[ipPlyE1Compression] - Compressive strain limit in the 1 axis direction.

[ipPlyE2Compression] - Compressive strain limit in the 2 axis direction.

[ipPlyEShear] - Shear strain limit.

[ipPlyInterLaminaShear] - Interlamina shear stress limit.

## Errors

ERR7\_APINotInitialised, ERR7\_APINotLicensed,  
ERR7\_FileNotOpen, ERR7\_InvalidFileUnit, ERR7\_NoError,  
ERR7\_ResultFileIsOpen, ERR7\_UnknownProperty

# St7GetPlyMaterial

---

## Description

Returns the material properties assigned to the specified ply property.

## Syntax

```
long St7GetPlyMaterial(long uID, long PropNum, long*  
    Integers, double* Doubles)
```

## Input Parameters

uID

Strand7 model file ID number.

PropNum

Ply property number.

## Output Parameters

Integers[0..0]

[ipPlyWeaveType] - Weave type, one of wtPlyUniDirectional,  
wtPlyBiDirectional, wtPlyTriDirectional or wtPlyQuasilisotropic.

Doubles[0..20]

[ipPlyModulus1] - Modulus in the 1 axis direction.

[ipPlyModulus2] - Modulus in the 2 axis direction.

[ipPlyPoisson] - Poisson's ratio.

[ipPlyShear12] - Shear modulus in the 12 axis direction.

[ipPlyShear13] - Shear modulus in the 23 axis direction.

[ipPlyShear23] - Shear modulus in the 31 axis direction.

---

[ipPlyAlpha1] - Thermal expansion coefficient in the 1 axis direction.

[ipPlyAlpha2] - Thermal expansion coefficient in the 2 axis direction.

[ipPlyDensity] - Density.

[ipPlyThickness] - Thickness.

[ipPlyS1Tension] - Tensile stress limit in the 1 axis direction.

[ipPlyS2Tension] - Tensile stress limit in the 2 axis direction.

[ipPlyS1Compression] - Compressive stress limit in the 1 axis direction.

[ipPlyS2Compression] - Compressive stress limit in the 2 axis direction.

[ipPlySShear] - Shear stress limit.

[ipPlyE1Tension] - Tensile strain limit in the 1 axis direction.

[ipPlyE2Tension] - Tensile strain limit in the 2 axis direction.

[ipPlyE1Compression] - Compressive strain limit in the 1 axis direction.

[ipPlyE2Compression] - Compressive strain limit in the 2 axis direction.

[ipPlyEShear] - Shear strain limit.

[ipPlyInterLaminaShear] - Interlamina shear stress limit.

## Errors

ERR7\_APINotInitialised, ERR7\_APINotLicensed,  
ERR7\_FileNotOpen, ERR7\_InvalidFileUnit, ERR7\_NoError,  
ERR7\_UnknownProperty

# St7SetPlateLaminateMaterial

---

## Description

Sets the laminate material properties for the specified plate property. Not all parameters returned by the *St7GetPlateLaminateMaterial* function can be set, as some parameters are based the ply properties in the layup.

## Syntax

```
long St7SetPlateLaminateMaterial(long uID, long PropNum,  
                                long LamNum, double* Doubles)
```

## Input Parameters

uID

Strand7 model file ID number.

PropNum

Plate property number.

LamNum

Laminate number.

Doubles [0..4]

[ipLaminateViscosity] - Viscous damping coefficient.

[ipLaminateDampingRatio] - Damping ratio.

[ipLaminateConductivity1] - Conductivity coefficient in the x-axis direction.

[ipLaminateConductivity2] - Conductivity coefficient in the y-axis direction.

[ipLaminateSpecificHeat] - Specific heat coefficient.

## Errors

ERR7\_APINotInitialised, ERR7\_APINotLicensed,  
ERR7\_FileNotOpen, ERR7\_InvalidFileUnit, ERR7\_NoError,  
ERR7\_ResultFileIsOpen, ERR7\_UnknownProperty

# St7GetPlateLaminateMaterial

---

## Description

Returns the laminate material properties for the specified plate property.

## Syntax

```
long St7GetPlateLaminateMaterial(long uID, long PropNum,  
                                long* LamNum, double* Doubles)
```

## Input Parameters

uID

Strand7 model file ID number.

---

PropNum

Plate property number.

## Output Parameters

LamNum

Laminate number.

Doubles [0..17]

[ipLaminateViscosity] - Viscous damping coefficient.

[ipLaminateDampingRatio] - Damping ratio.

[ipLaminateConductivity1] - Conductivity coefficient in the x-axis direction.

[ipLaminateConductivity2] - Conductivity coefficient in the y-axis direction.

[ipLaminateSpecificHeat] - Specific heat coefficient.

[ipLaminateDensity] - Density.

[ipLaminateAlphax] - Effective membrane thermal expansion coefficient in the x-axis direction.

[ipLaminateAlphay] - Effective membrane thermal expansion coefficient in the y-axis direction.

[ipLaminateAlphaxy] - Effective membrane shear thermal expansion coefficient in the xy plane.

[ipLaminateBetax] - Effective bending thermal expansion coefficient in the x-direction.

[ipLaminateBetay] - Effective bending thermal expansion coefficient in the y-direction.

[ipLaminateBetaxy] - Effective twisting thermal expansion coefficient out of the xy plane.

[ipLaminateModulusx] - Modulus in the x-axis direction.

[ipLaminateModulusy] - Modulus in the y-axis direction.

[ipLaminateShearxy] - Shear modulus in the xy plane.

[ipLaminatePoissonxy] - Poisson's ratio  $\nu_{xy}$ .

[ipLaminatePoissonyx] - Poisson's ratio  $\nu_{yx}$ .

[ipLaminateThickness] - Thickness.

### Errors

ERR7\_APINotInitialised, ERR7\_APINotLicensed,  
ERR7\_FileNotOpen, ERR7\_InvalidFileUnit, ERR7\_NoError,  
ERR7\_UnknownProperty

---

## Properties – Laminates

### St7GetTotalLaminateStacks

---

#### Description

Returns the total number and highest ID number of the laminate stacks in the specified model.

#### Syntax

```
long St7GetTotalLaminateStacks(long uID, long* NumStacks,  
                                long* LastStack)
```

#### Input Parameters

uID

Strand7 model file ID number.

#### Output Parameters

NumStacks

The total number of laminate stacks in the model.

LastStack

The highest laminate number identifying a laminate stack.

#### Errors

ERR7\_APINotInitialised, ERR7\_APINotLicensed,  
ERR7\_FileNotOpen, ERR7\_InvalidFileUnit, ERR7\_NoError

### St7GetLaminateStackNumByIndex

---

#### Description

Returns the laminate number associated with a specified laminate index. The laminate indices are stored internally and are based on a contiguous numbering system.

#### Syntax

```
long St7GetLaminateStackNumByIndex(long uID, long Index,  
                                    long* LaminateNum)
```

## **Input Parameters**

uID

Strand7 model file ID number.

Index

Laminate index.

## **Output Parameters**

LaminateNum

Laminate number.

## **Errors**

ERR7\_APINotInitialised, ERR7\_APINotLicensed,  
ERR7\_FileNotOpen, ERR7\_InvalidFileUnit, ERR7\_InvalidIndex,  
ERR7\_NoError

# **St7NewLaminate**

---

## **Description**

Creates a new laminate.

## **Syntax**

```
long St7NewLaminate(long uID, long LamNum, char* LamName)
```

## **Input Parameters**

uID

Strand7 model file ID number.

LamNum

Laminate number.

LamName

Name of the laminate.

## **Errors**

ERR7\_APINotInitialised, ERR7\_APINotLicensed,  
ERR7\_FileNotOpen, ERR7\_InvalidFileUnit,  
ERR7\_InvalidLaminateID, ERR7\_LaminateIDAlreadyExists,  
ERR7\_NoError, ERR7\_ResultFileIsOpen

---

## St7SetLaminateName

---

### Description

Sets the name of the specified laminate.

### Syntax

```
long St7SetLaminateName(long uID, long LamNum, char*
    LamName)
```

### Input Parameters

uID

Strand7 model file ID number.

LamNum

Laminate number

LamName

Name of the laminate.

### Errors

```
ERR7_APINotInitialised, ERR7_APINotLicensed,
ERR7_DataNotFound, ERR7_FileNotOpen, ERR7_InvalidFileUnit,
ERR7_InvalidLaminateID, ERR7_NoError, ERR7_ResultFileIsOpen
```

## St7GetLaminateName

---

### Description

Returns the name of the specified laminate.

### Syntax

```
long St7GetLaminateName(long uID, long LamNum, char*
    LamName, long MaxStringLen)
```

### Input Parameters

uID

Strand7 model file ID number.

LamNum

Laminate number.

MaxStringLen

Maximum number of characters allocated for LamName.

### Output Parameters

LamName

Name of the laminate.

### Errors

ERR7\_APINotInitialised, ERR7\_APINotLicensed,  
ERR7\_DataNotFound, ERR7\_FileNotOpen, ERR7\_InvalidFileUnit,  
ERR7\_InvalidLaminateID, ERR7\_NoError

## St7GetLaminateNumPlies

---

### Description

Returns the number of plies in the specified laminate.

### Syntax

```
long St7GetLaminateNumPlies(long uID, long LamNum, long*  
    NumPlies)
```

### Input Parameters

uID

Strand7 model file ID number.

LamNum

Laminate number.

### Output Parameters

NumPlies

Number of plies.

### Errors

ERR7\_APINotInitialised, ERR7\_APINotLicensed,  
ERR7\_FileNotOpen, ERR7\_InvalidFileUnit,  
ERR7\_InvalidLaminateID, ERR7\_NoError

---

## St7SetLaminatePly

---

### Description

Sets the ply property and ply orientation for the specified layer in a laminate.

### Syntax

```
long St7SetLaminatePly(long uID, long LamNum, long Pos,  
long PlyPropNum, double* Doubles)
```

### Input Parameters

uID

Strand7 model file ID number.

LamNum

Laminate number.

Pos

Ply position within the laminate.

PlyPropNum

Ply property number.

Doubles[0..1]

[ipLaminatePlyAngle] - Orientation of the ply and laminate material axis systems.

[ipLaminatePlyThickness] - Ply thickness.

### Errors

```
ERR7_APINotInitialised, ERR7_APINotLicensed,  
ERR7_DataNotFound, ERR7_FileNotOpen, ERR7_InvalidFileUnit,  
ERR7_InvalidLaminateID, ERR7_NoError, ERR7_ResultFileIsOpen,  
ERR7_UnknownProperty
```

---

## St7GetLaminatePly

---

### Description

Returns the ply property and ply orientation assigned to the specified layer in a laminate.

## Syntax

```
long St7GetLaminatePly(long uID, long LamNum, long Pos,  
long* PlyPropNum, double* Doubles)
```

## Input Parameters

uID

Strand7 model file ID number.

LamNum

Laminate number.

Pos

Ply position within the laminate.

## Output Parameters

PlyPropNum

Ply property number.

Doubles[0..1]

[ipLaminatePlyAngle] - Orientation of the ply and laminate material axis systems.

[ipLaminatePlyThickness] - Ply thickness.

## Errors

ERR7\_APINotInitialised, ERR7\_APINotLicensed,  
ERR7\_DataNotFound, ERR7\_FileNotOpen, ERR7\_InvalidFileUnit,  
ERR7\_InvalidLaminateID, ERR7\_NoError

## St7AddLaminatePly

---

### Description

Adds a new ply to the specified laminate. The ply is appended to the end of the current laminate stack.

## Syntax

```
long St7AddLaminatePly(long uID, long LamNum, long  
PlyPropNum, double* Doubles)
```

---

## **Input Parameters**

uID

Strand7 model file ID number.

LamNum

Laminate number.

PlyPropNum

Ply property number.

Doubles[0..1]

[ipLaminatePlyAngle] - Orientation of the ply and laminate material axis systems.

[ipLaminatePlyThickness] - Ply thickness.

## **Errors**

ERR7\_APINotInitialised, ERR7\_APINotLicensed,  
ERR7\_DataNotFound, ERR7\_FileNotOpen, ERR7\_InvalidFileUnit,  
ERR7\_InvalidLaminateID, ERR7\_NoError, ERR7\_ResultFileIsOpen,  
ERR7\_UnknownProperty

---

## **St7InsertLaminatePly**

### **Description**

Inserts a new ply at the specified position within a laminate.

### **Syntax**

```
long St7InsertLaminatePly(long uID, long LamNum, long Pos,  
                           long PlyPropNum, double* Doubles)
```

## **Input Parameters**

uID

Strand7 model file ID number.

LamNum

Laminate number.

Pos

Ply position within laminate.

PlyPropNum

Ply property number.

Doubles[0..1]

[ipLaminatePlyAngle] - Orientation of the ply and laminate material axis systems.

[ipLaminatePlyThickness] - Ply thickness.

## Errors

ERR7\_APINotInitialised, ERR7\_APINotLicensed,  
ERR7\_DataNotFound, ERR7\_ExceededMaxNumPlies,  
ERR7\_FileNotOpen, ERR7\_InvalidFileUnit,  
ERR7\_InvalidLaminateID, ERR7\_NoError, ERR7\_PlyDoesNotExist,  
ERR7\_ResultFileIsOpen, ERR7\_UnknownProperty

## St7DeleteLaminatePly

---

### Description

Deletes the specified ply from a laminate.

### Syntax

```
long St7DeleteLaminatePly(long uID, long LamNum, long Pos)
```

### Input Parameters

uID

Strand7 model file ID number.

LamNum

Laminate number.

Pos

Ply position within laminate.

### Errors

ERR7\_APINotInitialised, ERR7\_APINotLicensed,  
ERR7\_DataNotFound, ERR7\_FileNotOpen, ERR7\_InvalidFileUnit,  
ERR7\_InvalidLaminateID, ERR7\_NoError, ERR7\_ResultFileIsOpen

---

# St7SetLaminateMatrices

---

## Description

Sets the material matrices for the specified laminate.

## Syntax

```
long St7SetLaminateMatrices(long uID, long LamNum, long*  
    Integers, double* Doubles)
```

## Input Parameters

uID

Strand7 model file ID number.

LamNum

Laminate number.

Integers[0..1]

[ipLaminateIgnoreCoupling] - Coupled membrane/bending option,  
either btTrue or btFalse.

[ipLaminateAutoTransverseShear] - Automatic transverse shear  
calculation, either btTrue or btFalse.

Doubles[0..23]

[0..2] - Transverse shear terms of the material stress-strain matrix  $G_{xz}$ ,  $G_{yz}$   
and  $G_{cz}$  respectively.

[3..8] - Membrane terms C of the material stress-strain matrix defined by  
the coefficients  $C_{11}$ ,  $C_{12}$ ,  $C_{13}$ ,  $C_{22}$ ,  $C_{23}$  and  $C_{33}$  respectively.

[9..14] - Bending terms D of the material stress-strain matrix defined by the  
coefficients  $D_{11}$ ,  $D_{12}$ ,  $D_{13}$ ,  $D_{22}$ ,  $D_{23}$  and  $D_{33}$  respectively.

[15..23] - Coupling terms B of the material stress-strain matrix defined by  
the coefficients  $B_{11}$ ,  $B_{12}$ ,  $B_{13}$ ,  $B_{21}$ ,  $B_{22}$ ,  $B_{23}$ ,  $B_{31}$ ,  $B_{32}$  and  $B_{33}$  respectively.

## Errors

```
ERR7_APINotInitialised, ERR7_APINotLicensed,  
ERR7_DataNotFound, ERR7_FileNotOpen, ERR7_InvalidFileUnit,  
ERR7_InvalidLaminateID, ERR7_NoError, ERR7_ResultFileIsOpen
```

## St7GetLaminateMatrices

---

### Description

Returns the material matrices for the specified laminate.

### Syntax

```
long St7GetLaminateMatrices(long uID, long LamNum, long*
    Integers, double* Doubles)
```

### Input Parameters

uID

Strand7 model file ID number.

LamNum

Laminate number.

### Output Parameters

Integers[0..1]

[ipLaminateIgnoreCoupling] - Coupled membrane/bending option, either btTrue or btFalse.

[ipLaminateAutoTransverseShear] - Automatic transverse shear calculation, either btTrue or btFalse.

Doubles[0..23]

[0..2] - Transverse shear terms of the material stress-strain matrix  $G_{xz}$ ,  $G_{yz}$  and  $G_{cz}$  respectively.

[3..8] - Membrane terms of the material stress-strain matrix defined by the coefficients  $C_{11}$ ,  $C_{12}$ ,  $C_{13}$ ,  $C_{22}$ ,  $C_{23}$  and  $C_{33}$  respectively.

[9..14] - Bending terms of the material stress-strain matrix defined by the coefficients  $D_{11}$ ,  $D_{12}$ ,  $D_{13}$ ,  $D_{22}$ ,  $D_{23}$  and  $D_{33}$  respectively.

[15..23] - Coupling terms of the material stress-strain matrix defined by the coefficients  $B_{11}$ ,  $B_{12}$ ,  $B_{13}$ ,  $B_{21}$ ,  $B_{22}$ ,  $B_{23}$ ,  $B_{31}$ ,  $B_{32}$  and  $B_{33}$  respectively.

### Errors

ERR7\_APINotInitialised, ERR7\_APINotLicensed,  
ERR7\_DataNotFound, ERR7\_FileNotOpen, ERR7\_InvalidFileUnit,  
ERR7\_InvalidLaminateID, ERR7\_NoError

---

## St7DeleteLaminate

---

### Description

Deletes the specified laminate.

### Syntax

```
long St7DeleteLaminate(long uID, long LamNum)
```

### Input Parameters

uID

Strand7 model file ID number.

LamNum

Laminate number.

### Errors

```
ERR7_APINotInitialised, ERR7_APINotLicensed,  
ERR7_FileNotOpen, ERR7_InvalidFileUnit,  
ERR7_InvalidLaminateID, ERR7_NoError, ERR7_ResultFileIsOpen
```

## St7DeleteUnusedLaminates

---

### Description

Deletes all unused laminates in the specified model.

### Syntax

```
long St7DeleteUnusedLaminates(long uID, long* NumDeleted)
```

### Input Parameters

uID

Strand7 model file ID number.

### Output Parameters

NumDeleted

Number of laminates deleted.

### Errors

```
ERR7_APINotInitialised, ERR7_APINotLicensed,  
ERR7_FileNotOpen, ERR7_InvalidFileUnit, ERR7_NoError,  
ERR7_ResultFileIsOpen
```

# Concrete Reinforcement

## St7GetTotalReinforcementLayouts

---

### Description

Returns the total number and highest ID number of the concrete reinforcement layouts in the specified model.

### Syntax

```
long St7GetTotalReinforcementLayouts(long uID, long*  
    NumLayouts, long* LastLayout)
```

### Input Parameters

uID

Strand7 model file ID number.

### Output Parameters

NumLayouts

The total number of layouts in the model.

LastLayout

The highest layout ID number.

### Errors

ERR7\_APINotInitialised, ERR7\_APINotLicensed,  
ERR7\_FileNotOpen, ERR7\_InvalidFileUnit, ERR7\_NoError

## St7GetReinforcementLayoutNumByIndex

---

### Description

Returns the reinforcement layout number associated with a specified layout index. The reinforcement layout indices are stored internally and are based on a contiguous numbering system.

### Syntax

```
long St7GetReinforcementLayoutNumByIndex(long uID, long  
    Index, long* LayoutNum)
```

---

## **Input Parameters**

uID

Strand7 model file ID number.

Index

Reinforcement layout index.

## **Output Parameters**

LayoutNum

Reinforcement layout number.

## **Errors**

ERR7\_APINotInitialised, ERR7\_APINotLicensed,  
ERR7\_FileNotOpen, ERR7\_InvalidFileUnit, ERR7\_InvalidIndex,  
ERR7\_NoError

---

## **St7NewReinforcementLayout**

### **Description**

Creates a new concrete reinforcement layout.

### **Syntax**

```
long St7NewReinforcementLayout(long uID, long LayoutID,  
                           char* LayoutName)
```

## **Input Parameters**

uID

Strand7 model file ID number.

LayoutID

Layout ID number.

LayoutName

Name of the layout.

## **Errors**

ERR7\_APINotInitialised, ERR7\_APINotLicensed,  
ERR7\_FileNotOpen, ERR7\_InvalidFileUnit,  
ERR7\_InvalidLayoutID, ERR7\_LayoutIDAlreadyExists,  
ERR7\_NoError, ERR7\_ResultFileIsOpen

## St7SetReinforcementName

---

### Description

Sets the name of the specified concrete reinforcement layout.

### Syntax

```
long St7SetReinforcementName(long uID, long LayoutID, char*  
    LayoutName)
```

### Input Parameters

uID

Strand7 model file ID number.

LayoutID

Layout ID number.

LayoutName

Name of the layout.

### Errors

```
ERR7_APINotInitialised, ERR7_APINotLicensed,  
ERR7_DataNotFound, ERR7_FileNotOpen, ERR7_InvalidFileUnit,  
ERR7_InvalidLayoutID, ERR7_NoError, ERR7_ResultFileIsOpen
```

## St7GetReinforcementName

---

### Description

Returns the names assigned to the specified concrete reinforcement layout.

### Syntax

```
long St7GetReinforcementName(long uID, long LayoutID, char*  
    LayoutName, long MaxStringLen)
```

### Input Parameters

uID

Strand7 model file ID number.

LayoutID

Layout ID number.

---

MaxStringLen

Maximum number of characters allocated to LayoutName.

### Output Parameters

LayoutName

Name of the layout.

### Errors

ERR7\_APINotInitialised, ERR7\_APINotLicensed,  
ERR7\_DataNotFound, ERR7\_FileNotOpen, ERR7\_InvalidFileUnit,  
ERR7\_InvalidLayoutID, ERR7\_NoError

## St7SetReinforcementData

---

### Description

Sets the concrete reinforcement data for the specified concrete reinforcement layout.

### Syntax

```
long St7SetReinforcementData(long uID, long LayoutID, long*  
    Integers, double* Doubles)
```

### Input Parameters

uID

Strand7 model file ID number.

LayoutID

Layout ID number.

Integers[0..7]

[ipReoLayoutType] - Layup type, either crReoSmmetric or  
crReoAntiSymmetric.

[ipReoColour13] - Layer 13 colour as a 32 bit RGB value.

[ipReoColour24] - Layer 24 colour as a 32 bit RGB value.

[ipReoCalcMethod] either crReoSimplified or crReoElastoPlasticIter.

[ipReoConsiderMembrane] - Consider membrane effects, either btTrue or  
btFalse.

[ipReoAllowCompressionReo] - Allow the steel reinforcement to support compression, either btTrue or btFalse.

[ipReoCode] - either 0 for EC2 or 1 for AS 3600.

[ipReoLimitConcreteStrain] - Add reinforcement to limit concrete strain, either btTrue or btFalse.

Doubles[0..18]

[ipReoDiam1] - Layer 1 bar diameter.

[ipReoDiam2] - Layer 2 bar diameter.

[ipReoDiam3] - Layer 3 bar diameter.

[ipReoDiam4] - Layer 4 bar diameter.

[ipReoCover1] - Cover 1 depth.

[ipReoCover2] - Cover 2 depth.

[ipReoSpacing1] - Layer 1 bar spacing.

[ipReoSpacing2] - Layer 2 bar spacing.

[ipReoSpacing3] - Layer 3 bar spacing.

[ipReoSpacing4] - Layer 4 bar spacing.

[ipReoConcreteModulus] - Concrete modulus.

[ipReoConcreteStrain] - Concrete strain limit.

[ipReoConcreteStress] - Concrete stress limit.

[ipReoConcretePhi] - Concrete *phi* parameter.

[ipReoConcreteGamma] - Concrete *gamma* parameter.

[ipReoSteelModulus] - Steel modulus.

[ipReoSteelStress] - Steel stress limit.

[ipReoSteelGamma] - Steel *gamma* parameter.

[ipReoSteelMinArea] - Steel minimum area value.

---

## Errors

```
ERR7_APINotInitialised, ERR7_APINotLicensed,  
ERR7_DataNotFound, ERR7_FileNotOpen, ERR7_InvalidFileUnit,  
ERR7_InvalidLayoutID, ERR7_NoError, ERR7_ResultFileIsOpen
```

# St7GetReinforcementData

---

## Description

Returns the concrete reinforcement data assigned to the specified concrete reinforcement layout.

## Syntax

```
long St7GetReinforcementData(long uID, long LayoutID, long*  
Integers, double* Doubles)
```

## Input Parameters

uID

Strand7 model file ID number.

LayoutID

Layout ID number.

## Output Parameters

Integers[0..7]

[ipReoLayoutType] - Layup type, either crReoSymmetric or crReoAntiSymmetric.

[ipReoColour13] - Layer 13 colour as a 32 bit RGB value.

[ipReoColour24] - Layer 24 colour as a 32 bit RGB value.

[ipReoCalcMethod] either crReoSimplified or crReoElastoPlasticIter.

[ipReoConsiderMembrane] - Consider membrane effects, either btTrue or btFalse.

[ipReoAllowCompressionReo] - Allow the steel reinforcement to support compression, either btTrue or btFalse.

[ipReoCode] - either 0 for EC2 or 1 for AS 3600.

[ipReoLimitConcreteStrain] - Add reinforcement to limit concrete strain, either btTrue or btFalse.

Doubles [0..18]

[ipReoDiam1] - Layer 1 bar diameter.

[ipReoDiam2] - Layer 2 bar diameter.

[ipReoDiam3] - Layer 3 bar diameter.

[ipReoDiam4] - Layer 4 bar diameter.

[ipReoCover1] - Cover 1 depth.

[ipReoCover2] - Cover 2 depth.

[ipReoSpacing1] - Layer 1 bar spacing.

[ipReoSpacing2] - Layer 2 bar spacing.

[ipReoSpacing3] - Layer 3 bar spacing.

[ipReoSpacing4] - Layer 4 bar spacing.

[ipReoConcreteModulus] - Concrete modulus.

[ipReoConcreteStrain] - Concrete strain limit.

[ipReoConcreteStress] - Concrete stress limit.

[ipReoConcretePhi] - Concrete *phi* parameter.

[ipReoConcreteGamma] - Concrete *gamma* parameter.

[ipReoSteelModulus] - Steel modulus.

[ipReoSteelStress] - Steel stress limit.

[ipReoSteelGamma] - Steel *gamma* parameter.

[ipReoSteelMinArea] - Steel minimum area value.

### Errors

ERR7\_APINotInitialised, ERR7\_APINotLicensed,  
ERR7\_DataNotFound, ERR7\_FileNotOpen, ERR7\_InvalidFileUnit,  
ERR7\_InvalidLayoutID, ERR7\_NoError

---

## St7DeleteReinforcementLayout

---

### Description

Deletes the specified concrete reinforcement layout.

### Syntax

```
long St7DeleteReinforcementLayout(long uID, long LayoutID)
```

### Input Parameters

uID

Strand7 model file ID number.

LayoutID

Layout ID number.

### Errors

```
ERR7_APINotInitialised, ERR7_APINotLicensed,  
ERR7_FileNotOpen, ERR7_InvalidFileUnit,  
ERR7_InvalidLayoutID, ERR7_NoError, ERR7_ResultFileIsOpen
```

# Creep Law Definitions

## St7GetTotalCreepDefinitions

---

### Description

Returns the total number and highest ID number of the creep laws in the specified model.

### Syntax

```
long St7GetTotalCreepDefinitions(long uID, long* NumSets,  
                                long* LastSet)
```

### Input Parameters

uID

Strand7 model file ID number.

### Output Parameters

NumSets

The total number of creep laws in the model.

LastSet

The highest creep definition ID number.

### Errors

ERR7\_APINotInitialised, ERR7\_APINotLicensed,  
ERR7\_FileNotOpen, ERR7\_InvalidFileUnit, ERR7\_NoError

## St7GetCreepDefinitionNumByIndex

---

### Description

Returns the creep law number associated with a specified creep law index. The creep law indices are stored internally and are based on a contiguous numbering system.

### Syntax

```
long St7GetCreepDefinitionNumByIndex(long uID, long Index,  
                                       long* CreepNum)
```

---

## **Input Parameters**

uID

Strand7 model file ID number.

Index

Creep law index.

## **Output Parameters**

CreepNum

Creep law number.

## **Errors**

ERR7\_APINotInitialised, ERR7\_APINotLicensed,  
ERR7\_FileNotOpen, ERR7\_InvalidFileUnit, ERR7\_InvalidIndex,  
ERR7\_NoError

---

# **St7NewCreepDefinition**

## **Description**

Creates a new creep law definition.

## **Syntax**

```
long St7NewCreepDefinition(long uID, long CreepID, char*  
CreepDefinitionName)
```

## **Input Parameters**

uID

Strand7 model file ID number.

CreepID

Creep definition ID number.

CreepDefinitionName

Name of the creep definition.

## **Errors**

ERR7\_APINotInitialised, ERR7\_APINotLicensed,  
ERR7\_CreepIDAlreadyExists, ERR7\_FileNotOpen,  
ERR7\_InvalidCreepID, ERR7\_InvalidFileUnit, ERR7\_NoError,  
ERR7\_ResultFileIsOpen

## St7SetCreepDefinitionName

---

### Description

Sets the name of the specified creep law definition.

### Syntax

```
long St7SetCreepDefinitionName(long uID, long CreepID,  
                           char* CreepDefinitionName)
```

### Input Parameters

uID

Strand7 model file ID number.

CreepID

Creep definition ID number.

CreepDefinitionName

Name of the creep definition.

### Errors

```
ERR7_APINotInitialised, ERR7_APINotLicensed,  
ERR7_DataNotFound, ERR7_FileNotOpen, ERR7_InvalidCreepID,  
ERR7_InvalidFileUnit, ERR7_NoError, ERR7_ResultFileIsOpen
```

## St7GetCreepDefinitionName

---

### Description

Returns the name of the specified creep law definition.

### Syntax

```
long St7GetCreepDefinitionName(long uID, long CreepID,  
                           char* CreepDefinitionName, long MaxStringLen)
```

### Input Parameters

uID

Strand7 model file ID number.

CreepID

Creep definition ID number.

---

MaxStringLen

Maximum number of characters allocated for CreepDefinitionName.

### Output Parameters

CreepDefinitionName

Name of the creep definition.

### Errors

ERR7\_APINotInitialised, ERR7\_APINotLicensed,  
ERR7\_DataNotFound, ERR7\_FileNotOpen, ERR7\_InvalidCreepID,  
ERR7\_InvalidFileUnit, ERR7\_NoError

## St7SetCreepLaw

---

### Description

Sets the type of creep law assigned to the specified creep definition.

### Syntax

```
long St7SetCreepLaw(long uID, long CreepID, long CreepLaw)
```

### Input Parameters

uID

Strand7 model file ID number.

CreepID

Creep definition ID number.

CreepLaw

Type of creep law, one of clConcreteHyperbolic, clConcreteViscoChain,  
clConcreteUserDefined, clPrimaryPower, clSecondaryPower,  
clPrimarySecondaryPower, clSecondaryHyperbolic,  
clSecondaryExponential, clThetaProjection, clGenGraham, clGenBlackburn,  
clUserDefined.

### Errors

ERR7\_APINotInitialised, ERR7\_APINotLicensed,  
ERR7\_DataNotFound, ERR7\_FileNotOpen, ERR7\_InvalidCreepID,  
ERR7\_InvalidCreepLaw, ERR7\_InvalidFileUnit, ERR7\_NoError,  
ERR7\_ResultFileIsOpen

## St7GetCreepLaw

---

### Description

Returns the type of creep law assigned to the specified creep definition.

### Syntax

```
long St7GetCreepLaw(long uID, long CreepID, long* CreepLaw)
```

### Input Parameters

uID

Strand7 model file ID number.

CreepID

Creep definition ID number.

### Output Parameters

CreepLaw

Type of creep law, one of clConcreteHyperbolic, clConcreteViscoChain, clConcreteUserDefined, clPrimaryPower, clSecondaryPower, clPrimarySecondaryPower, clSecondaryHyperbolic, clSecondaryExponential, clThetaProjection, clGenGraham, clGenBlackburn, clUserDefined.

### Errors

```
ERR7_APINotInitialised, ERR7_APINotLicensed,  
ERR7_DataNotFound, ERR7_FileNotOpen, ERR7_InvalidCreepID,  
ERR7_InvalidFileUnit, ERR7_NoError
```

## St7SetCreepBasicData

---

### Description

Sets the basic creep coefficients for the specified creep law definition.

### Syntax

```
long St7SetCreepBasicData(long uID, long CreepID, double*  
    Doubles)
```

### Input Parameters

uID

Strand7 model file ID number.

---

CreepID

Creep definition ID number.

Doubles[0..15]

An array containing the basic creep coefficients. See *Creep Definitions* for additional information.

## Errors

ERR7\_APINotInitialised, ERR7\_APINotLicensed,  
ERR7\_DataNotFound, ERR7\_FileNotOpen, ERR7\_InvalidCreepID,  
ERR7\_InvalidFileUnit, ERR7\_NoError, ERR7\_ResultFileIsOpen

# St7GetCreepBasicData

---

## Description

Returns the basic creep coefficients assigned to the specified creep definition.

## Syntax

```
long St7GetCreepBasicData(long uID, long CreepID, double*  
    Doubles)
```

## Input Parameters

uID

Strand7 model file ID number.

CreepID

Creep definition ID number.

## Output Parameters

Doubles[0..15]

An array containing the basic creep coefficients. See *Creep Definitions* for additional information.

## Errors

ERR7\_APINotInitialised, ERR7\_APINotLicensed,  
ERR7\_DataNotFound, ERR7\_FileNotOpen, ERR7\_InvalidCreepID,  
ERR7\_InvalidFileUnit, ERR7\_NoError

## St7EnableCreepUserTable

---

### Description

Enables a user defined Strain vs Time table for the specified creep law definition.

### Syntax

```
long St7EnableCreepUserTable(long uID, long CreepID, long  
TableID)
```

### Input Parameters

uID

Strand7 model file ID number.

CreepID

Creep definition ID number.

TableID

User defined Strain vs Time table ID.

### Errors

```
ERR7_APINotInitialised, ERR7_APINotLicensed,  
ERR7_DataNotFound, ERR7_FileNotOpen, ERR7_InvalidCreepID,  
ERR7_InvalidFileUnit, ERR7_InvalidTableType, ERR7_NoError,  
ERR7_ResultFileIsOpen, ERR7_TableDoesNotExist
```

## St7DisableCreepUserTable

---

### Description

Disables a user defined Strain vs Time table for the specified creep law definition.

### Syntax

```
long St7DisableCreepUserTable(long uID, long CreepID, long  
TableID)
```

### Input Parameters

uID

Strand7 model file ID number.

CreepID

Creep definition ID number.

---

TableID

User defined Strain vs Time table ID.

## Errors

ERR7\_APINotInitialised, ERR7\_APINotLicensed,  
ERR7\_DataNotFound, ERR7\_FileNotOpen, ERR7\_InvalidCreepID,  
ERR7\_InvalidFileUnit, ERR7\_InvalidTableType, ERR7\_NoError,  
ERR7\_ResultFileIsOpen, ERR7\_TableDoesNotExist

# St7GetCreepUserTableState

---

## Description

Returns the state of a user defined Strain vs Time table for the specified creep law definition.

## Syntax

```
long St7GetCreepUserTableState(long uID, long CreepID, long  
TableID, bool* State)
```

## Input Parameters

uID

Strand7 model file ID number.

CreepID

Creep definition ID number.

TableID

User defined Strain vs Time table ID.

## Output Parameters

State

btTrue if the user defined table is enabled.

## Errors

ERR7\_APINotInitialised, ERR7\_APINotLicensed,  
ERR7\_DataNotFound, ERR7\_FileNotOpen, ERR7\_InvalidCreepID,  
ERR7\_InvalidFileUnit, ERR7\_InvalidTableType, ERR7\_NoError,  
ERR7\_TableDoesNotExist

## St7SetCreepUserTableData

---

### Description

Sets the data associated with the user defined Strain vs Time data for the specified creep law definition.

### Syntax

```
long St7SetCreepUserTableData(long uID, long CreepID, long  
TableID, double* Doubles)
```

### Input Parameters

uID

Strand7 model file ID number.

CreepID

Creep definition ID number.

TableID

User defined table ID.

Doubles [0..1]

[0] - Stress level associated with Strain vs Time data.

[1] - Temperature associated with Strain vs Time data.

### Errors

ERR7\_APINotInitialised, ERR7\_APINotLicensed,  
ERR7\_DataNotFound, ERR7\_FileNotOpen, ERR7\_InvalidCreepID,  
ERR7\_InvalidFileUnit, ERR7\_InvalidTableType, ERR7\_NoError,  
ERR7\_ResultFileIsOpen, ERR7\_TableDoesNotExist

## St7GetCreepUserTableData

---

### Description

Returns the data associated with the user defined Strain vs Time table assigned to the specified creep law definition.

### Syntax

```
long St7GetCreepUserTableData(long uID, long CreepID, long  
TableID, double* Doubles)
```

---

## **Input Parameters**

uID

Strand7 model file ID number.

CreepID

Creep definition ID number.

TableID

User defined table ID.

## **Output Parameters**

Doubles[0..1]

[0] - Stress level associated with Strain vs Time data.

[1] - Temperature associated with Strain vs Time data.

## **Errors**

ERR7\_APINotInitialised, ERR7\_APINotLicensed,  
ERR7\_DataNotFound, ERR7\_FileNotOpen, ERR7\_InvalidCreepID,  
ERR7\_InvalidFileUnit, ERR7\_InvalidTableType, ERR7\_NoError,  
ERR7\_TableDoesNotExist

---

## **St7SetCreepHardeningType**

### **Description**

Sets the hardening type for the specified creep law definition.

### **Syntax**

```
long St7SetCreepHardeningType(long uID, long CreepID, long*  
    Integers)
```

## **Input Parameters**

uID

Strand7 model file ID number.

CreepID

Creep definition ID number.

Integers[0..1]

[ipCreepHardeningType] - Type of creep hardening, either crHardeningTime or crHardeningStrain.

[ipCreepHardeningCyclic] - Cyclic hardening option, either btTrue or btFalse.

### Errors

ERR7\_APINotInitialised, ERR7\_APINotLicensed,  
ERR7\_DataNotFound, ERR7\_FileNotOpen,  
ERR7\_InvalidCreepHardeningLaw, ERR7\_InvalidCreepID,  
ERR7\_InvalidFileUnit, ERR7\_NoError, ERR7\_ResultFileIsOpen

## St7GetCreepHardeningType

---

### Description

Returns the hardening type assigned to the specified creep law definition.

### Syntax

```
long St7GetCreepHardeningType(long uID, long CreepID, long*  
    Integers)
```

### Input Parameters

uID

Strand7 model file ID number.

CreepID

Creep definition ID number.

### Output Parameters

Integers[0..1]

[ipCreepHardeningType] - Type of creep hardening, either crHardeningTime or crHardeningStrain.

[ipCreepHardeningCyclic] - Cyclic hardening option, either btTrue or btFalse.

### Errors

ERR7\_APINotInitialised, ERR7\_APINotLicensed,  
ERR7\_DataNotFound, ERR7\_FileNotOpen, ERR7\_InvalidCreepID,  
ERR7\_InvalidFileUnit, ERR7\_NoError

---

## St7SetCreepTimeUnit

---

### Description

Sets the time units for the specified metallic creep law definition.

### Syntax

```
long St7SetCreepTimeUnit(long uID, long CreepID, long*  
    Integers)
```

### Input Parameters

uID

Strand7 model file ID number.

CreepID

Creep definition ID number.

Integers[0..0]

[0] - Time units, one of tuMilliSec, tuSec, tuMin, tuHour or tuDay.

### Errors

```
ERR7_APINotInitialised, ERR7_APINotLicensed,  
ERR7_DataNotFound, ERR7_FileNotOpen, ERR7_InvalidCreepID,  
ERR7_InvalidFileUnit, ERR7_InvalidTimeUnit, ERR7_NoError,  
ERR7_ResultFileIsOpen
```

---

## St7GetCreepTimeUnit

---

### Description

Returns the time units for the specified metallic creep law definition.

### Syntax

```
long St7GetCreepTimeUnit(long uID, long CreepID, long*  
    Integers)
```

### Input Parameters

uID

Strand7 model file ID number.

CreepID

Creep definition ID number.

## Output Parameters

Integers[0..0]

[0] - Time units, one of tuMilliSec, tuSec, tuMin, tuHour or tuDay.

## Errors

ERR7\_APINotInitialised, ERR7\_APINotLicensed,  
ERR7\_DataNotFound, ERR7\_FileNotOpen, ERR7\_InvalidCreepID,  
ERR7\_InvalidFileUnit, ERR7\_NoError

# St7SetCreepTemperatureInclude

---

## Description

Sets temperature dependency for the specified creep law definition, where applicable.

## Syntax

```
long St7SetCreepTemperatureInclude(long uID, long CreepID,  
                                bool Include)
```

## Input Parameters

uID

Strand7 model file ID number.

CreepID

Creep definition ID number.

Include

btTrue to include temperature dependent terms.

## Errors

ERR7\_APINotInitialised, ERR7\_APINotLicensed,  
ERR7\_DataNotFound, ERR7\_FileNotOpen, ERR7\_InvalidCreepID,  
ERR7\_InvalidFileUnit, ERR7\_NoError, ERR7\_ResultFileIsOpen

# St7GetCreepTemperatureInclude

---

## Description

Returns the temperature dependency for the specified creep law definition, where applicable.

---

## Syntax

```
long St7GetCreepTemperatureInclude(long uID, long CreepID,  
                                bool* Include)
```

## Input Parameters

uID

Strand7 model file ID number.

CreepID

Creep definition ID number.

## Output Parameters

Include

returns btTrue when temperature dependent terms are included.

## Errors

```
ERR7_APINotInitialised, ERR7_APINotLicensed,  
ERR7_DataNotFound, ERR7_FileNotOpen, ERR7_InvalidCreepID,  
ERR7_InvalidFileUnit, ERR7_NoError
```

---

## St7SetCreepConcreteHyperbolicData

### Description

Sets the hyperbolic data for the specified creep law definition.

### Syntax

```
long St7SetCreepConcreteHyperbolicData(long uID, long  
                                         CreepID, long* Integers, double* Doubles)
```

### Input Parameters

uID

Strand7 model file ID number.

CreepID

Creep definition ID number.

Integers[0..1]

[ipCreepHyperbolicTimeTable] - Factor vs Time table ID, zero for none.

[ipCreepHyperbolicConstModulus] - Constant modulus flag, either btTrue or btFalse.

Doubles[0..3]

[ipCreepHyperbolicAlpha] - Hyperbolic law *alpha* parameter.

[ipCreepHyperbolicBeta] - Hyperbolic law *beta* parameter.

[ipCreepHyperbolicDelta] - Hyperbolic law *delta* parameter.

[ipCreepHyperbolicPhi] - Hyperbolic law *phi* parameter.

### Errors

ERR7\_APINotInitialised, ERR7\_APINotLicensed,  
ERR7\_DataNotFound, ERR7\_FileNotOpen, ERR7\_InvalidCreepID,  
ERR7\_InvalidFileUnit, ERR7\_InvalidTableType, ERR7\_NoError,  
ERR7\_ResultFileIsOpen, ERR7\_TableDoesNotExist

## St7GetCreepConcreteHyperbolicData

---

### Description

Returns the hyperbolic data assigned to the specified creep law definition.

### Syntax

```
long St7GetCreepConcreteHyperbolicData(long uID, long  
CreepID, long* Integers, double* Doubles)
```

### Input Parameters

uID

Strand7 model file ID number.

CreepID

Creep definition ID number.

### Output Parameters

Integers[0..1]

[ipCreepHyperbolicTimeTable] - Factor vs Time table ID, zero for none.

[ipCreepHyperbolicConstModulus] - Constant modulus flag, either btTrue or btFalse.

Doubles[0..3]

---

[ipCreepHyperbolicAlpha] - Hyperbolic law *alpha* parameter.  
[ipCreepHyperbolicBeta] - Hyperbolic law *beta* parameter.  
[ipCreepHyperbolicDelta] - Hyperbolic law *delta* parameter.  
[ipCreepHyperbolicPhi] - Hyperbolic law *phi* parameter.

## Errors

ERR7\_APINotInitialised, ERR7\_APINotLicensed,  
ERR7\_DataNotFound, ERR7\_FileNotOpen, ERR7\_InvalidCreepID,  
ERR7\_InvalidFileUnit, ERR7\_NoError

# St7SetCreepConcreteViscoChainData

---

## Description

Sets the visco-elastic chain data for the specified creep law definition.

## Syntax

```
long St7SetCreepConcreteViscoChainData(long uID, long  
                                         CreepID, long Pos, long* Integers, double* Doubles)
```

## Input Parameters

uID

Strand7 model file ID number.

CreepID

Creep definition ID number.

Pos

Chain number.

Integers[0..1]

[ipCreepViscoTimeTable] - Strain vs Time table ID, zero for none.

[ipCreepViscoTempTable] - Factor vs Temperature table ID, zero for none.

Doubles[0..1]

[ipCreepViscoDamper] - Damping value.

[ipCreepViscoStiffness] - Stiffness value.

## Errors

```
ERR7_APINotInitialised, ERR7_APINotLicensed,  
ERR7_DataNotFound, ERR7_FileNotOpen, ERR7_InvalidCreepID,  
ERR7_InvalidCreepViscoChainRow, ERR7_InvalidFileUnit,  
ERR7_InvalidTableType, ERR7_NoError, ERR7_ResultFileIsOpen,  
ERR7_TableDoesNotExist
```

# St7GetCreepConcreteViscoChainData

---

## Description

Returns the visco-elastic chain data assigned to the specified creep law definition.

## Syntax

```
long St7GetCreepConcreteViscoChainData(long uID, long  
CreepID, long Pos, long* Integers, double* Doubles)
```

## Input Parameters

uID

Strand7 model file ID number.

CreepID

Creep definition ID number.

Pos

Chain number.

## Output Parameters

Integers[0..1]

[ipCreepViscoTimeTable] - Strain vs Time table ID, zero for none.

[ipCreepViscoTempTable] - Factor vs Temperature table ID, zero for none.

Doubles[0..1]

[ipCreepViscoDamper] - Damping value.

[ipCreepViscoStiffness] - Stiffness value.

---

## Errors

```
ERR7_APINotInitialised, ERR7_APINotLicensed,  
ERR7_DataNotFound, ERR7_FileNotOpen, ERR7_InvalidCreepID,  
ERR7_InvalidCreepViscoChainRow, ERR7_InvalidFileUnit,  
ERR7_NoError
```

---

## St7EnableCreepConcreteUserTable

### Description

Enables the user defined concrete Strain vs Time table for the specified creep law definition.

### Syntax

```
long St7EnableCreepConcreteUserTable(long uID, long CreepID,  
                                     long TableID)
```

### Input Parameters

uID

Strand7 model file ID number.

CreepID

Creep definition ID number.

TableID

User defined Strain vs Time table ID.

### Errors

```
ERR7_APINotInitialised, ERR7_APINotLicensed,  
ERR7_DataNotFound, ERR7_FileNotOpen, ERR7_InvalidCreepID,  
ERR7_InvalidFileUnit, ERR7_InvalidTableType, ERR7_NoError,  
ERR7_ResultFileIsOpen, ERR7_TableDoesNotExist
```

---

## St7DisableCreepConcreteUserTable

### Description

Disables the user defined concrete Strain vs Time table for the specified creep law definition.

## Syntax

```
long St7DisableCreepConcreteUserTable(long uID, long  
CreepID, long TableID)
```

## Input Parameters

uID

Strand7 model file ID number.

CreepID

Creep definition ID number.

TableID

User defined Strain vs Time table ID.

## Errors

```
ERR7_APINotInitialised, ERR7_APINotLicensed,  
ERR7_DataNotFound, ERR7_FileNotOpen, ERR7_InvalidCreepID,  
ERR7_InvalidFileUnit, ERR7_InvalidTableType, ERR7_NoError,  
ERR7_ResultFileIsOpen, ERR7_TableDoesNotExist
```

## St7GetCreepConcreteUserTableState

---

### Description

Returns the state of the user defined concrete Strain vs Time table for the specified creep law definition.

## Syntax

```
long St7GetCreepConcreteUserTableState(long uID, long  
CreepID, long TableID, bool* State)
```

## Input Parameters

uID

Strand7 model file ID number.

CreepID

Creep definition ID number.

TableID

User defined Strain vs Time table ID.

---

## Output Parameters

State

btTrue if the user defined concrete table is enabled.

## Errors

ERR7\_APINotInitialised, ERR7\_APINotLicensed,  
ERR7\_DataNotFound, ERR7\_FileNotOpen, ERR7\_InvalidCreepID,  
ERR7\_InvalidFileUnit, ERR7\_InvalidTableType, ERR7\_NoError,  
ERR7\_TableDoesNotExist

---

## St7SetCreepConcreteUserTableData

### Description

Sets the data for the user defined concrete Strain vs Time table for the specified creep law definition.

### Syntax

```
long St7SetCreepConcreteUserTableData(long uID, long  
CreepID, long TableID, double* Doubles)
```

### Input Parameters

uID

Strand7 model file ID number.

CreepID

Creep definition ID number.

TableID

User defined Strain vs Time table ID.

Doubles[0..1]

[0] - Age at first loading value.

[1] - Stress value associated with Strain vs Time data.

### Errors

ERR7\_APINotInitialised, ERR7\_APINotLicensed,  
ERR7\_DataNotFound, ERR7\_FileNotOpen, ERR7\_InvalidCreepID,  
ERR7\_InvalidFileUnit, ERR7\_InvalidTableType, ERR7\_NoError,  
ERR7\_ResultFileIsOpen, ERR7\_TableDoesNotExist

## St7GetCreepConcreteUserData

---

### Description

Returns the data assigned to the user defined Strain vs Time concrete table for the specified creep law definition.

### Syntax

```
long St7GetCreepConcreteUserData(long uID, long  
CreepID, long TableID, double* Doubles)
```

### Input Parameters

uID

Strand7 model file ID number.

CreepID

Creep definition ID number.

TableID

User defined Strain vs Time table ID.

### Output Parameters

Doubles [0..1]

[0] - Age at first loading value.

[1] - Stress value associated with Strain vs Time data.

### Errors

ERR7\_APINotInitialised, ERR7\_APINotLicensed,  
ERR7\_DataNotFound, ERR7\_FileNotOpen, ERR7\_InvalidCreepID,  
ERR7\_InvalidFileUnit, ERR7\_InvalidTableType, ERR7\_NoError,  
ERR7\_TableDoesNotExist

## St7SetCreepConcreteFunctionType

---

### Description

Sets the concrete type assigned to the specified creep law definition.

### Syntax

```
long St7SetCreepConcreteFunctionType(long uID, long CreepID,  
long FunctionType)
```

---

## **Input Parameters**

uID

Strand7 model file ID number.

CreepID

Creep definition ID number.

FunctionType

Function type, either cfCreepFunction or cfRelaxationFunction.

## **Errors**

```
ERR7_APINotInitialised, ERR7_APINotLicensed,  
ERR7_DataNotFound, ERR7_FileNotOpen,  
ERR7_InvalidCreepFunctionType, ERR7_InvalidCreepID,  
ERR7_InvalidFileUnit, ERR7_NoError, ERR7_ResultFileIsOpen
```

---

# **St7GetCreepConcreteFunctionType**

## **Description**

Returns the concrete type assigned to the specified creep law definition.

## **Syntax**

```
long St7GetCreepConcreteFunctionType(long uID, long CreepID,  
                                     long* FunctionType)
```

## **Input Parameters**

uID

Strand7 model file ID number.

CreepID

Creep definition ID number.

## **Output Parameters**

FunctionType

Function type, either cfCreepFunction or cfRelaxationFunction.

## **Errors**

```
ERR7_APINotInitialised, ERR7_APINotLicensed,  
ERR7_DataNotFound, ERR7_FileNotOpen, ERR7_InvalidCreepID,  
ERR7_InvalidFileUnit, ERR7_NoError
```

## St7SetCreepConcreteLoadingAge

---

### Description

Sets the default loading age for the specified creep law definition.

### Syntax

```
long St7SetCreepConcreteLoadingAge(long uID, long CreepID,  
double LoadingAge)
```

### Input Parameters

uID

Strand7 model file ID number.

CreepID

Creep definition ID number.

LoadingAge

Default creep loading age.

### Errors

```
ERR7_APINotInitialised, ERR7_APINotLicensed,  
ERR7_DataNotFound, ERR7_FileNotOpen, ERR7_InvalidCreepID,  
ERR7_InvalidFileUnit, ERR7_NoError, ERR7_ResultFileIsOpen
```

## St7GetCreepConcreteLoadingAge

---

### Description

Returns the default loading age assigned to the specified creep law definition.

### Syntax

```
long St7GetCreepConcreteLoadingAge(long uID, long CreepID,  
double* LoadingAge)
```

### Input Parameters

uID

Strand7 model file ID number.

CreepID

Creep definition ID number.

---

## **Output Parameters**

>LoadingAge

Default creep loading age.

## **Errors**

ERR7\_APINotInitialised, ERR7\_APINotLicensed,  
ERR7\_DataNotFound, ERR7\_FileNotOpen, ERR7\_InvalidCreepID,  
ERR7\_InvalidFileUnit, ERR7\_NoError

---

## **St7SetCreepConcreteLoadingTimeUnit**

### **Description**

Sets the time units for the specified concrete creep law definition.

### **Syntax**

```
long St7SetCreepConcreteLoadingTimeUnit(long uID, long  
CreepID, long* Integers)
```

### **Input Parameters**

uID

Strand7 model file ID number.

CreepID

Creep definition ID number.

Integers[0..0]

[0] - Time units, one of tuMilliSec, tuSec, tuMin, tuHour or tuDay.

### **Errors**

ERR7\_APINotInitialised, ERR7\_APINotLicensed,  
ERR7\_DataNotFound, ERR7\_FileNotOpen, ERR7\_InvalidCreepID,  
ERR7\_InvalidFileUnit, ERR7\_InvalidTimeUnit, ERR7\_NoError,  
ERR7\_ResultFileIsOpen

---

## **St7GetCreepConcreteLoadingTimeUnit**

### **Description**

Returns the time units for the specified concrete creep law definition.

## Syntax

```
long St7GetCreepConcreteLoadingTimeUnit(long uID, long  
CreepID, long* Integers)
```

## Input Parameters

uID

Strand7 model file ID number.

CreepID

Creep definition ID number.

## Output Parameters

Integers[0..0]

[0] - Time units, one of tuMilliSec, tuSec, tuMin, tuHour or tuDay.

## Errors

ERR7\_APINotInitialised, ERR7\_APINotLicensed,  
ERR7\_DataNotFound, ERR7\_FileNotOpen, ERR7\_InvalidCreepID,  
ERR7\_InvalidFileUnit, ERR7\_NoError

# St7SetCreepConcreteShrinkageType

---

## Description

Sets the shrinkage type assigned to the specified creep law definition.

## Syntax

```
long St7SetCreepConcreteShrinkageType(long uID, long  
CreepID, long ShrinkageType)
```

## Input Parameters

uID

Strand7 model file ID number.

CreepID

Creep definition ID number.

ShrinkageType

Shrinkage type, either crCreepShrinkageTable or crCreepShrinkageFormula.

---

## Errors

```
ERR7_APINotInitialised, ERR7_APINotLicensed,  
ERR7_DataNotFound, ERR7_FileNotOpen, ERR7_InvalidCreepID,  
ERR7_InvalidCreepShrinkageType, ERR7_InvalidFileUnit,  
ERR7_NoError, ERR7_ResultFileIsOpen
```

---

## St7GetCreepConcreteShrinkageType

### Description

Returns the shrinkage type assigned to the specified creep law definition.

### Syntax

```
long St7GetCreepConcreteShrinkageType(long uID, long  
CreepID, long* ShrinkageType)
```

### Input Parameters

uID

Strand7 model file ID number.

CreepID

Creep definition ID number.

### Output Parameters

ShrinkageType

Shrinkage type, either crCreepShrinkageTable or crCreepShrinkageFormula.

### Errors

```
ERR7_APINotInitialised, ERR7_APINotLicensed,  
ERR7_DataNotFound, ERR7_FileNotOpen, ERR7_InvalidCreepID,  
ERR7_InvalidFileUnit, ERR7_NoError
```

---

## St7SetCreepConcreteShrinkageFormulaData

### Description

Assigns the shrinkage formula data for the specified creep law definition.

### Syntax

```
long St7SetCreepConcreteShrinkageFormulaData(long uID, long  
CreepID, long* Integers, double* Doubles)
```

## Input Parameters

uID

Strand7 model file ID number.

CreepID

Creep definition ID number.

Integers [ 0 ]

Currently unused, a dummy integer may be passed.

Doubles [ 0 .. 3 ]

[ipCreepShrinkageAlpha] - Concrete shrinkage *alpha* parameter.

[ipCreepShrinkageBeta] - Concrete shrinkage *beta* parameter.

[ipCreepShrinkageDelta] - Concrete shrinkage *delta* parameter.

[ipCreepShrinkageStrain] - Concrete shrinkage initial strain parameter.

## Errors

ERR7\_APINotInitialised, ERR7\_APINotLicensed,  
ERR7\_DataNotFound, ERR7\_FileNotOpen, ERR7\_InvalidCreepID,  
ERR7\_InvalidFileUnit, ERR7\_NoError, ERR7\_ResultFileIsOpen

# St7GetCreepConcreteShrinkageFormulaData

---

## Description

Returns the shrinkage formula data assigned to the specified creep law definition.

## Syntax

```
long St7GetCreepConcreteShrinkageFormulaData(long uID, long  
CreepID, long* Integers, double* Doubles)
```

## Input Parameters

uID

Strand7 model file ID number.

CreepID

Creep definition ID number.

---

## Output Parameters

Integers[0]

Currently unused, a dummy integer may be passed.

Doubles[0..3]

[ipCreepShrinkageAlpha] - Concrete shrinkage alpha parameter.

[ipCreepShrinkageBeta] - Concrete shrinkage beta parameter.

[ipCreepShrinkageDelta] - Concrete shrinkage delta parameter.

[ipCreepShrinkageStrain] - Concrete shrinkage initial strain parameter.

## Errors

ERR7\_APINotInitialised, ERR7\_APINotLicensed,  
ERR7\_DataNotFound, ERR7\_FileNotOpen, ERR7\_InvalidCreepID,  
ERR7\_InvalidFileUnit, ERR7\_NoError

---

# St7SetCreepConcreteShrinkageTableData

## Description

Associates a table with the concrete shrinkage data for the specified creep law definition.

## Syntax

```
long St7SetCreepConcreteShrinkageTableData(long uID, long  
CreepID, long TableID)
```

## Input Parameters

uID

Strand7 model file ID number.

CreepID

Creep definition ID number.

TableID

Strain vs Time table ID, zero for none.

## Errors

ERR7\_APINotInitialised, ERR7\_APINotLicensed,  
ERR7\_DataNotFound, ERR7\_FileNotOpen, ERR7\_InvalidCreepID,

```
ERR7_InvalidFileUnit, ERR7_InvalidTableType, ERR7_NoError,  
ERR7_ResultFileIsOpen, ERR7_TableDoesNotExist
```

## St7GetCreepConcreteShrinkageTableData

---

### Description

Returns the table associated with the concrete shrinkage data for the specified creep law definition.

### Syntax

```
long St7GetCreepConcreteShrinkageTableData(long uID, long  
CreepID, long* TableID)
```

### Input Parameters

uID

Strand7 model file ID number.

CreepID

Creep definition ID number.

### Output Parameters

TableID

Strain vs Time table ID, zero for none.

### Errors

```
ERR7_APINotInitialised, ERR7_APINotLicensed,  
ERR7_DataNotFound, ERR7_FileNotOpen, ERR7_InvalidCreepID,  
ERR7_InvalidFileUnit, ERR7_NoError
```

## St7SetCreepConcreteTemperatureData

---

### Description

Sets the concrete temperature data for the specified creep law definition.

### Syntax

```
long St7SetCreepConcreteTemperatureData(long uID, long  
CreepID, long* Integers, double* Doubles)
```

### Input Parameters

uID

---

Strand7 model file ID number.

CreepID

Creep definition ID number.

Integers [0..2]

[ipIncludeCreepTemperature] - Include temperature effects for the creep ageing, either btTrue or btFalse.

[ipIncludeRateTemperature] - Include temperature effects for the creep rate, either btTrue or btFalse.

[ipIncludeShrinkageTemperature] - Included temperature effects for the shrinkage ageing, either btTrue or btFalse.

Doubles [0..5]

[ipCreepCAAge] - Creep age CA parameter.

[ipCreepTRefAge] - Creep age  $T_{A_{REF}}$  parameter.

[ipCreepCCCreep] - Creep rate CC parameter.

[ipCreepTRefCreep] - Creep rate  $T_{C_{REF}}$  parameter.

[ipCreepCAShrink] - Shrinkage age CA parameter.

[ipCreepTRefShrink] - Shrinkage age  $T_{A_{REF}}$  parameter.

## Errors

ERR7\_APINotInitialised, ERR7\_APINotLicensed,  
ERR7\_DataNotFound, ERR7\_FileNotOpen, ERR7\_InvalidCreepID,  
ERR7\_InvalidFileUnit, ERR7\_NoError, ERR7\_ResultFileIsOpen

# St7GetCreepConcreteTemperatureData

---

## Description

Returns the concrete temperature data associated with the specified creep law definition.

## Syntax

```
long St7GetCreepConcreteTemperatureData(long uID, long  
CreepID, long* Integers, double* Doubles)
```

## Input Parameters

uID

Strand7 model file ID number.

CreepID

Creep definition ID number.

## Output Parameters

Integers [0..2]

[ipIncludeCreepTemperature] - Include temperature effects for the creep ageing, either btTrue or btFalse.

[ipIncludeRateTemperature] - Include temperature effects for the creep rate, either btTrue or btFalse.

[ipIncludeShrinkageTemperature] - Include temperature effects for the shrinkage ageing, either btTrue or btFalse.

Doubles [0..5]

[ipCreepCAAge] - Creep age CA parameter.

[ipCreepTRefAge] - Creep age  $TA_{REF}$  parameter.

[ipCreepCCCreep] - Creep rate CC parameter.

[ipCreepTRefCreep] - Creep rate  $TC_{REF}$  parameter.

[ipCreepCASHrink] - Shrinkage age CA parameter.

[ipCreepTRefShrink] - Shrinkage age  $TA_{REF}$  parameter.

## Errors

ERR7\_APINotInitialised, ERR7\_APINotLicensed,  
ERR7\_DataNotFound, ERR7\_FileNotOpen, ERR7\_InvalidCreepID,  
ERR7\_InvalidFileUnit, ERR7\_NoError

# St7SetCreepConcreteCementCuringData

---

## Description

Sets the cement curing data for the specified creep law definition.

---

## Syntax

```
long St7SetCreepConcreteCementCuringData(long uID, long  
                                         CreepID, long* Integers, double* Doubles)
```

## Input Parameters

uID

Strand7 model file ID number.

CreepID

Creep definition ID number.

Integers[0..2]

[ipCreepIncludeCuring] - Include curing effects, either btTrue or btFalse.

[ipCreepCuringTimeTable] - Factor vs Time table ID, zero for none.

[ipCreepCuringType] - Curing rate, one of ctCuringRapid,  
ctCuringNormal or ctCuringSlow.

Doubles[0..2]

[ipCreepCuringCT] - Curing CT parameter.

[ipCreepCuringTRef] - Curing  $T_{REF}$  parameter.

[ipCreepCuringT0] - Curing  $T_0$  parameter.

## Errors

```
ERR7_APINotInitialised, ERR7_APINotLicensed,  
ERR7_DataNotFound, ERR7_FileNotOpen,  
ERR7_InvalidCementHardeningType, ERR7_InvalidCreepID,  
ERR7_InvalidFileType, ERR7_NoError,  
ERR7_ResultFileIsOpen, ERR7_TableDoesNotExist
```

---

## St7GetCreepConcreteCementCuringData

### Description

Returns the cement curing data associated with the specified creep law definition.

## Syntax

```
long St7GetCreepConcreteCementCuringData(long uID, long  
CreepID, long* Integers, double* Doubles)
```

## Input Parameters

uID

Strand7 model file ID number.

CreepID

Creep definition ID number.

## Output Parameters

Integers[0..2]

[ipCreepIncludeCuring] - Include curing effects, either btTrue or btFalse.

[ipCreepCuringTimeTable] - Factor vs Time table ID, zero for none.

[ipCreepCuringType] - Curing rate, one of ctCuringRapid,  
ctCuringNormal or ctCuringSlow.

Doubles[0..2]

[ipCreepCuringCT] - Curing CT parameter.

[ipCreepCuringTRef] - Curing  $T_{REF}$  parameter.

[ipCreepCuringT0] - Curing  $T_0$  parameter.

## Errors

ERR7\_APINotInitialised, ERR7\_APINotLicensed,  
ERR7\_DataNotFound, ERR7\_FileNotOpen, ERR7\_InvalidCreepID,  
ERR7\_InvalidFileUnit, ERR7\_NoError

## St7DeleteCreepDefinition

---

### Description

Deletes the specified creep definition.

### Syntax

```
long St7DeleteCreepDefinition(long uID, long CreepID)
```

---

## **Input Parameters**

uID

Strand7 model file ID number.

CreepID

Creep definition ID number.

## **Errors**

ERR7\_APINotInitialised, ERR7\_APINotLicensed,  
ERR7\_DataNotFound, ERR7\_FileNotOpen, ERR7\_InvalidCreepID,  
ERR7\_InvalidFileUnit, ERR7\_NoError, ERR7\_ResultFileIsOpen

## Load Path Templates

### St7GetTotalLoadPathTemplates

---

#### Description

Returns the total number and highest ID number of the load path templates in the specified model.

#### Syntax

```
long St7GetTotalLoadPathTemplates(long uID, long*  
    NumTemplates, long* LastTemplate)
```

#### Input Parameters

uID

Strand7 model file ID number.

#### Output Parameters

NumTemplates

The total number of load path templates in the model.

LastTemplate

The highest load path template ID number.

#### Errors

ERR7\_APINotInitialised, ERR7\_APINotLicensed,  
ERR7\_FileNotOpen, ERR7\_InvalidFileUnit, ERR7\_NoError

### St7GetLoadPathTemplateNumByIndex

---

#### Description

Returns the load path template number associated with a specified template index. The load path template indices are stored internally and are based on a contiguous numbering system.

#### Syntax

```
long St7GetLoadPathTemplateNumByIndex(long uID, long Index,  
    long* PathNum)
```

---

## **Input Parameters**

uID

Strand7 model file ID number.

Index

Load path template index.

## **Output Parameters**

PathNum

Load path template ID number.

## **Errors**

ERR7\_APINotInitialised, ERR7\_APINotLicensed,  
ERR7\_FileNotOpen, ERR7\_InvalidFileUnit, ERR7\_InvalidIndex,  
ERR7\_NoError

---

# **St7NewLoadPathTemplate**

## **Description**

Creates a new load path template.

## **Syntax**

```
long St7NewLoadPathTemplate(long uID, long  
LoadPathTemplateID, char* LoadPathTemplateName)
```

## **Input Parameters**

uID

Strand7 model file ID number.

LoadPathTemplateID

Load path template ID number.

LoadPathTemplateName

Name of the new template.

## **Errors**

ERR7\_APINotInitialised, ERR7\_APINotLicensed,  
ERR7\_FileNotOpen, ERR7\_InvalidFileUnit,  
ERR7\_InvalidLoadPathTemplateID,

```
ERR7_LoadPathTemplateIDAlreadyExists, ERR7_NoError,  
ERR7_ResultFileIsOpen
```

## St7SetLoadPathTemplateName

---

### Description

Sets the name of the specified load path template.

### Syntax

```
long St7SetLoadPathTemplateName(long uID, long  
LoadPathTemplateID, char* LoadPathTemplateName)
```

### Input Parameters

uID

Strand7 model file ID number.

LoadPathTemplateID

Load path template ID number.

LoadPathTemplateName

Name of the template.

### Errors

```
ERR7_APINotInitialised, ERR7_APINotLicensed,  
ERR7_DataNotFound, ERR7_FileNotOpen, ERR7_InvalidFileUnit,  
ERR7_InvalidLoadPathTemplateID, ERR7_NoError,  
ERR7_ResultFileIsOpen
```

## St7GetLoadPathTemplateName

---

### Description

Returns the name assigned to the specified load path template.

### Syntax

```
long St7GetLoadPathTemplateName(long uID, long  
LoadPathTemplateID, char* LoadPathTemplateName, long  
MaxStringLen)
```

### Input Parameters

uID

---

Strand7 model file ID number.

LoadPathTemplateID

Load path template ID number.

MaxStringLen

Maximum number of characters allocated for LoadPathTemplateName.

### Output Parameters

LoadPathTemplateName

Name of the template.

### Errors

ERR7\_APINotInitialised, ERR7\_APINotLicensed,  
ERR7\_DataNotFound, ERR7\_FileNotOpen, ERR7\_InvalidFileUnit,  
ERR7\_InvalidLoadPathTemplateID, ERR7\_NoError

## St7SetLoadPathTemplateParameters

---

### Description

Sets the data for the specified load path template.

### Syntax

```
long St7SetLoadPathTemplateParameters(long uID, long  
LoadPathTemplateID, long* Integers, double* Doubles)
```

### Input Parameters

uID

Strand7 model file ID number.

LoadPathTemplateID

Load path template ID number.

Integers[0..2]

[ipLPTColour] - Load path colour as a 32 bit RGB value.

[ipLPTNumLanes] - Number of lanes.

[ipLPTMultiLaneType] - Multi lane type, either lpAllSameFactors or  
lpAllDifferentFactors.

Doubles[0..1]

[ipLPTTolerance] - Relative tolerance.

[ipLPTMinLaneWidth] - Minimum lane width.

### Errors

ERR7\_APINotInitialised, ERR7\_APINotLicensed,  
ERR7\_DataNotFound, ERR7\_FileNotOpen, ERR7\_InvalidFileUnit,  
ERR7\_InvalidLoadPathLaneFactorType,  
ERR7\_InvalidLoadPathTemplateID, ERR7\_NoError,  
ERR7\_ResultFileIsOpen

## St7GetLoadPathTemplateParameters

---

### Description

Returns the data assigned to the specified load path template.

### Syntax

```
long St7GetLoadPathTemplateParameters(long uID, long  
LoadPathTemplateID, long* Integers, double* Doubles)
```

### Input Parameters

uID

Strand7 model file ID number.

LoadPathTemplateID

Load path template ID number.

### Output Parameters

Integers[0..2]

[ipLPTColour] - Load path colour as a 32 bit RGB value.

[ipLPTNumLanes] - Number of lanes.

[ipLPTMultiLaneType] - Multi lane type, either IpAllSameFactors or  
IpAllDifferentFactors.

Doubles[0..1]

[ipLPTTolerance] - Relative tolerance.

[ipLPTMinLaneWidth] - Minimum lane width.

---

## Errors

```
ERR7_APINotInitialised, ERR7_APINotLicensed,  
ERR7_DataNotFound, ERR7_FileNotOpen, ERR7_InvalidFileUnit,  
ERR7_InvalidLoadPathTemplateID, ERR7_NoError
```

---

## St7SetLoadPathTemplateLaneFactor

### Description

Assigns the lane factor for the specified load path template.

### Syntax

```
long St7SetLoadPathTemplateLaneFactor(long uID, long  
LoadPathTemplateID, long Lane, double Factor)
```

### Input Parameters

uID

Strand7 model file ID number.

LoadPathTemplateID

Load path template ID number.

Lane

Lane number.

Factor

Lane factor.

### Errors

```
ERR7_APINotInitialised, ERR7_APINotLicensed,  
ERR7_DataNotFound, ERR7_FileNotOpen, ERR7_InvalidFileUnit,  
ERR7_InvalidLoadPathLane, ERR7_InvalidLoadPathTemplateID,  
ERR7_NoError, ERR7_ResultFileIsOpen
```

---

## St7GetLoadPathTemplateLaneFactor

### Description

Returns the lane factor assigned to the specified load path template.

## Syntax

```
long St7GetLoadPathTemplateLaneFactor(long uID, long LoadPathTemplateID, long Lane, double* Factor)
```

## Input Parameters

uID

Strand7 model file ID number.

LoadPathTemplateID

Load path template ID number.

Lane

Lane number.

## Output Parameters

Factor

Lane factor.

## Errors

ERR7\_APINotInitialised, ERR7\_APINotLicensed,  
ERR7\_DataNotFound, ERR7\_FileNotOpen, ERR7\_InvalidFileUnit,  
ERR7\_InvalidLoadPathLane, ERR7\_InvalidLoadPathTemplateID,  
ERR7\_NoError

# St7AddLoadPathTemplateVehicle

---

## Description

Adds a vehicle to the specified load path template.

## Syntax

```
long St7AddLoadPathTemplateVehicle(long uID, long LoadPathTemplateID)
```

## Input Parameters

uID

Strand7 model file ID number.

LoadPathTemplateID

Load path template ID number.

---

## Errors

```
ERR7_APINotInitialised, ERR7_APINotLicensed,  
ERR7_DataNotFound, ERR7_ExceededMaxNumLoadPathVehicles,  
ERR7_FileNotOpen, ERR7_InvalidFileUnit,  
ERR7_InvalidLoadPathTemplateID, ERR7_NoError,  
ERR7_ResultFileIsOpen
```

---

## St7SetLoadPathTemplateVehicleName

### Description

Sets the name of a vehicle in the specified load path template.

### Syntax

```
long St7SetLoadPathTemplateVehicleName(long uID, long  
LoadPathTemplateID, long Vehicle, char*  
LoadPathTemplateVehicleName)
```

### Input Parameters

uID

Strand7 model file ID number.

LoadPathTemplateID

Load path template ID number.

Vehicle

Vehicle number.

LoadPathTemplateVehicleName

Vehicle name.

### Errors

```
ERR7_APINotInitialised, ERR7_APINotLicensed,  
ERR7_DataNotFound, ERR7_FileNotOpen, ERR7_InvalidFileUnit,  
ERR7_InvalidLoadPathTemplateID, ERR7_InvalidLoadPathVehicle,  
ERR7_NoError, ERR7_ResultFileIsOpen
```

## St7GetLoadPathTemplateVehicleName

---

### Description

Returns the name assigned to a vehicle in the specified load path template.

### Syntax

```
long St7GetLoadPathTemplateVehicleName(long uID, long
LoadPathTemplateID, long Vehicle, char*
LoadPathTemplateVehicleName, long MaxStringLen)
```

### Input Parameters

uID

Strand7 model file ID number.

LoadPathTemplateID

Load path template ID number.

Vehicle

Vehicle number.

MaxStringLen

Maximum number of characters allocated for  
LoadPathTemplateVehicleName.

### Output Parameters

LoadPathTemplateVehicleName

Vehicle name.

### Errors

ERR7\_APINotInitialised, ERR7\_APINotLicensed,  
ERR7\_DataNotFound, ERR7\_FileNotOpen, ERR7\_InvalidFileUnit,  
ERR7\_InvalidLoadPathTemplateID, ERR7\_InvalidLoadPathVehicle,  
ERR7\_NoError

## St7InsertLoadPathTemplateVehicle

---

### Description

Inserts a new vehicle at the specified position in the specified load path template.

---

## Syntax

```
long St7InsertLoadPathTemplateVehicle(long uID, long  
LoadPathTemplateID, long Vehicle)
```

## Input Parameters

uID

Strand7 model file ID number.

LoadPathTemplateID

Load path template ID number.

Vehicle

New vehicle number.

## Errors

```
ERR7_APINotInitialised, ERR7_APINotLicensed,  
ERR7_DataNotFound, ERR7_ExceededMaxNumLoadPathVehicles,  
ERR7_FileNotOpen, ERR7_InvalidFileUnit,  
ERR7_InvalidLoadPathTemplateID, ERR7_InvalidLoadPathVehicle,  
ERR7_NoError, ERR7_ResultFileIsOpen
```

---

## St7CloneLoadPathTemplateVehicle

### Description

Creates a copy of a vehicle in the specified load path template and appends it to the vehicle list.

### Syntax

```
long St7CloneLoadPathTemplateVehicle(long uID, long  
LoadPathTemplateID, long Vehicle)
```

### Input Parameters

uID

Strand7 model file ID number.

LoadPathTemplateID

Load path template ID number.

Vehicle

Vehicle number to be cloned.

## Errors

```
ERR7_APINotInitialised, ERR7_APINotLicensed,  
ERR7_DataNotFound, ERR7_ExceededMaxNumLoadPathVehicles,  
ERR7_FileNotOpen, ERR7_InvalidFileUnit,  
ERR7_InvalidLoadPathTemplateID, ERR7_InvalidLoadPathVehicle,  
ERR7_NoError, ERR7_ResultFileIsOpen
```

## St7DeleteLoadPathTemplateVehicle

---

### Description

Deletes a vehicle within the specified load path template.

### Syntax

```
long St7DeleteLoadPathTemplateVehicle(long uID, long  
LoadPathTemplateID, long Vehicle)
```

### Input Parameters

uID

Strand7 model file ID number.

LoadPathTemplateID

Load path template ID number.

Vehicle

Vehicle number.

### Errors

```
ERR7_APINotInitialised, ERR7_APINotLicensed,  
ERR7_DataNotFound, ERR7_FileNotOpen, ERR7_InvalidFileUnit,  
ERR7_InvalidLoadPathTemplateID, ERR7_InvalidLoadPathVehicle,  
ERR7_NoError, ERR7_ResultFileIsOpen
```

## St7GetNumLoadPathTemplateVehicles

---

### Description

Returns the number of vehicles assigned to the specified load path template.

### Syntax

```
long St7GetNumLoadPathTemplateVehicles(long uID, long  
LoadPathTemplateID, long* NumVehicles)
```

---

## **Input Parameters**

uID

Strand7 model file ID number.

LoadPathTemplateID

Load path template ID number.

## **Output Parameters**

NumVehicles

Number of vehicles.

## **Errors**

ERR7\_APINotInitialised, ERR7\_APINotLicensed,  
ERR7\_DataNotFound, ERR7\_FileNotOpen, ERR7\_InvalidFileUnit,  
ERR7\_InvalidLoadPathTemplateID, ERR7\_NoError

---

# **St7SetLoadPathTemplateVehicleData**

## **Description**

Sets the data for a vehicle in the specified load path template.

## **Syntax**

```
long St7SetLoadPathTemplateVehicleData(long uID, long  
LoadPathTemplateID, long Vehicle, long* Integers,  
double* Doubles)
```

## **Input Parameters**

uID

Strand7 model file ID number.

LoadPathTemplateID

Load path template ID number.

Vehicle

Vehicle number.

Integers

[ipLPTVehicleInstance] - Vehicle instance type, either  
IpVehicleSingleLane or IpVehicleDoubleLane

[ipLPTVehicleDirection] - Vehicle direction flag, either  
IpVehicleForward or IpVehicleBackward.

Doubles

[ipLPTVehicleVelocity] - Vehicle velocity.

[ipLPTVehicleStartTime] - Vehicle start time.

### Errors

ERR7\_APINotInitialised, ERR7\_APINotLicensed,  
ERR7\_DataNotFound, ERR7\_FileNotOpen, ERR7\_InvalidFileUnit,  
ERR7\_InvalidLoadPathTemplateID, ERR7\_InvalidLoadPathVehicle,  
ERR7\_InvalidLoadPathVehicleInstance, ERR7\_NoError,  
ERR7\_ResultFileIsOpen

## St7GetLoadPathTemplateVehicleData

---

### Description

Returns the data assigned to a vehicle in the specified load path template.

### Syntax

```
long St7GetLoadPathTemplateVehicleData(long uID, long
LoadPathTemplateID, long Vehicle, long* Integers,
double* Doubles)
```

### Input Parameters

uID

Strand7 model file ID number.

LoadPathTemplateID

Load path template ID number.

Vehicle

Vehicle number.

### Output Parameters

Integers[0..1]

[ipLPTVehicleInstance] - Vehicle instance type, either  
IpVehicleSingleLane or IpVehicleDoubleLane

---

[ipLPTVehicleDirection] - Vehicle direction flag, either  
lpVehicleForward or lpVehicleBackward.

Doubles[0..1]

[ipLPTVehicleVelocity] - Vehicle velocity.

[ipLPTVehicleStartTime] - Vehicle start time.

## Errors

ERR7\_APINotInitialised, ERR7\_APINotLicensed,  
ERR7\_DataNotFound, ERR7\_FileNotOpen, ERR7\_InvalidFileUnit,  
ERR7\_InvalidLoadPathTemplateID, ERR7\_InvalidLoadPathVehicle,  
ERR7\_NoError

# St7EnableLoadPathTemplateVehicleLane

---

## Description

Enables a vehicle/lane combination within the specified load path template.

## Syntax

```
long St7EnableLoadPathTemplateVehicleLane(long uID, long  
LoadPathTemplateID, long Vehicle, long Lane)
```

## Input Parameters

uID

Strand7 model file ID number.

LoadPathTemplateID

Load path template ID number.

Vehicle

Vehicle number.

Lane

Lane number.

## Errors

ERR7\_APINotInitialised, ERR7\_APINotLicensed,  
ERR7\_DataNotFound, ERR7\_FileNotOpen, ERR7\_InvalidFileUnit,  
ERR7\_InvalidLoadPathLane, ERR7\_InvalidLoadPathTemplateID,

```
ERR7_InvalidLoadPathVehicle, ERR7_NoError,  
ERR7_ResultFileIsOpen
```

## St7DisableLoadPathTemplateVehicleLane

---

### Description

Disables a vehicle/lane combination within the specified load path template.

### Syntax

```
long St7DisableLoadPathTemplateVehicleLane(long uID, long  
LoadPathTemplateID, long Vehicle, long Lane)
```

### Input Parameters

uID

Strand7 model file ID number.

LoadPathTemplateID

Load path template ID number.

Vehicle

Vehicle number.

Lane

Lane number.

### Errors

```
ERR7_APINotInitialised, ERR7_APINotLicensed,  
ERR7_DataNotFound, ERR7_FileNotOpen, ERR7_InvalidFileUnit,  
ERR7_InvalidLoadPathLane, ERR7_InvalidLoadPathTemplateID,  
ERR7_InvalidLoadPathVehicle, ERR7_NoError,  
ERR7_ResultFileIsOpen
```

## St7GetLoadPathTemplateVehicleLaneState

---

### Description

Returns the state of a vehicle/lane combination within the specified load path template.

---

## Syntax

```
long St7GetLoadPathTemplateVehicleLaneState(long uID, long
    LoadPathTemplateID, long Vehicle, long Lane, bool*
    State)
```

## Input Parameters

uID

Strand7 model file ID number.

LoadPathTemplateID

Load path template ID number.

Vehicle

Vehicle number.

Lane

Lane number.

## Output Parameters

State

btTrue if the specified vehicle/lane combination is enabled.

## Errors

ERR7\_APINotInitialised, ERR7\_APINotLicensed,  
ERR7\_DataNotFound, ERR7\_FileNotOpen, ERR7\_InvalidFileUnit,  
ERR7\_InvalidLoadPathLane, ERR7\_InvalidLoadPathTemplateID,  
ERR7\_InvalidLoadPathVehicle, ERR7\_NoError

---

## St7AddLoadPathTemplatePointForce

### Description

Adds a point force to the specified load path template.

### Syntax

```
long St7AddLoadPathTemplatePointForce(long uID, long
    LoadPathTemplateID, long Vehicle)
```

### Input Parameters

uID

Strand7 model file ID number.

LoadPathTemplateID

Load path template ID number.

Vehicle

Vehicle number.

### Errors

ERR7\_APINotInitialised, ERR7\_APINotLicensed,  
ERR7\_DataNotFound, ERR7\_ExceededMaxNumRows,  
ERR7\_FileNotOpen, ERR7\_InvalidFileUnit,  
ERR7\_InvalidLoadPathTemplateID, ERR7\_InvalidLoadPathVehicle,  
ERR7\_NoError, ERR7\_ResultFileIsOpen

## St7InsertLoadPathTemplatePointForce

---

### Description

Inserts a point force within the specified load path template.

### Syntax

```
long St7InsertLoadPathTemplatePointForce(long uID, long  
LoadPathTemplateID, long Vehicle, long Pos)
```

### Input Parameters

uID

Strand7 model file ID number.

LoadPathTemplateID

Load path template ID number.

Vehicle

Vehicle number.

Pos

Point force number.

### Errors

ERR7\_APINotInitialised, ERR7\_APINotLicensed,  
ERR7\_DataNotFound, ERR7\_FileNotOpen, ERR7\_InvalidFileUnit,  
ERR7\_InvalidLoadPathTemplateID, ERR7\_InvalidLoadPathVehicle,  
ERR7\_InvalidTableRow, ERR7\_NoError, ERR7\_ResultFileIsOpen

---

## St7DeleteLoadPathTemplatePointForce

---

### Description

Deletes a point force from the specified load path template.

### Syntax

```
long St7DeleteLoadPathTemplatePointForce(long uID, long  
LoadPathTemplateID, long Vehicle, long Pos)
```

### Input Parameters

uID

Strand7 model file ID number.

LoadPathTemplateID

Load path template ID number.

Vehicle

Vehicle number.

Pos

Point force number.

### Errors

```
ERR7_APINotInitialised, ERR7_APINotLicensed,  
ERR7_DataNotFound, ERR7_FileNotOpen, ERR7_InvalidFileUnit,  
ERR7_InvalidLoadPathTemplateID, ERR7_NoError,  
ERR7_ResultFileIsOpen
```

---

## St7GetNumLoadPathTemplatePointForces

---

### Description

Returns the number of point forces assigned to the specified load path template.

### Syntax

```
long St7GetNumLoadPathTemplatePointForces(long uID, long  
LoadPathTemplateID, long Vehicle, long*  
NumPointForces)
```

### Input Parameters

uID

Strand7 model file ID number.

LoadPathTemplateID

Load path template ID number.

Vehicle

Vehicle number.

### Output Parameters

NumPointForces

Number of point forces.

### Errors

ERR7\_APINotInitialised, ERR7\_APINotLicensed,  
ERR7\_DataNotFound, ERR7\_FileNotOpen, ERR7\_InvalidFileUnit,  
ERR7\_InvalidLoadPathTemplateID, ERR7\_InvalidLoadPathVehicle,  
ERR7\_NoError

## St7SetLoadPathTemplatePointForceData

---

### Description

Sets the point force data for the specified load path template.

### Syntax

```
long St7SetLoadPathTemplatePointForceData(long uID, long
                                         LoadPathTemplateID, long Vehicle, long Pos, long*
                                         Integers, double* Doubles)
```

### Input Parameters

uID

Strand7 model file ID number.

LoadPathTemplateID

Load path template ID number.

Vehicle

Vehicle number.

Pos

Point force number.

---

Integers[0..3]

[ipLPTMobility] - Mobility, either IpPointForceMobilityGrouped or IpPointForceMobilityFloating.

[ipLPTAxisSystem] - Axis system, either IpAxisGlobal or IpAxisLocal

[ipLPTAdjacency] - Consider adjacency, either btTrue or btFalse.

[ipLPTCentrifugal] - Consider centrifugal effects, either btTrue or btFalse.

Doubles[0..4]

[0..1] - XY position of the point force.

[2..4] - Components of the point force according to the 123 axis convention in the specified axis system.

## Errors

ERR7\_APINotInitialised, ERR7\_APINotLicensed,  
ERR7\_DataNotFound, ERR7\_FileNotOpen, ERR7\_InvalidAxisSystem,  
ERR7\_InvalidFileUnit, ERR7\_InvalidLoadPathTemplateID,  
ERR7\_InvalidMobilityType, ERR7\_NoError,  
ERR7\_ResultFileIsOpen

# St7GetLoadPathTemplatePointForceData

---

## Description

Returns the point force data assigned to the specified load path template.

## Syntax

```
long St7GetLoadPathTemplatePointForceData(long uID, long  
LoadPathTemplateID, long Vehicle, long Pos, long*  
Integers, double* Doubles)
```

## Input Parameters

uID

Strand7 model file ID number.

LoadPathTemplateID

Load path template ID number.

Vehicle

Vehicle number.

Pos

Point force number.

### Output Parameters

Integers [0..3]

[ipLPTMobility] - Mobility, either IpPointForceMobilityGrouped or IpPointForceMobilityFloating.

[ipLPTAxisSystem] - Axis system, either IpAxisGlobal or IpAxisLocal

[ipLPTAdjacency] - Consider adjacency, either btTrue or btFalse.

[ipLPTCentrifugal] - Consider centrifugal effects, either btTrue or btFalse.

Doubles [0..4]

[0..1] - XY position of the point force.

[2..4] - Components of the point force according to the 123 axis convention in the specified axis system.

### Errors

ERR7\_APINotInitialised, ERR7\_APINotLicensed,  
ERR7\_DataNotFound, ERR7\_FileNotOpen, ERR7\_InvalidFileUnit,  
ERR7\_InvalidLoadPathTemplateID, ERR7\_NoError

## St7AddLoadPathTemplateDistributedForce

---

### Description

Adds a distributed force to the specified load path template.

### Syntax

```
long St7AddLoadPathTemplateDistributedForce(long uID, long  
LoadPathTemplateID, long Vehicle)
```

### Input Parameters

uID

Strand7 model file ID number.

LoadPathTemplateID

---

Load path template ID number.

Vehicle

Vehicle number.

### Errors

ERR7\_APINotInitialised, ERR7\_APINotLicensed,  
ERR7\_DataNotFound, ERR7\_ExceededMaxNumRows,  
ERR7\_FileNotOpen, ERR7\_InvalidFileUnit,  
ERR7\_InvalidLoadPathTemplateID, ERR7\_InvalidLoadPathVehicle,  
ERR7\_NoError, ERR7\_ResultFileIsOpen

## St7InsertLoadPathTemplateDistributedForce

---

### Description

Inserts a new distributed force to the specified load path template.

### Syntax

```
long St7InsertLoadPathTemplateDistributedForce (long uID,  
                                              long LoadPathTemplateID, long Vehicle, long Pos)
```

### Input Parameters

uID

Strand7 model file ID number.

LoadPathTemplateID

Load path template ID number.

Vehicle

Vehicle number.

Pos

Distributed force number.

### Errors

ERR7\_APINotInitialised, ERR7\_APINotLicensed,  
ERR7\_DataNotFound, ERR7\_FileNotOpen, ERR7\_InvalidFileUnit,  
ERR7\_InvalidLoadPathTemplateID, ERR7\_InvalidLoadPathVehicle,  
ERR7\_InvalidTableRow, ERR7\_NoError, ERR7\_ResultFileIsOpen

## St7DeleteLoadPathTemplateDistributedForce

---

### Description

Deletes a distributed force from the specified load path template.

### Syntax

```
long St7DeleteLoadPathTemplateDistributedForce(long uID,  
                                              long LoadPathTemplateID, long Vehicle, long Pos)
```

### Input Parameters

uID

Strand7 model file ID number.

LoadPathTemplateID

Load path template ID number.

Vehicle

Vehicle number.

Pos

Distributed load number.

### Errors

```
ERR7_APINotInitialised, ERR7_APINotLicensed,  
ERR7_DataNotFound, ERR7_FileNotOpen, ERR7_InvalidFileUnit,  
ERR7_InvalidLoadPathTemplateID, ERR7_NoError,  
ERR7_ResultFileIsOpen
```

## St7GetNumLoadPathTemplateDistributedForces

---

### Description

Returns the number of distributed forces assigned to the specified load path template.

### Syntax

```
long St7GetNumLoadPathTemplateDistributedForces(long uID,  
                                                long LoadPathTemplateID, long Vehicle, long*  
                                                NumDistributedForces)
```

---

## **Input Parameters**

**uID**

Strand7 model file ID number.

**LoadPathTemplateID**

Load path template ID number.

**Vehicle**

Vehicle number.

## **Output Parameters**

**NumDistributedForces**

Number of distributed forces.

## **Errors**

ERR7\_APINotInitialised, ERR7\_APINotLicensed,  
ERR7\_DataNotFound, ERR7\_FileNotOpen, ERR7\_InvalidFileUnit,  
ERR7\_InvalidLoadPathTemplateID, ERR7\_InvalidLoadPathVehicle,  
ERR7\_NoError

---

# **St7SetLoadPathTemplateDistributedForceData**

## **Description**

Sets the distributed force data for the specified load path template.

## **Syntax**

```
long St7SetLoadPathTemplateDistributedForceData(long uID,  
                                long LoadPathTemplateID, long Vehicle, long Pos, long*  
                                Integers, double* Doubles)
```

## **Input Parameters**

**uID**

Strand7 model file ID number.

**LoadPathTemplateID**

Load path template ID number.

**Vehicle**

Vehicle number,

Pos

Distributed force number.

Integers [0..3]

[ipLPTMobility] - Mobility, one of IpDistrForceMobilityGrouped, IpDistrForceMobilityLeading, IpDistrForceMobilityTrailing, IpDistrForceMobilityFullLength or IpDistrForceMobilityFloating.

[ipLPTAxisSystem] - Axis system, either IpAxisGlobal or IpAxisLocal

[ipLPTAdjacency] - Consider adjacency, either btTrue or btFalse.

[ipLPTCentrifugal] - Consider centrifugal effects, either btTrue or btFalse.

Doubles [0..6]

[0..3] - Position of endpoints according to the [x1, x2, y1, y2] format.

[4..6] - Components of distributed force according to the 123 axis convention in the specified coordinate system.

### Errors

ERR7\_APINotInitialised, ERR7\_APINotLicensed,  
ERR7\_DataNotFound, ERR7\_FileNotOpen, ERR7\_InvalidAxisSystem,  
ERR7\_InvalidFileUnit, ERR7\_InvalidLoadPathTemplateID,  
ERR7\_InvalidMobilityType, ERR7\_NoError,  
ERR7\_ResultFileIsOpen

## St7GetLoadPathTemplateDistributedForceData

---

### Description

Returns the distributed force data assigned to the specified load path template.

### Syntax

```
long St7GetLoadPathTemplateDistributedForceData(long uID,  
                                              long LoadPathTemplateID, long Vehicle, long Pos, long*  
                                              Integers, double* Doubles)
```

### Input Parameters

uID

Strand7 model file ID number.

LoadPathTemplateID

---

Load path template ID number.

Vehicle

Vehicle number.

Pos

Distributed force number.

### Output Parameters

Integers [0..3]

[ipLPTMobility] - Mobility, one of IpDistrForceMobilityGrouped, IpDistrForceMobilityLeading, IpDistrForceMobilityTrailing, IpDistrForceMobilityFullLength or IpDistrForceMobilityFloating.

[ipLPTAxisSystem] - Axis system, either IpAxisGlobal or IpAxisLocal

[ipLPTAdjacency] - Consider adjacency, either btTrue or btFalse.

[ipLPTCentrifugal] - Consider centrifugal effects, either btTrue or btFalse.

Doubles [0..6]

[0..3] - Position of endpoints according to the [x1, x2, y1, y2] format.

[4..6] - Components of distributed force according to the 123 axis convention in the specified coordinate system.

### Errors

ERR7\_APINotInitialised, ERR7\_APINotLicensed,  
ERR7\_DataNotFound, ERR7\_FileNotOpen, ERR7\_InvalidFileUnit,  
ERR7\_InvalidLoadPathTemplateID, ERR7\_NoError

## St7AddLoadPathTemplateHeatSource

---

### Description

Adds a new heat source to the specified load path template.

### Syntax

```
long St7AddLoadPathTemplateHeatSource(long uID, long  
LoadPathTemplateID, long Vehicle)
```

### Input Parameters

uID

Strand7 model file ID number.

LoadPathTemplateID

Load path template ID number.

Vehicle

Vehicle number.

### Errors

ERR7\_APINotInitialised, ERR7\_APINotLicensed,  
ERR7\_DataNotFound, ERR7\_ExceededMaxNumRows,  
ERR7\_FileNotOpen, ERR7\_InvalidFileUnit,  
ERR7\_InvalidLoadPathTemplateID, ERR7\_InvalidLoadPathVehicle,  
ERR7\_NoError, ERR7\_ResultFileIsOpen

## St7InsertLoadPathTemplateHeatSource

---

### Description

Inserts a new heat source in the specified load path template.

### Syntax

```
long St7InsertLoadPathTemplateHeatSource(long uID, long  
LoadPathTemplateID, long Vehicle, long Pos)
```

### Input Parameters

uID

Strand7 model file ID number.

LoadPathTemplateID

Load path template ID number.

Vehicle

Vehicle number.

Pos

Heat source number.

### Errors

ERR7\_APINotInitialised, ERR7\_APINotLicensed,  
ERR7\_DataNotFound, ERR7\_ExceededMaxNumRows,  
ERR7\_FileNotOpen, ERR7\_InvalidFileUnit,

---

```
ERR7_InvalidLoadPathTemplateID, ERR7_InvalidLoadPathVehicle,  
ERR7_InvalidTableRow, ERR7_NoError, ERR7_ResultFileIsOpen
```

## St7DeleteLoadPathTemplateHeatSource

---

### Description

Deletes a heat source from the specified load path template.

### Syntax

```
long St7DeleteLoadPathTemplateHeatSource(long uID, long  
LoadPathTemplateID, long Vehicle, long Pos)
```

### Input Parameters

uID

Strand7 model file ID number.

LoadPathTemplateID

Load path template ID number.

Vehicle

Vehicle number.

Pos

Heat source number.

### Errors

```
ERR7_APINotInitialised, ERR7_APINotLicensed,  
ERR7_DataNotFound, ERR7_FileNotOpen, ERR7_InvalidFileUnit,  
ERR7_InvalidLoadPathTemplateID, ERR7_NoError,  
ERR7_ResultFileIsOpen
```

## St7GetNumLoadPathTemplateHeatSources

---

### Description

Returns the number of heat sources assigned to the specified load path template.

### Syntax

```
long St7GetNumLoadPathTemplateHeatSources(long uID, long  
LoadPathTemplateID, long Vehicle, long*  
NumHeatSources)
```

## Input Parameters

`uID`

Strand7 model file ID number.

`LoadPathTemplateID`

Load path template ID number.

`Vehicle`

Vehicle number.

## Output Parameters

`NumHeatSources`

Number of heat sources.

## Errors

`ERR7_APINotInitialised`, `ERR7_APINotLicensed`,  
`ERR7_DataNotFound`, `ERR7_FileNotOpen`, `ERR7_InvalidFileUnit`,  
`ERR7_InvalidLoadPathTemplateID`, `ERR7_InvalidLoadPathVehicle`,  
`ERR7_NoError`

# St7SetLoadPathTemplateHeatSourceData

---

## Description

Sets the heat source data for the specified load path template.

## Syntax

```
long St7SetLoadPathTemplateHeatSourceData(long uID, long  
LoadPathTemplateID, long Vehicle, long Pos, long*  
Integers, double* Doubles)
```

## Input Parameters

`uID`

Strand7 model file ID number.

`LoadPathTemplateID`

Load path template ID number.

`Vehicle`

Vehicle number.

---

Pos

Heat source number.

Integers [0]

Currently unused, a dummy integer may be passed.

Doubles [0..4]

[0..1] - XY position of the heat source.

[2..3] - XY dimensions of heat source.

[4] - Heat source value.

## Errors

ERR7\_APINotInitialised, ERR7\_APINotLicensed,  
ERR7\_DataNotFound, ERR7\_FileNotOpen, ERR7\_InvalidAxisSystem,  
ERR7\_InvalidFileUnit, ERR7\_InvalidLoadPathTemplateID,  
ERR7\_InvalidMobilityType, ERR7\_NoError,  
ERR7\_ResultFileIsOpen

# St7GetLoadPathTemplateHeatSourceData

---

## Description

Returns the heat source data assigned to the specified load path template.

## Syntax

```
long St7GetLoadPathTemplateHeatSourceData(long uID, long
LoadPathTemplateID, long Vehicle, long Pos, long*
Integers, double* Doubles)
```

## Input Parameters

uID

Strand7 model file ID number.

LoadPathTemplateID

Load path template ID number.

Vehicle

Vehicle number.

Pos

Heat source number.

### Output Parameters

Integers [0]

Currently unused, a dummy integer may be passed.

Doubles [0..4]

[0..1] - XY position of the heat source.

[2..3] - XY dimensions of heat source.

[4] - Heat source value.

### Errors

ERR7\_APINotInitialised, ERR7\_APINotLicensed,  
ERR7\_DataNotFound, ERR7\_FileNotOpen, ERR7\_InvalidFileUnit,  
ERR7\_InvalidLoadPathTemplateID, ERR7\_NoError

## St7SetLoadPathTemplateVehicleSet

---

### Description

Assigns a vehicle set to a specified vehicle in a given load path template.

### Syntax

```
long St7SetLoadPathTemplateVehicleSet(long uID, long
                                      LoadPathTemplateID, long Vehicle, char*
                                      LoadPathTemplateVehicleSet)
```

### Input Parameters

uID

Strand7 model file ID number.

LoadPathTemplateID

Load path template ID number.

Vehicle

Vehicle number.

LoadPathTemplateVehicleSet

String identifying the vehicle set. A null string indicates that the specified vehicle does not belong to a set.

---

## Errors

```
ERR7_APINotInitialised, ERR7_APINotLicensed,  
ERR7_DataNotFound, ERR7_FileNotOpen, ERR7_InvalidFileUnit,  
ERR7_InvalidLoadPathTemplateID, ERR7_NoError,  
ERR7_ResultFileIsOpen
```

# St7GetLoadPathTemplateVehicleSet

---

## Description

Returns the vehicle set assigned to a specified vehicle in a given load path template.

## Syntax

```
long St7GetLoadPathTemplateVehicleSet(long uID, long  
LoadPathTemplateID, long Vehicle, char*  
LoadPathTemplateVehicleSet, long MaxStringLen)
```

## Input Parameters

uID

Strand7 model file ID number.

LoadPathTemplateID

Load path template ID number.

Vehicle

Vehicle number.

MaxStringLen

Maximum number of characters allocated for LoadPathTemplateVehicleSet.

## Output Parameters

LoadPathTemplateVehicleSet

String identifying the vehicle set. A null string indicates that the specified vehicle does not belong to a set.

## Errors

```
ERR7_APINotInitialised, ERR7_APINotLicensed,  
ERR7_DataNotFound, ERR7_FileNotOpen, ERR7_InvalidFileUnit,  
ERR7_InvalidLoadPathTemplateID, ERR7_NoError
```

## St7DeleteLoadPathTemplate

---

### Description

Deletes the specified load path template.

### Syntax

```
long St7DeleteLoadPathTemplate(long uID, long  
LoadPathTemplateID)
```

### Input Parameters

uID

Strand7 model file ID number.

LoadPathTemplateID

Load path template ID number.

### Errors

```
ERR7_APINotInitialised, ERR7_APINotLicensed,  
ERR7_DataNotFound, ERR7_FileNotOpen, ERR7_InvalidFileUnit,  
ERR7_InvalidLoadPathTemplateID, ERR7_NoError,  
ERR7_ResultFileIsOpen
```

## St7SetLoadPathTemplateCentrifugalData

---

### Description

Sets the centrifugal data for the specified load path template.

### Syntax

```
long St7SetLoadPathTemplateCentrifugalData(long uID, long  
LoadPathTemplateID, char* K0, char* K1, long* Integers,  
double* Doubles)
```

### Input Parameters

uID

Strand7 model file ID number.

LoadPathTemplateID

Load path template ID number.

K0

---

Expression for the K0 term in the centrifugal force equation:  $F_c = K_0 + K_1 \cdot F_z$ .  
This formula can be a function of R, L, V and g.

K1

Expression for the K1 term in the centrifugal force equation:  $F_c = K_0 + K_1 \cdot F_z$ .  
This formula can be a function of R, L, V and g.

Integers [0..2]

[ipLPTLimitK1] - Impose K1 limits, either btTrue or btFalse.

[ipLPTLengthUnit] - Length unit, one of luMETRE, luCENTIMETRE,  
luMILLIMETRE, luFOOT or luINCH.

[ipLPTForceUnit] - Force unit, one of fuNEWTON, fuKILONEWTON,  
fuMEGANEWTON, fuKILOFORCE, fuPOUNDFORCE, fuTONNEFORCE or  
fuKIPFORCE.

Doubles [0..1]

[ipLPTMinK1] - Minimum K1 value.

[ipLPTMaxK1] - Maximum K1 value.

## Errors

ERR7\_APINotInitialised, ERR7\_APINotLicensed,  
ERR7\_FileNotOpen, ERR7\_InvalidFileUnit,  
ERR7\_InvalidLoadPathTemplateID, ERR7\_InvalidUnits,  
ERR7\_NoError, ERR7\_ResultFileIsOpen, ERR7\_UnknownError

# St7GetLoadPathTemplateCentrifugalData

---

## Description

Returns the centrifugal data assigned to the specified load path template.

## Syntax

```
long St7GetLoadPathTemplateCentrifugalData(long uID, long
LoadPathTemplateID, char* K0, char* K1, long
MaxStringLen, long* Integers, double* Doubles)
```

## Input Parameters

uID

Strand7 model file ID number.

LoadPathTemplateID

Load path template ID number.

MaxStringLen

Maximum number of characters allocated for K0, K1.

### Output Parameters

K0

Expression for the K0 term in the centrifugal force equation:  $F_c = K_0 + K_1 \cdot F_z$ .

This formula can be a function of R, L, V and g.

K1

Expression for the K1 term in the centrifugal force equation:  $F_c = K_0 + K_1 \cdot F_z$ .

This formula can be a function of R, L, V and g.

Integers [0..2]

[ipLPTLimitK1] - Impose K1 limits, either btTrue or btFalse.

[ipLPTLengthUnit] - Length unit, one of luMETRE, luCENTIMETRE,  
luMILLIMETRE, luFOOT or luINCH.

[ipLPTForceUnit] - Force unit, one of fuNEWTON, fuKILOWEIGHTON,  
fuMEGANEWTON, fuKILOFORCE, fuPOUNDFORCE, fuTONNEFORCE or  
fuKIPFORCE.

Doubles [0..1]

[ipLPTMinK1] - Minimum K1 value.

[ipLPTMaxK1] - Maximum K1 value.

### Errors

ERR7\_APINotInitialised, ERR7\_APINotLicensed,  
ERR7\_FileNotOpen, ERR7\_InvalidFileUnit,  
ERR7\_InvalidLoadPathTemplateID, ERR7\_NoError,  
ERR7\_UnknownError

---

# Material Property Libraries

## St7GetNumLibraries

---

### Description

Returns the number of material libraries currently available.

### Syntax

```
long St7GetNumLibraries(long uID, long LibraryType, long*  
    NumLibraries)
```

### Input Parameters

uID

Strand7 model file ID number.

LibraryType

Library type, one of IbMaterial, IbBeamSection, IbComposite,  
IbReinforcementLayout, IbCreepDefinition or IbLoadPathTemplate.

### Output Parameters

NumLibraries

Number of libraries.

### Errors

ERR7\_APINotInitialised, ERR7\_APINotLicensed,  
ERR7\_FileNotOpen, ERR7\_InvalidFileUnit,  
ERR7\_InvalidLibraryType, ERR7\_NoError

## St7GetLibraryName

---

### Description

Returns the name assigned to the specified library.

### Syntax

```
long St7GetLibraryName(long uID, long LibraryType, long  
    LibraryID, char* LibraryName, long MaxStringLen)
```

### Input Parameters

uID

Strand7 model file ID number.

LibraryType

Library type, one of IbMaterial, IbBeamSection, IbComposite,  
IbReinforcementLayout, IbCreepDefinition or IbLoadPathTemplate.

LibraryID

Library ID number.

MaxStringLen

Maximum number of characters allocated for LibraryName.

## Output Parameters

LibraryName

Library name.

## Errors

ERR7\_APINotInitialised, ERR7\_APINotLicensed,  
ERR7\_FileNotOpen, ERR7\_InvalidFileUnit,  
ERR7\_InvalidLibraryID, ERR7\_InvalidLibraryType,  
ERR7\_NoError

# St7GetLibraryID

---

## Description

Returns the ID number assigned to a specified library.

## Syntax

```
long St7GetLibraryID(long uID, long LibraryType, char*  
    LibraryName, long* LibraryID)
```

## Input Parameters

uID

Strand7 model file ID number.

LibraryType

Library type, one of IbMaterial, IbBeamSection, IbComposite,  
IbReinforcementLayout, IbCreepDefinition or IbLoadPathTemplate.

LibraryName

---

Library name.

### Output Parameters

LibraryID

Library ID number.

### Errors

ERR7\_APINotInitialised, ERR7\_APINotLicensed,  
ERR7\_FileNotOpen, ERR7\_InvalidFileUnit,  
ERR7\_InvalidLibraryName, ERR7\_InvalidLibraryType,  
ERR7\_NoError

## St7GetNumLibraryItems

---

### Description

Returns the number of items assigned to a specified library.

### Syntax

```
long St7GetNumLibraryItems(long uID, long LibraryType, long  
                           LibraryID, long* NumItems)
```

### Input Parameters

uID

Strand7 model file ID number.

LibraryType

Library type, one of IbMaterial, IbBeamSection, IbComposite,  
IbReinforcementLayout, IbCreepDefinition or IbLoadPathTemplate.

LibraryID

Library ID number.

### Output Parameters

NumItems

Number of library items.

### Errors

ERR7\_APINotInitialised, ERR7\_APINotLicensed,  
ERR7\_DataNotFound, ERR7\_FileNotOpen, ERR7\_InvalidFileUnit,

```
ERR7_InvalidLibraryID, ERR7_InvalidLibraryType,  
ERR7_NoError
```

## St7GetLibraryItemName

---

### Description

Returns the name assigned to a specified library item.

### Syntax

```
long St7GetLibraryItemName(long uID, long LibraryType, long  
                           LibraryID, long ItemID, char* ItemName, long  
                           MaxStringLen)
```

### Input Parameters

uID

Strand7 model file ID number.

LibraryType

Library type, one of IbMaterial, IbBeamSection, IbComposite,  
IbReinforcementLayout, IbCreepDefinition or IbLoadPathTemplate.

LibraryID

Library ID number.

ItemID

Item ID number.

MaxStringLen

Maximum number of characters allocated for ItemName.

### Output Parameters

ItemName

Name of the item.

### Errors

```
ERR7_APINotInitialised, ERR7_APINotLicensed,  
ERR7_DataNotFound, ERR7_FileNotOpen, ERR7_InvalidFileUnit,  
ERR7_InvalidLibraryID, ERR7_InvalidLibraryItemID,  
ERR7_InvalidLibraryType, ERR7_NoError
```

---

## St7GetLibraryItemID

---

### Description

Returns the ID number assigned to a specified library item.

### Syntax

```
long St7GetLibraryItemID(long uID, long LibraryType, long  
LibraryID, char* ItemName, long* ItemID)
```

### Input Parameters

uID

Strand7 model file ID number.

LibraryType

Library type, one of IbMaterial, IbBeamSection, IbComposite,  
IbReinforcementLayout, IbCreepDefinition or IbLoadPathTemplate.

LibraryID

Library ID number.

ItemName

Name of the item.

### Output Parameters

ItemID

Item ID number.

### Errors

ERR7\_APINotInitialised, ERR7\_APINotLicensed,  
ERR7\_DataNotFound, ERR7\_FileNotOpen, ERR7\_InvalidFileUnit,  
ERR7\_InvalidLibraryID, ERR7\_InvalidLibraryItemName,  
ERR7\_InvalidLibraryType, ERR7\_NoError

---

## St7AssignLibraryMaterial

---

### Description

Assigns the specified material library item to an element property. The material is stored at the specified item ID position.

## Syntax

```
long St7AssignLibraryMaterial(long uID, long Entity, long  
PropNum, long LibraryID, long ItemID)
```

## Input Parameters

uID

Strand7 model file ID number.

Entity

Property type, one of ptBEAMPROP, ptPLATEPROP or ptBRICKPROP.

PropNum

Element property number.

LibraryID

Library ID number.

ItemID

Item ID number.

## Errors

ERR7\_APINotInitialised, ERR7\_APINotLicensed,  
ERR7\_DataNotFound, ERR7\_FileNotOpen, ERR7\_InvalidEntity,  
ERR7\_InvalidFileUnit, ERR7\_InvalidLibraryID,  
ERR7\_InvalidLibraryItemID, ERR7\_NoError,  
ERR7\_ResultFileIsOpen, ERR7\_UnknownProperty

## St7AssignLibraryComposite

---

### Description

Assigns the specified composite library item to a ply property. The ply material is stored at the specified item ID position.

## Syntax

```
long St7AssignLibraryComposite(long uID, long PropNum, long  
LibraryID, long ItemID)
```

## Input Parameters

uID

Strand7 model file ID number.

---

PropNum

Composite property number.

LibraryID

Library ID number.

ItemID

Item ID number.

## Errors

ERR7\_APINotInitialised, ERR7\_APINotLicensed,  
ERR7\_DataNotFound, ERR7\_FileNotOpen, ERR7\_InvalidEntity,  
ERR7\_InvalidFileUnit, ERR7\_InvalidLibraryID,  
ERR7\_InvalidLibraryItemID, ERR7\_NoError,  
ERR7\_ResultFileIsOpen, ERR7\_UnknownProperty

# St7AssignLibraryBeamSection

---

## Description

Assigns the specified beam section library item to a beam property. The beam section is stored at the specified item ID position.

## Syntax

```
long St7AssignLibraryBeamSection(long uID, long PropNum,  
                                long LibraryID, long ItemID, long* Integers)
```

## Input Parameters

uID

Strand7 model file ID number.

PropNum

Beam property number.

LibraryID

Library ID number.

ItemID

Item ID number.

Integers [0..1]

[0] - btTrue to import beam material data.

[1] - btTrue to calculate null values.

## Errors

ERR7\_APINotInitialised, ERR7\_APINotLicensed,  
ERR7\_DataNotFound, ERR7\_FileNotOpen, ERR7\_InvalidEntity,  
ERR7\_InvalidFileUnit, ERR7\_InvalidLibraryID, ERR7\_NoError,  
ERR7\_ResultFileIsOpen, ERR7\_UnknownProperty

# St7AssignLibraryCreepDefinition

---

## Description

Assigns the specified creep law library item to a creep law definition. The creep law definition is stored at the specified item ID position.

## Syntax

```
long St7AssignLibraryCreepDefinition(long uID, long CreepID,  
                                     long LibraryID, long ItemID)
```

## Input Parameters

uID

Strand7 model file ID number.

CreepID

Creep law definition ID number.

LibraryID

Library ID number.

ItemID

Item ID number.

## Errors

ERR7\_APINotInitialised, ERR7\_APINotLicensed,  
ERR7\_DataNotFound, ERR7\_FileNotOpen, ERR7\_InvalidCreepID,  
ERR7\_InvalidFileUnit, ERR7\_InvalidLibraryID,  
ERR7\_InvalidLibraryItemID, ERR7\_NoError,  
ERR7\_ResultFileIsOpen

---

## St7AssignLibraryLoadPathTemplate

---

### Description

Assigns the specified load path library item to a load path template. The load path template is stored at the specified item ID position.

### Syntax

```
long St7AssignLibraryLoadPathTemplate(long uID, long  
LoadPathTemplateID, long LibraryID, long ItemID)
```

### Input Parameters

uID

Strand7 model file ID number.

LoadPathTemplateID

Load path template ID number.

LibraryID

Library ID number.

ItemID

Item ID number.

### Errors

```
ERR7_APINotInitialised, ERR7_APINotLicensed,  
ERR7_DataNotFound, ERR7_FileNotOpen, ERR7_InvalidFileUnit,  
ERR7_InvalidLibraryID, ERR7_InvalidLoadPathTemplateID,  
ERR7_InvalidLibraryItemID, ERR7_NoError,  
ERR7_ResultFileIsOpen
```

---

## St7AssignLibraryReinforcementLayout

---

### Description

Assigns the specified concrete reinforcement library item to a concrete reinforcement template. The concrete reinforcement layout is stored at the specified item ID position.

### Syntax

```
long St7AssignLibraryReinforcementLayout(long uID, long  
LayoutID, long LibraryID, long ItemID)
```

## **Input Parameters**

`uID`

Strand7 model file ID number.

`LayoutID`

Concrete reinforcement layout ID number.

`LibraryID`

Library ID number.

`ItemID`

Item ID number.

## **Errors**

```
ERR7_APINotInitialised, ERR7_APINotLicensed,  
ERR7_DataNotFound, ERR7_FileNotOpen, ERR7_InvalidFileUnit,  
ERR7_InvalidLayoutID, ERR7_InvalidLibraryID,  
ERR7_InvalidLibraryItemID, ERR7_NoError,  
ERR7_ResultFileIsOpen
```

---

# Tables

## St7GetNumTables

---

### Description

Returns the number of tables of a specified type in the model.

### Syntax

```
long St7GetNumTables(long uID, long TableType, long*  
    NumTables, long* MaxTableNum)
```

### Input Parameters

uID

Strand7 model file ID number.

TableType

Table type, one of ttVsTime, ttVsTemperature, ttVsFrequency, ttStressStrain, ttForceDisplacement, ttMomentCurvature, ttMomentRotation, ttAccVsTime, ttForceVelocity, ttVsPosition or ttStrainTime.

### Output Parameters

NumTables

Number of tables.

MaxTableNum

Maximum table ID number.

### Errors

ERR7\_APINotInitialised, ERR7\_APINotLicensed,  
ERR7\_FileNotOpen, ERR7\_InvalidFileUnit,  
ERR7\_InvalidTableType, ERR7\_NoError

## St7GetTableInfoByIndex

---

### Description

Returns the name and ID number of the specified table. The maximum table index is returned by the St7GetNumTables function.

## Syntax

```
long St7GetTableInfoByIndex(long uID, long TableType, long  
Index, long* TableID, char* TableName, long  
MaxStringLen)
```

## Input Parameters

uID

Strand7 model file ID number.

TableType

Type of the table, one of ttVsTime, ttVsTemperature, ttVsFrequency,  
ttStressStrain, ttForceDisplacement, ttMomentCurvature, ttMomentRotation,  
ttAccVsTime, ttForceVelocity, ttVsPosition or ttStrainTime.

Index

Table index.

MaxStringLen

The maximum number of characters allocated for TableName.

## Output Parameters

TableID

Table ID number.

TableName

Name of the table.

## Errors

ERR7\_APINotInitialised, ERR7\_APINotLicensed,  
ERR7\_FileNotOpen, ERR7\_InvalidFileUnit,  
ERR7\_InvalidTableType, ERR7\_NoError, ERR7\_TableDoesNotExist

## St7NewTableType

---

### Description

Creates a new table in the specified model.

### Syntax

```
long St7NewTableType(long uID, long TableType, long TableID,  
long NumEntries, char* TableName, double* Doubles)
```

---

## **Input Parameters**

**uID**

Strand7 model file ID number.

**TableType**

Type of the table, one of ttVsTime, ttVsTemperature, ttVsFrequency, ttStressStrain, ttForceDisplacement, ttMomentCurvature, ttMomentRotation, ttAccVsTime, ttForceVelocity, ttVsPosition or ttStrainTime.

**TableID**

Table ID number.

**NumEntries**

Number of rows (or XY data pairs) in the table.

**TableName**

Name of the table.

**Doubles [0..2\*NumEntries-1]**

An array containing the XY data for the table. Each XY pair is stored in a block of length 2, with the start of the  $i^{\text{th}}$  pair at Doubles[ $(i-1) * 2$ ].

## **Errors**

ERR7\_APINotInitialised, ERR7\_APINotLicensed,  
ERR7\_FileNotOpen, ERR7\_InvalidFileUnit,  
ERR7\_InvalidNumberOfEntries, ERR7\_InvalidTableID,  
ERR7\_InvalidTableName, ERR7\_InvalidTableType, ERR7\_NoError,  
ERR7\_ResultFileIsOpen, ERR7\_TableNameAlreadyExists

---

## **St7DeleteTableType**

### **Description**

Deletes the specified table.

### **Syntax**

```
long St7DeleteTableType(long uID, long TableType, long  
TableID)
```

## **Input Parameters**

**uID**

Strand7 model file ID number.

TableType

Type of the table, one of ttVsTime, ttVsTemperature, ttVsFrequency, ttStressStrain, ttForceDisplacement, ttMomentCurvature, ttMomentRotation, ttAccVsTime, ttForceVelocity, ttVsPosition or ttStrainTime.

TableID

Table ID number.

## Errors

ERR7\_APINotInitialised, ERR7\_APINotLicensed,  
ERR7\_FileNotOpen, ERR7\_InvalidFileUnit,  
ERR7\_InvalidTableType, ERR7\_NoError, ERR7\_ResultFileIsOpen,  
ERR7\_TableDoesNotExist

# St7GetTableName

---

## Description

Returns the name of the specified table.

## Syntax

```
long St7GetTableName(long uID, long TableType, long  
TableID, char* TableName, long MaxStringLen)
```

## Input Parameters

uID

Strand7 model file ID number.

TableType

Type of the table, one of ttVsTime, ttVsTemperature, ttVsFrequency, ttStressStrain, ttForceDisplacement, ttMomentCurvature, ttMomentRotation, ttAccVsTime, ttForceVelocity, ttVsPosition or ttStrainTime.

TableID

Table ID number.

MaxStringLen

Maximum number of characters allocated for TableName.

---

## Output Parameters

TableName

Name of the table.

## Errors

ERR7\_APINotInitialised, ERR7\_APINotLicensed,  
ERR7\_FileNotOpen, ERR7\_InvalidFileUnit,  
ERR7\_InvalidTableType, ERR7\_NoError, ERR7\_TableDoesNotExist

# St7GetTableID

---

## Description

Returns the ID number for a table specified by name. Where multiple names exist, the table ID with the lowest table index is returned.

## Syntax

```
long St7GetTableID(long uID, char* TableName, long  
                    TableType, long* TableID)
```

## Input Parameters

uID

Strand7 model file ID number.

TableName

Name of the table.

TableType

Type of the table, one of ttVsTime, ttVsTemperature, ttVsFrequency,  
ttStressStrain, ttForceDisplacement, ttMomentCurvature, ttMomentRotation,  
ttAccVsTime, ttForceVelocity, ttVsPosition or ttStrainTime.

## Output Parameters

TableID

Table ID number.

## Errors

ERR7\_APINotInitialised, ERR7\_APINotLicensed,  
ERR7\_FileNotOpen, ERR7\_InvalidFileUnit,  
ERR7\_InvalidTableType, ERR7\_NoError, ERR7\_TableDoesNotExist

## St7GetNumTableTypeRows

---

### Description

Returns the number of rows in the specified table.

### Syntax

```
long St7GetNumTableTypeRows(long uID, long TableType, long  
TableID, long* NumRows)
```

### Input Parameters

uID

Strand7 model file ID number.

TableType

Type of the table, one of ttVsTime, ttVsTemperature, ttVsFrequency,  
ttStressStrain, ttForceDisplacement, ttMomentCurvature, ttMomentRotation,  
ttAccVsTime, ttForceVelocity, ttVsPosition or ttStrainTime.

TableID

Table ID number.

### Output Parameters

NumRows

Number of rows.

### Errors

ERR7\_APINotInitialised, ERR7\_APINotLicensed,  
ERR7\_FileNotOpen, ERR7\_InvalidFileUnit,  
ERR7\_InvalidTableType, ERR7\_NoError, ERR7\_TableDoesNotExist

## St7SetTableTypeData

---

### Description

Sets the XY data for the specified table.

### Syntax

```
long St7SetTableTypeData(long uID, long TableType, long  
TableID, long NumEntries, double* Doubles)
```

---

## **Input Parameters**

uID

Strand7 model file ID number.

TableType

Type of the table, one of ttVsTime, ttVsTemperature, ttVsFrequency, ttStressStrain, ttForceDisplacement, ttMomentCurvature, ttMomentRotation, ttAccVsTime, ttForceVelocity, ttVsPosition or ttStrainTime.

TableID

Table ID number.

NumEntries

Number of entries in table.

Doubles [0 .. 2\*NumEntries-1]

An array containing the XY data for the table. Each XY pair is stored in a block of length 2, with the start of the  $i^{\text{th}}$  pair at Doubles [  $(i-1) * 2$  ].

## **Errors**

ERR7\_APINotInitialised, ERR7\_APINotLicensed,  
ERR7\_FileNotOpen, ERR7\_InvalidFileUnit,  
ERR7\_InvalidNumberOfEntries, ERR7\_InvalidTableType,  
ERR7\_NoError, ERR7\_ResultFileIsOpen, ERR7\_TableDoesNotExist

---

## **St7GetTableTypeData**

### **Description**

Returns the XY data for the specified table.

### **Syntax**

```
long St7GetTableTypeData(long uID, long TableType, long  
TableID, long MaxRows, long* NumRows, double* Doubles)
```

## **Input Parameters**

uID

Strand7 model file ID number.

TableType

Type of the table, one of ttVsTime, ttVsTemperature, ttVsFrequency, ttStressStrain, ttForceDisplacement, ttMomentCurvature, ttMomentRotation, ttAccVsTime, ttForceVelocity, ttVsPosition or ttStrainTime.

TableID

Table ID number.

MaxRows

Maximum number of rows allocated for Doubles.

## Output Parameters

NumRows

Number of rows used.

Doubles [0 .. 2\*MaxRows-1]

An array containing the XY data for the table. Each XY pair is stored in a block of length 2, with the start of the  $i^{\text{th}}$  pair at Doubles [  $(i-1) * 2$  ].

## Errors

ERR7\_APINotInitialised, ERR7\_APINotLicensed,  
ERR7\_FileNotOpen, ERR7\_InvalidFileUnit,  
ERR7\_InvalidTableType, ERR7\_NoError, ERR7\_TableDoesNotExist

# St7SetFrequencyTable

---

## Description

Sets the type of the specified Factor vs Frequency table.

## Syntax

```
long St7SetFrequencyTable(long uID, long TableID, long  
FreqType)
```

## Input Parameters

uID

Strand7 model file ID number.

TableID

Table ID number.

FreqType

---

Type of frequency table, either tyPeriod or tyFrequency.

### Errors

```
ERR7_APINotInitialised, ERR7_APINotLicensed,  
ERR7_FileNotOpen, ERR7_InvalidFileUnit,  
ERR7_InvalidFrequencyType, ERR7_NoError,  
ERR7_NotFrequencyTable, ERR7_ResultFileIsOpen,  
ERR7_TableDoesNotExist
```

## St7GetFrequencyTable

---

### Description

Returns the type of the specified Factor vs Frequency table.

### Syntax

```
long St7GetFrequencyTable(long uID, long TableID, long*  
                           FreqType)
```

### Input Parameters

uID

Strand7 model file ID number.

TableID

Table ID number.

### Output Parameters

FreqType

Type of frequency table, either tyPeriod or tyFrequency.

### Errors

```
ERR7_APINotInitialised, ERR7_APINotLicensed,  
ERR7_FileNotOpen, ERR7_InvalidFileUnit, ERR7_NoError,  
ERR7_NotFrequencyTable, ERR7_TableDoesNotExist
```

## St7SetTimeTableUnits

---

### Description

Sets the time units for the specified time based table.

## Syntax

```
long St7SetTimeTableUnits(long uID, long TableType, long  
TableID, long UnitType)
```

## Input Parameters

uID

Strand7 model file ID number.

TableType

Type of the table, one of ttVsTime or ttStrainTime.

TableID

Table ID number.

UnitType

Time units, one of tuMilliSec, tuSec, tuMin, tuHour or tuDay.

## Errors

```
ERR7_APINotInitialised, ERR7_APINotLicensed,  
ERR7_FileNotOpen, ERR7_InvalidFileUnit,  
ERR7_InvalidTableType, ERR7_InvalidTimeUnit, ERR7_NoError,  
ERR7_ResultFileIsOpen, ERR7_TableDoesNotExist,  
ERR7_TableTypeIsNotTimeBased
```

# St7GetTimeTableUnits

---

## Description

Returns the time units assigned to the specified time based table.

## Syntax

```
long St7GetTimeTableUnits(long uID, long TableType, long  
TableID, long* UnitType)
```

## Input Parameters

uID

Strand7 model file ID number.

TableType

Type of the table, one of ttVsTime or ttStrainTime.

---

TableID

Table ID number.

### Output Parameters

UnitType

Time units, one of tuMilliSec, tuSec, tuMin, tuHour or tuDay.

### Errors

ERR7\_APINotInitialised, ERR7\_APINotLicensed,  
ERR7\_FileNotOpen, ERR7\_InvalidFileUnit,  
ERR7\_InvalidTableType, ERR7\_NoError, ERR7\_TableDoesNotExist,  
ERR7\_TableTypeIsNotTimeBased

## St7ConvertTimeTableUnits

---

### Description

Converts the time units for the specified time based table.

### Syntax

```
long St7ConvertTimeTableUnits(long uID, long TableType,  
                             long TableID, long UnitType)
```

### Input Parameters

uID

Strand7 model file ID number.

TableType

Type of the table, one of ttVsTime, ttVsTemperature, ttVsFrequency,  
ttStressStrain, ttForceDisplacement, ttMomentCurvature, ttMomentRotation,  
ttAccVsTime, ttForceVelocity, ttVsPosition or ttStrainTime.

TableID

Table ID number.

UnitType

Time units, one of tuMilliSec, tuSec, tuMin, tuHour or tuDay.

### Errors

ERR7\_APINotInitialised, ERR7\_APINotLicensed,  
ERR7\_FileNotOpen, ERR7\_InvalidFileUnit,

```
ERR7_InvalidTableType, ERR7_InvalidTimeUnit, ERR7_NoError,  
ERR7_ResultFileIsOpen, ERR7_TableDoesNotExist,  
ERR7_TableTypeIsNotTimeBased
```

## St7SetFrequencyPeriodTableUnits

---

### Description

Sets the units assigned to the specified frequency based table.

### Syntax

```
long St7SetFrequencyPeriodTableUnits(long uID, long TableID,  
                                     long UnitType)
```

### Input Parameters

uID

Strand7 model file ID number.

TableID

Table ID number.

UnitType

Spectrum units type, one of fuNone, fuDispResponse, fuVelResponse,  
fuAccelResponse, fuDispPSD, fuVelPSD or fuAccelPSD.

### Errors

```
ERR7_APINotInitialised, ERR7_APINotLicensed,  
ERR7_FileNotOpen, ERR7_InvalidFileUnit, ERR7_InvalidUnits,  
ERR7_InvalidTableType, ERR7_NoError, ERR7_ResultFileIsOpen,  
ERR7_TableDoesNotExist
```

## St7GetFrequencyPeriodTableUnits

---

### Description

Returns the units assigned to the specified frequency based table.

### Syntax

```
long St7GetFrequencyPeriodTableUnits(long uID, long TableID,  
                                     long* UnitType)
```

---

## **Input Parameters**

uID

Strand7 model file ID number.

TableID

Table ID number.

## **Output Parameters**

UnitType

Spectrum units type, one of fuNone, fuDispResponse, fuVelResponse,  
fuAccelResponse, fuDispPSD, fuVelPSD or fuAccelPSD.

## **Errors**

ERR7\_APINotInitialised, ERR7\_APINotLicensed,  
ERR7\_FileNotOpen, ERR7\_InvalidFileUnit,  
ERR7\_InvalidTableType, ERR7\_NoError, ERR7\_TableDoesNotExist

## Solver – Linear Static

### St7EnableLSALoadCase

---

#### Description

Activates the specified load/seismic case and freedom case combination such that it is included when performing Linear Static analysis.

#### Syntax

```
long St7EnableLSALoadCase(long uID, long LCaseNum, long  
                           FCaseNum)
```

#### Input Parameters

uID

Strand7 model file ID number.

LCaseNum

Either the load case number, or the sum of the total number of load cases and the seismic case number, to indicate a load case or a seismic case respectively.

FCaseNum

Freedom case number.

#### Errors

ERR7\_APINotInitialised, ERR7\_APINotLicensed,  
ERR7\_DataNotFound, ERR7\_FileNotOpen, ERR7\_InvalidFileUnit,  
ERR7\_InvalidFreedomCase, ERR7\_InvalidLoadCase, ERR7\_NoError,  
ERR7\_ResultFileIsOpen

### St7DisableLSALoadCase

---

#### Description

Deactivates the specified load/seismic case and freedom case combination such that it is not included when performing Linear Static analysis.

#### Syntax

```
long St7DisableLSALoadCase(long uID, long LCaseNum, long  
                           FCaseNum)
```

---

## **Input Parameters**

uID

Strand7 model file ID number.

LCaseNum

Either the load case number, or the sum of the total number of load cases and the seismic case number, to indicate a load case or a seismic case respectively.

FCaseNum

Freedom case number.

## **Errors**

ERR7\_APINotInitialised, ERR7\_APINotLicensed,  
ERR7\_DataNotFound, ERR7\_FileNotOpen, ERR7\_InvalidFileUnit,  
ERR7\_InvalidFreedomCase, ERR7\_InvalidLoadCase, ERR7\_NoError,  
ERR7\_ResultFileIsOpen

---

## **St7GetLSALoadCaseState**

### **Description**

Returns the state assigned to the specified load/seismic case and freedom case combination for Linear Static analysis.

### **Syntax**

```
long St7GetLSALoadCaseState(long uID, long LCaseNum, long  
FCaseNum, bool* State)
```

## **Input Parameters**

uID

Strand7 model file ID number.

LCaseNum

Either the load case number, or the sum of the total number of load cases and the seismic case number, to indicate a load case or a seismic case respectively.

FCaseNum

Freedom case number.

## Output Parameters

State

btTrue if the specified load/seismic case and freedom case combination is enabled for Linear Static analysis.

## Errors

ERR7\_APINotInitialised, ERR7\_APINotLicensed,  
ERR7\_DataNotFound, ERR7\_FileNotOpen, ERR7\_InvalidFileUnit,  
ERR7\_InvalidFreedomCase, ERR7\_InvalidLoadCase, ERR7\_NoError,  
ERR7\_ResultFileIsOpen

# St7EnableLSAInitialPCGFile

---

## Description

Sets the PCG solver to use the initial conditions supplied. The initial conditions are specified using the St7SetLSAInitialPCGFile function.

## Syntax

```
long St7EnableLSAInitialPCGFile(long uID)
```

## Input Parameters

uID

Strand7 model file ID number.

## Errors

ERR7\_APINotInitialised, ERR7\_APINotLicensed,  
ERR7\_FileNotOpen, ERR7\_InvalidFileUnit, ERR7\_NoError,  
ERR7\_ResultFileIsOpen

# St7DisableLSAInitialPCGFile

---

## Description

Sets the PCG solver to use the default initial conditions.

## Syntax

```
long St7DisableLSAInitialPCGFile(long uID)
```

## Input Parameters

uID

---

Strand7 model file ID number.

### Errors

ERR7\_APINotInitialised, ERR7\_APINotLicensed,  
ERR7\_FileNotOpen, ERR7\_InvalidFileUnit, ERR7\_NoError,  
ERR7\_ResultFileIsOpen

## St7GetLSAInitialPCGFileState

---

### Description

Returns the state assigned for the PCG initial conditions.

### Syntax

```
long St7GetLSAInitialPCGFileState(long uID, bool* State)
```

### Input Parameters

uID

Strand7 model file ID number.

### Output Parameters

State

btTrue if the starting vector for the PCG solver is obtained from the initial conditions file.

### Errors

ERR7\_APINotInitialised, ERR7\_APINotLicensed,  
ERR7\_FileNotOpen, ERR7\_InvalidFileUnit, ERR7\_NoError,  
ERR7\_ResultFileIsOpen

## St7SetLSAInitialPCGFile

---

### Description

Assigns the initial conditions file used by the PCG solver.

### Syntax

```
long St7SetLSAInitialPCGFile(long uID, char* FileName)
```

### Input Parameters

uID

Strand7 model file ID number.

FileName

Full path and name for the initial conditions file for the PCG solver.

### Errors

ERR7\_APINotInitialised, ERR7\_APINotLicensed,  
ERR7\_FileNotOpen, ERR7\_InvalidFileUnit, ERR7\_NoError,  
ERR7\_ResultFileIsOpen

## St7GetLSAInitialPCGFile

---

### Description

Returns the initial conditions file assigned to the PCG solver.

### Syntax

```
long St7GetLSAInitialPCGFile(long uID, char* FileName, long  
MaxStringLen)
```

### Input Parameters

uID

Strand7 model file ID number.

MaxStringLen

Maximum number of characters allocated for FileName.

### Output Parameters

FileName

Full path and name for the initial conditions file for the PCG solver.

### Errors

ERR7\_APINotInitialised, ERR7\_APINotLicensed,  
ERR7\_FileNotOpen, ERR7\_InvalidFileUnit, ERR7\_NoError,  
ERR7\_ResultFileIsOpen

---

## Solver – Linear Buckling

### St7SetLBAInitialFile

---

#### Description

Assigns the initial conditions file used by the Linear Buckling solver.

#### Syntax

```
long St7SetLBAInitialFile(long uID, char* FileName, long CaseNum)
```

#### Input Parameters

uID

Strand7 model file ID number.

FileName

Full path and name for the initial conditions file for the Linear Buckling solver.

CaseNum

Result case number within the initial conditions file used by the solver.

#### Errors

```
ERR7_APINotInitialised, ERR7_APINotLicensed,  
ERR7_FileNotOpen, ERR7_InvalidFileUnit,  
ERR7_InvalidInitialCaseNumber, ERR7_InvalidInitialFile,  
ERR7_NoError, ERR7_ResultFileIsOpen
```

### St7GetLBAInitialFile

---

#### Description

Returns the initial conditions file assigned to the Linear Buckling solver.

#### Syntax

```
long St7GetLBAInitialFile(long uID, char* FileName, long* CaseNum, long MaxStringLen)
```

#### Input Parameters

uID

Strand7 model file ID number.

MaxStringLen

Maximum number of characters allocated for FileName.

## Output Parameters

FileName

Full path and name for the initial conditions file used by the Linear Buckling solver.

CaseNum

Result case number within the initial conditions file used by the solver.

## Errors

ERR7\_APINotInitialised, ERR7\_APINotLicensed,  
ERR7\_FileNotOpen, ERR7\_InvalidFileUnit, ERR7\_NoError

# St7SetLBANumModes

---

## Description

Sets the number of modes to be found when running the Linear Buckling solver.

## Syntax

```
long St7SetLBANumModes (long uID, long NumModes)
```

## Input Parameters

uID

Strand7 model file ID number.

NumModes

Number of modes to be found.

## Errors

ERR7\_APINotInitialised, ERR7\_APINotLicensed,  
ERR7\_FileNotOpen, ERR7\_InvalidFileUnit,  
ERR7\_InvalidNumModes, ERR7\_NoError, ERR7\_ResultFileIsOpen

---

## St7GetLBANumModes

---

### Description

Returns the number of modes to be found when running the Linear Buckling solver.

### Syntax

```
long St7GetLBANumModes (long uID, long* NumModes)
```

### Input Parameters

uID

Strand7 model file ID number.

### Output Parameters

NumModes

Number of modes to be found.

### Errors

```
ERR7_APINotInitialised, ERR7_APINotLicensed,  
ERR7_FileNotOpen, ERR7_InvalidFileUnit, ERR7_NoError
```

## St7SetLBAShift

---

### Description

Sets the frequency shift used by the Linear Buckling solver. The first modes found both above and below the shift value will be found when running the solver.

### Syntax

```
long St7SetLBAShift (long uID, double Shift)
```

### Input Parameters

uID

Strand7 model file ID number.

Shift

The eigenvalue shift to be applied when performing a Linear Buckling analysis.  
The first modes that occur on either side of this value are included in the analysis.

## Errors

ERR7\_APINotInitialised, ERR7\_APINotLicensed,  
ERR7\_FileNotOpen, ERR7\_InvalidFileUnit, ERR7\_NoError,  
ERR7\_ResultFileIsOpen

# St7GetLBAShift

---

## Description

Returns the shift value assigned to the Linear Buckling solver. The first modes found both above and below the shift value will be found when running the solver.

## Syntax

```
long St7GetLBAShift(long uID, double* Shift)
```

### Input Parameters

uID

Strand7 model file ID number.

### Output Parameters

Shift

The eigenvalue shift to be applied when performing Linear Buckling analysis.

The first modes that occur on either side of this value are included in the analysis.

## Errors

ERR7\_APINotInitialised, ERR7\_APINotLicensed,  
ERR7\_FileNotOpen, ERR7\_InvalidFileUnit, ERR7\_NoError

---

## Solver – Load Influence

### St7EnableLIALoadCase

---

#### Description

Activates the specified load and freedom case combination such that it is included when performing Load Influence analysis.

#### Syntax

```
long St7EnableLIALoadCase(long uID, long LCaseNum, long  
FCaseNum)
```

#### Input Parameters

uID

Strand7 model file ID number.

LCaseNum

Load case number.

FCaseNum

Freedom case number.

#### Errors

```
ERR7_APINotInitialised, ERR7_APINotLicensed,  
ERR7_DataNotFound, ERR7_FileNotOpen, ERR7_InvalidFileUnit,  
ERR7_InvalidFreedomCase, ERR7_InvalidLoadCase, ERR7_NoError,  
ERR7_ResultFileIsOpen
```

### St7DisableLIALoadCase

---

#### Description

Deactivates the specified load and freedom case combination such that it is not included when performing Load Influence analysis.

#### Syntax

```
long St7DisableLIALoadCase(long uID, long LCaseNum, long  
FCaseNum)
```

#### Input Parameters

uID

Strand7 model file ID number.

LCaseNum

Load case number.

FCaseNum

Freedom case number.

## Errors

ERR7\_APINotInitialised, ERR7\_APINotLicensed,  
ERR7\_DataNotFound, ERR7\_FileNotOpen, ERR7\_InvalidFileUnit,  
ERR7\_InvalidFreedomCase, ERR7\_InvalidLoadCase, ERR7\_NoError,  
ERR7\_ResultFileIsOpen

## St7GetLIALoadCaseState

---

### Description

Returns the state assigned to the specified load and freedom case combination for Load Influence analysis.

### Syntax

```
long St7GetLIALoadCaseState(long uID, long LCaseNum, long  
FCaseNum, bool* State)
```

### Input Parameters

uID

Strand7 model file ID number.

LCaseNum

Load case number.

FCaseNum

Freedom case number.

### Output Parameters

State

bTrue is the specified load and freedom case combination is enabled for Load Influence analysis.

---

## Errors

ERR7\_APINotInitialised, ERR7\_APINotLicensed,  
ERR7\_DataNotFound, ERR7\_FileNotOpen, ERR7\_InvalidFileUnit,  
ERR7\_InvalidFreedomCase, ERR7\_InvalidLoadCase, ERR7\_NoError,  
ERR7\_ResultFileIsOpen

# Solver – Nonlinear Static

## St7SetNLAStagedAnalysis

### Description

Sets the state of the staged analysis option for the Nonlinear Static solver.

### Syntax

```
long St7SetNLAStagedAnalysis(long uID, bool StagedAnalysis)
```

### Input Parameters

uID

Strand7 model file ID number.

StagedAnalysis

btTrue to perform staged analysis.

### Errors

```
ERR7_APINotInitialised, ERR7_APINotLicensed,  
ERR7_FileNotOpen, ERR7_InvalidFileUnit, ERR7_NoError,  
ERR7_ResultFileIsOpen
```

## St7GetNLAStagedAnalysis

### Description

Returns the state of the staged analysis option for the Nonlinear Static solver.

### Syntax

```
long St7GetNLAStagedAnalysis(long uID, bool*  
    StagedAnalysis)
```

### Input Parameters

uID

Strand7 model file ID number.

### Output Parameters

StagedAnalysis

btTrue to perform staged nonlinear static analysis.

---

## Errors

```
ERR7_APINotInitialised, ERR7_APINotLicensed,  
ERR7_FileNotOpen, ERR7_InvalidFileUnit, ERR7_NoError
```

## St7EnableNLAStrage

---

### Description

Activates the specified stage such that it is included when performing Nonlinear Static analysis.

### Syntax

```
long St7EnableNLAStrage(long uID, long Stage)
```

### Input Parameters

uID

Strand7 model file ID number.

Stage

Stage number to be enabled.

### Errors

```
ERR7_APINotInitialised, ERR7_APINotLicensed,  
ERR7_FileNotOpen, ERR7_InvalidFileUnit, ERR7_NoError,  
ERR7_ResultFileIsOpen, ERR7_StageDoesNotExist
```

## St7DisableNLAStrage

---

### Description

Deactivates the specified stage such that it is not included when performing Nonlinear Static analysis.

### Syntax

```
long St7DisableNLAStrage(long uID, long Stage)
```

### Input Parameters

uID

Strand7 model file ID number.

Stage

Stage number to be disabled.

### Errors

ERR7\_APINotInitialised, ERR7\_APINotLicensed,  
ERR7\_FileNotOpen, ERR7\_InvalidFileUnit, ERR7\_NoError,  
ERR7\_ResultFileIsOpen, ERR7\_StageDoesNotExist

## St7GetNLASStageState

---

### Description

Returns the state assigned to the specified stage for Nonlinear Static analysis.

### Syntax

```
long St7GetNLASStageState(long uID, long Stage, bool* State)
```

### Input Parameters

uID

Strand7 model file ID number.

Stage

Stage number.

### Output Parameters

State

btTrue if the specified stage is enabled.

### Errors

ERR7\_APINotInitialised, ERR7\_APINotLicensed,  
ERR7\_DataNotFound, ERR7\_FileNotOpen, ERR7\_InvalidFileUnit,  
ERR7\_NoError, ERR7\_StageDoesNotExist

## St7AddNLAIncrement

---

### Description

Adds a new blank increment to the Nonlinear Static analysis load increment table.

### Syntax

```
long St7AddNLAIncrement(long uID, long Stage, char*  
IncName)
```

---

## **Input Parameters**

uID

Strand7 model file ID number.

Stage

Stage number - use zero for unstaged analysis.

IncName

String containing the increment name.

## **Errors**

ERR7\_APINotInitialised, ERR7\_APINotLicensed,  
ERR7\_FileNotOpen, ERR7\_InvalidFileUnit, ERR7\_NoError,  
ERR7\_ResultFileIsOpen, ERR7\_StageDoesNotExist

---

## **St7InsertNLAIncrement**

### **Description**

Inserts a new blank increment at the specified position in the Nonlinear Static analysis load increment table.

### **Syntax**

```
long St7InsertNLAIncrement(long uID, long Stage, long  
Increment, char* IncName)
```

## **Input Parameters**

uID

Strand7 model file ID number.

Stage

Stage number - use zero for unstaged analysis.

Increment

Increment number.

IncName

String containing the increment name.

**Errors**

```
ERR7_APINotInitialised, ERR7_APINotLicensed,  
ERR7_FileNotOpen, ERR7_IncrementDoesNotExist,  
ERR7_InvalidFileUnit, ERR7_NoError, ERR7_ResultFileIsOpen,  
ERR7_StageDoesNotExist
```

## St7DeleteNLAIncrement

---

**Description**

Deletes the specified increment from the Nonlinear Static analysis load increment table.

**Syntax**

```
long St7DeleteNLAIncrement(long uID, long Stage, long  
Increment)
```

**Input Parameters**

uID

Strand7 model file ID number.

Stage

Stage number - use zero for unstaged analysis.

Increment

Increment number.

**Errors**

```
ERR7_APINotInitialised, ERR7_APINotLicensed,  
ERR7_FileNotOpen, ERR7_IncrementDoesNotExist,  
ERR7_InvalidFileUnit, ERR7_NoError, ERR7_ResultFileIsOpen,  
ERR7_StageDoesNotExist
```

## St7GetNumNLAIncrements

---

**Description**

Returns the total number of increments assigned in the Nonlinear Static analysis load increment table.

---

## Syntax

```
long St7GetNumNLAIncrements(long uID, long Stage, long*
    NumIncrements)
```

## Input Parameters

uID

Strand7 model file ID number.

Stage

Stage number - use zero for unstaged analysis.

## Output Parameters

NumIncrements

Total number of increments.

## Errors

ERR7\_APINotInitialised, ERR7\_APINotLicensed,  
ERR7\_FileNotOpen, ERR7\_InvalidFileUnit, ERR7\_NoError,  
ERR7\_StageDoesNotExist

---

## St7SetNLALoadIncrementFactor

### Description

Assigns the load case factors for the specified increment in the Nonlinear Static analysis load increment table.

### Syntax

```
long St7SetNLALoadIncrementFactor(long uID, long Stage,
    long Increment, long CaseNum, double dFactor)
```

### Input Parameters

uID

Strand7 model file ID number.

Stage

Stage number - use zero for unstaged analysis.

Increment

Increment number.

CaseNum

Load case number.

dFactor

Load case factor.

## Errors

ERR7\_APINotInitialised, ERR7\_APINotLicensed,  
ERR7\_FileNotOpen, ERR7\_IncrementDoesNotExist,  
ERR7\_InvalidFileUnit, ERR7\_InvalidLoadCase, ERR7\_NoError,  
ERR7\_ResultFileIsOpen, ERR7\_StageDoesNotExist

# St7GetNLALoadIncrementFactor

---

## Description

Returns the load case factors assigned for the specified increment in the Nonlinear Static analysis load increment table.

## Syntax

```
long St7GetNLALoadIncrementFactor(long uID, long Stage,  
                                 long Increment, long CaseNum, double* dFactor)
```

## Input Parameters

uID

Strand7 model file ID number.

Stage

Stage number - use zero for unstaged analysis.

Increment

Increment number.

CaseNum

Load case number.

## Output Parameters

dFactor

Load case factor.

---

## Errors

```
ERR7_APINotInitialised, ERR7_APINotLicensed,  
ERR7_FileNotOpen, ERR7_IncrementDoesNotExist,  
ERR7_InvalidFileUnit, ERR7_InvalidLoadCase, ERR7_NoError,  
ERR7_ResultFileIsOpen, ERR7_StageDoesNotExist
```

# St7SetNLAFreedomIncrementFactor

---

## Description

Assigns the freedom case factors for the specified increment in the Nonlinear Static analysis load increment table.

## Syntax

```
long St7SetNLAFreedomIncrementFactor(long uID, long Stage,  
                                     long Increment, long CaseNum, double dFactor)
```

## Input Parameters

uID

Strand7 model file ID number.

Stage

Stage number - use zero for unstaged analysis.

Increment

Increment number.

CaseNum

Freedom case number.

dFactor

Freedom case factor.

## Errors

```
ERR7_APINotInitialised, ERR7_APINotLicensed,  
ERR7_FileNotOpen, ERR7_IncrementDoesNotExist,  
ERR7_InvalidFileUnit, ERR7_InvalidFreedomCase, ERR7_NoError,  
ERR7_ResultFileIsOpen, ERR7_StageDoesNotExist
```

## St7GetNLAFreedomIncrementFactor

---

### Description

Returns the freedom case factors assigned in the specified increment in the Nonlinear Static analysis load increment table.

### Syntax

```
long St7GetNLAFreedomIncrementFactor(long uID, long Stage,  
                                     long Increment, long CaseNum, double* dFactor)
```

### Input Parameters

uID

Strand7 model file ID number.

Stage

Stage number - use zero for unstaged analysis.

Increment

Increment number.

CaseNum

Freedom case number.

### Output Parameters

dFactor

Freedom case factor.

### Errors

ERR7\_APINotInitialised, ERR7\_APINotLicensed,  
ERR7\_FileNotOpen, ERR7\_IncrementDoesNotExist,  
ERR7\_InvalidFileUnit, ERR7\_InvalidFreedomCase, ERR7\_NoError,  
ERR7\_ResultFileIsOpen, ERR7\_StageDoesNotExist

## St7EnableNLALoadCase

---

### Description

Activates the specified load case such that it is included in Nonlinear Static analysis.

---

## Syntax

```
long St7EnableNLALoadCase(long uID, long Stage, long  
CaseNum)
```

## Input Parameters

uID

Strand7 model file ID number.

Stage

Stage number - use zero for unstaged analysis.

CaseNum

Load case number.

## Errors

```
ERR7_APINotInitialised, ERR7_APINotLicensed,  
ERR7_FileNotOpen, ERR7_IncrementDoesNotExist,  
ERR7_InvalidFileUnit, ERR7_InvalidLoadCase, ERR7_NoError,  
ERR7_ResultFileIsOpen, ERR7_StageDoesNotExist
```

---

## St7DisableNLALoadCase

## Description

Deactivates the specified load case such that it is not included in Nonlinear Static analysis.

## Syntax

```
long St7DisableNLALoadCase(long uID, long Stage, long  
CaseNum)
```

## Input Parameters

uID

Strand7 model file ID number.

Stage

Stage number - use zero for unstaged analysis.

CaseNum

Load case number.

**Errors**

```
ERR7_APINotInitialised, ERR7_APINotLicensed,  
ERR7_FileNotOpen, ERR7_IncrementDoesNotExist,  
ERR7_InvalidFileUnit, ERR7_InvalidLoadCase, ERR7_NoError,  
ERR7_ResultFileIsOpen, ERR7_StageDoesNotExist
```

## St7GetNLALoadCaseState

---

**Description**

Returns the state assigned to the specified load case for Nonlinear Static analysis.

**Syntax**

```
long St7GetNLALoadCaseState(long uID, long Stage, long  
CaseNum, bool* State)
```

**Input Parameters**

uID

Strand7 model file ID number.

Stage

Stage number - use zero for unstaged analysis.

CaseNum

Load case number.

**Output Parameters**

State

btTrue if the specified load case is enabled for Nonlinear Static analysis.

**Errors**

```
ERR7_APINotInitialised, ERR7_APINotLicensed,  
ERR7_FileNotOpen, ERR7_IncrementDoesNotExist,  
ERR7_InvalidFileUnit, ERR7_InvalidLoadCase, ERR7_NoError,  
ERR7_StageDoesNotExist
```

---

## St7EnableNLAFreedomCase

---

### Description

Enables the specified freedom case such that it is included in Nonlinear Static analysis.

### Syntax

```
long St7EnableNLAFreedomCase(long uID, long Stage, long  
CaseNum)
```

### Input Parameters

uID

Strand7 model file ID number.

Stage

Stage number - use zero for unstaged analysis.

CaseNum

Freedom case number.

### Errors

ERR7\_APINotInitialised, ERR7\_APINotLicensed,  
ERR7\_FileNotOpen, ERR7\_IncrementDoesNotExist,  
ERR7\_InvalidFileUnit, ERR7\_InvalidFreedomCase, ERR7\_NoError,  
ERR7\_ResultFileIsOpen, ERR7\_StageDoesNotExist

---

## St7DisableNLAFreedomCase

---

### Description

Deactivates the specified freedom case such that it is not included in Nonlinear Static analysis.

### Syntax

```
long St7DisableNLAFreedomCase(long uID, long Stage, long  
CaseNum)
```

### Input Parameters

uID

Strand7 model file ID number.

Stage

Stage number - use zero for unstaged analysis.

CaseNum

Freedom case number.

## Errors

ERR7\_APINotInitialised, ERR7\_APINotLicensed,  
ERR7\_FileNotOpen, ERR7\_IncrementDoesNotExist,  
ERR7\_InvalidFileUnit, ERR7\_InvalidFreedomCase, ERR7\_NoError,  
ERR7\_ResultFileIsOpen, ERR7\_StageDoesNotExist

# St7GetNLAFreedomCaseState

---

## Description

Returns the state assigned to the specified freedom case for Nonlinear Static analysis.

## Syntax

```
long St7GetNLAFreedomCaseState(long uID, long Stage, long  
CaseNum, bool* State)
```

## Input Parameters

uID

Strand7 model file ID number.

Stage

Stage number - use zero for unstaged analysis.

CaseNum

Freedom case number.

## Output Parameters

State

btTrue if the specified freedom case is enabled for Nonlinear Static analysis.

## Errors

ERR7\_APINotInitialised, ERR7\_APINotLicensed,  
ERR7\_FileNotOpen, ERR7\_IncrementDoesNotExist,

---

```
ERR7_InvalidFileUnit, ERR7_InvalidFreedomCase, ERR7_NoError,  
ERR7_StageDoesNotExist
```

## St7SetNLAInitialFile

---

### Description

Assigns the initial conditions file used for Nonlinear Static analysis.

### Syntax

```
long St7SetNLAInitialFile(long uID, char* FileName, long  
CaseNum)
```

### Input Parameters

uID

Strand7 model file ID number.

FileName

Full path and name for the initial conditions file.

CaseNum

Result case number within FileName to be used as the initial conditions.

### Errors

```
ERR7_APINotInitialised, ERR7_APINotLicensed,  
ERR7_FileNotOpen, ERR7_InvalidFileUnit,  
ERR7_InvalidInitialCaseNumber, ERR7_InvalidInitialFile,  
ERR7_NoError, ERR7_ResultFileIsOpen
```

## St7GetNLAInitialFile

---

### Description

Returns the initial conditions file assigned for Nonlinear Static analysis.

### Syntax

```
long St7GetNLAInitialFile(long uID, char* FileName, long*  
CaseNum, long MaxStringLen)
```

### Input Parameters

uID

Strand7 model file ID number.

MaxStringLen

Maximum number of characters allocated for FileName.

### **Output Parameters**

FileName

Full path and name for the initial conditions file.

CaseNum

Result case number within FileName to be used as the initial conditions.

### **Errors**

ERR7\_APINotInitialised, ERR7\_APINotLicensed,  
ERR7\_FileNotOpen, ERR7\_InvalidFileUnit, ERR7\_NoError

---

## Solver – Quasi-Static

### St7SetQSAInitialFile

---

#### Description

Assigns the initial conditions file used by the Quasi-Static solver.

#### Syntax

```
long St7SetQSAInitialFile(long uID, char* FileName, long CaseNum)
```

#### Input Parameters

uID

Strand7 model file ID number.

FileName

Full path and name for the initial conditions file.

CaseNum

Result case number within FileName to be used as the initial conditions.

#### Errors

```
ERR7_APINotInitialised, ERR7_APINotLicensed,  
ERR7_FileNotOpen, ERR7_InvalidFileUnit,  
ERR7_InvalidInitialCaseNumber, ERR7_InvalidInitialFile,  
ERR7_NoError, ERR7_ResultFileIsOpen
```

### St7GetQSAInitialFile

---

#### Description

Returns the initial conditions file assigned for Quasi-Static analysis.

#### Syntax

```
long St7GetQSAInitialFile(long uID, char* FileName, long* CaseNum, long MaxStringLen)
```

#### Input Parameters

uID

Strand7 model file ID number.

MaxStringLen

Maximum number of characters allocated for FileName.

## Output Parameters

FileName

Full path and name for the initial conditions file.

CaseNum

Result case number within FileName to be used as the initial conditions.

## Errors

ERR7\_APINotInitialised, ERR7\_APINotLicensed,  
ERR7\_FileNotOpen, ERR7\_InvalidFileUnit, ERR7\_NoError

# Solver – Natural Frequency

## St7SetNFAInitialFile

### Description

Assigns the initial conditions file used for Natural Frequency analysis. If an initial conditions file is specified stress stiffening/softening effects will be included in the analysis.

### Syntax

```
long St7SetNFAInitialFile(long uID, char* FileName, long CaseNum)
```

### Input Parameters

uID

Strand7 model file ID number.

FileName

Full path and name for the initial conditions file.

CaseNum

Result case number within FileName to be used as the initial conditions.

### Errors

ERR7\_APINotInitialised, ERR7\_APINotLicensed,  
ERR7\_FileNotOpen, ERR7\_InvalidFileUnit,  
ERR7\_InvalidInitialCaseNumber, ERR7\_InvalidInitialFile,  
ERR7\_NoError, ERR7\_ResultFileIsOpen

## St7GetNFAInitialFile

### Description

Returns the initial conditions file assigned for Natural Frequency analysis. If an initial conditions file is specified stress stiffening/softening effects will be included in the analysis.

### Syntax

```
long St7GetNFAInitialFile(long uID, char* FileName, long* CaseNum, long MaxStringLen)
```

## Input Parameters

uID

Strand7 model file ID number.

MaxStringLen

Maximum number of characters allocated for FileName

## Output Parameters

FileName

Full path and name for the initial conditions file.

CaseNum

Result case number within FileName to be used as the initial conditions.

## Errors

ERR7\_APINotInitialised, ERR7\_APINotLicensed,  
ERR7\_FileNotOpen, ERR7\_InvalidFileUnit, ERR7\_NoError

# St7EnableNFANonStructuralMassCase

---

## Description

Activates the non-structural mass for the specified load case such that it is included in Natural Frequency analysis.

## Syntax

```
long St7EnableNFANonStructuralMassCase(long uID, long  
CaseNum)
```

## Input Parameters

uID

Strand7 model file ID number.

CaseNum

Load case number.

## Errors

ERR7\_APINotInitialised, ERR7\_APINotLicensed,  
ERR7\_FileNotOpen, ERR7\_InvalidFileUnit,  
ERR7\_InvalidLoadCase, ERR7\_NoError, ERR7\_ResultFileIsOpen

---

## St7DisableNFANonStructuralMassCase

---

### Description

Deactivates the non-structural mass for the specified load case such that it is not included in Natural Frequency analysis.

### Syntax

```
long St7DisableNFANonStructuralMassCase(long uID, long  
CaseNum)
```

### Input Parameters

uID

Strand7 model file ID number.

CaseNum

Load case number.

### Errors

```
ERR7_APINotInitialised, ERR7_APINotLicensed,  
ERR7_FileNotOpen, ERR7_InvalidFileUnit,  
ERR7_InvalidLoadCase, ERR7_NoError, ERR7_ResultFileIsOpen
```

## St7GetNFANonStructuralMassCaseState

---

### Description

Returns the state assigned to the non-structural mass in the specified load case for Natural Frequency analysis.

### Syntax

```
long St7GetNFANonStructuralMassCaseState(long uID, long  
CaseNum, bool* State)
```

### Input Parameters

uID

Strand7 model file ID number.

CaseNum

Load case number.

## Output Parameters

State

btTrue if the non-structural mass is enabled for the specified load case.

## Errors

ERR7\_APINotInitialised, ERR7\_APINotLicensed,  
ERR7\_FileNotOpen, ERR7\_InvalidFileUnit,  
ERR7\_InvalidLoadCase, ERR7\_NoError

# St7SetNFANumModes

---

## Description

Sets the number of modes to be solved for when performing Natural Frequency analysis.

## Syntax

```
long St7SetNFANumModes (long uID, long NumModes)
```

## Input Parameters

uID

Strand7 model file ID number.

NumModes

Number of modes.

## Errors

ERR7\_APINotInitialised, ERR7\_APINotLicensed,  
ERR7\_FileNotOpen, ERR7\_InvalidFileUnit,  
ERR7\_InvalidNumModes, ERR7\_NoError, ERR7\_ResultFileIsOpen

# St7GetNFANumModes

---

## Description

Returns the number of modes to be found when performing Natural Frequency analysis.

## Syntax

```
long St7GetNFANumModes (long uID, long* NumModes)
```

---

## **Input Parameters**

uID

Strand7 model file ID number.

## **Output Parameters**

NumModes

Number of modes.

## **Errors**

ERR7\_APINotInitialised, ERR7\_APINotLicensed,  
ERR7\_FileNotOpen, ERR7\_InvalidFileUnit, ERR7\_NoError

---

# **St7SetNFAShift**

## **Description**

Sets the frequency shift used by the Natural Frequency solver. The first modes found both above and below the shift value will be found when running the solver.

## **Syntax**

```
long St7SetNFAShift(long uID, double Shift)
```

## **Input Parameters**

uID

Strand7 model file ID number.

Shift

Frequency shift (Hz).

## **Errors**

ERR7\_APINotInitialised, ERR7\_APINotLicensed,  
ERR7\_FileNotOpen, ERR7\_InvalidFileUnit, ERR7\_NoError,  
ERR7\_ResultFileIsOpen

## St7GetNFAShift

---

### Description

Returns the shift value assigned to the Natural Frequency solver. The first modes found both above and below the shift value will be found when running the solver.

### Syntax

```
long St7GetNFAShift(long uID, double* Shift)
```

### Input Parameters

uID

Strand7 model file ID number.

### Output Parameters

Shift

Frequency shift (Hz).

### Errors

ERR7\_APINotInitialised, ERR7\_APINotLicensed,  
ERR7\_FileNotOpen, ERR7\_InvalidFileUnit, ERR7\_NoError

## St7SetNFAModeParticipationCalculate

---

### Description

Sets the state of the mass participation option for the Natural Frequency solver.

### Syntax

```
long St7SetNFAModeParticipationCalculate(long uID, bool  
Calculate)
```

### Input Parameters

uID

Strand7 model file ID number.

Calculate

bTrue to calculate the mass participation for each mode in the analysis.

---

## Errors

```
ERR7_APINotInitialised, ERR7_APINotLicensed,  
ERR7_FileNotOpen, ERR7_InvalidFileUnit, ERR7_NoError,  
ERR7_ResultFileIsOpen
```

## St7GetNFAModeParticipationCalculate

---

### Description

Returns the state of the mass participation option for the Natural Frequency solver.

### Syntax

```
long St7GetNFAModeParticipationCalculate(long uID, bool*  
Calculate)
```

### Input Parameters

uID

Strand7 model file ID number.

### Output Parameters

Calculate

btTrue to calculate the mass participation for each mode in the analysis.

### Errors

```
ERR7_APINotInitialised, ERR7_APINotLicensed,  
ERR7_FileNotOpen, ERR7_InvalidFileUnit, ERR7_NoError
```

## St7SetNFAModeParticipationVectors

---

### Description

Assigns the direction vector used when calculating mass participation factors for Natural Frequency analysis.

### Syntax

```
long St7SetNFAModeParticipationVectors(long uID, double*  
Doubles)
```

### Input Parameters

uID

Strand7 model file ID number.

Doubles [0..2]

A 3 element array describing the direction vector in the Global Cartesian Coordinate system. The orientation of this vector is used when calculating mass participation factors.

## Errors

ERR7\_APINotInitialised, ERR7\_APINotLicensed,  
ERR7\_FileNotOpen, ERR7\_InvalidFileUnit, ERR7\_NoError,  
ERR7\_ResultFileIsOpen

# St7GetNFAModeParticipationVectors

---

## Description

Returns the direction vector assigned for Natural Frequency analysis used when calculating mass participation factors.

## Syntax

```
long St7GetNFAModeParticipationVectors (long uID, double*  
                                         Doubles)
```

## Input Parameters

uID

Strand7 model file ID number.

## Output Parameters

Doubles [0..2]

A 3 element array describing the direction vector in the Global Cartesian Coordinate system. The orientation of this vector is used when calculating mass participation factors.

## Errors

ERR7\_APINotInitialised, ERR7\_APINotLicensed,  
ERR7\_FileNotOpen, ERR7\_InvalidFileUnit, ERR7\_NoError

---

# Solver – Harmonic Response

## St7SetHRARange

---

### Description

Assigns the frequency range used when performing Harmonic Response analysis.

### Syntax

```
long St7SetHRARange(long uID, long NumSteps, double F1,  
                      double F2, bool AutoInsert)
```

### Input Parameters

uID

Strand7 model file ID number.

NumSteps

Number of steps in the range.

F1

Starting frequency (Hz).

F2

Finishing frequency (Hz).

AutoInsert

btTrue to automatically insert additional steps within the range. This feature is used to ensure that peaks in the frequency response are adequately captured.

### Errors

ERR7\_APINotInitialised, ERR7\_APINotLicensed,  
ERR7\_FileNotOpen, ERR7\_InvalidFileUnit, ERR7\_NoError,  
ERR7\_ResultFileIsOpen

## St7GetHRARange

---

### Description

Returns the frequency range assigned for Harmonic Response analysis.

## Syntax

```
long St7GetHRARange (long uID, long* NumSteps, double* F1,  
                     double* F2, bool* AutoInsert)
```

## Input Parameters

uID

Strand7 model file ID number.

## Output Parameters

NumSteps

Number of steps in the range.

F1

Starting frequency (Hz).

F2

Finishing frequency (Hz).

AutoInsert

btTrue to automatically insert additional steps within the range. This feature is used to ensure that peaks in the frequency response are adequately captured.

## Errors

ERR7\_APINotInitialised, ERR7\_APINotLicensed,  
ERR7\_FileNotOpen, ERR7\_InvalidFileUnit, ERR7\_NoError

## St7SetHRAResultType

---

### Description

Assigns the result type generated when performing Harmonic Response analysis. This option is only used when the load type is set to **Applied load**.

## Syntax

```
long St7SetHRAResultType (long uID, long lType)
```

## Input Parameters

uID

Strand7 model file ID number.

---

**lType**

Result type, either htVsTime or htVsFrequency.

### Errors

ERR7\_APINotInitialised, ERR7\_APINotLicensed,  
ERR7\_FileNotOpen, ERR7\_InvalidFileUnit,  
ERR7\_InvalidHarmonicLoadType, ERR7\_NoError,  
ERR7\_ResultFileIsOpen

## St7GetHRAResultType

---

### Description

Returns the result type assigned for Harmonic Response analysis. This option is only used when the load type is set to **Applied load**.

### Syntax

```
long St7GetHRAResultType(long uID, long* lType)
```

### Input Parameters

**uID**

Strand7 model file ID number.

### Output Parameters

**lType**

Result type, either htVsTime or htVsFrequency.

### Errors

ERR7\_APINotInitialised, ERR7\_APINotLicensed,  
ERR7\_FileNotOpen, ERR7\_InvalidFileUnit, ERR7\_NoError

## St7SetHRABaseVector

---

### Description

Assigns the base excitation vector used when performing Harmonic Response analysis.

### Syntax

```
long St7SetHRABaseVector(long uID, double* Doubles)
```

## Input Parameters

uID

Strand7 model file ID number.

Doubles [0..2]

A 3 element array containing the base excitation vector.

## Errors

ERR7\_APINotInitialised, ERR7\_APINotLicensed,  
ERR7\_FileNotOpen, ERR7\_InvalidFileUnit, ERR7\_NoError,  
ERR7\_ResultFileIsOpen

# St7GetHRABaseVector

---

## Description

Returns the base excitation vector used when performing Harmonic Response analysis.

## Syntax

```
long St7GetHRABaseVector(long uID, double* Doubles)
```

## Input Parameters

uID

Strand7 model file ID number.

## Output Parameters

Doubles [0..2]

A 3 element array containing the base excitation vector.

## Errors

ERR7\_APINotInitialised, ERR7\_APINotLicensed,  
ERR7\_FileNotOpen, ERR7\_InvalidFileUnit, ERR7\_NoError

# St7SetHRALoadCase

---

## Description

Assigns a harmonic load case factor, phase angle and frequency to a given load case. This option is only used when the load type is set to **Applied load**.

---

## Syntax

```
long St7SetHRAloadCase(long uID, long CaseNum, long TableID,  
                      double* Doubles)
```

## Input Parameters

uID

Strand7 model file ID number.

CaseNum

Load case number.

TableID

Factor vs Frequency table ID, zero for none.

Doubles[0..2]

A 3 element array containing the load factor, the phase angle in degrees, and the frequency in Hz, for load case CaseNum. Note that the frequency is only used in **vs Time** analyses.

## Errors

```
ERR7_APINotInitialised, ERR7_APINotLicensed,  
ERR7_DataNotFound, ERR7_FileNotOpen, ERR7_InvalidFileUnit,  
ERR7_InvalidLoadCase, ERR7_InvalidTableType, ERR7_NoError,  
ERR7_ResultFileIsOpen, ERR7_TableDoesNotExist
```

---

## St7GetHRAloadCase

### Description

Returns the harmonic load case factor, phase angle and frequency assigned to a given load case. This option is only used when the load type is set to **Applied load**.

### Syntax

```
long St7GetHRAloadCase(long uID, long CaseNum, long*  
                      TableID, double* Doubles)
```

### Input Parameters

uID

Strand7 model file ID number.

CaseNum

Load case number.

## Output Parameters

TableID

Factor vs Frequency table ID, zero for none.

Doubles [0..2]

A 3 element array containing the load factor, the phase angle in degrees, and the frequency in Hz, for load case CaseNum. Note that the frequency is only used in **vs Time** analyses.

## Errors

ERR7\_APINotInitialised, ERR7\_APINotLicensed,  
ERR7\_DataNotFound, ERR7\_FileNotOpen, ERR7\_InvalidFileUnit,  
ERR7\_InvalidLoadCase, ERR7\_NoError

---

## Solver – Spectral Response

### St7AddSRALoadCase

---

#### Description

Adds a new blank load case to the Spectral Response analysis load case table. Spectral load cases are only used when the load type is set to **Applied Load**.

#### Syntax

```
long St7AddSRALoadCase (long uID, char* CaseName)
```

#### Input Parameters

uID

Strand7 model file ID number.

CaseName

Spectral Response load case name.

#### Errors

```
ERR7_APINotInitialised, ERR7_APINotLicensed,  
ERR7_ExceededMaxNumSpectralCases, ERR7_FileNotOpen,  
ERR7_InvalidFileUnit, ERR7_NoError, ERR7_ResultFileIsOpen
```

### St7InsertSRALoadCase

---

#### Description

Inserts a new blank load case at the specified position within the Spectral Response analysis load case table. Spectral load cases are only used when the load type is set to **Applied Load**.

#### Syntax

```
long St7InsertSRALoadCase (long uID, long Pos, char*  
CaseName)
```

#### Input Parameters

uID

Strand7 model file ID number.

Pos

Spectral Response load case number.

CaseName

Spectral Response load case name.

### Errors

ERR7\_APINotInitialised, ERR7\_APINotLicensed,  
ERR7\_ExceededMaxNumSpectralCases, ERR7\_FileNotOpen,  
ERR7\_InvalidFileUnit, ERR7\_InvalidSpectralCase,  
ERR7\_NoError, ERR7\_ResultFileIsOpen

## St7DeleteSRALoadCase

---

### Description

Deletes the specified load case from the Spectral Response analysis load case table. Spectral load cases are only used when the load type is set to **Applied Load**.

### Syntax

```
long St7DeleteSRALoadCase(long uID, long Pos)
```

### Input Parameters

uID

Strand7 model file ID number.

Pos

Spectral Response load case number.

### Errors

ERR7\_APINotInitialised, ERR7\_APINotLicensed,  
ERR7\_ExceededMaxNumSpectralCases, ERR7\_FileNotOpen,  
ERR7\_InvalidFileUnit, ERR7\_InvalidSpectralCase,  
ERR7\_NoError, ERR7\_ResultFileIsOpen

## St7GetNumSRALoadCases

---

### Description

Returns the number of load cases assigned for Spectral Response analysis.

### Syntax

```
long St7GetNumSRALoadCases(long uID, long* NumCases)
```

---

## **Input Parameters**

uID

Strand7 model file ID number.

## **Output Parameters**

NumCases

Number of Spectral Response analysis load cases.

## **Errors**

ERR7\_APINotInitialised, ERR7\_APINotLicensed,  
ERR7\_FileNotOpen, ERR7\_InvalidFileUnit, ERR7\_NoError

---

# **St7SetSRALoadCaseTable**

## **Description**

Specifies the table associated with the specified Spectral Response analysis load case. Spectral load cases are only used when the load type is set to **Applied Load**.

## **Syntax**

```
long St7SetSRALoadCaseTable(long uID, long Pos, long  
CaseNum, long TableID)
```

## **Input Parameters**

uID

Strand7 model file ID number.

Pos

Spectral Response load case number.

CaseNum

Global load case number.

TableID

Table ID number, zero for none.

## **Errors**

ERR7\_APINotInitialised, ERR7\_APINotLicensed,  
ERR7\_FileNotOpen, ERR7\_InvalidFileUnit,  
ERR7\_InvalidLoadCase, ERR7\_InvalidSpectralCase,

```
ERR7_InvalidTableType, ERR7_NoError, ERR7_ResultFileIsOpen,  
ERR7_TableDoesNotExist
```

## St7GetSRALoadCaseTable

---

### Description

Returns the table associated with the specified Spectral Response analysis load case. Spectral load cases are only used when the load type is set to **Applied Load**.

### Syntax

```
long St7GetSRALoadCaseTable(long uID, long Pos, long  
CaseNum, long* TableID)
```

### Input Parameters

uID

Strand7 model file ID number.

Pos

Spectral Response analysis load case number.

CaseNum

Global load case number.

### Output Parameters

TableID

Table ID number, zero for none.

### Errors

```
ERR7_APINotInitialised, ERR7_APINotLicensed,  
ERR7_FileNotOpen, ERR7_InvalidFileUnit,  
ERR7_InvalidLoadCase, ERR7_InvalidSpectralCase,  
ERR7_NoError
```

## St7AddSRADirectionVector

---

### Description

Adds a new direction based Spectral Response analysis load case. This option is only used if the load type is set to one of **Base Acceleration**, **Velocity** or **Displacement**.

---

## Syntax

```
long St7AddSRADirectionVector(long uID, char* CaseName)
```

## Input Parameters

uID

Strand7 model file ID number.

CaseName

Spectral Response load case name.

## Errors

```
ERR7_APINotInitialised, ERR7_APINotLicensed,  
ERR7_ExceededMaxNumSpectralCases, ERR7_FileNotOpen,  
ERR7_InvalidFileUnit, ERR7_NoError, ERR7_ResultFileIsOpen
```

---

## St7InsertSRADirectionVector

## Description

Inserts a new direction based Spectral Response analysis load case at the specified position. This option is only used if the load type is set to one of **Base Acceleration, Velocity or Displacement**.

## Syntax

```
long St7InsertSRADirectionVector(long uID, long Pos, char*  
CaseName)
```

## Input Parameters

uID

Strand7 model file ID number.

Pos

Spectral Response load case number.

CaseName

Spectral Response load case name.

## Errors

```
ERR7_APINotInitialised, ERR7_APINotLicensed,  
ERR7_ExceededMaxNumSpectralCases, ERR7_FileNotOpen,
```

```
ERR7_InvalidFileUnit, ERR7_InvalidSpectralCase,  
ERR7_NoError, ERR7_ResultFileIsOpen
```

## St7DeleteSRADirectionVector

---

### Description

Deletes the specified direction based Spectral Response load case. This option is only used if the load type is set to one of **Base Acceleration**, **Velocity** or **Displacement**.

### Syntax

```
long St7DeleteSRADirectionVector(long uID, long Pos)
```

### Input Parameters

uID

Strand7 model file ID number.

Pos

Spectral Response load case number.

### Errors

```
ERR7_APINotInitialised, ERR7_APINotLicensed,  
ERR7_FileNotOpen, ERR7_InvalidFileUnit,  
ERR7_InvalidSpectralCase, ERR7_NoError,  
ERR7_ResultFileIsOpen
```

## St7GetNumSRADirectionVectors

---

### Description

Returns the number of direction based load cases assigned for Spectral Response Analysis.

### Syntax

```
long St7GetNumSRADirectionVectors(long uID, long* NumCases)
```

### Input Parameters

uID

Strand7 model file ID number.

---

## Output Parameters

NumCases

Number of direction based load cases.

## Errors

ERR7\_APINotInitialised, ERR7\_APINotLicensed,  
ERR7\_FileNotOpen, ERR7\_InvalidFileUnit, ERR7\_NoError

# St7SetSRADirectionVectorTable

---

## Description

Sets the table associated with the specified Spectral Response load case. This option is only used if the load type is set to one of **Base Acceleration**, **Velocity** or **Displacement**.

## Syntax

```
long St7SetSRADirectionVectorTable(long uID, long Pos, long  
TableID)
```

## Input Parameters

uID

Strand7 model file ID number.

Pos

Spectral Response load case number.

TableID

Table ID number, zero for none.

## Errors

ERR7\_APINotInitialised, ERR7\_APINotLicensed,  
ERR7\_FileNotOpen, ERR7\_InvalidFileUnit,  
ERR7\_InvalidSpectralCase, ERR7\_InvalidTableType,  
ERR7\_NoError, ERR7\_ResultFileIsOpen, ERR7\_TableDoesNotExist

## St7GetSRADirectionVectorTable

---

### Description

Returns the table associated with the specified Spectral Response load case. This option is only used if the load type is set to one of **Base Acceleration**, **Velocity** or **Displacement**.

### Syntax

```
long St7GetSRADirectionVectorTable(long uID, long Pos,  
                                    long* TableID)
```

### Input Parameters

uID

Strand7 model file ID number.

Pos

Spectral Response load case.

### Output Parameters

TableID

Table ID number, zero for none.

### Errors

ERR7\_APINotInitialised, ERR7\_APINotLicensed,  
ERR7\_FileNotOpen, ERR7\_InvalidFileUnit,  
ERR7\_InvalidSpectralCase, ERR7\_NoError

## St7SetSRADirectionVectorFactors

---

### Description

Assigns the components of the direction vector for the specified Spectral Response load case. This option is only used if the load type is set to one of **Base Acceleration**, **Velocity** or **Displacement**.

### Syntax

```
long St7SetSRADirectionVectorFactors(long uID, long Pos,  
                                      double* Doubles)
```

### Input Parameters

uID

---

Strand7 model file ID number.

Pos

Spectral Response load case number.

Doubles[0..2]

A 3 element array describing the XYZ components of the direction vector according to the Global Cartesian Coordinate system.

## Errors

ERR7\_APINotInitialised, ERR7\_APINotLicensed,  
ERR7\_FileNotOpen, ERR7\_InvalidFileUnit,  
ERR7\_InvalidSpectralCase, ERR7\_NoError,  
ERR7\_ResultFileIsOpen

# St7GetSRADirectionVectorFactors

---

## Description

Returns the components of the direction vector assigned to the specified Spectral Response load case. This option is only used if the load type is set to one of **Base Acceleration**, **Velocity** or **Displacement**.

## Syntax

```
long St7GetSRADirectionVectorFactors(long uID, long Pos,  
double* Doubles)
```

## Input Parameters

uID

Strand7 model file ID number.

Pos

Spectral Response load case number.

## Output Parameters

Doubles[0..2]

A 3 element array describing the XYZ components of the direction vector according to the Global Cartesian Coordinate system.

## Errors

```
ERR7_APINotInitialised, ERR7_APINotLicensed,  
ERR7_FileNotOpen, ERR7_InvalidFileUnit,  
ERR7_InvalidSpectralCase, ERR7_NoError
```

# St7SetSRAResultModal

---

## Description

Sets the state of the **Modal** result option for the Spectral Response Solver.

## Syntax

```
long St7SetSRAResultModal(long uID, bool Modal)
```

## Input Parameters

uID

Strand7 model file ID number.

Modal

btTrue to generate **Modal** results.

## Errors

```
ERR7_APINotInitialised, ERR7_APINotLicensed,  
ERR7_FileNotOpen, ERR7_InvalidFileUnit, ERR7_NoError,  
ERR7_ResultFileIsOpen
```

# St7SetSRAResultSRSS

---

## Description

Sets the state of the **SRSS** result option for the Spectral Response solver.

## Syntax

```
long St7SetSRAResultSRSS(long uID, bool SRSS)
```

## Input Parameters

uID

Strand7 model file ID number.

SRSS

btTrue to generate **SRSS** results.

---

## Errors

```
ERR7_APINotInitialised, ERR7_APINotLicensed,  
ERR7_FileNotOpen, ERR7_InvalidFileUnit, ERR7_NoError,  
ERR7_ResultFileIsOpen
```

## St7SetSRAResultCQC

---

### Description

Sets the state of the **CQC** result option for the Spectral Response solver.

### Syntax

```
long St7SetSRAResultCQC(long uID, bool CQC)
```

### Input Parameters

uID

Strand7 model file ID number.

CQC

btTrue to generate **CQC** results.

### Errors

```
ERR7_APINotInitialised, ERR7_APINotLicensed,  
ERR7_FileNotOpen, ERR7_InvalidFileUnit, ERR7_NoError,  
ERR7_ResultFileIsOpen
```

## St7SetSRAType

---

### Description

Assigns the spectrum type used for Spectral Response analysis.

### Syntax

```
long St7SetSRAType(long uID, long SpectrumType)
```

### Input Parameters

uID

Strand7 model file ID number.

SpectrumType

Type of spectrum supplied, either stResponse or stPSD

## Errors

```
ERR7_APINotInitialised, ERR7_APINotLicensed,  
ERR7_FileNotOpen, ERR7_InvalidFileUnit,  
ERR7_InvalidSpectrumType, ERR7_NoError,  
ERR7_ResultFileIsOpen
```

# St7SetSRAResultsSign

---

## Description

Sets the results sign option for the Spectral Response solver.

## Syntax

```
long St7SetSRAResultsSign(long uID, long ResultsSign)
```

## Input Parameters

uID

Strand7 model file ID number.

ResultsSign

Results sign, either rsAuto or rsAbsolute.

## Errors

```
ERR7_APINotInitialised, ERR7_APINotLicensed,  
ERR7_FileNotOpen, ERR7_InvalidFileUnit,  
ERR7_InvalidResultsSign, ERR7_NoError,  
ERR7_ResultFileIsOpen
```

---

# Solver – Linear Transient Dynamic

## St7SetLTInitialFile

---

### Description

Assigns the initial conditions file used for Linear Transient analysis.

### Syntax

```
long St7SetLTInitialFile(long uID, char* FileName, long CaseNum)
```

### Input Parameters

uID

Strand7 model file ID number.

FileName

Full path and name for the initial conditions file.

CaseNum

Result case number within FileName to be used as the initial conditions.

### Errors

```
ERR7_APINotInitialised, ERR7_APINotLicensed,  
ERR7_FileNotOpen, ERR7_InvalidFileUnit,  
ERR7_InvalidInitialCaseNumber, ERR7_InvalidInitialFile,  
ERR7_NoError, ERR7_ResultFileIsOpen
```

## St7GetLTInitialFile

---

### Description

Returns the initial conditions file assigned for Linear Transient analysis.

### Syntax

```
long St7GetLTInitialFile(long uID, char* FileName, long* CaseNum, long MaxStringLen)
```

### Input Parameters

uID

Strand7 model file ID number.

MaxStringLen

Maximum number of characters allocated for FileName.

### Output Parameters

FileName

Full path and name for the initial conditions file.

CaseNum

Result case number within FileName to be used as the initial conditions.

### Errors

ERR7\_APINotInitialised, ERR7\_APINotLicensed,  
ERR7\_FileNotOpen, ERR7\_InvalidFileUnit, ERR7\_NoError

## St7SetLTAMethod

---

### Description

Sets the integration method used for Linear Transient analysis.

### Syntax

```
long St7SetLTAMethod(long uID, long Method)
```

### Input Parameters

uID

Strand7 model file ID number.

Method

Time integration method, either ItWilson or ItNewmark.

### Errors

ERR7\_APINotInitialised, ERR7\_APINotLicensed,  
ERR7\_FileNotOpen, ERR7\_InvalidFileUnit,  
ERR7\_InvalidLTAMethod, ERR7\_NoError, ERR7\_ResultFileIsOpen

## St7GetLTAMethod

---

### Description

Returns the integration method assigned for Linear Transient analysis.

---

## Syntax

```
long St7GetLTAMethod(long uID, long* Method)
```

### Input Parameters

uID

Strand7 model file ID number.

### Output Parameters

Method

Time integration method, either ltWilson or ltNewmark.

### Errors

```
ERR7_APINotInitialised, ERR7_APINotLicensed,  
ERR7_FileNotOpen, ERR7_InvalidFileUnit, ERR7_NoError
```

---

## St7SetLTASolutionType

### Description

Sets the solution type option for Linear Transient analysis.

### Syntax

```
long St7SetLTASolutionType(long uID, long SolutionType)
```

### Input Parameters

uID

Strand7 model file ID number.

SolutionType

Solution type, either stFullSystem or stSuperposition.

### Errors

```
ERR7_APINotInitialised, ERR7_APINotLicensed,  
ERR7_FileNotOpen, ERR7_InvalidFileUnit,  
ERR7_InvalidLTASolutionType, ERR7_NoError,  
ERR7_ResultFileIsOpen
```

## St7GetLTASolutionType

---

### Description

Returns the solution type option assigned for Linear Transient analysis.

### Syntax

```
long St7GetLTASolutionType(long uID, long* SolutionType)
```

### Input Parameters

uID

Strand7 model file ID number.

### Output Parameters

SolutionType

Solution type, either stFullSystem or stSuperposition.

### Errors

```
ERR7_APINotInitialised, ERR7_APINotLicensed,  
ERR7_FileNotOpen, ERR7_InvalidFileUnit,  
ERR7_InvalidLTASolutionType, ERR7_NoError
```

---

# Solver – Nonlinear Transient Dynamic

## St7SetNTAInitialFile

---

### Description

Assigns the initial conditions file used for Nonlinear Transient analysis.

### Syntax

```
long St7SetNTAInitialFile(long uID, char* FileName, long CaseNum)
```

### Input Parameters

uID

Strand7 model file ID number.

FileName

Full path and name for the initial conditions file.

CaseNum

Result case number within FileName to be used as the initial conditions.

### Errors

```
ERR7_APINotInitialised, ERR7_APINotLicensed,  
ERR7_FileNotOpen, ERR7_InvalidFileUnit,  
ERR7_InvalidInitialCaseNumber, ERR7_InvalidInitialFile,  
ERR7_NoError, ERR7_ResultFileIsOpen
```

## St7GetNTAInitialFile

---

### Description

Returns the initial conditions file assigned for Nonlinear Transient analysis.

### Syntax

```
long St7GetNTAInitialFile(long uID, char* FileName, long* CaseNum, long MaxStringLen)
```

### Input Parameters

uID

Strand7 model file ID number.

MaxStringLen

Maximum number of characters allocated for FileName

### Output Parameters

FileName

Full path and name for the initial conditions file.

CaseNum

Result case number within FileName to be used as the initial conditions.

### Errors

ERR7\_APINotInitialised, ERR7\_APINotLicensed,  
ERR7\_FileNotOpen, ERR7\_InvalidFileUnit, ERR7\_NoError

## St7SetNTALoadPositionTable

---

### Description

Assigns a Factor vs Position table for the specified Nonlinear Transient analysis load case.

### Syntax

```
long St7SetNTALoadPositionTable(long uID, long CaseNum,  
                                long TableNum, long UCSId, long Axis)
```

### Input Parameters

uID

Strand7 model file ID number.

CaseNum

Load case number.

TableNum

ID number for the Factor vs Position table, zero for none.

UCSId

UCS ID number used when evaluating position data.

Axis

Local UCS axis, one of 1, 2 or 3.

---

## Errors

```
ERR7_APINotInitialised, ERR7_APINotLicensed,  
ERR7_FileNotOpen, ERR7_InvalidFileUnit,  
ERR7_InvalidLoadCase, ERR7_InvalidPositionTableAxis,  
ERR7_InvalidTableType, ERR7_InvalidUCSID, ERR7_NoError,  
ERR7_ResultFileIsOpen, ERR7_TableDoesNotExist
```

---

## St7GetNTALoadPositionTable

### Description

Returns the Factor vs Position table associated with the specified Nonlinear Transient load case.

### Syntax

```
long St7GetNTALoadPositionTable(long uID, long CaseNum,  
                                long* TableNum, long* UCSId, long* Axis)
```

### Input Parameters

uID

Strand7 model file ID number.

CaseNum

Load case number.

### Output Parameters

TableNum

ID number for the Factor vs Position table, zero for none.

UCSID

UCS ID number used when evaluating position data.

Axis

Local UCS axis, one of 1, 2 or 3.

### Errors

```
ERR7_APINotInitialised, ERR7_APINotLicensed,  
ERR7_FileNotOpen, ERR7_InvalidFileUnit,  
ERR7_InvalidLoadCase, ERR7_NoError
```

## St7SetNTAFreedomPositionTable

---

### Description

Assigns a Factor vs Position table for the specified Nonlinear Transient freedom case.

### Syntax

```
long St7SetNTAFreedomPositionTable(long uID, long CaseNum,  
                                    long TableNum, long UCSId, long Axis)
```

### Input Parameters

uID

Strand7 model file ID number.

CaseNum

Freedom case number.

TableNum

ID number for the Factor vs Position table, zero for none.

UCSId

UCS ID number used when evaluating position data.

Axis

Local UCS axis, one of 1, 2 or 3.

### Errors

ERR7\_APINotInitialised, ERR7\_APINotLicensed,  
ERR7\_FileNotOpen, ERR7\_InvalidFileUnit,  
ERR7\_InvalidFreedomCase, ERR7\_InvalidPositionTableAxis,  
ERR7\_InvalidTableType, ERR7\_InvalidUCSID, ERR7\_NoError,  
ERR7\_ResultFileIsOpen, ERR7\_TableDoesNotExist

## St7GetNTAFreedomPositionTable

---

### Description

Returns the Factor vs Position table associated with the specified Nonlinear Transient freedom case.

---

## Syntax

```
long St7GetNTAFreedomPositionTable(long uID, long CaseNum,  
                                    long* TableNum, long* UCSId, long* Axis)
```

## Input Parameters

uID

Strand7 model file ID number.

CaseNum

Freedom case number.

## Output Parameters

TableNum

ID number for the Factor vs Position table, zero for none.

UCSId

UCS ID number used when evaluating position data.

Axis

Local UCS axis, one of 1, 2 or 3.

## Errors

```
ERR7_APINotInitialised, ERR7_APINotLicensed,  
ERR7_FileNotOpen, ERR7_InvalidFileUnit,  
ERR7_InvalidFreedomCase, ERR7_NoError
```

## Solver – Steady-State Heat

### St7EnableHeatLoadCase

---

#### Description

Activates the specified load case such that it is included when performing Steady State heat analysis.

#### Syntax

```
long St7EnableHeatLoadCase(long uID, long CaseNum)
```

#### Input Parameters

uID

Strand7 model file ID number.

CaseNum

Load case number.

#### Errors

ERR7\_APINotInitialised, ERR7\_APINotLicensed,  
ERR7\_DataNotFound, ERR7\_FileNotOpen, ERR7\_InvalidFileUnit,  
ERR7\_InvalidLoadCase, ERR7\_NoError, ERR7\_ResultFileIsOpen

### St7DisableHeatLoadCase

---

#### Description

Deactivates the specified load case such that it is not included when performing Steady State heat analysis.

#### Syntax

```
long St7DisableHeatLoadCase(long uID, long CaseNum)
```

#### Input Parameters

uID

Strand7 model file ID number.

CaseNum

Load case number.

---

## Errors

```
ERR7_APINotInitialised, ERR7_APINotLicensed,  
ERR7_DataNotFound, ERR7_FileNotOpen, ERR7_InvalidFileUnit,  
ERR7_InvalidLoadCase, ERR7_NoError, ERR7_ResultFileIsOpen
```

# St7GetHeatLoadCaseState

---

## Description

Returns the state of the specified load case for Steady State heat analysis.

## Syntax

```
long St7GetHeatLoadCaseState(long uID, long CaseNum, bool*  
    State)
```

## Input Parameters

uID

Strand7 model file ID number.

CaseNum

Load case number.

## Output Parameters

State

btTrue if the specified load case is enabled for Steady State heat analysis.

## Errors

```
ERR7_APINotInitialised, ERR7_APINotLicensed,  
ERR7_DataNotFound, ERR7_FileNotOpen, ERR7_InvalidFileUnit,  
ERR7_InvalidLoadCase, ERR7_NoError, ERR7_ResultFileIsOpen
```

# Solver – Transient Heat

## St7SetTHAInitialFile

### Description

Assigns the initial conditions file used for Transient Heat analysis.

### Syntax

```
long St7SetTHAInitialFile(long uID, char* FileName, long CaseNum)
```

### Input Parameters

uID

Strand7 model file ID number.

FileName

Full path and name for the initial conditions file.

CaseNum

Result case number within FileName to be used as the initial conditions.

### Errors

```
ERR7_APINotInitialised, ERR7_APINotLicensed,  
ERR7_FileNotOpen, ERR7_InvalidFileUnit,  
ERR7_InvalidInitialCaseNumber, ERR7_InvalidInitialFile,  
ERR7_NoError, ERR7_ResultFileIsOpen
```

## St7GetTHAInitialFile

### Description

Returns the initial conditions file assigned for Transient Heat analysis.

### Syntax

```
long St7GetTHAInitialFile(long uID, char* FileName, long* CaseNum, long MaxStringLen)
```

### Input Parameters

uID

Strand7 model file ID number.

---

MaxStringLen

Maximum number of characters allocated for FileName.

### Output Parameters

FileName

Full path and name for the initial conditions file.

CaseNum

Result case number within FileName to be used as the initial conditions.

### Errors

ERR7\_APINotInitialised, ERR7\_APINotLicensed,  
ERR7\_FileNotOpen, ERR7\_InvalidFileUnit, ERR7\_NoError

## St7SetTHATemperatureLoadCase

---

### Description

Assigns the load case to be used to specify the nodal temperature distribution within the model when performing Transient Heat analysis.

### Syntax

```
long St7SetTHATemperatureLoadCase(long uID, long CaseNum)
```

### Input Parameters

uID

Strand7 model file ID number.

CaseNum

Load case number.

### Errors

ERR7\_APINotInitialised, ERR7\_APINotLicensed,  
ERR7\_FileNotOpen, ERR7\_InvalidFileUnit,  
ERR7\_InvalidLoadCase, ERR7\_NoError, ERR7\_ResultFileIsOpen

## St7GetTHATemperatureLoadCase

---

### Description

Returns the load case assigned to specify the nodal temperature distribution in the model for Transient Heat analysis.

### Syntax

```
long St7GetTHATemperatureLoadCase(long uID, long* CaseNum)
```

### Input Parameters

uID

Strand7 model file ID number.

### Output Parameters

CaseNum

Load case number.

### Errors

ERR7\_APINotInitialised, ERR7\_APINotLicensed,  
ERR7\_FileNotOpen, ERR7\_InvalidFileUnit, ERR7\_NoError

---

## Solver – Harmonic and Spectral Response

### St7SetModalLoadType

---

#### Description

Sets the modal load type used when performing Harmonic and Spectral Response analysis.

#### Syntax

```
long St7SetModalLoadType(long uID, long lType)
```

#### Input Parameters

uID

Strand7 model file ID number.

lType

Modal load type, one of mtBaseAcc, mtBaseVel, mtBaseDisp or mtAppliedLoad.

#### Errors

ERR7\_APINotInitialised, ERR7\_APINotLicensed,  
ERR7\_FileNotOpen, ERR7\_InvalidFileUnit,  
ERR7\_InvalidModalLoadType, ERR7\_NoError,  
ERR7\_ResultFileIsOpen

### St7GetModalLoadType

---

#### Description

Returns the modal load type assigned for Harmonic and Spectral Response analysis.

#### Syntax

```
long St7GetModalLoadType(long uID, long* lType)
```

#### Input Parameters

uID

Strand7 model file ID number.

## Output Parameters

**lType**

Modal load type, one of mtBaseAcc, mtBaseVel, mtBaseDisp or mtAppliedLoad.

## Errors

ERR7\_APINotInitialised, ERR7\_APINotLicensed,  
ERR7\_FileNotOpen, ERR7\_InvalidFileUnit, ERR7\_NoError

# St7SetModalNodeReactionType

---

## Description

Sets the type of modal reaction calculation used for Harmonic and Spectral Response analysis.

## Syntax

```
long St7SetModalNodeReactionType(long uID, long rType)
```

## Input Parameters

**uID**

Strand7 model file ID number.

**rType**

Modal reaction type, either mrElementForce or mrlInertiaForce.

## Errors

ERR7\_APINotInitialised, ERR7\_APINotLicensed,  
ERR7\_FileNotOpen, ERR7\_InvalidFileUnit, ERR7\_NoError,  
ERR7\_ResultFileIsOpen

# St7GetModalNodeReactionType

---

## Description

Returns the type of modal reaction calculation used for Harmonic and Spectral Response analysis.

## Syntax

```
long St7GetModalNodeReactionType(long uID, long* rType)
```

---

## **Input Parameters**

`uID`

Strand7 model file ID number.

## **Output Parameters**

`rType`

Modal reaction type, either `mrElementForce` or `mrlInertiaForce`.

## **Errors**

`ERR7_APINotInitialised`, `ERR7_APINotLicensed`,  
`ERR7_FileNotOpen`, `ERR7_InvalidFileUnit`, `ERR7_NoError`

## Solver – Harmonic, Spectral and Linear Transient

### St7SetModalSuperpositionFile

#### Description

Assigns the modal superposition file used for Harmonic Response, Spectral Response and Linear Transient analysis.

#### Syntax

```
long St7SetModalSuperpositionFile(long uID, char* FileName)
```

#### Input Parameters

uID

Strand7 model file ID number.

FileName

Full path and name for the modal superposition file.

#### Errors

```
ERR7_APINotInitialised, ERR7_APINotLicensed,  
ERR7_FileNotOpen, ERR7_InvalidFileUnit,  
ERR7_InvalidModalFile, ERR7_NoError, ERR7_ResultFileIsOpen
```

### St7GetModalSuperpositionFile

#### Description

Returns the modal superposition file assigned for Harmonic Response, Spectral Response and Linear Transient analysis.

#### Syntax

```
long St7GetModalSuperpositionFile(long uID, char* FileName,  
                                long MaxStringLen)
```

#### Input Parameters

uID

Strand7 model file ID number.

MaxStringLen

Maximum number of characters allocated for FileName.

---

## **Output Parameters**

FileName

Full path and name for the modal superposition file.

## **Errors**

ERR7\_APINotInitialised, ERR7\_APINotLicensed,  
ERR7\_FileNotOpen, ERR7\_InvalidFileUnit, ERR7\_NoError

---

## **St7GetNumModesInModalFile**

### **Description**

Returns the number of modes included in the modal superposition file assigned for Harmonic Response, Spectral Response and Linear Transient analysis.

### **Syntax**

```
long St7GetNumModesInModalFile(long uID, long* NumModes)
```

### **Input Parameters**

uID

Strand7 model file ID number.

### **Output Parameters**

NumModes

Number of modes in file.

### **Errors**

ERR7\_APINotInitialised, ERR7\_APINotLicensed,  
ERR7\_FileNotOpen, ERR7\_InvalidFileUnit,  
ERR7\_InvalidModalFile, ERR7\_NoError

---

## **St7EnableMode**

### **Description**

Enables the specified mode in the modal superposition file for Harmonic Response, Spectral Response and Linear Transient analysis.

### **Syntax**

```
long St7EnableMode(long uID, long ModeNum)
```

## **Input Parameters**

uID

Strand7 model file ID number.

ModeNum

Mode number to enable.

## **Errors**

ERR7\_APINotInitialised, ERR7\_APINotLicensed,  
ERR7\_FileNotOpen, ERR7\_InvalidFileUnit,  
ERR7\_InvalidModeNumber, ERR7\_NoError, ERR7\_ResultFileIsOpen

## **St7DisableMode**

---

### **Description**

Disables the specified mode in the modal superposition file for Harmonic Response, Spectral Response and Linear Transient analysis.

### **Syntax**

```
long St7DisableMode(long uID, long ModeNum)
```

### **Input Parameters**

uID

Strand7 model file ID number.

ModeNum

Mode number to disable.

### **Errors**

ERR7\_APINotInitialised, ERR7\_APINotLicensed,  
ERR7\_FileNotOpen, ERR7\_InvalidFileUnit,  
ERR7\_InvalidModeNumber, ERR7\_NoError, ERR7\_ResultFileIsOpen

## **St7SetModeDampingRatio**

---

### **Description**

Sets the modal damping ratio for the specified mode in the modal superposition file. This value is used for Harmonic Response, Spectral Response and Linear Transient analysis.

---

## Syntax

```
long St7SetModeDampingRatio(long uID, long ModeNum, double  
                           Ratio)
```

## Input Parameters

uID

Strand7 model file ID number.

ModeNum

Mode number.

Ratio

Modal damping ratio.

## Errors

```
ERR7_APINotInitialised, ERR7_APINotLicensed,  
ERR7_FileNotOpen, ERR7_InvalidFileUnit,  
ERR7_InvalidModeNumber, ERR7_NoError, ERR7_ResultFileIsOpen
```

---

## St7GetModeDampingRatio

## Description

Returns the modal damping ratio assigned for the specified mode in the modal superposition file. This value is used for Harmonic Response, Spectral Response and Linear Transient analysis.

## Syntax

```
long St7GetModeDampingRatio(long uID, long ModeNum, double*  
                           Ratio)
```

## Input Parameters

uID

Strand7 model file ID number.

ModeNum

Mode number.

## Output Parameters

Ratio

Modal damping ratio.

## Errors

ERR7\_APINotInitialised, ERR7\_APINotLicensed,  
ERR7\_FileNotOpen, ERR7\_InvalidFileUnit,  
ERR7\_InvalidModeNumber, ERR7\_NoError

---

## Solver – Linear and Nonlinear Transient Dynamic

### St7SetTransientInitialConditionsType

---

#### Description

Sets the type of initial conditions used for Linear and Nonlinear Transient analysis.

#### Syntax

```
long St7SetTransientInitialConditionsType(long uID, long  
InitialType)
```

#### Input Parameters

uID

Strand7 model file ID number.

InitialType

Initial conditions type, one of icAppliedVectors, icNodalVelocity or icFromFile.

#### Errors

```
ERR7_APINotInitialised, ERR7_APINotLicensed,  
ERR7_FileNotOpen, ERR7_InvalidFileUnit,  
ERR7_InvalidInitialConditionsType, ERR7_NoError,  
ERR7_ResultFileIsOpen
```

### St7GetTransientInitialConditionsType

---

#### Description

Returns the type of initial conditions assigned for Linear and Nonlinear Transient analysis.

#### Syntax

```
long St7GetTransientInitialConditionsType(long uID, long*  
InitialType)
```

#### Input Parameters

uID

Strand7 model file ID number.

**Output Parameters****InitialType**

Initial conditions type, one of icAppliedVectors, icNodalVelocity or icFromFile.

**Errors**`ERR7_APINotInitialised, ERR7_APINotLicensed,  
ERR7_FileNotOpen, ERR7_InvalidFileUnit, ERR7_NoError`

## St7SetTransientInitialConditionsVectors

---

**Description**

Sets the initial acceleration and velocity vectors used for Linear and Nonlinear Transient analysis. A uniform acceleration and velocity is applied to all nodes in the specified model.

**Syntax**

```
long St7SetTransientInitialConditionsVectors(long uID,  
double* Doubles)
```

**Input Parameters****uID**

Strand7 model file ID number.

**Doubles [0..5]**

[0..2] - Initial acceleration components according to the XYZ axis system in the Global Cartesian coordinate system.

[3..5] - Initial velocity components according to the XYZ axis system in the Global Cartesian coordinate system.

**Errors**`ERR7_APINotInitialised, ERR7_APINotLicensed,  
ERR7_FileNotOpen, ERR7_InvalidFileUnit, ERR7_NoError,  
ERR7_ResultFileIsOpen`

---

## St7GetTransientInitialConditionsVectors

---

### Description

Returns the initial acceleration and velocity vectors assigned for Linear and Nonlinear Transient analysis. A uniform acceleration and velocity is applied to all nodes in the model.

### Syntax

```
long St7GetTransientInitialConditionsVectors(long uID,  
    double* Doubles)
```

### Input Parameters

uID

Strand7 model file ID number.

### Output Parameters

Doubles[0..5]

[0..2] - Initial acceleration components according to the XYZ axis system in the Global Cartesian coordinate system.

[3..5] - Initial velocity components according to the XYZ axis system in the Global Cartesian coordinate system.

### Errors

ERR7\_APINotInitialised, ERR7\_APINotLicensed,  
ERR7\_FileNotOpen, ERR7\_InvalidFileUnit, ERR7\_NoError

---

## St7SetTransientInitialConditionsNodalVelocity

---

### Description

Sets the load case used to specified the initial nodal velocity for Linear and Nonlinear Transient analysis. The initial velocity components are determined by the **Initial Velocity** nodal attribute.

### Syntax

```
long St7SetTransientInitialConditionsNodalVelocity(long uID,  
    long CaseNum)
```

### Input Parameters

uID

Strand7 model file ID number.

CaseNum

Load case number.

## Errors

ERR7\_APINotInitialised, ERR7\_APINotLicensed,  
ERR7\_FileNotOpen, ERR7\_InvalidFileUnit,  
ERR7\_InvalidLoadCase, ERR7\_NoError, ERR7\_ResultFileIsOpen

# St7GetTransientInitialConditionsNodalVelocity

---

## Description

Returns the load case assigned to specified the initial velocity for Linear and Nonlinear Transient analysis. The initial velocity components are determined by the **Initial Velocity** nodal attribute.

## Syntax

```
long St7GetTransientInitialConditionsNodalVelocity(long uID,  
                                                 long* CaseNum)
```

## Input Parameters

uID

Strand7 model file ID number.

## Output Parameters

CaseNum

Load case number.

## Errors

ERR7\_APINotInitialised, ERR7\_APINotLicensed,  
ERR7\_FileNotOpen, ERR7\_InvalidFileUnit, ERR7\_NoError

# St7SetTransientBaseVector

---

## Description

Sets the base acceleration vector for Linear and Nonlinear Transient analysis. The base acceleration is applied to all restrained nodes in the specified model.

---

## Syntax

```
long St7SetTransientBaseVector(long uID, double* Doubles)
```

### Input Parameters

uID

Strand7 model file ID number.

Doubles[0..2]

Base acceleration components according to the XYZ axis system in the Global Cartesian coordinate system.

### Errors

ERR7\_APINotInitialised, ERR7\_APINotLicensed,  
ERR7\_FileNotOpen, ERR7\_InvalidFileUnit, ERR7\_NoError,  
ERR7\_ResultFileIsOpen

---

## St7GetTransientBaseVector

### Description

Returns the base acceleration vector assigned for Linear and Nonlinear Transient analysis. The base acceleration is applied to all restrained nodes in the specified model.

### Syntax

```
long St7GetTransientBaseVector(long uID, double* Doubles)
```

### Input Parameters

uID

Strand7 model file ID number.

### Output Parameters

Doubles[0..2]

Base acceleration components according to the XYZ axis system in the Global Cartesian coordinate system.

### Errors

ERR7\_APINotInitialised, ERR7\_APINotLicensed,  
ERR7\_FileNotOpen, ERR7\_InvalidFileUnit, ERR7\_NoError

## St7SetTransientBaseVelocity

---

### Description

Sets the initial base velocity for Linear and Nonlinear Transient analysis. All restrained nodes in the specified model will initially have this velocity.

### Syntax

```
long St7SetTransientBaseVelocity(long uID, double* Doubles)
```

#### Input Parameters

uID

Strand7 model file ID number.

Doubles [0..2]

Base velocity components according to the XYZ axis system in the Global Cartesian coordinate system.

#### Errors

ERR7\_APINotInitialised, ERR7\_APINotLicensed,  
ERR7\_FileNotOpen, ERR7\_InvalidFileUnit, ERR7\_NoError,  
ERR7\_ResultFileIsOpen

## St7GetTransientBaseVelocity

---

### Description

Returns the initial base velocity assigned for Linear and Nonlinear Transient analysis. All restrained nodes in the specified model will initially have this velocity.

### Syntax

```
long St7GetTransientBaseVelocity(long uID, double* Doubles)
```

#### Input Parameters

uID

Strand7 model file ID number.

#### Output Parameters

Doubles [0..2]

Base velocity components according to the XYZ axis system in the Global Cartesian coordinate system.

---

## Errors

```
ERR7_APINotInitialised, ERR7_APINotLicensed,  
ERR7_FileNotOpen, ERR7_InvalidFileUnit, ERR7_NoError
```

# St7SetTransientBaseTables

---

## Description

Specifies the Acceleration vs Time tables to be associated with the base acceleration components for Linear and Nonlinear Transient analysis.

## Syntax

```
long St7SetTransientBaseTables(long uID, long* Integers)
```

## Input Parameters

uID

Strand7 model file ID number.

Integers[0..2]

ID numbers for the Acceleration vs Time tables to be used, zero for none. A table can be assigned to each of the XYZ acceleration components specified via the *St7SetTransientBaseVector* function.

## Errors

```
ERR7_APINotInitialised, ERR7_APINotLicensed,  
ERR7_FileNotOpen, ERR7_InvalidFileUnit, ERR7_NoError,  
ERR7_ResultFileIsOpen, ERR7_TableDoesNotExist
```

# St7GetTransientBaseTables

---

## Description

Returns the Acceleration vs Time tables associated with the base acceleration components for Linear and Nonlinear Transient analysis.

## Syntax

```
long St7GetTransientBaseTables(long uID, long* Integers)
```

## Input Parameters

uID

Strand7 model file ID number.

## Output Parameters

Integers [0..2]

ID numbers for the Acceleration vs Time tables to be used, zero for none. A table can be assigned to each of the XYZ acceleration components specified via the St7SetTransientBaseVector function.

## Errors

ERR7\_APINotInitialised, ERR7\_APINotLicensed,  
ERR7\_FileNotOpen, ERR7\_InvalidFileUnit, ERR7\_NoError

# St7SetTransientBaseResults

---

## Description

Sets the global coordinate frame used for reporting displacement results in Linear and Nonlinear Transient analysis.

## Syntax

```
long St7SetTransientBaseResults(long uID, bool* Logicals)
```

## Input Parameters

uID

Strand7 model file ID number.

Logicals [0..2]

A 3 element array specifying the coordinate frame used for reporting displacement, velocity and acceleration results respectively.

Elements are either btTrue for the static global frame, or btFalse for the moving base frame.

## Errors

ERR7\_APINotInitialised, ERR7\_APINotLicensed,  
ERR7\_FileNotOpen, ERR7\_InvalidFileUnit, ERR7\_NoError,  
ERR7\_ResultFileIsOpen

# St7GetTransientBaseResults

---

## Description

Returns the global coordinate frame used for reporting displacement results in Linear and Nonlinear Transient analysis.

---

## Syntax

```
long St7GetTransientBaseResults(long uID, bool* Logicals)
```

## Input Parameters

uID

Strand7 model file ID number.

## Output Parameters

Logicals[0..2]

A 3 element array specifying the coordinate frame used for reporting displacement, velocity and acceleration results respectively.

Elements are either btTrue for the static global frame, or btFalse for the moving base frame.

## Errors

ERR7\_APINotInitialised, ERR7\_APINotLicensed,  
ERR7\_FileNotOpen, ERR7\_InvalidFileUnit, ERR7\_NoError

---

## St7AddTransientNodeHistoryCase

### Description

Adds a new node history case for Linear and Nonlinear Transient analysis.

### Syntax

```
long St7AddTransientNodeHistoryCase(long uID, long NodeNum)
```

### Input Parameters

uID

Strand7 model file ID number.

NodeNum

Node number.

### Errors

ERR7\_APINotInitialised, ERR7\_APINotLicensed,  
ERR7\_ExceededMaxNumNodeHistory, ERR7\_FileNotOpen,  
ERR7\_InvalidEntityNumber, ERR7\_InvalidFileUnit,  
ERR7\_NoError, ERR7\_ResultFileIsOpen

## St7InsertTransientNodeHistoryCase

---

### Description

Inserts a new node history case for Linear and Nonlinear Transient analysis.

### Syntax

```
long St7InsertTransientNodeHistoryCase(long uID, long  
    NodeNum, long Pos)
```

### Input Parameters

uID

Strand7 model file ID number.

NodeNum

Node number.

Pos

Node history case number.

### Errors

```
ERR7_APINotInitialised, ERR7_APINotLicensed,  
ERR7_ExceededMaxNumNodeHistory, ERR7_FileNotOpen,  
ERR7_InvalidEntityNumber, ERR7_InvalidFileUnit,  
ERR7_NodeHistoryDoesNotExist, ERR7_NoError,  
ERR7_ResultFileIsOpen
```

## St7DeleteTransientNodeHistoryCase

---

### Description

Deletes the specified node history case for Linear and Nonlinear Transient analysis.

### Syntax

```
long St7DeleteTransientNodeHistoryCase(long uID, long Pos)
```

### Input Parameters

uID

Strand7 model file ID number.

Pos

Node history case number.

---

## Errors

```
ERR7_APINotInitialised, ERR7_APINotLicensed,  
ERR7_ExceededMaxNumNodeHistory, ERR7_FileNotOpen,  
ERR7_InvalidFileUnit, ERR7_NodeHistoryDoesNotExist,  
ERR7_NoError, ERR7_ResultFileIsOpen
```

---

## St7GetNumTransientNodeHistoryCases

### Description

Returns the number of node history cases assigned for Linear and Nonlinear Transient analysis.

### Syntax

```
long St7GetNumTransientNodeHistoryCases(long uID, long*  
                                         NumCases)
```

### Input Parameters

uID

Strand7 model file ID number.

### Output Parameters

NumCases

Number of node history cases.

### Errors

```
ERR7_APINotInitialised, ERR7_APINotLicensed,  
ERR7_FileNotOpen, ERR7_InvalidFileUnit, ERR7_NoError
```

---

## St7SetTransientNodeHistoryCaseData

### Description

Assigns the settings for the specified node history case for Linear and Nonlinear Transient analysis.

### Syntax

```
long St7SetTransientNodeHistoryCaseData(long uID, long Pos,  
                                         bool* Logicals)
```

### Input Parameters

uID

Strand7 model file ID number.

Pos

Node history case number.

Logicals [0..5]

[0..2] - btTrue to include nodal result component, according to the XYZ axis in the Global Cartesian coordinate system.

[3..5] - btTrue to include displacement, velocity and acceleration results respectively.

## Errors

ERR7\_APINotInitialised, ERR7\_APINotLicensed,  
ERR7\_FileNotOpen, ERR7\_InvalidFileUnit,  
ERR7\_NodeHistoryDoesNotExist, ERR7\_NoError,  
ERR7\_ResultFileIsOpen

# St7GetTransientNodeHistoryCaseData

---

## Description

Returns the settings assigned for the specified node history case for Linear and Nonlinear Transient analysis.

## Syntax

```
long St7GetTransientNodeHistoryCaseData(long uID, long Pos,  
bool* Logicals)
```

## Input Parameters

uID

Strand7 model file ID number.

Pos

Node history case number.

## Output Parameters

Logicals [0..5]

[0..2] - btTrue to include nodal result component, according to the XYZ axis in the Global Cartesian coordinate system.

---

[ 3 .. 5 ] - btTrue to include displacement, velocity and acceleration results respectively.

### Errors

ERR7\_APINotInitialised, ERR7\_APINotLicensed,  
ERR7\_FileNotOpen, ERR7\_InvalidFileUnit,  
ERR7\_NodeHistoryDoesNotExist, ERR7\_NoError,  
ERR7\_ResultFileIsOpen

## St7EnableAutoAssignPathDivisions

---

### Description

Enables the transient solver to assign automatically the number of divisions on a load path so that it is appropriate for the timestep under consideration.

### Syntax

```
long St7EnableAutoAssignPathDivisions (long uID)
```

### Input Parameters

uID

Strand7 model file ID number.

### Errors

ERR7\_APINotInitialised, ERR7\_APINotLicensed,  
ERR7\_FileNotOpen, ERR7\_InvalidFileUnit, ERR7\_NoError,  
ERR7\_ResultFileIsOpen

## St7DisableAutoAssignPathDivisions

---

### Description

Prevents the transient solver from automatically assigning the number of divisions on a load path to suit the timestep.

### Syntax

```
long St7DisableAutoAssignPathDivisions (long uID)
```

### Input Parameters

uID

Strand7 model file ID number.

## Errors

ERR7\_APINotInitialised, ERR7\_APINotLicensed,  
ERR7\_FileNotOpen, ERR7\_InvalidFileUnit, ERR7\_NoError,  
ERR7\_ResultFileIsOpen

---

## Solver – Quasi-Static and Nonlinear Transient Dynamic

### St7SetTransientTemperatureInputType

---

#### Description

Sets the type of temperature data used for Quasi-Static and Nonlinear Transient analysis.

#### Syntax

```
long St7SetTransientTemperatureInputType(long uID, long  
InputType)
```

#### Input Parameters

uID

Strand7 model file ID number.

InputType

Temperature type, either ttFromFile or ttNodalTemp.

#### Errors

```
ERR7_APINotInitialised, ERR7_APINotLicensed,  
ERR7_FileNotOpen, ERR7_InvalidFileUnit,  
ERR7_InvalidTransientTempType, ERR7_NoError,  
ERR7_ResultFileIsOpen
```

### St7SetTransientHeatFile

---

#### Description

Assigns the temperature file used for Quasi-Static and Nonlinear Transient analysis.

#### Syntax

```
long St7SetTransientHeatFile(long uID, char* FileName,  
double RefTemp)
```

#### Input Parameters

uID

Strand7 model file ID number.

FileName

Full path and name for the temperature file.

RefTemp

Reference temperature.

## Errors

ERR7\_APINotInitialised, ERR7\_APINotLicensed,  
ERR7\_FileNotOpen, ERR7\_InvalidFileUnit, ERR7\_NoError,  
ERR7\_ResultFileIsOpen

# St7GetTransientHeatFile

---

## Description

Returns the temperature file assigned for Quasi-Static and Nonlinear Transient analysis.

## Syntax

```
long St7GetTransientHeatFile(long uID, char* FileName, long  
                           MaxStringLen, double* RefTemp)
```

## Input Parameters

uID

Strand7 model file ID number.

MaxStringLen

Maximum number of characters allocated for FileName.

## Output Parameters

FileName

Full path and name for the temperature file.

RefTemp

Reference temperature.

## Errors

ERR7\_APINotInitialised, ERR7\_APINotLicensed,  
ERR7\_FileNotOpen, ERR7\_InvalidFileUnit, ERR7\_NoError

---

## Solver – Quasi-Static and Transient Dynamic

### St7EnableTransientLoadCase

---

#### Description

Enables the specified load case for Quasi-Static and Transient analysis.

#### Syntax

```
long St7EnableTransientLoadCase(long uID, long CaseNum)
```

#### Input Parameters

uID

Strand7 model file ID number.

CaseNum

Load case number.

#### Errors

```
ERR7_APINotInitialised, ERR7_APINotLicensed,  
ERR7_FileNotOpen, ERR7_InvalidFileUnit,  
ERR7_InvalidLoadCase, ERR7_NoError, ERR7_ResultFileIsOpen
```

### St7DisableTransientLoadCase

---

#### Description

Disables the specified load case for Quasi-Static and Transient analysis.

#### Syntax

```
long St7DisableTransientLoadCase(long uID, long CaseNum)
```

#### Input Parameters

uID

Strand7 model file ID number.

CaseNum

Load case number.

## Errors

```
ERR7_APINotInitialised, ERR7_APINotLicensed,  
ERR7_FileNotOpen, ERR7_InvalidFileUnit,  
ERR7_InvalidLoadCase, ERR7_NoError, ERR7_ResultFileIsOpen
```

# St7GetTransientLoadCaseState

---

## Description

Returns the state of the specified load case for Quasi-Static and Transient analysis.

## Syntax

```
long St7GetTransientLoadCaseState(long uID, long CaseNum,  
                                bool* State)
```

## Input Parameters

uID

Strand7 model file ID number.

CaseNum

Load case number.

## Output Parameters

State

btTrue if the specified load case is enabled.

## Errors

```
ERR7_APINotInitialised, ERR7_APINotLicensed,  
ERR7_FileNotOpen, ERR7_InvalidFileUnit,  
ERR7_InvalidLoadCase, ERR7_NoError
```

# St7EnableTransientFreedomCase

---

## Description

Enables the specified freedom case for Quasi-Static and Transient analysis.

## Syntax

```
long St7EnableTransientFreedomCase(long uID, long CaseNum)
```

## Input Parameters

uID

---

Strand7 model file ID number.

CaseNum

Freedom case number.

### Errors

ERR7\_APINotInitialised, ERR7\_APINotLicensed,  
ERR7\_FileNotOpen, ERR7\_InvalidFileUnit,  
ERR7\_InvalidFreedomCase, ERR7\_NoError,  
ERR7\_ResultFileIsOpen

## St7DisableTransientFreedomCase

---

### Description

Disables the specified freedom case for Quasi-Static and Transient analysis.

### Syntax

```
long St7DisableTransientFreedomCase(long uID, long CaseNum)
```

### Input Parameters

uID

Strand7 model file ID number.

CaseNum

Freedom case number.

### Errors

ERR7\_APINotInitialised, ERR7\_APINotLicensed,  
ERR7\_FileNotOpen, ERR7\_InvalidFileUnit,  
ERR7\_InvalidFreedomCase, ERR7\_NoError,  
ERR7\_ResultFileIsOpen

## St7GetTransientFreedomCaseState

---

### Description

Returns the state of the specified freedom case for Quasi-Static and Transient analysis.

## Syntax

```
long St7GetTransientFreedomCaseState(long uID, long CaseNum,  
bool* State)
```

## Input Parameters

uID

Strand7 model file ID number.

CaseNum

Freedom case number.

## Output Parameters

State

bTrue if the specified freedom case is enabled.

## Errors

```
ERR7_APINotInitialised, ERR7_APINotLicensed,  
ERR7_FileNotOpen, ERR7_InvalidFileUnit,  
ERR7_InvalidFreedomCase, ERR7_NoError
```

## St7SetTransientLoadTable

---

### Description

Specifies the Factor vs Time table to be associated with a given load case for Quasi-Static and Transient analysis.

## Syntax

```
long St7SetTransientLoadTable(long uID, long CaseNum, long  
TableNum)
```

## Input Parameters

uID

Strand7 model file ID number.

CaseNum

Load case number.

TableNum

Factor vs Time table ID, zero for none.

---

## Errors

```
ERR7_APINotInitialised, ERR7_APINotLicensed,  
ERR7_FileNotOpen, ERR7_InvalidFileUnit,  
ERR7_InvalidLoadCase, ERR7_NoError, ERR7_ResultFileIsOpen,  
ERR7_TableDoesNotExist
```

---

## St7GetTransientLoadTable

### Description

Returns the Factor vs Time table associated with the specified load case for Quasi-Static and Transient analysis.

### Syntax

```
long St7GetTransientLoadTable(long uID, long CaseNum, long*  
TableNum)
```

### Input Parameters

uID

Strand7 model file ID number.

CaseNum

Load case number.

### Output Parameters

TableNum

Factor vs Time table ID, zero for none.

### Errors

```
ERR7_APINotInitialised, ERR7_APINotLicensed,  
ERR7_FileNotOpen, ERR7_InvalidFileUnit,  
ERR7_InvalidLoadCase, ERR7_NoError
```

---

## St7SetTransientFreedomTable

### Description

Specifies the Factor vs Time table to be associated with a given freedom case for Quasi-Static and Transient analysis.

## Syntax

```
long St7SetTransientFreedomTable(long uID, long CaseNum,  
                                long TableNum)
```

## Input Parameters

uID

Strand7 model file ID number.

CaseNum

Freedom case number.

TableNum

Factor vs Time table ID, zero for none.

## Errors

```
ERR7_APINotInitialised, ERR7_APINotLicensed,  
ERR7_FileNotOpen, ERR7_InvalidFileUnit,  
ERR7_InvalidFreedomCase, ERR7_NoError,  
ERR7_ResultFileIsOpen, ERR7_TableDoesNotExist
```

## St7GetTransientFreedomTable

---

### Description

Returns the Factor vs Time table associated with the specified freedom case for Quasi-Static and Transient analysis.

## Syntax

```
long St7GetTransientFreedomTable(long uID, long CaseNum,  
                                long* TableNum)
```

## Input Parameters

uID

Strand7 model file ID number.

CaseNum

Freedom case number.

## Output Parameters

TableNum

Factor vs Time table ID, zero for none.

---

## Errors

```
ERR7_APINotInitialised, ERR7_APINotLicensed,  
ERR7_FileNotOpen, ERR7_InvalidFileUnit,  
ERR7_InvalidFreedomCase, ERR7_NoError
```

---

## St7SetNumTimeStepRows

### Description

Sets the number of rows used to specify the integration intervals for Quasi-Static and Transient analysis. Each row may have separate time step and integration settings.

### Syntax

```
long St7SetNumTimeStepRows (long uID, long NumRows)
```

### Input Parameters

uID

Strand7 model file ID number.

NumRows

Number of rows.

### Errors

```
ERR7_APINotInitialised, ERR7_APINotLicensed,  
ERR7_ExceededMaxNumRows, ERR7_FileNotOpen,  
ERR7_InvalidFileUnit, ERR7_NoError, ERR7_ResultFileIsOpen
```

---

## St7GetNumTimeStepRows

### Description

Returns the number of rows used to specify the integration interval for Quasi-Static and Transient analysis. Each row may have separate time step and integration settings.

### Syntax

```
long St7GetNumTimeStepRows (long uID, long* NumRows)
```

### Input Parameters

uID

Strand7 model file ID number.

### Output Parameters

NumRows

Number of rows.

### Errors

ERR7\_APINotInitialised, ERR7\_APINotLicensed,  
ERR7\_FileNotOpen, ERR7\_InvalidFileUnit, ERR7\_NoError

## St7SetTimeStepData

---

### Description

Sets the time step and integration data used for Quasi-Static and Transient analysis. The integration data may be specified over multiple rows.

### Syntax

```
long St7SetTimeStepData(long uID, long Row, long NumSteps,
                        long SaveEvery, double TimeStep)
```

### Input Parameters

uID

Strand7 model file ID number.

Row

Integration data row.

NumSteps

Total number of time steps in row.

SaveEvery

Number of time steps between successive result cases.

TimeStep

Time step size.

### Errors

ERR7\_APINotInitialised, ERR7\_APINotLicensed,  
ERR7\_FileNotOpen, ERR7\_InvalidFileUnit, ERR7\_InvalidTimeRow,  
ERR7\_NoError, ERR7\_ResultFileIsOpen

---

## St7GetTimeStepData

---

### Description

Returns the time step and integration data used for Quasi-Static and Transient analysis. The integration data may be specified over multiple rows.

### Syntax

```
long St7GetTimeStepData(long uID, long Row, long* NumSteps,  
                        long* SaveEvery, double* TimeStep)
```

### Input Parameters

uID

Strand7 model file ID number.

Row

Integration data row.

### Output Parameters

NumSteps

Total number of time steps in row.

SaveEvery

Number of time steps between successive result cases.

TimeStep

Time step size.

### Errors

ERR7\_APINotInitialised, ERR7\_APINotLicensed,  
ERR7\_FileNotOpen, ERR7\_InvalidFileUnit, ERR7\_InvalidTimeRow,  
ERR7\_NoError

---

## St7SetTimeStepUnit

---

### Description

Sets the units for the time step used for Quasi-Static and Transient analysis.

### Syntax

```
long St7SetTimeStepUnit(long uID, long TimeUnit)
```

## **Input Parameters**

uID

Strand7 model file ID number.

TimeUnit

Time-step units, one of tuMilliSec, tuSec, tuMin, tuHour, tuDay.

## **Errors**

ERR7\_APINotInitialised, ERR7\_APINotLicensed,  
ERR7\_FileNotOpen, ERR7\_InvalidFileUnit,  
ERR7\_InvalidTimeUnit, ERR7\_NoError, ERR7\_ResultFileIsOpen

# **St7GetTimeStepUnit**

---

## **Description**

Returns the units assigned for the time step used for Quasi-Static and Transient analysis.

## **Syntax**

```
long St7GetTimeStepUnit(long uID, long* TimeUnit)
```

## **Input Parameters**

uID

Strand7 model file ID number.

## **Output Parameters**

TimeUnit

Time-step units, one of tuMilliSec, tuSec, tuMin, tuHour, tuDay.

## **Errors**

ERR7\_APINotInitialised, ERR7\_APINotLicensed,  
ERR7\_FileNotOpen, ERR7\_InvalidFileUnit, ERR7\_NoError

# **St7EnableMovingLoad**

---

## **Description**

Enables the specified moving load path for Quasi-Static and Transient analysis.

---

## Syntax

```
long St7EnableMovingLoad(long uID, long LoadPathID)
```

### Input Parameters

uID

Strand7 model file ID number.

LoadPathID

Load path ID number.

### Errors

```
ERR7_APINotInitialised, ERR7_APINotLicensed,  
ERR7_FileNotOpen, ERR7_InvalidFileUnit,  
ERR7_InvalidLoadPath, ERR7_InvalidLoadPathID, ERR7_NoError,  
ERR7_ResultFileIsOpen
```

---

## St7DisableMovingLoad

### Description

Disables the specified moving load path for Quasi-Static and Transient analysis.

### Syntax

```
long St7DisableMovingLoad(long uID, long LoadPathID)
```

### Input Parameters

uID

Strand7 model file ID number.

LoadPathID

Load path ID number.

### Errors

```
ERR7_APINotInitialised, ERR7_APINotLicensed,  
ERR7_FileNotOpen, ERR7_InvalidFileUnit,  
ERR7_InvalidLoadPath, ERR7_InvalidLoadPathID, ERR7_NoError,  
ERR7_ResultFileIsOpen
```

## St7GetMovingLoadState

---

### Description

Returns the state of the specified moving load path for Quasi-Static and Transient analysis.

### Syntax

```
long St7GetMovingLoadState(long uID, long LoadPathID, bool*  
    State)
```

### Input Parameters

uID

Strand7 model file ID number.

LoadPathID

Load path ID number.

### Output Parameters

State

btTrue if the load path is enabled.

### Errors

ERR7\_APINotInitialised, ERR7\_APINotLicensed,  
ERR7\_FileNotOpen, ERR7\_InvalidFileUnit,  
ERR7\_InvalidLoadPath, ERR7\_InvalidLoadPathID, ERR7\_NoError

---

# Solver – Steady-State and Transient Heat

## St7SetSolverHeatNonlinear

---

### Description

Sets the state of the nonlinear analysis option for the Heat solvers. Models containing radiative boundary conditions or temperature dependent material conditions should use the nonlinear analysis option.

### Syntax

```
long St7SetSolverHeatNonlinear(long uID, bool Nonlinear)
```

### Input Parameters

uID

Strand7 model file ID number.

Nonlinear

btTrue to perform nonlinear heat analyses. The nonlinear flag must be active to solve problems incorporating radiative boundary conditions or temperature dependent material properties.

### Errors

```
ERR7_APINotInitialised, ERR7_APINotLicensed,  
ERR7_FileNotOpen, ERR7_InvalidFileUnit, ERR7_NoError,  
ERR7_ResultFileIsOpen
```

## Solver – General

### St7SetSolverScheme

#### Description

Sets the scheme used for the solution of the linear system arising from the Finite Element model.

#### Syntax

```
long St7SetSolverScheme(long uID, long Solver)
```

#### Input Parameters

uID

Strand7 model file ID number.

Solver

Solver scheme, one of stSkyline, stSparse or stIterativePCG.

#### Errors

```
ERR7_APINotInitialised, ERR7_APINotLicensed,  
ERR7_FileNotOpen, ERR7_InvalidFileUnit,  
ERR7_InvalidSolverScheme, ERR7_NoError,  
ERR7_ResultFileIsOpen, ERR7_SparseSolverNotLicenced
```

### St7GetSolverScheme

#### Description

Returns the scheme assigned for the solution of the linear system arising from the Finite Element model.

#### Syntax

```
long St7GetSolverScheme(long uID, long* Solver)
```

#### Input Parameters

uID

Strand7 model file ID number.

#### Output Parameters

Solver

---

Solver scheme, one of stSkyline, stSparse or stIterativePCG.

## Errors

ERR7\_APINotInitialised, ERR7\_APINotLicensed,  
ERR7\_FileNotOpen, ERR7\_InvalidFileUnit, ERR7\_NoError

# St7SetSolverSort

---

## Description

Sets the node number re-ordering strategy used by the solver.

## Syntax

```
long St7SetSolverSort(long uID, long Sort)
```

## Input Parameters

uID

Strand7 model file ID number.

Sort

Re-ordering method, one of rnNone, rnTree, rnGeometry or rnAMD.

## Errors

ERR7\_APINotInitialised, ERR7\_APINotLicensed,  
ERR7\_FileNotOpen, ERR7\_InvalidFileUnit,  
ERR7\_InvalidSortOption, ERR7\_NoError, ERR7\_ResultFileIsOpen

# St7GetSolverSort

---

## Description

Returns the node number re-ordering strategy assigned to the solver.

## Syntax

```
long St7GetSolverSort(long uID, long* Sort)
```

## Input Parameters

uID

Strand7 model file ID number.

## Output Parameters

Sort

Re-ordering method, one of rnNone, rnTree, rnGeometry or rnAMD.

## Errors

ERR7\_APINotInitialised, ERR7\_APINotLicensed,  
ERR7\_FileNotOpen, ERR7\_InvalidFileUnit, ERR7\_NoError

# St7SetSolverTreeStartNumber

---

## Description

Sets the starting node number for the Tree type re-ordering strategy.

## Syntax

```
long St7SetSolverTreeStartNumber(long uID, long Start)
```

## Input Parameters

uID

Strand7 model file ID number.

Start

Starting node number.

## Errors

ERR7\_APINotInitialised, ERR7\_APINotLicensed,  
ERR7\_FileNotOpen, ERR7\_InvalidFileUnit, ERR7\_NoError,  
ERR7\_ResultFileIsOpen

# St7GetSolverTreeStartNumber

---

## Description

Returns the starting node number assigned for the Tree type re-ordering strategy.

## Syntax

```
long St7GetSolverTreeStartNumber(long uID, long* Start)
```

## Input Parameters

uID

Strand7 model file ID number.

## Output Parameters

Start

---

Starting node number.

### Errors

ERR7\_APINotInitialised, ERR7\_APINotLicensed,  
ERR7\_FileNotOpen, ERR7\_InvalidFileUnit, ERR7\_NoError

## St7SetSolverActiveStage

---

### Description

Sets the active stage for the analysis.

### Syntax

```
long St7SetSolverActiveStage(long uID, long Stage)
```

### Input Parameters

uID

Strand7 model file ID number.

Stage

Stage number.

### Errors

ERR7\_APINotInitialised, ERR7\_APINotLicensed,  
ERR7\_FileNotOpen, ERR7\_InvalidFileUnit, ERR7\_NoError,  
ERR7\_ResultFileIsOpen, ERR7\_StageDoesNotExist

## St7GetSolverActiveStage

---

### Description

Returns the active stage assigned for the analysis.

### Syntax

```
long St7GetSolverActiveStage(long uID, long* Stage)
```

### Input Parameters

uID

Strand7 model file ID number.

### Output Parameters

Stage

Stage number.

### Errors

ERR7\_APINotInitialised, ERR7\_APINotLicensed,  
ERR7\_FileNotOpen, ERR7\_InvalidFileUnit, ERR7\_NoError

## St7SetSolverTemperatureDependence

---

### Description

Specifies the type of temperature dependence used for Quasi-Static, Nonlinear Static and Nonlinear Transient analysis.

### Syntax

```
long St7SetSolverTemperatureDependence (long uID, long  
TempType)
```

### Input Parameters

uID

Strand7 model file ID number.

TempType

Temperature dependence type, either tdNone or tdCombined.

### Errors

ERR7\_APINotInitialised, ERR7\_APINotLicensed,  
ERR7\_FileNotOpen, ERR7\_InvalidFileUnit,  
ERR7\_InvalidTempDependenceType, ERR7\_NoError,  
ERR7\_ResultFileIsOpen

## St7GetSolverTemperatureDependence

---

### Description

Returns the type of temperature dependence used for Quasi-Static, Nonlinear Static and Nonlinear Transient analysis.

### Syntax

```
long St7GetSolverTemperatureDependence (long uID, long*  
TempType)
```

---

## **Input Parameters**

uID

Strand7 model file ID number.

## **Output Parameters**

TempType

Temperature dependence type, either tdNone or tdCombined.

## **Errors**

ERR7\_APINotInitialised, ERR7\_APINotLicensed,  
ERR7\_FileNotOpen, ERR7\_InvalidFileUnit, ERR7\_NoError

---

# **St7SetSolverLoadCaseTemperatureDependence**

## **Description**

Sets the load case used to specify the temperature dependence for Linear Static, Load Influence, Natural Frequency and Linear Transient analysis.

## **Syntax**

```
long St7SetSolverLoadCaseTemperatureDependence (long uID,  
                                              long CaseNum)
```

## **Input Parameters**

uID

Strand7 model file ID number.

CaseNum

Load case number.

## **Errors**

ERR7\_APINotInitialised, ERR7\_APINotLicensed,  
ERR7\_FileNotOpen, ERR7\_InvalidFileUnit,  
ERR7\_InvalidLoadCase, ERR7\_NoError, ERR7\_ResultFileIsOpen

---

# **St7GetSolverLoadCaseTemperatureDependence**

## **Description**

Returns the load case assigned to specify the temperature dependence for Linear Static, Load Influence, Natural Frequency and Linear Transient analysis.

## Syntax

```
long St7GetSolverLoadCaseTemperatureDependence (long uID,  
                                              long* CaseNum)
```

## Input Parameters

uID

Strand7 model file ID number.

## Output Parameters

CaseNum

Load case number.

## Errors

ERR7\_APINotInitialised, ERR7\_APINotLicensed,  
ERR7\_FileNotOpen, ERR7\_InvalidFileUnit, ERR7\_NoError

# St7SetSolverFreedomCase

---

## Description

Sets the freedom case used for the analysis. Multiple freedom cases may be specified for Linear Static analysis using the St7EnableLSALoadCase function.

## Syntax

```
long St7SetSolverFreedomCase (long uID, long CaseNum)
```

## Input Parameters

uID

Strand7 model file ID number.

CaseNum

Freedom case number.

## Errors

ERR7\_APINotInitialised, ERR7\_APINotLicensed,  
ERR7\_FileNotOpen, ERR7\_InvalidFileUnit,  
ERR7\_InvalidFreedomCase, ERR7\_NoError,  
ERR7\_ResultFileIsOpen

---

## St7GetSolverFreedomCase

---

### Description

Returns the freedom case assigned for the analysis. Multiple freedom cases may be specified for Linear Static analysis using the St7EnableLSALoadCase function.

### Syntax

```
long St7GetSolverFreedomCase(long uID, long* CaseNum)
```

### Input Parameters

uID

Strand7 model file ID number.

### Output Parameters

CaseNum

Freedom case number.

### Errors

```
ERR7_APINotInitialised, ERR7_APINotLicensed,  
ERR7_FileNotOpen, ERR7_InvalidFileUnit, ERR7_NoError
```

---

## St7SetDampingType

---

### Description

Sets the type of damping used for the analysis.

### Syntax

```
long St7SetDampingType(long uID, long DampType)
```

### Input Parameters

uID

Strand7 model file ID number.

DampType

Damping type, one of dtNoDamping, dtRayleighDamping, dtModalDamping or dtViscousDamping.

## Errors

```
ERR7_APINotInitialised, ERR7_APINotLicensed,  
ERR7_FileNotOpen, ERR7_InvalidDampingType,  
ERR7_InvalidFileUnit, ERR7_NoError, ERR7_ResultFileIsOpen
```

## St7GetDampingType

---

### Description

Returns the type of damping assigned for the analysis.

### Syntax

```
long St7GetDampingType(long uID, long* DampType)
```

### Input Parameters

uID

Strand7 model file ID number.

### Output Parameters

DampType

Damping type, one of dtNoDamping, dtRayleighDamping, dtModalDamping or dtViscousDamping.

### Errors

```
ERR7_APINotInitialised, ERR7_APINotLicensed,  
ERR7_FileNotOpen, ERR7_InvalidFileUnit, ERR7_NoError
```

## St7SetRayleighFactors

---

### Description

Sets the Rayleigh damping factors used for the analysis.

### Syntax

```
long St7SetRayleighFactors(long uID, long RayleighMode,  
double* Doubles)
```

### Input Parameters

uID

Strand7 model file ID number.

RayleighMode

---

Type of Rayleigh factors specified, either rmSetFrequencies or rmSetAlphaBeta.

Doubles[0..5]

rmSetAlphaBeta:

[0..1] - Alpha, Beta values respectively.

rmSetFrequencies:

[0..1] - Frequency 1 and 2 respectively (Hz).

[2..3] - Ratio 1 and 2 respectively.

[4..5] - Minimum and maximum frequency respectively.

## Errors

ERR7\_APINotInitialised, ERR7\_APINotLicensed,  
ERR7\_FileNotOpen, ERR7\_InvalidFileUnit,  
ERR7\_InvalidRayleighMode, ERR7\_NoError,  
ERR7\_ResultFileIsOpen

# St7GetRayleighFactors

---

## Description

Returns the Rayleigh damping factors assigned for the analysis.

## Syntax

```
long St7GetRayleighFactors(long uID, long* RayleighMode,  
                           double* Doubles)
```

## Input Parameters

uID

Strand7 model file ID number.

## Output Parameters

RayleighMode

Type of Rayleigh factors specified, either rmSetFrequencies or rmSetAlphaBeta.

Doubles[0..5]

rmSetAlphaBeta:

[0..1] - Alpha, Beta values respectively.

rmSetFrequencies:

[0..1] - Frequency 1 and 2 respectively.

[2..3] - Ratio 1 and 2 respectively.

[4..5] - Minimum and maximum frequency respectively.

## Errors

ERR7\_APINotInitialised, ERR7\_APINotLicensed,  
ERR7\_FileNotOpen, ERR7\_InvalidFileUnit, ERR7\_NoError

# St7SetSoilFluidOptions

---

## Description

Sets the soil/fluid options for the analysis. These parameters are only used for models containing soil or fluid properties.

## Syntax

```
long St7SetSoilFluidOptions(long uID, long CaseNum, double*  
    Doubles)
```

## Input Parameters

uID

Strand7 model file ID number.

CaseNum

Gravitational load case number.

Doubles[0..2]

A 3 element array describing the default fluid level, fluid mass density and fluid bulk modulus respectively.

## Errors

ERR7\_APINotInitialised, ERR7\_APINotLicensed,  
ERR7\_FileNotOpen, ERR7\_InvalidFileUnit,  
ERR7\_InvalidLoadCase, ERR7\_NoError, ERR7\_ResultFileIsOpen

---

## St7GetSoilFluidOptions

---

### Description

Returns the soil/fluid parameters assigned for the analysis. These parameters are only used for models containing soil or fluid properties.

### Syntax

```
long St7GetSoilFluidOptions(long uID, long* CaseNum,  
                           double* Doubles)
```

### Input Parameters

uID

Strand7 model file ID number.

### Output Parameters

CaseNum

Gravitational load case number.

Doubles[0..2]

A 3 element array describing the default fluid level, fluid mass density and fluid bulk modulus respectively.

### Errors

ERR7\_APINotInitialised, ERR7\_APINotLicensed,  
ERR7\_FileNotOpen, ERR7\_InvalidFileUnit, ERR7\_NoError

---

## St7SetSturmCheck

---

### Description

Assigns the state of the **Sturm Check** option, for eigenvalue analyses.

### Syntax

```
long St7SetSturmCheck(long uID, bool DoSturm)
```

### Input Parameters

uID

Strand7 model file ID number.

DoSturm

btTrue to enable the Sturm Check.

**Errors**

ERR7\_APINotInitialised, ERR7\_APINotLicensed,  
ERR7\_FileNotOpen, ERR7\_InvalidFileUnit, ERR7\_NoError,  
ERR7\_ResultFileIsOpen

## St7GetSturmCheck

---

**Description**

Returns the state of the **Sturm Check** option, for eigenvalue analyses.

**Syntax**

```
long St7GetSturmCheck(long uID, bool* DoSturm)
```

**Input Parameters**

uID

Strand7 model file ID number.

**Output Parameters**

DoSturm

bTrue to enable the Sturm Check.

**Errors**

ERR7\_APINotInitialised, ERR7\_APINotLicensed,  
ERR7\_FileNotOpen, ERR7\_InvalidFileUnit, ERR7\_NoError

## St7SetSolverNonlinearGeometry

---

**Description**

Sets the state of the **Nonlinear geometry** option for Nonlinear analyses.

**Syntax**

```
long St7SetSolverNonlinearGeometry(long uID, bool  
NonlinearGeometry)
```

**Input Parameters**

uID

Strand7 model file ID number.

NonlinearGeometry

---

`btTrue` to enable the **Nonlinear geometry** option.

## Errors

`ERR7_APINotInitialised`, `ERR7_APINotLicensed`,  
`ERR7_FileNotOpen`, `ERR7_InvalidFileUnit`, `ERR7_NoError`,  
`ERR7_ResultFileIsOpen`

# St7GetSolverNonlinearGeometry

---

## Description

Returns the state assigned for the **Nonlinear Geometry** option for Nonlinear analyses.

## Syntax

```
long St7GetSolverNonlinearGeometry(long uID, bool*  
    NonlinearGeometry)
```

## Input Parameters

`uID`

Strand7 model file ID number.

## Output Parameters

`NonlinearGeometry`

`btTrue` to enable the **Nonlinear geometry** option.

## Errors

`ERR7_APINotInitialised`, `ERR7_APINotLicensed`,  
`ERR7_FileNotOpen`, `ERR7_InvalidFileUnit`, `ERR7_NoError`

# St7SetSolverNonlinearMaterial

---

## Description

Sets the state of the **Nonlinear material** option for Nonlinear analyses.

## Syntax

```
long St7SetSolverNonlinearMaterial(long uID, bool  
    NonlinearMaterial)
```

## Input Parameters

`uID`

Strand7 model file ID number.

NonlinearMaterial

btTrue to enable the **Nonlinear material** option.

## Errors

ERR7\_APINotInitialised, ERR7\_APINotLicensed,  
ERR7\_FileNotOpen, ERR7\_InvalidFileUnit, ERR7\_NoError,  
ERR7\_ResultFileIsOpen

# St7GetSolverNonlinearMaterial

---

## Description

Returns the state assigned for the **Nonlinear Material** option for Nonlinear analyses.

## Syntax

```
long St7GetSolverNonlinearMaterial(long uID, bool*  
NonlinearMaterial)
```

## Input Parameters

uID

Strand7 model file ID number.

## Output Parameters

NonlinearMaterial

btTrue to enable the **Nonlinear material** option.

## Errors

ERR7\_APINotInitialised, ERR7\_APINotLicensed,  
ERR7\_FileNotOpen, ERR7\_InvalidFileUnit, ERR7\_NoError

# St7SetSolverCreep

---

## Description

Sets the state of the **Creep** option for creep analyses.

## Syntax

```
long St7SetSolverCreep(long uID, bool Creep)
```

---

## Input Parameters

uID

Strand7 model file ID number.

Creep

btTrue to enable the **Creep** option.

## Errors

ERR7\_APINotInitialised, ERR7\_APINotLicensed,  
ERR7\_FileNotOpen, ERR7\_InvalidFileUnit, ERR7\_NoError,  
ERR7\_ResultFileIsOpen

---

# St7GetSolverCreep

## Description

Returns the state assigned for the **Creep** option for creep analyses.

## Syntax

```
long St7GetSolverCreep(long uID, bool* Creep)
```

## Input Parameters

uID

Strand7 model file ID number.

## Output Parameters

Creep

btTrue to enable the **Creep** option.

## Errors

ERR7\_APINotInitialised, ERR7\_APINotLicensed,  
ERR7\_FileNotOpen, ERR7\_InvalidFileUnit, ERR7\_NoError

---

# St7SetSolverIncludeKG

## Description

Sets the state of the **KG** parameter for Nonlinear analyses. This option controls the use of the Geometric Stiffness matrix (KG).

**Syntax**

```
long St7SetSolverIncludeKG(long uID, bool IncludeKG)
```

**Input Parameters**

uID

Strand7 model file ID number.

IncludeKG

btTrue to include the **KG** matrix.

**Errors**

```
ERR7_APINotInitialised, ERR7_APINotLicensed,  
ERR7_FileNotOpen, ERR7_InvalidFileUnit, ERR7_NoError,  
ERR7_ResultFileIsOpen
```

## St7GetSolverIncludeKG

---

**Description**

Returns the state assigned for the **KG** option for nonlinear analyses. This option controls the use of the Geometric Stiffness matrix (KG).

**Syntax**

```
long St7GetSolverIncludeKG(long uID, bool* IncludeKG)
```

**Input Parameters**

uID

Strand7 model file ID number.

**Output Parameters**

IncludeKG

btTrue to include the **KG** matrix.

**Errors**

```
ERR7_APINotInitialised, ERR7_APINotLicensed,  
ERR7_FileNotOpen, ERR7_InvalidFileUnit, ERR7_NoError
```

---

## St7SetSolverStressStiffening

---

### Description

Sets the state of the stress stiffening option for Linear Transient analyses.

### Syntax

```
long St7SetSolverStressStiffening(long uID, bool  
AddStressStiffening)
```

### Input Parameters

uID

Strand7 model file ID number.

AddStressStiffening

btTrue to include the stress stiffening effects.

### Errors

```
ERR7_APINotInitialised, ERR7_APINotLicensed,  
ERR7_FileNotOpen, ERR7_InvalidFileUnit, ERR7_NoError,  
ERR7_ResultFileIsOpen
```

## St7GetSolverStressStiffening

---

### Description

Returns the state assigned for the stress stiffening option for Linear Transient analyses.

### Syntax

```
long St7GetSolverStressStiffening(long uID, bool*  
AddStressStiffening)
```

### Input Parameters

uID

Strand7 model file ID number.

### Output Parameters

AddStressStiffening

btTrue to include the stress stiffening effects.

## Errors

```
ERR7_APINotInitialised, ERR7_APINotLicensed,  
ERR7_FileNotOpen, ERR7_InvalidFileUnit, ERR7_NoError
```

# St7SetEntityResult

---

## Description

Sets the state for the specified entity result. Only enabled entity results are written to the result file.

## Syntax

```
long St7SetEntityResult(long uID, long Result, long State)
```

## Input Parameters

uID

Strand7 model file ID number.

Result

See Solver Options for additional information.

State

btTrue to enable the specified result.

## Errors

```
ERR7_APINotInitialised, ERR7_APINotLicensed,  
ERR7_FileNotOpen, ERR7_InvalidFileUnit,  
ERR7_InvalidResultType, ERR7_NoError, ERR7_ResultFileIsOpen
```

# St7GetEntityResult

---

## Description

Returns the state for the specified entity result. Only enabled entity results are written to the result file.

## Syntax

```
long St7GetEntityResult(long uID, long Result, long* State)
```

## Input Parameters

uID

---

Strand7 model file ID number.

Result

See *Solver Options* for additional information.

### Output Parameters

State

btTrue to enable the specified result.

### Errors

ERR7\_APINotInitialised, ERR7\_APINotLicensed,  
ERR7\_FileNotOpen, ERR7\_InvalidFileUnit,  
ERR7\_InvalidResultType, ERR7\_NoError

## St7SetResultSurfaceBricksOnly

---

### Description

Sets the state of the **Surface bricks only** option for the analysis.

### Syntax

```
long St7SetResultSurfaceBricksOnly(long uID, long State)
```

### Input Parameters

uID

Strand7 model file ID number.

State

btTrue to calculate the results for **Surface bricks only**.

### Errors

ERR7\_APINotInitialised, ERR7\_APINotLicensed,  
ERR7\_FileNotOpen, ERR7\_InvalidFileUnit, ERR7\_NoError,  
ERR7\_ResultFileIsOpen

## St7GetResultSurfaceBricksOnly

---

### Description

Returns the state of the **Surface bricks only** option assigned for the analysis.

## Syntax

```
long St7GetResultSurfaceBricksOnly(long uID, long* State)
```

## Input Parameters

uID

Strand7 model file ID number.

## Output Parameters

State

btTrue to calculate the results for **Surface bricks only**.

## Errors

```
ERR7_APINotInitialised, ERR7_APINotLicensed,  
ERR7_FileNotOpen, ERR7_InvalidFileUnit, ERR7_NoError
```

# St7SetResultLimit

---

## Description

Assigns a limit for the calculated entity stress results.

## Syntax

```
long St7SetResultLimit(long uID, long Entity, long State,  
                      double Limit)
```

## Input Parameters

uID

Strand7 model file ID number.

Entity

Entity type, either tyPLATE or tyBRICK.

State

btTrue to enforce limits when calculating results.

Limit

Stress result limit value.

---

## Errors

```
ERR7_APINotInitialised, ERR7_APINotLicensed,  
ERR7_FileNotOpen, ERR7_InvalidEntity, ERR7_InvalidFileUnit,  
ERR7_NoError, ERR7_ResultFileIsOpen
```

---

## St7GetResultLimit

### Description

Returns the limit assigned for the specified entity stress results.

### Syntax

```
long St7GetResultLimit(long uID, long Entity, long* State,  
                      double* Limit)
```

### Input Parameters

uID

Strand7 model file ID number.

Entity

Entity type, either tyPLATE or tyBRICK.

### Output Parameters

State

btTrue to enforce limits when calculating results.

Limit

Stress result limit value.

### Errors

```
ERR7_APINotInitialised, ERR7_APINotLicensed,  
ERR7_FileNotOpen, ERR7_InvalidEntity, ERR7_InvalidFileUnit,  
ERR7_NoError
```

---

## St7EnableResultGroup

### Description

Enables the specified group results for the analysis. Only element results corresponding to enabled groups are written to the result file.

## Syntax

```
long St7EnableResultGroup(long uID, long GroupID)
```

### Input Parameters

uID

Strand7 model file ID number.

GroupID

Group ID number to enable.

### Errors

```
ERR7_APINotInitialised, ERR7_APINotLicensed,  
ERR7_FileNotOpen, ERR7_GroupIdDoesNotExist,  
ERR7_InvalidFileUnit, ERR7_NoError, ERR7_ResultFileIsOpen
```

## St7DisableResultGroup

---

### Description

Disables the specified group results for the analysis. Only element results corresponding to enabled groups are written to the result file.

## Syntax

```
long St7DisableResultGroup(long uID, long GroupID)
```

### Input Parameters

uID

Strand7 model file ID number.

GroupID

Group ID number to disable.

### Errors

```
ERR7_APINotInitialised, ERR7_APINotLicensed,  
ERR7_FileNotOpen, ERR7_GroupIdDoesNotExist,  
ERR7_InvalidFileUnit, ERR7_NoError, ERR7_ResultFileIsOpen
```

---

## St7GetResultGroupState

---

### Description

Returns the state of the group results for the analysis. Only element results corresponding to enabled groups are written to the result file.

### Syntax

```
long St7GetResultGroupState(long uID, long GroupID, bool*  
    State)
```

### Input Parameters

uID

Strand7 model file ID number.

GroupID

Group ID number.

### Output Parameters

State

btTrue if the specified group is enabled.

### Errors

```
ERR7_APINotInitialised, ERR7_APINotLicensed,  
ERR7_FileNotOpen, ERR7_GroupIdDoesNotExist,  
ERR7_InvalidFileUnit, ERR7_NoError
```

---

## St7EnableResultProperty

---

### Description

Enables the specified property results for the analysis. Only element results corresponding to enabled properties are written to the result file.

### Syntax

```
long St7EnableResultProperty(long uID, long Entity, long  
    PropNum)
```

### Input Parameters

uID

Strand7 model file ID number.

Entity

Property type, one of ptBEAMPROP, ptPLATEPROP or ptBRICKPROP.

PropNum

Property number.

## Errors

ERR7\_APINotInitialised, ERR7\_APINotLicensed,  
ERR7\_FileNotOpen, ERR7\_InvalidEntity, ERR7\_InvalidFileUnit,  
ERR7\_NoError, ERR7\_ResultFileIsOpen, ERR7\_UnknownProperty

# St7DisableResultProperty

---

## Description

Disables the specified property results for the analysis. Only element results corresponding to enabled properties are written to the result file.

## Syntax

```
long St7DisableResultProperty(long uID, long Entity, long  
PropNum)
```

## Input Parameters

uID

Strand7 model file ID number.

Entity

Property type, one of ptBEAMPROP, ptPLATEPROP or ptBRICKPROP.

PropNum

Property number.

## Errors

ERR7\_APINotInitialised, ERR7\_APINotLicensed,  
ERR7\_FileNotOpen, ERR7\_InvalidEntity, ERR7\_InvalidFileUnit,  
ERR7\_NoError, ERR7\_ResultFileIsOpen, ERR7\_UnknownProperty

---

## St7GetPropertyState

---

### Description

Returns the state of the specified property results for the analysis. Only element results corresponding to enabled properties are written to the result file.

### Syntax

```
long St7GetPropertyState(long uID, long Entity, long  
PropNum, bool* State)
```

### Input Parameters

uID

Strand7 model file ID number.

Entity

Property type, one of ptBEAMPROP, ptPLATEPROP or ptBRICKPROP.

PropNum

Property number.

### Output Parameters

State

btTrue if the specified property results are enabled.

### Errors

ERR7\_APINotInitialised, ERR7\_APINotLicensed,  
ERR7\_FileNotOpen, ERR7\_InvalidEntity, ERR7\_InvalidFileUnit,  
ERR7\_NoError, ERR7\_UnknownProperty

---

## St7SetResultFileName

---

### Description

Sets the name of the results file for the analysis.

### Syntax

```
long St7SetResultFileName(long uID, char* FileName)
```

### Input Parameters

uID

Strand7 model file ID number.

FileName

Full path and name for the results file.

## Errors

ERR7\_APINotInitialised, ERR7\_APINotLicensed,  
ERR7\_FileNotOpen, ERR7\_InvalidFileUnit, ERR7\_NoError,  
ERR7\_ResultFileIsOpen

# St7SetResultLogFileName

---

## Description

Sets the name of the solver log-file for the analysis.

## Syntax

```
long St7SetResultLogFileName(long uID, char* LogName)
```

## Input Parameters

uID

Strand7 model file ID number.

LogName

Full path and name of the log-file.

## Errors

ERR7\_APINotInitialised, ERR7\_APINotLicensed,  
ERR7\_FileNotOpen, ERR7\_InvalidFileUnit, ERR7\_NoError,  
ERR7\_ResultFileIsOpen

# St7SetStaticRestartFile

---

## Description

Sets the name of the static restart file for the analysis.

## Syntax

```
long St7SetStaticRestartFile(long uID, char* FileName)
```

## Input Parameters

uID

Strand7 model file ID number.

---

FileName

Full path and name for the static restart file.

### Errors

ERR7\_APINotInitialised, ERR7\_APINotLicensed,  
ERR7\_FileNotOpen, ERR7\_InvalidFileUnit, ERR7\_NoError,  
ERR7\_ResultFileIsOpen

## St7GetStaticRestartFile

---

### Description

Returns the name of the static restart file assigned for the analysis.

### Syntax

```
long St7GetStaticRestartFile(long uID, char* FileName, long  
                           MaxStringLen)
```

### Input Parameters

uID

Strand7 model file ID number.

MaxStringLen

Maximum number of characters allocated for FileName.

### Output Parameters

FileName

Full path and name for the static restart file.

### Errors

ERR7\_APINotInitialised, ERR7\_APINotLicensed,  
ERR7\_FileNotOpen, ERR7\_InvalidFileUnit, ERR7\_NoError

## St7SetDynamicRestartFile

---

### Description

Sets the name of the dynamic restart file for the analysis.

### Syntax

```
long St7SetDynamicRestartFile(long uID, char* FileName)
```

## **Input Parameters**

uID

Strand7 model file ID number.

FileName

Full path and name for the dynamic restart file.

## **Errors**

ERR7\_APINotInitialised, ERR7\_APINotLicensed,  
ERR7\_FileNotOpen, ERR7\_InvalidFileUnit, ERR7\_NoError,  
ERR7\_ResultFileIsOpen

# **St7GetDynamicRestartFile**

---

## **Description**

Returns the name of the dynamic restart file assigned to the analysis.

## **Syntax**

```
long St7GetDynamicRestartFile(long uID, char* FileName,  
                           long MaxStringLen)
```

## **Input Parameters**

uID

Strand7 model file ID number.

MaxStringLen

Maximum number of characters allocated for FileName.

## **Output Parameters**

FileName

Full path and name for the dynamic restart file.

## **Errors**

ERR7\_APINotInitialised, ERR7\_APINotLicensed,  
ERR7\_FileNotOpen, ERR7\_InvalidFileUnit, ERR7\_NoError

---

## St7SetQuasiStaticRestartFile

---

### Description

Sets the name of the quasi-static restart file for the analysis.

### Syntax

```
long St7SetQuasiStaticRestartFile(long uID, char* FileName)
```

### Input Parameters

uID

Strand7 model file ID number.

FileName

Full path and name for the quasi-static restart file.

### Errors

```
ERR7_APINotInitialised, ERR7_APINotLicensed,  
ERR7_FileNotOpen, ERR7_InvalidFileUnit, ERR7_NoError,  
ERR7_ResultFileIsOpen
```

---

## St7GetQuasiStaticRestartFile

---

### Description

Gets the name of the quasi-static restart file for the analysis.

### Syntax

```
long St7GetQuasiStaticRestartFile(long uID, char* FileName,  
                                long MaxStringLen)
```

### Input Parameters

uID

Strand7 model file ID number.

MaxStringLen

Maximum number of characters allocated for FileName.

### Output Parameters

FileName

Full path and name for the quasi-static restart file.

## Errors

ERR7\_APINotInitialised, ERR7\_APINotLicensed,  
ERR7\_FileNotOpen, ERR7\_InvalidFileUnit, ERR7\_NoError

## St7SetNodeHistoryFile

---

### Description

Sets the name of the node history file for the analysis.

### Syntax

```
long St7SetNodeHistoryFile(long uID, char* FileName)
```

### Input Parameters

uID

Strand7 model file ID number.

FileName

Full path and name for the node history file.

### Errors

ERR7\_APINotInitialised, ERR7\_APINotLicensed,  
ERR7\_FileNotOpen, ERR7\_InvalidFileUnit, ERR7\_NoError,  
ERR7\_ResultFileIsOpen

## St7GetNodeHistoryFile

---

### Description

Gets the name of the node history file for the analysis.

### Syntax

```
long St7GetNodeHistoryFile(long uID, char* FileName, long  
MaxStringLen)
```

### Input Parameters

uID

Strand7 model file ID number.

MaxStringLen

Maximum number of characters allocated for FileName.

---

## **Output Parameters**

FileName

Full path and name for the node history file.

## **Errors**

ERR7\_APINotInitialised, ERR7\_APINotLicensed,  
ERR7\_FileNotOpen, ERR7\_InvalidFileUnit, ERR7\_NoError

---

## **St7EnableSaveRestart**

### **Description**

Enables the **Save Restart** option for the analysis.

### **Syntax**

```
long St7EnableSaveRestart(long uID)
```

### **Input Parameters**

uID

Strand7 model file ID number.

### **Errors**

ERR7\_APINotInitialised, ERR7\_APINotLicensed,  
ERR7\_FileNotOpen, ERR7\_InvalidFileUnit, ERR7\_NoError,  
ERR7\_ResultFileIsOpen

---

## **St7DisableSaveRestart**

### **Description**

Disables the **Save Restart** option for the analysis.

### **Syntax**

```
long St7DisableSaveRestart(long uID)
```

### **Input Parameters**

uID

Strand7 model file ID number.

## Errors

ERR7\_APINotInitialised, ERR7\_APINotLicensed,  
ERR7\_FileNotOpen, ERR7\_InvalidFileUnit, ERR7\_NoError,  
ERR7\_ResultFileIsOpen

# St7EnableSaveLastRestartStep

---

## Description

Enables the **Save Last Restart Step** option for the analysis.

## Syntax

```
long St7EnableSaveLastRestartStep(long uID)
```

## Input Parameters

uID

Strand7 model file ID number.

## Errors

ERR7\_APINotInitialised, ERR7\_APINotLicensed,  
ERR7\_FileNotOpen, ERR7\_InvalidFileUnit, ERR7\_NoError,  
ERR7\_ResultFileIsOpen

# St7DisableSaveLastRestartStep

---

## Description

Disables the **Save Last Restart Step** option for the analysis.

## Syntax

```
long St7DisableSaveLastRestartStep(long uID)
```

## Input Parameters

uID

Strand7 model file ID number.

## Errors

ERR7\_APINotInitialised, ERR7\_APINotLicensed,  
ERR7\_FileNotOpen, ERR7\_InvalidFileUnit, ERR7\_NoError,  
ERR7\_ResultFileIsOpen

---

## St7SetSolverDefaultsLogical

---

### Description

Sets a series of Boolean parameters for the analysis.

### Syntax

```
long St7SetSolverDefaultsLogical(long uID, long Parameter,  
                                bool pValue)
```

### Input Parameters

uID

Strand7 model file ID number.

Parameter

Solver logical parameter, see *Solver Options* for additional information.

pValue

Boolean value, either btTrue or btFalse.

### Errors

```
ERR7_APINotInitialised, ERR7_APINotLicensed,  
ERR7_FileNotOpen, ERR7_InvalidFileUnit,  
ERR7_InvalidSolverParameter, ERR7_NoError,  
ERR7_ResultFileIsOpen
```

## St7GetSolverDefaultsLogical

---

### Description

Returns the state assigned for a set of Boolean parameters for the analysis.

### Syntax

```
long St7GetSolverDefaultsLogical(long uID, long Parameter,  
                                bool* pValue)
```

### Input Parameters

uID

Strand7 model file ID number.

Parameter

Solver logical parameter, see *Solver Options* for additional information.

## Output Parameters

pValue

Boolean value, either btTrue or btFalse.

## Errors

ERR7\_APINotInitialised, ERR7\_APINotLicensed,  
ERR7\_FileNotOpen, ERR7\_InvalidFileUnit,  
ERR7\_InvalidSolverParameter, ERR7\_NoError

# St7SetSolverDefaultsInteger

---

## Description

Sets the integer solver default values.

## Syntax

```
long St7SetSolverDefaultsInteger(long uID, long Parameter,  
                                long pValue)
```

## Input Parameters

uID

Strand7 model file ID number.

Parameter

Solver integer parameter, see *Solver Options* for additional information.

pValue

Integer value.

## Errors

ERR7\_APINotInitialised, ERR7\_APINotLicensed,  
ERR7\_FileNotOpen, ERR7\_InvalidFileUnit,  
ERR7\_InvalidSolverParameter, ERR7\_NoError,  
ERR7\_ResultFileIsOpen

# St7GetSolverDefaultsInteger

---

## Description

Returns the value assigned to the integer solver defaults.

---

## Syntax

```
long St7GetSolverDefaultsInteger(long uID, long Parameter,  
                                long* pValue)
```

## Input Parameters

uID

Strand7 model file ID number.

Parameter

Solver integer parameter, see *Solver Options* for additional information.

## Output Parameters

pValue

Integer value.

## Errors

```
ERR7_APINotInitialised, ERR7_APINotLicensed,  
ERR7_FileNotOpen, ERR7_InvalidFileUnit,  
ERR7_InvalidSolverParameter, ERR7_NoError
```

---

## St7SetSolverDefaultsDouble

### Description

Sets the double solver default values.

### Syntax

```
long St7SetSolverDefaultsDouble(long uID, long Parameter,  
                                 double pValue)
```

### Input Parameters

uID

Strand7 model file ID number.

Parameter

Solver double parameter, see *Solver Options* for additional information.

pValue

Double value.

## Errors

```
ERR7_APINotInitialised, ERR7_APINotLicensed,  
ERR7_FileNotOpen, ERR7_InvalidFileUnit,  
ERR7_InvalidSolverParameter, ERR7_NoError,  
ERR7_ResultFileIsOpen
```

# St7GetSolverDefaultsDouble

---

## Description

Returns the value assigned to the double solver defaults.

## Syntax

```
long St7GetSolverDefaultsDouble(long uID, long Parameter,  
                               double* pValue)
```

## Input Parameters

uID

Strand7 model file D number.

Parameter

Solver double parameter, see *Solver Options* for additional information.

## Output Parameters

pValue

Double value.

## Errors

```
ERR7_APINotInitialised, ERR7_APINotLicensed,  
ERR7_FileNotOpen, ERR7_InvalidFileUnit,  
ERR7_InvalidSolverParameter, ERR7_NoError
```

# Solve

## St7RunSolver

### Description

Launches the specified Strand7 solver. All Strand7 solvers run as a separate process to the calling application.

### Syntax

```
long St7RunSolver(long uID, long Solver, long Mode, long Wait)
```

### Input Parameters

uID

Strand7 model file ID number.

Solver

Solver type, one of stLinearStaticSolver, stLinearBucklingSolver, stNonlinearStaticSolver, stNaturalFrequencySolver, stHarmonicResponseSolver, stSpectralResponseSolver, stLinearTransientDynamicSolver, stNonlinearTransientDynamicSolver, stSteadyHeatSolver, stTransientHeatSolver, stLoadInfluenceSolver, stQuasiStaticSolver.

Mode

Solver progress mode, one of smNormalRun, smNormalCloseRun, smProgressRun or smBackgroundRun. See *Solver Options* for more information.

Wait

Solver execution mode. If this option is set to btTrue execution of the caller will be halted until the solve is complete. If this option is set to btFalse execution of the caller will continue and the solver will run independently.

### Errors

ERR7\_APINotInitialised, ERR7\_APINotLicensed,  
ERR7\_FileNotOpen, ERR7\_InvalidFileUnit,  
ERR7\_InvalidSolverMode, ERR7\_NoError, ERR7\_ResultFileIsOpen,  
ERR7\_UnknownError, ERR7\_UnknownSolver

## St7RunSolverProcess

---

### Description

Launches the specified Strand7 solver and returns the ID number for the new process created. All Strand7 solvers run as a separate process to the calling application.

### Syntax

```
long St7RunSolverProcess(long uID, long Solver, long Mode,  
                           long Wait, long* ProcessID)
```

### Input Parameters

uID

Strand7 model file ID number.

Solver

Solver type, one of stLinearStaticSolver, stLinearBucklingSolver, stNonlinearStaticSolver, stNaturalFrequencySolver, stHarmonicResponseSolver, stSpectralResponseSolver, stLinearTransientDynamicSolver, stNonlinearTransientDynamicSolver, stSteadyHeatSolver, stTransientHeatSolver, stLoadInfluenceSolver, stQuasiStaticSolver.

Mode

Solver progress mode, one of smNormalRun, smNormalCloseRun, smProgressRun or smBackgroundRun. See *Solver Options* for more information.

Wait

Solver execution mode. If this option is set to btTrue execution of the caller will be halted until the solve is complete. If this option is set to btFalse execution of the calling code will continue and the solver will run independently.

### Output Parameters

ProcessID

ID number for the solver process.

### Errors

ERR7\_APINotInitialised, ERR7\_APINotLicensed,  
ERR7\_FileNotOpen, ERR7\_InvalidFileUnit,

---

```
ERR7_InvalidSolverMode, ERR7_NoError, ERR7_ResultFileIsOpen,  
ERR7_UnknownError, ERR7_UnknownSolver
```

## St7CheckSolverRunning

---

### Description

Returns the execution state for the specified solver process.

### Syntax

```
long St7CheckSolverRunning(long ProcessID, bool* IsRunning)
```

### Input Parameters

ProcessID

Solver process ID number.

### Output Parameters

IsRunning

btTrue if the solver process is currently executing.

### Errors

ERR7\_NoError

## Results

### St7GetResultCaseName

---

#### Description

Returns the name of the specified result case in the result file currently open.

#### Syntax

```
long St7GetResultCaseName(long uID, long CaseNum, char*  
CaseName, long MaxStringLen)
```

#### Input Parameters

uID

Strand7 model file ID number.

CaseNum

Result case number.

MaxStringLen

Maximum number of characters allocated for CaseName.

#### Output Parameters

CaseName

Result case name.

#### Errors

```
ERR7_APINotInitialised, ERR7_APINotLicensed,  
ERR7_ExceededResultCase, ERR7_FileNotOpen,  
ERR7_InvalidFileUnit, ERR7_NoError, ERR7_ResultFileNotOpen
```

### St7GetResultFreedomCaseName

---

#### Description

Returns the name of the freedom case in the result file currently open.

#### Syntax

```
long St7GetResultFreedomCaseName(long uID, char* CaseName,  
long MaxStringLen)
```

---

## **Input Parameters**

uID

Strand7 model file ID number.

MaxStringLen

Maximum number of characters allocated for CaseName.

## **Output Parameters**

CaseName

Result freedom case name.

## **Errors**

ERR7\_APINotInitialised, ERR7\_APINotLicensed,  
ERR7\_FileNotOpen, ERR7\_InvalidFileUnit, ERR7\_NoError,  
ERR7\_ResultFileNotOpen

---

## **St7GetResultCaseConvergence**

### **Description**

Returns the convergence of the specified result case in the result file currently open.

### **Syntax**

```
long St7GetResultCaseConvergence(long uID, long CaseNum,  
                                bool* Converged)
```

## **Input Parameters**

uID

Strand7 model file ID number.

CaseNum

Result case number.

## **Output Parameters**

Converged

btTrue if the specified result case is converged.

## Errors

```
ERR7_ExceededResultCase, ERR7_FileNotOpen,  
ERR7_IncompatibleResultFile, ERR7_InvalidFileUnit,  
ERR7_NoError, ERR7_ResultFileNotOpen
```

# St7GetResultCaseTime

---

## Description

Returns the integration time for the specified result case in the result file currently open.

## Syntax

```
long St7GetResultCaseTime(long uID, long CaseNum, double*  
Time)
```

## Input Parameters

uID

Strand7 model file ID number.

CaseNum

Result case number.

## Output Parameters

Time

Integration time.

## Errors

```
ERR7_ExceededResultCase, ERR7_FileNotOpen,  
ERR7_IncompatibleResultFile, ERR7_InvalidFileUnit,  
ERR7_NoError, ERR7_ResultFileNotOpen
```

# St7GetResultCaseFactor

---

## Description

Returns a context dependent factor relevant to the opened result file.

## Syntax

```
long St7GetResultCaseFactor(long uID, long CaseNum, double*  
Factor)
```

---

## **Input Parameters**

uID

Strand7 model file ID number.

CaseNum

Result case number.

## **Output Parameters**

Factor

The value of this output depends on the analysis that produced the results file.

Linear Static Analysis - undefined.

Linear Buckling Analysis - buckling factor for mode CaseNum.

Load Influence Analysis - undefined.

Nonlinear Static Analysis - the fractional substep when CaseNum is a substep, otherwise zero for complete steps.

Linear Transient Dynamic Analysis - integration time at CaseNum.

Quasi-Static Analysis - integration time at CaseNum.

Nonlinear Transient Dynamic Analysis - integration time at CaseNum.

Natural Frequency Analysis - undefined.

Harmonic Response Analysis - frequency (Hz) of applied load for CaseNum, when CaseNum is a harmonic result case. When a harmonic time history is generated, it is the time at CaseNum.

Spectral Response Analysis - returns the natural frequency (Hz) of the mode from which the Spectral response arises when CaseNum is not combined;  
-1.0 when CaseNum is an SRSS combination;  
-2.0 when CaseNum is a CQC combination;  
-3.0 when CaseNum has been generated as any other combination.

Steady State Heat Analysis - undefined.

Transient Heat Analysis - integration time at CaseNum.

## Errors

```
ERR7_ExceededResultCase, ERR7_FileNotOpen,  
ERR7_IncompatibleResultFile, ERR7_InvalidFileUnit,  
ERR7_NoError, ERR7_ResultFileNotOpen
```

# St7GetFrequency

---

## Description

Returns the frequency for the specified results case.

## Syntax

```
long St7GetFrequency(long uID, long Mode, double* Freq)
```

## Input Parameters

uID

Strand7 model file ID number.

Mode

Result case/mode number.

## Output Parameters

Freq

Mode frequency (Hz).

## Errors

```
ERR7_ExceededResultCase, ERR7_FileNotOpen,  
ERR7_IncompatibleResultFile, ERR7_InvalidFileUnit,  
ERR7_NoError, ERR7_ResultFileNotOpen
```

# St7GetInertiaReliefResults

---

## Description

Returns the inertial results for the specified result case in inertial relief.

## Syntax

```
long St7GetInertiaReliefResults(long uID, long CaseNum,  
double* InertiaRes)
```

## Input Parameters

uID

---

Strand7 model file ID number.

CaseNum

Result case number.

## Output Parameters

InertiaRes[0..11]

[ipMassXIRA] - Mass component in the global X direction.

[ipMassYIRA] - Mass component in the global Y direction.

[ipMassZIRA] - Mass component in the global Z direction.

[ipXcIRA] - Global X ordinate of the centre of mass.

[ipYcIRA] - Global Y ordinate of the centre of mass.

[ipZcIRA] - Global Z ordinate of the centre of mass.

[ipAccXIRA] - Translational acceleration of the centre of mass in the global X direction.

[ipAccYIRA] - Translational acceleration of the centre of mass in the global Y direction.

[ipAccZIRA] - Translational acceleration of the centre of mass in the global Z direction.

[ipAngAccXIRA] - Rotational acceleration about the global X axis in degrees/(time<sup>2</sup>).

[ipAngAccYIRA] - Rotational acceleration about the global Y axis in degrees/(time<sup>2</sup>).

[ipAngAccZIRA] - Rotational acceleration about the global Z axis in degrees/(time<sup>2</sup>).

## Errors

ERR7\_ExceededResultCase, ERR7\_ResultCaseNotInertiaRelief,  
ERR7\_FileNotOpen, ERR7\_IncompatibleResultFile,  
ERR7\_InvalidFileUnit, ERR7\_NoError, ERR7\_ResultFileNotOpen

## St7GetModalResultsNFA

---

### Description

Returns the modal results from a natural frequency analysis for the specified mode.

### Syntax

```
long St7GetModalResultsNFA(long uID, long Mode, double*  
    ModalRes)
```

### Input Parameters

uID

Strand7 model file ID number.

Mode

Result case/mode number.

### Output Parameters

ModalRes [0..9]

[ipFrequencyNFA] - Mode frequency (Hz).

[ipModalMassNFA] - Modal mass.

[ipModalStiffNFA] - Modal stiffness.

[ipModalDampNFA] - Modal damping.

[ipModalTMassP1] - Translational Mass Participation - first direction or total participation when not Global.

[ipModalTMassP2] - Translational Mass Participation - second direction or zero when not Global.

[ipModalTMassP3] - Translational Mass Participation - third direction or zero when not Global.

[ipModalRMassP1] - Rotational Mass Participation - first direction or zero when not Global.

[ipModalRMassP2] - Rotational Mass Participation - second direction or zero when not Global.

---

[ ipModalRMassP3 ] - Rotational Mass Participation - third direction or zero when not Global.

### Errors

```
ERR7_ExceededResultCase, ERR7_FileNotOpen,  
ERR7_IncompatibleResultFile, ERR7_InvalidFileUnit,  
ERR7_NoError, ERR7_ResultFileNotOpen
```

## St7GetBuckFactor

---

### Description

Returns the buckling factor for the specified result case.

### Syntax

```
long St7GetBuckFactor(long uID, long Mode, double* Fact)
```

### Input Parameters

uID

Strand7 model file ID number.

Mode

Result case/mode number.

### Output Parameters

Fact

Buckling factor.

### Errors

```
ERR7_ExceededResultCase, ERR7_FileNotOpen,  
ERR7_IncompatibleResultFile, ERR7_InvalidFileUnit,  
ERR7_NoError, ERR7_ResultFileNotOpen
```

## St7GetNodeResult

---

### Description

Returns the specified nodal result quantity in the Global Cartesian coordinate system.

## Syntax

```
long St7GetNodeResult(long uID, long ResultType, long  
NodeNum, long ResultCase, double* NodeRes)
```

## Input Parameters

uID

Strand7 model file ID number.

ResultType

Nodal result quantity, see *Node Results* for additional information.

NodeNum

Node number.

ResultCase

Result case number.

## Output Parameters

NodeRes [0..5]

A 6 element array containing the nodal results. See *Node Results* for additional information.

## Errors

```
ERR7_APINotInitialised, ERR7_APINotLicensed,  
ERR7_ExceededResultCase, ERR7_ExceededTotal,  
ERR7_FileNotOpen, ERR7_InvalidEntityNumber,  
ERR7_InvalidFileUnit, ERR7_NoError, ERR7_ResultFileNotOpen,  
ERR7_ResultQuantityNotAvailable, ERR7_UnknownResultType,  
ERR7_UnknownUCS
```

# St7GetNodeResultUCS

---

## Description

Returns the specified nodal result in a UCS.

## Syntax

```
long St7GetNodeResultUCS(long uID, long ResultType, long  
UCSID, long NodeNum, long ResultCase, double* NodeRes)
```

---

## **Input Parameters**

`uID`

Strand7 model file ID number.

`ResultType`

Nodal result quantity, see *Node Results* for additional information.

`UCSID`

UCS ID number.

`NodeNum`

Node number.

`ResultCase`

Result case number.

## **Output Parameters**

`NodeRes [0..5]`

A 6 element array containing the nodal results. See *Node Results* for additional information.

## **Errors**

`ERR7_APINotInitialised`, `ERR7_APINotLicensed`,  
`ERR7_ExceededResultCase`, `ERR7_ExceededTotal`,  
`ERR7_FileNotOpen`, `ERR7_InvalidEntityNumber`,  
`ERR7_InvalidFileUnit`, `ERR7_NoError`, `ERR7_ResultFileNotOpen`,  
`ERR7_ResultQuantityNotAvailable`, `ERR7_UnknownResultType`,  
`ERR7_UncorrectedUCS`

---

## **St7GetBeamResultArray**

### **Description**

Returns the specified beam result quantity at several stations along the length of the beam. Additional stations are inserted to ensure that the maximum/minimum results are captured.

### **Syntax**

```
long St7GetBeamResultArray(long uID, long ResultType, long  
ResultSubType, long BeamNum, long MinStations, long
```

```
ResultCase, long* NumStations, long* NumColumns,
double* BeamPos, double* BeamRes)
```

### **Input Parameters**

`uID`

Strand7 model file ID number.

`ResultType`

Beam result quantity, see *Beam Results* for additional information.

`ResultSubType`

Beam result sub-type, see *Beam Results* for additional information.

`BeamNum`

Beam number.

`MinStations`

Minimum number of stations required.

`ResultCase`

Result case number.

### **Output Parameters**

`NumStations`

Number of stations used.

`NumColumns`

Number of result quantities returned at each station.

`BeamPos [0 .. kMaxBeamResult-1]`

[0 .. NumStations-1] - an array of positions of the beam stations measured along the element from End1. Positions vary between zero and the length of the element.

`BeamRes [0 .. kMaxBeamResult-1]`

[0 .. NumStations\*NumColumns-1] - an array containing the beam results at each station.

The results are returned in blocks of length NumColumns with the start of the  $i^{\text{th}}$  block for the  $i^{\text{th}}$  station at `BeamRes [(i-1) * NumColumns]`.

---

See *Beam Results* for additional information.

## Errors

```
ERR7_APINotInitialised, ERR7_APINotLicensed,  
ERR7_ExceededResultCase, ERR7_ExceededTotal,  
ERR7_FileNotOpen, ERR7_InvalidEntityNumber,  
ERR7_InvalidFileUnit, ERR7_InvalidResultType, ERR7_NoError,  
ERR7_ResultFileNotOpen, ERR7_ResultQuantityNotAvailable,  
ERR7_TooManyBeamStations, ERR7_UnknownResultType
```

# St7GetBeamResultArrayPos

---

## Description

Returns the specified beam results at a series of positions along the length of the beam.

## Syntax

```
long St7GetBeamResultArrayPos(long uID, long ResultType,  
                             long ResultSubType, long BeamNum, long ResultCase,  
                             long NumStations, double* BeamPos, long* NumColumns,  
                             double* BeamRes)
```

## Input Parameters

uID

Strand7 model file ID number.

ResultType

Beam result quantity, see *Beam Results* for additional information.

ResultSubType

Beam result sub-type, see *Beam Results* for additional information.

BeamNum

Beam number.

ResultCase

Result case number.

NumStations

Number of stations specified.

## Results

---

BeamPos [0 .. kMaxBeamResult-1]

[0 .. NumStations-1] - an array of positions of the beam stations measured along the element from End1. Positions vary between zero and the length of the element.

### Output Parameters

NumColumns

Number of result quantities returned at each station.

BeamRes [0 .. kMaxBeamResult-1]

[0 .. NumStations\*NumColumns-1] - an array containing the beam results at each station.

The results are returned in blocks of length NumColumns with the start of the  $i^{\text{th}}$  block for the  $i^{\text{th}}$  station at BeamRes [ $(i-1) * \text{NumColumns}$ ].

See *Beam Results* for additional information.

### Errors

ERR7\_APINotInitialised, ERR7\_APINotLicensed,  
ERR7\_ExceededResultCase, ERR7\_ExceededTotal,  
ERR7\_FileNotOpen, ERR7\_InvalidEntityNumber,  
ERR7\_InvalidFileUnit, ERR7\_InvalidResultType, ERR7\_NoError,  
ERR7\_ResultFileNotOpen, ERR7\_ResultQuantityNotAvailable,  
ERR7\_TooManyBeamStations, ERR7\_UnknownResultType

## St7GetBeamResultEndPos

---

### Description

Returns the specified beam result at the beam endpoints.

### Syntax

```
long St7GetBeamResultEndPos(long uID, long ResultType, long  
    ResultSubType, long BeamNum, long ResultCase, long*  
    NumColumns, double* BeamRes)
```

### Input Parameters

uID

Strand7 model file ID number.

ResultType

---

Beam result quantity, see *Beam Results* for additional information.

ResultSubType

Beam result sub-type, see *Beam Results* for additional information.

BeamNum

Beam number.

ResultCase

Result case number.

## Output Parameters

NumColumns

Number of result quantities returned at each endpoint.

BeamRes [0 .. kMaxBeamResult-1]

[0 .. NumColumns-1] - a block of results for End1.

[NumColumns .. 2\*NumColumns-1] - a block of results for End2.

See *Beam Results* for additional information.

## Errors

ERR7\_APINotInitialised, ERR7\_APINotLicensed,  
ERR7\_DataNotFound, ERR7\_ExceededResultCase,  
ERR7\_ExceededTotal, ERR7\_FileNotOpen, ERR7\_InvalidEntity,  
ERR7\_InvalidEntityNumber, ERR7\_InvalidFileUnit,  
ERR7\_NoError, ERR7\_ResultFileNotOpen,  
ERR7\_ResultQuantityNotAvailable, ERR7\_TooManyBeamStations,  
ERR7\_UnknownResultType

## St7GetBeamResultSinglePos

---

### Description

Returns the specified beam result at a single position along the length of the beam.

### Syntax

```
long St7GetBeamResultSinglePos(long uID, long ResultType,  
                           long ResultSubType, long BeamNum, long ResultCase,  
                           double Position, long* NumColumns, double* BeamRes)
```

### Input Parameters

uID

Strand7 model file ID number.

ResultType

Beam result quantity, see *Beam Results* for additional information.

ResultSubType

Beam result sub-type, see *Beam Results* for additional information.

BeamNum

Beam number.

ResultCase

Result case number.

Position

The position of the beam station measured along the element from End1.

Positions vary between zero and the length of the element.

### Output Parameters

NumColumns

Number of result quantities returned at the specified Position.

BeamRes [0 .. kMaxBeamResult-1]

[0 .. NumColumns-1] - a block of results at the specified Position.

See *Beam Results* for additional information.

### Errors

ERR7\_APINotInitialised, ERR7\_APINotLicensed,  
ERR7\_ExceededResultCase, ERR7\_ExceededTotal,  
ERR7\_FileNotOpen, ERR7\_InvalidEntityNumber,  
ERR7\_InvalidFileUnit, ERR7\_InvalidResultType, ERR7\_NoError,  
ERR7\_ResultFileNotOpen, ERR7\_ResultQuantityNotAvailable,  
ERR7\_TooManyBeamStations, ERR7\_UnknownResultType

---

# St7GetBeamReleaseResult

---

## Description

Returns the release results for the specified beam.

## Syntax

```
long St7GetBeamReleaseResult(long uID, long BeamNum, long  
ResultCase, bool* BeamReleased, double* ReleaseValue)
```

## Input Parameters

uID

Strand7 model file ID number.

BeamNum

Beam number.

ResultCase

Result case number.

## Output Parameters

BeamReleased [0..kMaxBeamRelease-1]

An array containing the release status for the beam ends according to the local 123456 axis system for translational and rotational DoF.

Values set to btTrue indicate a release for the corresponding DoF.

[0..5] - release conditions for End1.

[6..11] - release conditions for End2.

ReleaseValue [0..kMaxBeamRelease-1]

An array containing the displacement results for the released beam end DoF.

The same format as the BeamReleased array is used.

## Errors

ERR7\_APINotInitialised, ERR7\_APINotLicensed,  
ERR7\_ExceededResultCase, ERR7\_ExceededTotal,  
ERR7\_FileNotOpen, ERR7\_InvalidEntityNumber,  
ERR7\_InvalidFileUnit, ERR7\_NoError, ERR7\_ResultFileNotOpen

## St7GetPlateResultArray

---

### Description

Returns the specified plate results at a series of sample locations on the element.

### Syntax

```
long St7GetPlateResultArray(long uID, long ResultType, long  
ResultSubType, long PlateNum, long ResultCase, long  
SampleLocation, long Surface, long Layer, long*  
NumPoints, long* NumColumns, double* PlateResult)
```

### Input Parameters

uID

Strand7 model file ID number.

ResultType

Plate result quantity, see *Plate Results* for additional information.

ResultSubType

Plate result sub-type, see *Plate Results* for additional information.

PlateNum

Plate number.

ResultCase

Result case number.

SampleLocation

Result sampling location, one of AtCentroid, AtGaussPoints,  
AtNodesAverageNever, AtNodesAverageAll or AtNodesAverageSame.

Surface

Plate surface, one of psPlateMidPlane, psPlateZPlus or psPlateZMinus.

Layer

Layer number for elements that reference a composite property or a plate  
reinforcement property, unused for other property types.

### Output Parameters

NumPoints

---

Number of sample locations used.

NumColumns

Number of result quantities returned at each sample location.

PlateResult [0..kMaxPlateResult-1]

[0..NumPoints\*NumColumns-1] - An array containing the plate results at each sample location.

The results are returned in blocks of length NumColumns, with the start of the  $i^{\text{th}}$  block for the  $i^{\text{th}}$  location at  $\text{PlateResult}[(i-1) * \text{NumColumns}]$ .

See *Plate Results* for additional information.

## Errors

ERR7\_APINotInitialised, ERR7\_APINotLicensed,  
ERR7\_DataNotFound, ERR7\_ExceededResultCase,  
ERR7\_ExceededTotal, ERR7\_FileNotOpen, ERR7\_InvalidEntity,  
ERR7\_InvalidEntityNumber, ERR7\_InvalidFileUnit,  
ERR7\_NoError, ERR7\_PlyDoesNotExist, ERR7\_ResultFileNotOpen,  
ERR7\_ResultQuantityNotAvailable, ERR7\_UnknownProperty,  
ERR7\_UnknownResultLocation, ERR7\_UnknownResultType,  
ERR7\_UnknownSubType, ERR7\_UnknownSurfaceLocation,  
ERR7\_UnknownUCS

# St7SetPlateResultMaxJunctionAngle

---

## Description

Sets the maximum junction angle used when calculating averaged plate results.

## Syntax

```
long St7SetPlateResultMaxJunctionAngle(long uID, double  
MaxJunctionAngle)
```

## Input Parameters

uID

Strand7 model file ID number.

MaxJunctionAngle

Maximum allowable angle between adjacent plate surfaces.

## Errors

ERR7\_APINotInitialised, ERR7\_APINotLicensed,  
ERR7\_FileNotOpen, ERR7\_InvalidFileUnit, ERR7\_NoError

# St7GetPlateResultMaxJunctionAngle

---

## Description

Returns the maximum junction angle used when calculating averaged plate results.

## Syntax

```
long St7GetPlateResultMaxJunctionAngle(long uID, double*  
                                      MaxJunctionAngle)
```

## Input Parameters

uID

Strand7 model file ID number.

## Output Parameters

MaxJunctionAngle

Maximum allowable angle between adjacent plate surfaces.

## Errors

ERR7\_APINotInitialised, ERR7\_APINotLicensed,  
ERR7\_FileNotOpen, ERR7\_InvalidFileUnit, ERR7\_NoError

# St7SetPlateResultUserEquation

---

## Description

Assigns a user defined equation for plate results. The calculated results can be accessed using the *St7GetPlateResultArray* function.

## Syntax

```
long St7SetPlateResultUserEquation(long uID, char* Equation,  
                                    long TrigType)
```

## Input Parameters

uID

Strand7 model file ID number.

---

### Equation

User defined equation as a character array. See *User Defined Results* for additional information.

### TrigType

Type of angle arguments, either ipRadian or ipDegree.

### Errors

ERR7\_APINotInitialised, ERR7\_APINotLicensed,  
ERR7\_FileNotOpen, ERR7\_InvalidFileUnit,  
ERR7\_InvalidTrigType, ERR7\_InvalidUserEquation,  
ERR7\_NoError

## St7GetPlateResultUserEquation

---

### Description

Returns the user defined equation assigned for plate results. The calculated results can be accessed using the *St7GetPlateResultArray* function.

### Syntax

```
long St7GetPlateResultUserEquation(long uID, char* Equation,  
                                long MaxStringLen, long* TrigType)
```

### Input Parameters

#### uID

Strand7 model file ID number.

#### MaxStringLen

Maximum number of characters allocated for Equation.

### Output Parameters

#### Equation

User defined equation as a character array. See *User Defined Results* for additional information.

#### TrigType

Type of angle arguments, either ipRadian or ipDegree.

## Errors

```
ERR7_APINotInitialised, ERR7_APINotLicensed,  
ERR7_FileNotOpen, ERR7_InvalidFileUnit, ERR7_NoError
```

# St7GetPlateResultGaussPoints

---

## Description

Returns the position of the result Gauss points for the specified plate.

## Syntax

```
long St7GetPlateResultGaussPoints(long uID, long PlateNum,  
                                long ResultCase, long* NumGauss, double* Doubles)
```

## Input Parameters

uID

Strand7 model file ID number.

PlateNum

Plate number.

ResultCase

Result case number.

## Output Parameters

NumGauss

Number of Gauss points.

Doubles [0..26]

[0..3\*NumGauss-1] - An array containing the XYZ position of the result Gauss points in the Global Cartesian coordinate system. The positions are returned in blocks of length 3, with the position of the  $i^{\text{th}}$  point starting at Doubles [(i-1)\*3].

## Errors

```
ERR7_APINotInitialised, ERR7_APINotLicensed,  
ERR7_DataNotFound, ERR7_ExceededResultCase,  
ERR7_ExceededTotal, ERR7_FileNotOpen,  
ERR7_InvalidEntityNumber, ERR7_InvalidFileUnit,  
ERR7_InvalidResultType, ERR7_NoError,  
ERR7_ResultFileNotOpen
```

---

# St7GetBrickResultArray

---

## Description

Returns the specified brick results at series of sample locations in the element.

## Syntax

```
long St7GetBrickResultArray(long uID, long ResultType, long  
    ResultSubType, long BrickNum, long ResultCase, long  
    SampleLocation, long* NumPoints, long* NumColumns,  
    double* BrickRes)
```

## Input Parameters

uID

Strand7 model file ID number.

ResultType

Brick result quantity, see *Brick Results* for additional information.

ResultSubType

Brick result sub-type, see *Brick Results* for additional information.

BrickNum

Brick number.

ResultCase

Result case number.

SampleLocation

Result sampling location, one of AtCentroid, AtGaussPoints,  
AtNodesAverageNever, AtNodesAverageAll or AtNodesAverageSame.

## Output Parameters

NumPoints

Number of sampling points used.

NumColumns

Number of result quantities returned at each sample location.

BrickRes [0 .. kMaxBrickResult-1]

## Results

---

[0..NumPoints\*NumColumns-1] - An array containing the brick results at each sample location.

The results are returned in blocks of length NumColumns, with the start of the  $i^{\text{th}}$  block for the  $i^{\text{th}}$  location at BrickResult[ $(i-1) * \text{NumColumns}$ ].

See [Brick Results](#) for additional information.

## Errors

ERR7\_APINotInitialised, ERR7\_APINotLicensed,  
ERR7\_ExceededResultCase, ERR7\_ExceededTotal,  
ERR7\_FileNotOpen, ERR7\_InvalidEntityNumber,  
ERR7\_InvalidFileUnit, ERR7\_NoError, ERR7\_ResultFileNotOpen,  
ERR7\_ResultQuantityNotAvailable, ERR7\_UnknownResultLocation,  
ERR7\_UnknownResultType, ERR7\_UnknownSubType,  
ERR7\_UnknownUCS

# St7SetBrickResultUserEquation

---

## Description

Assigns a user defined equation for brick results. The calculated results can be accessed using the [St7GetBrickResultArray](#) function.

## Syntax

```
long St7SetBrickResultUserEquation(long uID, char* Equation,  
                                long TrigType)
```

## Input Parameters

uID

Strand7 model file ID number.

Equation

User defined equation as a character array. See [User Defined Results](#) for additional information.

TrigType

Type of angle arguments, either ipRadian or ipDegree.

## Errors

ERR7\_APINotInitialised, ERR7\_APINotLicensed,  
ERR7\_FileNotOpen, ERR7\_InvalidFileUnit,

---

```
ERR7_InvalidTrigType, ERR7_InvalidUserEquation,  
ERR7_NoError
```

## St7GetBrickResultUserEquation

---

### Description

Returns the user defined equation assigned for brick results. The calculated results can be accessed using the *St7GetBrickResultArray* function.

### Syntax

```
long St7GetBrickResultUserEquation(long uID, char* Equation,  
                                long MaxStringLen, long* TrigType)
```

### Input Parameters

uID

Strand7 model file ID number.

MaxStringLen

Maximum number of characters allocated for Equation.

### Output Parameters

Equation

User defined equation as a character array. See *User Defined Results* for additional information.

TrigType

Type of angle arguments, either ipRadian or ipDegree.

### Errors

```
ERR7_APINotInitialised, ERR7_APINotLicensed,  
ERR7_FileNotOpen, ERR7_InvalidFileUnit, ERR7_NoError
```

## St7GetBrickResultGaussPoints

---

### Description

Returns the position of the result Gauss points for the specified brick.

### Syntax

```
long St7GetBrickResultGaussPoints(long uID, long BrickNum,  
                                    long ResultCase, long* NumGauss, double* Doubles)
```

### Input Parameters

uID

Strand7 model file ID number.

BrickNum

Brick number.

ResultCase

Result case number.

### Output Parameters

NumGauss

Number of Gauss points.

Doubles [0..80]

[0..3\*NumGauss-1] - An array containing the XYZ position of the result Gauss points in the Global Cartesian coordinate system. The positions are returned in blocks of length 3, with the position of the  $i^{\text{th}}$  point starting at Doubles [ (i-1) \*3 ].

### Errors

ERR7\_APINotInitialised, ERR7\_APINotLicensed,  
ERR7\_DataNotFound, ERR7\_ExceededResultCase,  
ERR7\_ExceededTotal, ERR7\_FileNotOpen,  
ERR7\_InvalidEntityNumber, ERR7\_InvalidFileUnit,  
ERR7\_InvalidResultType, ERR7\_NoError,  
ERR7\_ResultFileNotOpen

---

# Linear Load Case Combinations

## St7GetNumLSACombinations

---

### Description

Returns the number of linear load case combinations in the specified model.

### Syntax

```
long St7GetNumLSACombinations(long uID, long* NumCases)
```

### Input Parameters

uID

Strand7 model file ID number.

### Output Parameters

NumCases

Number of linear load case combinations.

### Errors

ERR7\_APINotInitialised, ERR7\_APINotLicensed,  
ERR7\_FileNotOpen, ERR7\_InvalidFileUnit, ERR7\_NoError

## St7SetLSACombinationName

---

### Description

Sets the name of the specified linear load case combination.

### Syntax

```
long St7SetLSACombinationName(long uID, long CaseNum, char*  
CaseName)
```

### Input Parameters

uID

Strand7 model file ID number.

CaseNum

Load case combination number.

CaseName

Name of the specified load case combination.

### Errors

ERR7\_APINotInitialised, ERR7\_APINotLicensed,  
ERR7\_FileNotOpen, ERR7\_InvalidCombinationCaseNumber,  
ERR7\_InvalidFileUnit, ERR7\_NoError

## St7GetLSACCombinationName

---

### Description

Returns the name of the specified linear load case combination.

### Syntax

```
long St7GetLSACCombinationName(long uID, long CaseNum, char*  
CaseName, long MaxStringLen)
```

### Input Parameters

uID

Strand7 model file ID number.

CaseNum

Load case combination number.

MaxStringLen

Maximum number of characters allocated for CaseName.

### Output Parameters

CaseName

Name of the specified load case combination.

### Errors

ERR7\_APINotInitialised, ERR7\_APINotLicensed,  
ERR7\_FileNotOpen, ERR7\_InvalidCombinationCaseNumber,  
ERR7\_InvalidFileUnit, ERR7\_NoError

## St7SetLSACCombinationSpectralName

---

### Description

Sets the spectral results filename to be used in linear load combination.

---

## Syntax

```
long St7SetLSACombinationSpectralName(long uID, char*  
FileName)
```

## Input Parameters

uID

Strand7 model file ID number.

FileName

Full path and name for the spectral results file.

## Errors

ERR7\_APINotInitialised, ERR7\_APINotLicensed,  
ERR7\_FileNotOpen, ERR7\_InvalidFileUnit, ERR7\_NoError,  
ERR7\_ResultFileIsOpen

---

## St7GetLSACombinationSpectralName

## Description

Returns the spectral results filename used in linear load combination.

## Syntax

```
long St7GetLSACombinationSpectralName(long uID, char*  
FileName, long MaxStringLen)
```

## Input Parameters

uID

Strand7 model file ID number.

MaxStringLen

Maximum number of characters allocated for FileName.

## Output Parameters

FileName

Full path and name for the spectral results file.

## Errors

ERR7\_APINotInitialised, ERR7\_APINotLicensed,  
ERR7\_FileNotOpen, ERR7\_InvalidFileUnit, ERR7\_NoError

## St7AddLSACombination

---

### Description

Adds a new linear load case combination to the specified model.

### Syntax

```
long St7AddLSACombination(long uID, char* IncName)
```

### Input Parameters

uID

Strand7 model file ID number.

IncName

Name of the load case combination.

### Errors

```
ERR7_APINotInitialised, ERR7_APINotLicensed,  
ERR7_FileNotOpen, ERR7_InvalidFileUnit, ERR7_NoError,  
ERR7_ResultFileIsOpen
```

## St7InsertLSACombination

---

### Description

Inserts a new linear load case combination at the specified position in the model.

### Syntax

```
long St7InsertLSACombination(long uID, long Pos, char*  
                             IncName)
```

### Input Parameters

uID

Strand7 model file ID number.

Pos

Load case combination number.

IncName

Name of the load case combination.

---

## Errors

```
ERR7_APINotInitialised, ERR7_APINotLicensed,  
ERR7_CombinationDoesNotExist, ERR7_FileNotOpen,  
ERR7_IncrementDoesNotExist, ERR7_InvalidFileUnit,  
ERR7_NoError, ERR7_ResultFileIsOpen
```

---

## St7DeleteLSACombination

### Description

Deletes the specified linear load case combination from the model.

### Syntax

```
long St7DeleteLSACombination(long uID, long Pos)
```

### Input Parameters

uID

Strand7 model file ID number.

Pos

Load case combination number.

### Errors

```
ERR7_APINotInitialised, ERR7_APINotLicensed,  
ERR7_CombinationDoesNotExist, ERR7_FileNotOpen,  
ERR7_IncrementDoesNotExist, ERR7_InvalidFileUnit,  
ERR7_NoError, ERR7_ResultFileIsOpen
```

---

## St7SetLSACombinationFactor

### Description

Sets the multiplying factor for the specified case in a linear load case combination.

### Syntax

```
long St7SetLSACombinationFactor(long uID, long LType, long  
Pos, long LCaseNum, long FCaseNum, double Factor)
```

### Input Parameters

uID

Strand7 model file ID number.

LType

Type of load case, one of ItLoadCase, ItSeismicCase or ItSpectralCase.

Pos

Load case combination number.

LCaseNum

Load, Seismic or Spectral case number.

FCaseNum

Freedom case number.

Factor

Factor value.

## Errors

ERR7\_APINotInitialised, ERR7\_APINotLicensed,  
ERR7\_CombinationDoesNotExist, ERR7\_FileNotOpen,  
ERR7\_InvalidFileUnit, ERR7\_InvalidFreedomCase,  
ERR7\_InvalidLoadCase, ERR7\_NoError, ERR7\_ResultFileIsOpen

## St7GetLSACombinationFactor

---

### Description

Returns the multiplying factor for the specified case in a linear load case combination.

### Syntax

```
long St7GetLSACombinationFactor(long uID, long LType, long  
Pos, long LCaseNum, long FCaseNum, double* Factor)
```

### Input Parameters

uID

Strand7 model file ID number.

LType

Type of load case, one of ItLoadCase, ItSeismicCase or ItSpectralCase.

Pos

---

Load case combination number.

LCaseNum

Load, Seismic or Spectral case number.

FCaseNum

Freedom case number.

### **Output Parameters**

Factor

Factor value.

### **Errors**

ERR7\_APINotInitialised, ERR7\_APINotLicensed,  
ERR7\_CombinationDoesNotExist, ERR7\_FileNotOpen,  
ERR7\_InvalidFileUnit, ERR7\_InvalidFreedomCase,  
ERR7\_InvalidLoadCase, ERR7\_NoError

# Envelopes

## St7GetNumEnvelopes

### Description

Returns the number of envelopes in the specified model.

### Syntax

```
long St7GetNumEnvelopes(long uID, long* NumLimitEnvelopes,  
                           long* NumCombinationEnvelopes, long*  
                           NumFactorsEnvelopes)
```

### Input Parameters

uID

Strand7 model file ID number.

### Output Parameters

NumLimitEnvelopes

Number of limit envelopes.

NumCombinationEnvelopes

Number of combination envelopes.

NumFactorsEnvelopes

Number of factors envelopes.

### Errors

ERR7\_ExceededResultCase, ERR7\_FileNotOpen,  
ERR7\_InvalidFileUnit, ERR7\_NoError, ERR7\_ResultFileNotOpen

## St7AddLimitEnvelope

### Description

Adds a new limit envelope to the specified model.

### Syntax

```
long St7AddLimitEnvelope(long uID, long EnvType, char*  
                           EnvName)
```

---

## **Input Parameters**

uID

Strand7 model file ID number.

EnvType

Limit envelope type, one of etLimitEnvelopeAbs, etLimitEnvelopeMin or etLimitEnvelopeMax.

EnvName

Name of the envelope.

## **Errors**

ERR7\_ExceededMaxNumLimitEnvelopes, ERR7\_ExceededResultCase,  
ERR7\_FileNotOpen, ERR7\_InvalidFileUnit,  
ERR7\_InvalidLimitEnvelopeType, ERR7\_NoError,  
ERR7\_ResultFileNotOpen

---

## **St7InsertLimitEnvelope**

### **Description**

Inserts a new limit envelope at the specified position.

### **Syntax**

```
long St7InsertLimitEnvelope(long uID, long Envelope, long  
EnvType, char* EnvName)
```

## **Input Parameters**

uID

Strand7 model file ID number.

Envelope

Limit envelope number.

EnvType

Limit envelope type, one of etLimitEnvelopeAbs, etLimitEnvelopeMin or etLimitEnvelopeMax.

EnvName

Name of the envelope.

## Errors

```
ERR7_ExceededResultCase, ERR7_FileNotOpen,  
ERR7_InvalidFileUnit, ERR7_InvalidLimitEnvelope,  
ERR7_InvalidLimitEnvelopeType, ERR7_NoError,  
ERR7_ResultFileNotOpen
```

## St7DeleteLimitEnvelope

---

### Description

Deletes the specified limit envelope.

### Syntax

```
long St7DeleteLimitEnvelope(long uID, long Envelope)
```

### Input Parameters

uID

Strand7 model file ID number.

Envelope

Limit envelope number.

### Errors

```
ERR7_ExceededResultCase, ERR7_FileNotOpen,  
ERR7_InvalidFileUnit, ERR7_InvalidLimitEnvelope,  
ERR7_NoError, ERR7_ResultFileNotOpen
```

## St7EnableLimitEnvelopeCase

---

### Description

Enables the specified result case in a limit envelope. Only results from enabled result cases are included in the envelope.

### Syntax

```
long St7EnableLimitEnvelopeCase(long uID, long Envelope,  
                                long CaseNum)
```

### Input Parameters

uID

Strand7 model file ID number.

---

Envelope

Limit envelope number.

CaseNum

Result case number.

## Errors

ERR7\_APINotInitialised, ERR7\_APINotLicensed,  
ERR7\_DataNotFound, ERR7\_ExceededResultCase,  
ERR7\_FileNotOpen, ERR7\_InvalidFileUnit,  
ERR7\_InvalidLimitEnvelope, ERR7\_NoError,  
ERR7\_ResultFileNotOpen

# St7DisableLimitEnvelopeCase

---

## Description

Disables the specified result case in a limit envelope. Only results from enabled result cases are included in the envelope.

## Syntax

```
long St7DisableLimitEnvelopeCase(long uID, long Envelope,  
                                long CaseNum)
```

## Input Parameters

uID

Strand7 model file ID number.

Envelope

Limit envelope number.

CaseNum

Result case number to disable.

## Errors

ERR7\_APINotInitialised, ERR7\_APINotLicensed,  
ERR7\_DataNotFound, ERR7\_ExceededResultCase,  
ERR7\_FileNotOpen, ERR7\_InvalidFileUnit,  
ERR7\_InvalidLimitEnvelope, ERR7\_NoError,  
ERR7\_ResultFileNotOpen

## St7GetLimitEnvelopeCaseState

---

### Description

Returns the state of a specified result case in a limit envelope. Only results from enabled result cases are included in the envelope.

### Syntax

```
long St7GetLimitEnvelopeCaseState(long uID, long Envelope,  
                                long CaseNum, bool* State)
```

### Input Parameters

uID

Strand7 model file ID number.

Envelope

Limit envelope number.

CaseNum

Result case number.

### Output Parameters

State

btTrue if the specified result case is enabled.

### Errors

```
ERR7_APINotInitialised, ERR7_APINotLicensed,  
ERR7_DataNotFound, ERR7_ExceededResultCase,  
ERR7_FileNotOpen, ERR7_InvalidFileUnit,  
ERR7_InvalidLimitEnvelope, ERR7_NoError,  
ERR7_ResultFileNotOpen
```

## St7SetLimitEnvelopeData

---

### Description

Assigns the settings for a specified limit envelope.

### Syntax

```
long St7SetLimitEnvelopeData(long uID, long Envelope, long  
                           EnvType, char* EnvName)
```

---

## **Input Parameters**

uID

Strand7 model file ID number.

Envelope

Limit envelope number.

EnvType

Limit envelope type, one of etLimitEnvelopeAbs, etLimitEnvelopeMin or etLimitEnvelopeMax.

EnvName

Name of the envelope.

## **Errors**

ERR7\_DataNotFound, ERR7\_ExceededResultCase,  
ERR7\_FileNotOpen, ERR7\_InvalidFileUnit,  
ERR7\_InvalidLimitEnvelope, ERR7\_InvalidLimitEnvelopeType,  
ERR7\_NoError, ERR7\_ResultFileNotOpen

---

## **St7GetLimitEnvelopeData**

### **Description**

Returns the settings assigned to a specified limit envelope.

### **Syntax**

```
long St7GetLimitEnvelopeData(long uID, long Envelope, long*  
EnvType, char* EnvName, long MaxStringLen)
```

## **Input Parameters**

uID

Strand7 model file ID number.

Envelope

Limit envelope number.

MaxStringLen

Maximum number of characters allocated for EnvName.

## Output Parameters

EnvType

Limit envelope type, one of etLimitEnvelopeAbs, etLimitEnvelopeMin or etLimitEnvelopeMax.

EnvName

Name of the specified envelope.

## Errors

ERR7\_DataNotFound, ERR7\_ExceededResultCase,  
ERR7\_FileNotOpen, ERR7\_InvalidFileUnit,  
ERR7\_InvalidLimitEnvelope, ERR7\_NoError,  
ERR7\_ResultFileNotOpen

# St7AddCombinationEnvelope

---

## Description

Adds a new combination envelope to the specified model.

## Syntax

```
long St7AddCombinationEnvelope(long uID, long EnvType,  
                                char* EnvName)
```

## Input Parameters

uID

Strand7 model file ID number.

EnvType

Combination envelope type, either etCombEnvelopeMin or etCombEnvelopeMax.

EnvName

Name of the envelope.

## Errors

ERR7\_ExceededMaxNumCombEnvelopes, ERR7\_ExceededResultCase,  
ERR7\_FileNotOpen, ERR7\_InvalidCombEnvelopeType,  
ERR7\_InvalidFileUnit, ERR7\_NoError, ERR7\_ResultFileNotOpen

---

## St7InsertCombinationEnvelope

---

### Description

Inserts a new combination envelope at a specified position.

### Syntax

```
long St7InsertCombinationEnvelope(long uID, long Envelope,  
                                long EnvType, char* EnvName)
```

### Input Parameters

uID

Strand7 model file ID number.

Envelope

Combination envelope number.

EnvType

Combination envelope type, either etCombEnvelopeMin or  
etCombEnvelopeMax.

EnvName

Name of the envelope.

### Errors

```
ERR7_ExceededResultCase, ERR7_FileNotOpen,  
ERR7_InvalidCombEnvelope, ERR7_InvalidCombEnvelopeType,  
ERR7_InvalidFileUnit, ERR7_NoError, ERR7_ResultFileNotOpen
```

---

## St7DeleteCombinationEnvelope

---

### Description

Deletes the specified combination envelope.

### Syntax

```
long St7DeleteCombinationEnvelope(long uID, long Envelope)
```

### Input Parameters

uID

Strand7 model file ID number.

Envelope

Combination envelope number.

## Errors

ERR7\_ExceededResultCase, ERR7\_FileNotOpen,  
ERR7\_InvalidCombEnvelope, ERR7\_InvalidFileUnit,  
ERR7\_NoError, ERR7\_ResultFileNotOpen

# St7SetCombinationEnvelopeCase

---

## Description

Sets the state of a specified results case in a combination envelope.

## Syntax

```
long St7SetCombinationEnvelopeCase(long uID, long Envelope,
                                    long CaseNum, long State)
```

## Input Parameters

uID

Strand7 model file ID number.

Envelope

Combination envelope number.

CaseNum

Result case number.

State

State of the result case, one of esCombEnvelopeOn, esCombEnvelopeOff or  
esCombEnvelopeCheck.

## Errors

ERR7\_APINotInitialised, ERR7\_APINotLicensed,  
ERR7\_DataNotFound, ERR7\_ExceededResultCase,  
ERR7\_FileNotOpen, ERR7\_InvalidCombEnvelope,  
ERR7\_InvalidCombEnvelopeAccType, ERR7\_InvalidFileUnit,  
ERR7\_NoError, ERR7\_ResultFileNotOpen

---

## St7GetCombinationEnvelopeCase

---

### Description

Returns the state of a specified result case in a combination envelope.

### Syntax

```
long St7GetCombinationEnvelopeCase(long uID, long Envelope,  
                                long CaseNum, long* State)
```

### Input Parameters

uID

Strand7 model file ID number.

Envelope

Combination envelope number.

CaseNum

Result case number.

### Output Parameters

State

State of the result case, one of esCombEnvelopeOn, esCombEnvelopeOff or esCombEnvelopeCheck.

### Errors

ERR7\_APINotInitialised, ERR7\_APINotLicensed,  
ERR7\_DataNotFound, ERR7\_ExceededResultCase,  
ERR7\_FileNotOpen, ERR7\_InvalidCombEnvelope,  
ERR7\_InvalidFileUnit, ERR7\_NoError, ERR7\_ResultFileNotOpen

---

## St7SetCombinationEnvelopeData

---

### Description

Assigns the settings for a specified combination envelope.

### Syntax

```
long St7SetCombinationEnvelopeData(long uID, long Envelope,  
                                    long EnvType, char* EnvName)
```

## **Input Parameters**

uID

Strand7 model file ID number.

Envelope

Combination envelope number.

EnvType

Combination envelope type, either etCombEnvelopeMin or etCombEnvelopeMax.

EnvName

Name of the envelope.

## **Errors**

ERR7\_DataNotFound, ERR7\_ExceededResultCase,  
ERR7\_FileNotOpen, ERR7\_InvalidCombEnvelope,  
ERR7\_InvalidCombEnvelopeType, ERR7\_InvalidFileUnit,  
ERR7\_NoError, ERR7\_ResultFileNotOpen

# **St7GetCombinationEnvelopeData**

---

## **Description**

Returns the settings assigned to a specified combination envelope.

## **Syntax**

```
long St7GetCombinationEnvelopeData(long uID, long Envelope,  
                                long* EnvType, char* EnvName, long MaxStringLen)
```

## **Input Parameters**

uID

Strand7 model file ID number.

Envelope

Combination envelope number.

MaxStringLen

Maximum number of characters allocated for EnvName.

---

## **Output Parameters**

EnvType

Combination envelope type, either etCombEnvelopeMin or etCombEnvelopeMax.

EnvName

Name of the envelope.

## **Errors**

ERR7\_DataNotFound, ERR7\_ExceededResultCase,  
ERR7\_FileNotOpen, ERR7\_InvalidCombEnvelope,  
ERR7\_InvalidFileUnit, ERR7\_NoError, ERR7\_ResultFileNotOpen

---

## **St7AddFactorsEnvelope**

### **Description**

Adds a new factors envelope to a specified model.

### **Syntax**

```
long St7AddFactorsEnvelope(long uID, long EnvType, char*  
                           EnvName)
```

### **Input Parameters**

uID

Strand7 model file ID number.

EnvType

Factors envelope type, either etFactEnvelopeMin or etFactEnvelopeMax.

EnvName

Name of the envelope.

### **Errors**

ERR7\_ExceededMaxNumFactorsEnvelopes,  
ERR7\_ExceededResultCase, ERR7\_FileNotOpen,  
ERR7\_InvalidFactorsEnvelopeType, ERR7\_InvalidFileUnit,  
ERR7\_NoError, ERR7\_ResultFileNotOpen

## St7InsertFactorsEnvelope

---

### Description

Inserts a new factors envelope at the specified position.

### Syntax

```
long St7InsertFactorsEnvelope(long uID, long Envelope, long  
EnvType, char* EnvName)
```

### Input Parameters

uID

Strand7 model file ID number.

Envelope

Factors envelope number.

EnvType

Factors envelope type, either etFactEnvelopeMin or etFactEnvelopeMax.

EnvName

Name of the envelope.

### Errors

```
ERR7_ExceededResultCase, ERR7_FileNotOpen,  
ERR7_InvalidFactorsEnvelope,  
ERR7_InvalidFactorsEnvelopeType, ERR7_InvalidFileUnit,  
ERR7_NoError, ERR7_ResultFileNotOpen
```

## St7DeleteFactorsEnvelope

---

### Description

Deletes the specified factors envelope.

### Syntax

```
long St7DeleteFactorsEnvelope(long uID, long Envelope)
```

### Input Parameters

uID

Strand7 model file ID number.

---

Envelope

Factors envelope number.

### Errors

ERR7\_ExceededResultCase, ERR7\_FileNotOpen,  
ERR7\_InvalidFactorsEnvelope, ERR7\_InvalidFileUnit,  
ERR7\_NoError, ERR7\_ResultFileNotOpen

## St7SetFactorsEnvelopeData

---

### Description

Assigns the settings for a specified factors envelope.

### Syntax

```
long St7SetFactorsEnvelopeData(long uID, long Envelope,  
                                long EnvType, char* EnvName)
```

### Input Parameters

uID

Strand7 model file ID number.

Envelope

Factors envelope number.

EnvType

Factors envelope type, either etFactEnvelopeMin or etFactEnvelopeMax.

EnvName

Name of the envelope.

### Errors

ERR7\_DataNotFound, ERR7\_ExceededResultCase,  
ERR7\_FileNotOpen, ERR7\_InvalidFactorsEnvelope,  
ERR7\_InvalidFactorsEnvelopeType, ERR7\_InvalidFileUnit,  
ERR7\_NoError, ERR7\_ResultFileNotOpen

## St7GetFactorsEnvelopeData

---

### Description

Returns the settings assigned to a specified factors envelope.

### Syntax

```
long St7GetFactorsEnvelopeData(long uID, long Envelope,  
                                long* EnvType, char* EnvName, long MaxStringLen)
```

### Input Parameters

uID

Strand7 model file ID number.

Envelope

Factors envelope number.

MaxStringLen

Maximum number of characters allocated for EnvName.

### Output Parameters

EnvType

Factors envelope type, either etFactEnvelopeMin or etFactEnvelopeMax.

EnvName

Name of the envelope.

### Errors

```
ERR7_DataNotFound, ERR7_ExceededResultCase,  
ERR7_FileNotOpen, ERR7_InvalidFactorsEnvelope,  
ERR7_InvalidFileUnit, ERR7_NoError, ERR7_ResultFileNotOpen
```

## St7AddFactorsEnvelopeCase

---

### Description

Adds a new result case dependency to a specified factors envelope.

### Syntax

```
long St7AddFactorsEnvelopeCase(long uID, long Envelope)
```

---

## **Input Parameters**

uID

Strand7 model file ID number.

Envelope

Factors envelope number.

## **Errors**

ERR7\_DataNotFound, ERR7\_ExceededResultCase,  
ERR7\_FileNotOpen, ERR7\_InvalidFactorsEnvelope,  
ERR7\_InvalidFileUnit, ERR7\_NoError, ERR7\_ResultFileNotOpen

---

## **St7InsertFactorsEnvelopeCase**

### **Description**

Inserts a new result case dependency at a specified position in a factors envelope.

### **Syntax**

```
long St7InsertFactorsEnvelopeCase(long uID, long Envelope,  
                                long Pos)
```

## **Input Parameters**

uID

Strand7 model file ID number.

Envelope

Factors envelope number.

Pos

New factors envelope case number.

## **Errors**

ERR7\_DataNotFound, ERR7\_ExceededResultCase,  
ERR7\_FileNotOpen, ERR7\_InvalidFactorsEnvelope,  
ERR7\_InvalidFileUnit, ERR7\_InvalidTableRow, ERR7\_NoError,  
ERR7\_ResultFileNotOpen

## St7DeleteFactorsEnvelopeCase

---

### Description

Deletes the specified result case dependency for a factors envelope.

### Syntax

```
long St7DeleteFactorsEnvelopeCase(long uID, long Envelope,  
                                long Pos)
```

### Input Parameters

uID

Strand7 model file ID number.

Envelope

Factors envelope number.

Pos

Factors envelope case number.

### Errors

```
ERR7_DataNotFound, ERR7_ExceededResultCase,  
ERR7_FileNotOpen, ERR7_InvalidFactorsEnvelope,  
ERR7_InvalidFileUnit, ERR7_InvalidTableRow, ERR7_NoError,  
ERR7_ResultFileNotOpen
```

## St7SetFactorsEnvelopeCaseData

---

### Description

Assigns the settings for the specified factors envelope case.

### Syntax

```
long St7SetFactorsEnvelopeCaseData(long uID, long Envelope,  
                                    long Pos, long* Integers, double* Doubles)
```

### Input Parameters

uID

Strand7 model file ID number.

Envelope

Factors envelope number.

---

Pos

Factors envelope case number.

Integers [0..1]

A 2 element array containing the result case number and set number for the factors envelope case respectively.

Doubles [0..1]

A 2 element array containing the **Factor1** and **Factor2** values for the factors envelope case.

## Errors

ERR7\_APINotInitialised, ERR7\_APINotLicensed,  
ERR7\_DataNotFound, ERR7\_ExceededResultCase,  
ERR7\_FileNotOpen, ERR7\_InvalidEnvelopeSet,  
ERR7\_InvalidFactorsEnvelope, ERR7\_InvalidFileUnit,  
ERR7\_InvalidTableRow, ERR7\_NoError, ERR7\_ResultFileNotOpen

# St7GetFactorsEnvelopeCaseData

---

## Description

Returns the settings assigned to a specified factors envelope case.

## Syntax

```
long St7GetFactorsEnvelopeCaseData(long uID, long Envelope,  
                                long Pos, long* Integers, double* Doubles)
```

## Input Parameters

uID

Strand7 model file ID number.

Envelope

Factors envelope number.

Pos

Factors envelope case number.

## Output Parameters

Integers [0..1]

A 2 element array containing the result case number and set number for the factors envelope case respectively.

Doubles[0..1]

A 2 element array containing the **Factor1** and **Factor2** values for the factors envelope case.

## Errors

ERR7\_DataNotFound, ERR7\_ExceededResultCase,  
ERR7\_FileNotOpen, ERR7\_InvalidFactorsEnvelope,  
ERR7\_InvalidFileUnit, ERR7\_InvalidTableRow, ERR7\_NoError,  
ERR7\_ResultFileNotOpen

## St7AddFactorsEnvelopeSet

---

### Description

Adds a new set to the specified factors envelope.

### Syntax

long **St7AddFactorsEnvelopeSet**(long uID)

### Input Parameters

uID

Strand7 model file ID number.

### Errors

ERR7\_ExceededMaxNumEnvelopeSets, ERR7\_ExceededResultCase,  
ERR7\_FileNotOpen, ERR7\_InvalidFileUnit, ERR7\_NoError,  
ERR7\_ResultFileNotOpen

## St7InsertFactorsEnvelopeSet

---

### Description

Inserts a new set at the specified position for a factors envelope.

### Syntax

long **St7InsertFactorsEnvelopeSet**(long uID, long Pos)

### Input Parameters

uID

---

Strand7 model file ID number.

Pos

New set position.

### Errors

ERR7\_ExceededResultCase, ERR7\_FileNotOpen,  
ERR7\_InvalidEnvelopeSet, ERR7\_InvalidFileUnit, ERR7\_NoError,  
ERR7\_ResultFileNotOpen

## St7DeleteFactorsEnvelopeSet

---

### Description

Deletes the specified set from a factors envelope.

### Syntax

```
long St7DeleteFactorsEnvelopeSet(long uID, long Pos)
```

### Input Parameters

uID

Strand7 model file ID number.

Pos

Set position.

### Errors

ERR7\_ExceededResultCase, ERR7\_FileNotOpen,  
ERR7\_InvalidEnvelopeSet, ERR7\_InvalidFileUnit, ERR7\_NoError,  
ERR7\_ResultFileNotOpen

## St7GetNumFactorsEnvelopeSets

---

### Description

Returns the number of sets assigned to a specified factors envelope.

### Syntax

```
long St7GetNumFactorsEnvelopeSets(long uID, long* NumSets)
```

### Input Parameters

uID

Strand7 model file ID number.

### Output Parameters

NumSets

Number of sets in the envelope.

### Errors

ERR7\_APINotInitialised, ERR7\_APINotLicensed,  
ERR7\_FileNotOpen, ERR7\_InvalidFileUnit, ERR7\_NoError

## St7SetFactorsEnvelopeSetData

---

### Description

Assigns the settings for a specified set in a factors envelope.

### Syntax

```
long St7SetFactorsEnvelopeSetData(long uID, long Pos, long  
        SetType, char* SetName, char* SetGroup)
```

### Input Parameters

uID

Strand7 model file ID number.

Pos

Set position.

SetType

Type of set, either stExclusiveOR or stExclusiveAND.

SetName

Name of the set.

SetGroup

Group identifier for set.

### Errors

ERR7\_DataNotFound, ERR7\_ExceededResultCase,  
ERR7\_FileNotOpen, ERR7\_InvalidEnvelopeSet,  
ERR7\_InvalidEnvelopeSetType, ERR7\_InvalidFileUnit,  
ERR7\_NoError, ERR7\_ResultFileNotOpen

---

## St7GetFactorsEnvelopeSetData

---

### Description

Returns the settings assigned to a specified set in a factors envelope.

### Syntax

```
long St7GetFactorsEnvelopeSetData(long uID, long Pos, long*
    SetType, char* SetName, char* SetGroup, long
    MaxStringLen)
```

### Input Parameters

uID

Strand7 model file ID number.

Pos

Set position.

MaxStringLen

Maximum number of characters allocated for SetName.

### Output Parameters

SetType

Type of set, either stExclusiveOR or stExclusiveAND.

SetName

Name of the set.

SetGroup

Group identifier for set.

### Errors

```
ERR7_DataNotFound, ERR7_ExceededResultCase,
ERR7_FileNotOpen, ERR7_InvalidEnvelopeSet,
ERR7_InvalidFileUnit, ERR7_NoError, ERR7_ResultFileNotOpen
```

## Result File Combination

### St7SetResultFileCombTargetFileName

#### Description

Sets the name of the target file produced when forming a combined result file.

#### Syntax

```
long St7SetResultFileCombTargetFileName(long uID, char*  
    FileName)
```

#### Input Parameters

uID

Strand7 model file ID number.

FileName

Full path and name for the target file.

#### Errors

```
ERR7_APINotInitialised, ERR7_APINotLicensed,  
ERR7_FileNotOpen, ERR7_InvalidFileUnit, ERR7_NoError,  
ERR7_ResultFileIsOpen
```

### St7GetResultFileCombTargetFileName

#### Description

Returns the name of the target file produced when forming a combined result file.

#### Syntax

```
long St7GetResultFileCombTargetFileName(long uID, char*  
    FileName, long MaxStringLen)
```

#### Input Parameters

uID

Strand7 model file ID number.

MaxStringLen

Maximum number of characters allocated for FileName.

---

## **Output Parameters**

FileName

Full path and name for the target file.

## **Errors**

ERR7\_APINotInitialised, ERR7\_APINotLicensed,  
ERR7\_FileNotOpen, ERR7\_InvalidFileUnit, ERR7\_NoError

---

## **St7AddResultFileCombFileName**

### **Description**

Adds a new file to the current results file combination.

### **Syntax**

```
long St7AddResultFileCombFileName(long uID, char* FileName)
```

### **Input Parameters**

uID

Strand7 model file ID number.

FileName

Full path and name for the new result file.

### **Errors**

ERR7\_APINotInitialised, ERR7\_APINotLicensed,  
ERR7\_ExceededMaxNumCombResFiles, ERR7\_FileNotOpen,  
ERR7\_InvalidFileUnit, ERR7\_NoError, ERR7\_ResultFileIsOpen

---

## **St7DeleteResultFileCombFileName**

### **Description**

Deletes a specified file from the current results file combination.

### **Syntax**

```
long St7DeleteResultFileCombFileName(long uID, long  
          FileNum)
```

### **Input Parameters**

uID

Strand7 model file ID number.

FileNum

File number in current combination.

### Errors

ERR7\_APINotInitialised, ERR7\_APINotLicensed,  
ERR7\_FileNotOpen, ERR7\_InvalidCombResFile,  
ERR7\_InvalidFileUnit, ERR7\_NoError, ERR7\_ResultFileIsOpen

## St7SetResultFileCombFileName

---

### Description

Sets the name of a specified file in the current result file combination.

### Syntax

```
long St7SetResultFileCombFileName(long uID, long FileNum,  
                                 char* FileName)
```

### Input Parameters

uID

Strand7 model file ID number.

FileNum

File number in the current combination.

FileName

Full path and name for the result file.

### Errors

ERR7\_APINotInitialised, ERR7\_APINotLicensed,  
ERR7\_FileNotOpen, ERR7\_InvalidCombResFile,  
ERR7\_InvalidFileUnit, ERR7\_NoError, ERR7\_ResultFileIsOpen

## St7GetResultFileCombFileName

---

### Description

Returns the name of a specified file in the current results file combination.

---

## Syntax

```
long St7GetResultFileCombFileName(long uID, long FileNum,  
                                char* FileName, long MaxStringLen)
```

## Input Parameters

uID

Strand7 model file ID number.

FileNum

File number in the current combination.

MaxStringLen

Maximum number of characters allocated for FileName.

## Output Parameters

FileName

Full path and name for the file.

## Errors

ERR7\_APINotInitialised, ERR7\_APINotLicensed,  
ERR7\_FileNotOpen, ERR7\_InvalidCombResFile,  
ERR7\_InvalidFileUnit, ERR7\_NoError

---

## St7AddResultFileCombCase

### Description

Adds a new case to the current result file combination.

### Syntax

```
long St7AddResultFileCombCase(long uID, char* CaseName)
```

### Input Parameters

uID

Strand7 model file ID number.

CaseName

New combination case name.

## Errors

```
ERR7_APINotInitialised, ERR7_APINotLicensed,  
ERR7_ExceededMaxNumRows, ERR7_FileNotOpen,  
ERR7_InvalidCombResFile, ERR7_InvalidFileUnit, ERR7_NoError,  
ERR7_ResultFileIsOpen
```

# St7DeleteResultFileCombCase

---

## Description

Deletes a specified case from the current result file combination.

## Syntax

```
long St7DeleteResultFileCombCase (long uID)
```

## Input Parameters

uID

Strand7 model file ID number.

## Errors

```
ERR7_APINotInitialised, ERR7_APINotLicensed,  
ERR7_FileNotOpen, ERR7_InvalidCombResFile,  
ERR7_InvalidFileUnit, ERR7_InvalidTableRow, ERR7_NoError,  
ERR7_ResultFileIsOpen
```

# St7SetResultFileCombCaseData

---

## Description

Sets the combination data for a combined result case in the specified result file combination.

## Syntax

```
long St7SetResultFileCombCaseData (long uID, long FileNum,  
                                  long Pos, long CaseNum, double Factor)
```

## Input Parameters

uID

Strand7 model file ID number.

FileNum

---

Combination file number.

Pos

Result case in combined file.

CaseNum

Result case.

Factor

Combination factor.

## Errors

```
ERR7_APINotInitialised, ERR7_APINotLicensed,  
ERR7_ExceededResultCase, ERR7_FileNotOpen,  
ERR7_InvalidCombResFile, ERR7_InvalidFileUnit,  
ERR7_InvalidTableRow, ERR7_NoError, ERR7_ResultFileIsOpen
```

# St7GetResultFileCombCaseData

---

## Description

Returns the combination data assigned to a combined result case in the specified result file combination.

## Syntax

```
long St7GetResultFileCombCaseData(long uID, long FileNum,  
                                long Pos, long* CaseNum, double* Factor)
```

## Input Parameters

uID

Strand7 model file ID number.

FileNum

Combination file number.

Pos

Result case in combined file.

## Output Parameters

CaseNum

Result case.

Factor

Combination factor.

**Errors**

ERR7\_APINotInitialised, ERR7\_APINotLicensed,  
ERR7\_FileNotOpen, ERR7\_InvalidCombResFile,  
ERR7\_InvalidFileUnit, ERR7\_InvalidTableRow, ERR7\_NoError

## St7SetResultFileCombCaseName

---

**Description**

Sets the name of a combined result case in the specified result file combination.

**Syntax**

```
long St7SetResultFileCombCaseName(long uID, long Pos, char*  
CaseName)
```

**Input Parameters**

uID

Strand7 model file ID number.

Pos

Result case in combined file.

CaseName

Combined result case name.

**Errors**

ERR7\_APINotInitialised, ERR7\_APINotLicensed,  
ERR7\_FileNotOpen, ERR7\_InvalidCombResFile,  
ERR7\_InvalidFileUnit, ERR7\_InvalidTableRow, ERR7\_NoError,  
ERR7\_ResultFileIsOpen

## St7GetResultFileCombCaseName

---

**Description**

Returns the name assigned to a combined result case in the specified result file combination.

---

## Syntax

```
long St7GetResultFileCombCaseName(long uID, long Pos, char*  
CaseName, long MaxStringLen)
```

## Input Parameters

uID

Strand7 model file ID number.

Pos

Result case in combined file.

MaxStringLen

Maximum number of characters allocated for CaseName.

## Output Parameters

CaseName

Combined result case name.

## Errors

```
ERR7_APINotInitialised, ERR7_APINotLicensed,  
ERR7_FileNotOpen, ERR7_InvalidCombResFile,  
ERR7_InvalidFileUnit, ERR7_InvalidTableRow, ERR7_NoError
```

---

## St7GenerateResultFileComb

### Description

Generates the combined result file using the specified method.

### Syntax

```
long St7GenerateResultFileComb(long uID, long Method)
```

### Input Parameters

uID

Strand7 model file ID number.

Method

Combination method, either rfCombFactors or rfCombSRSS.

## Errors

ERR7\_APINotInitialised, ERR7\_APINotLicensed,  
ERR7\_CannotCombResFiles, ERR7\_FileNotOpen,  
ERR7\_InvalidFileUnit, ERR7\_InvalidResultFile, ERR7\_NoError,  
ERR7\_ResultFileIsOpen

# St7UpdateResultFileComb

---

## Description

Updates the specified result file combination.

## Syntax

```
long St7UpdateResultFileComb(long uID, char* FileName)
```

## Input Parameters

uID

Strand7 model file ID number.

FileName

Full path and name for the result file.

## Errors

ERR7\_APINotInitialised, ERR7\_APINotLicensed,  
ERR7\_FileNotOpen, ERR7\_InvalidFileUnit,  
ERR7\_InvalidResultFile, ERR7\_NoError, ERR7\_ResultFileIsOpen

# Harmonic Time History

## St7GenerateHRATimeHistory

### Description

Generates the time history response for a specified model based on a Harmonic Response analysis. An associated Harmonic Response result file must currently be open.

### Syntax

```
long St7GenerateHRATimeHistory(long uID, double StartTime,  
                               double EndTime, long NumSteps)
```

### Input Parameters

uID

Strand7 model file ID number.

StartTime

Start time for the time history integration.

EndTime

End time for the time history integration.

NumSteps

Number of steps used for the time history integration.

### Errors

```
ERR7_ExceededResultCase, ERR7_FileNotOpen,  
ERR7_InvalidFileUnit, ERR7_InvalidNumSteps,  
ERR7_InvalidResultFile, ERR7_InvalidStartEndTimes,  
ERR7_NoError, ERR7_ResultFileNotOpen
```

## Custom Result Files

### St7NewResFile

#### Description

Creates a new custom result file.

#### Syntax

```
long St7NewResFile(long uID, char* FileName, long  
ResultType)
```

#### Input Parameters

uID

Strand7 model file ID number.

FileName

Full path and name for the new result file.

ResultType

Result file type, one of stLinearStaticSolver, stLinearBucklingSolver,  
stNonlinearStaticSolver, stNaturalFrequencySolver,  
stLinearTransientDynamicSolver, stNonlinearTransientDynamicSolver,  
stSteadyHeatSolver, stTransientHeatSolver or stQuasiStaticSolver.

#### Errors

```
ERR7_APINotInitialised, ERR7_APINotLicensed,  
ERR7_FileNotOpen, ERR7_InvalidFileUnit, ERR7_NoError,  
ERR7_ResFileAlreadyOpen, ERR7_ResFileContainsNoElements,  
ERR7_ResFileContainsNoNodes, ERR7_ResFileUnsupportedType,  
ERR7_UnknownError
```

### St7OpenResFile

#### Description

Opens a specified custom result file.

#### Syntax

```
long St7OpenResFile(long uID, char* FileName)
```

---

## **Input Parameters**

**uID**

Strand7 model file ID number.

**FileName**

Full path and name for the result file.

## **Errors**

ERR7\_APINotInitialised, ERR7\_APINotLicensed,  
ERR7\_CannotEditSolverFiles, ERR7\_CannotOpenResultFile,  
ERR7\_FileNotOpen, ERR7\_InvalidFileUnit,  
ERR7\_InvalidResultFile, ERR7\_NoError,  
ERR7\_ResFileAlreadyOpen, ERR7\_UnknownError

---

## **St7CloseResFile**

### **Description**

Closes the open custom result file.

### **Syntax**

long **St7CloseResFile**(long uID)

### **Input Parameters**

**uID**

Strand7 model file ID number.

### **Errors**

ERR7\_APINotInitialised, ERR7\_APINotLicensed,  
ERR7\_FileNotOpen, ERR7\_InvalidFileUnit, ERR7\_NoError,  
ERR7\_ResFileCantSave, ERR7\_ResFileNotOpen,  
ERR7\_UnknownError

---

## **St7SetResFileDescription**

### **Description**

Sets the description for a specified result file.

### **Syntax**

long **St7SetResFileDescription**(long uID, char\* Name)

## **Input Parameters**

uID

Strand7 model file ID number.

Name

Result file description.

## **Errors**

ERR7\_APINotInitialised, ERR7\_APINotLicensed,  
ERR7\_FileNotOpen, ERR7\_InvalidFileUnit, ERR7\_NoError,  
ERR7\_ResFileNotOpen

# **St7GetResFileDescription**

---

## **Description**

Returns the description of a specified result file.

## **Syntax**

```
long St7GetResFileDescription(long uID, char* Name, long  
MaxStringLen)
```

## **Input Parameters**

uID

Strand7 model file ID number.

MaxStringLen

Maximum number of characters allocated for Name.

## **Output Parameters**

Name

Result file description.

## **Errors**

ERR7\_APINotInitialised, ERR7\_APINotLicensed,  
ERR7\_FileNotOpen, ERR7\_InvalidFileUnit, ERR7\_NoError,  
ERR7\_ResFileNotOpen

---

## St7SetResFileNumCases

---

### Description

Sets the number of result cases in the open result file.

### Syntax

```
long St7SetResFileNumCases(long uID, long NumCases)
```

### Input Parameters

uID

Strand7 model file ID number.

NumCases

Number of result cases in the file.

### Errors

```
ERR7_APINotInitialised, ERR7_APINotLicensed,  
ERR7_FileNotOpen, ERR7_InvalidFileUnit, ERR7_NoError,  
ERR7_ResFileInvalidNumCases, ERR7_ResFileNotOpen
```

---

## St7SetResFileCaseName

---

### Description

Sets the name of a specified result case.

### Syntax

```
long St7SetResFileCaseName(long uID, long CaseNum, char*  
CaseName)
```

### Input Parameters

uID

Strand7 model file ID number.

CaseNum

Result case number.

CaseName

Result case name.

## Errors

```
ERR7_APINotInitialised, ERR7_APINotLicensed,  
ERR7_FileNotOpen, ERR7_InvalidFileUnit, ERR7_NoError,  
ERR7_ResFileInvalidCase, ERR7_ResFileInvalidName,  
ERR7_ResFileNotOpen
```

## St7AssociateResFileCase

---

### Description

Associate load and freedom cases with a specified result case.

### Syntax

```
long St7AssociateResFileCase(long uID, long CaseNum, long  
LoadCase, long FreedomCase)
```

### Input Parameters

uID

Strand7 model file ID number.

CaseNum

Result case number.

LoadCase

Load case number.

FreedomCase

Freedom case number.

### Errors

```
ERR7_APINotInitialised, ERR7_APINotLicensed,  
ERR7_FileNotOpen, ERR7_InvalidFileUnit, ERR7_NoError,  
ERR7_ResFileAssociationNotAllowed, ERR7_ResFileInvalidCase,  
ERR7_ResFileNotOpen
```

## St7AssociateResFileStage

---

### Description

Associate a stage with a specified result case.

---

## Syntax

```
long St7AssociateResFileStage(long uID, long CaseNum, long StageNum)
```

## Input Parameters

uID

Strand7 model file ID number.

CaseNum

Result case number.

StageNum

Stage number.

## Errors

```
ERR7_APINotInitialised, ERR7_APINotLicensed,  
ERR7_FileNotOpen, ERR7_InvalidFileUnit, ERR7_NoError,  
ERR7_StageDoesNotExist, ERR7_ResFileInvalidCase,  
ERR7_ResFileNotOpen
```

---

## St7SetRes FileMode

### Description

Sets the modal frequency for the specified result case.

### Syntax

```
long St7SetRes FileMode(long uID, long CaseNum, double Mode)
```

### Input Parameters

uID

Strand7 model file ID number.

CaseNum

Result case number.

Mode

Modal frequency (Hz) for natural frequency results, or linear buckling factor for linear buckling results.

## Errors

```
ERR7_APINotInitialised, ERR7_APINotLicensed,  
ERR7_FileNotOpen, ERR7_InvalidFileUnit, ERR7_NoError,  
ERR7_ResFileIncompatibleQuantity, ERR7_ResFileInvalidCase,  
ERR7_ResFileNotOpen
```

# St7GetRes FileMode

---

## Description

Returns the modal frequency assigned to the specified result case.

## Syntax

```
long St7GetRes FileMode (long uID, long CaseNum, double*  
Mode)
```

## Input Parameters

uID

Strand7 model file ID number.

CaseNum

Result case number.

## Output Parameters

Mode

Modal frequency (Hz) for natural frequency results, or linear buckling factor for linear buckling results.

## Errors

```
ERR7_APINotInitialised, ERR7_APINotLicensed,  
ERR7_FileNotOpen, ERR7_InvalidFileUnit, ERR7_NoError,  
ERR7_ResFileIncompatibleQuantity, ERR7_ResFileInvalidCase,  
ERR7_ResFileNotOpen
```

# St7SetRes FileTime

---

## Description

Sets the integration time for a specified result case, in seconds.

---

## Syntax

```
long St7SetResFileTime(long uID, long CaseNum, double Time)
```

### Input Parameters

uID

Strand7 model file ID number.

CaseNum

Result case number.

Time

Integration time in seconds.

### Errors

```
ERR7_APINotInitialised, ERR7_APINotLicensed,  
ERR7_FileNotOpen, ERR7_InvalidFileUnit, ERR7_NoError,  
ERR7_ResFileIncompatibleQuantity, ERR7_ResFileInvalidCase,  
ERR7_ResFileNotOpen
```

## St7GetResFileTime

---

### Description

Returns the integration time assigned to a specified result case, in seconds.

### Syntax

```
long St7GetResFileTime(long uID, long CaseNum, double*  
Time)
```

### Input Parameters

uID

Strand7 model file ID number.

CaseNum

Result case number.

### Output Parameters

Time

Integration time in seconds.

## Errors

ERR7\_APINotInitialised, ERR7\_APINotLicensed,  
ERR7\_FileNotOpen, ERR7\_InvalidFileUnit, ERR7\_NoError,  
ERR7\_ResFileIncompatibleQuantity, ERR7\_ResFileInvalidCase,  
ERR7\_ResFileNotOpen

## St7SetResFileTypeUnit

---

### Description

Sets the time units displayed in the specified result file. Note that this setting does not affect the time input to *St7SetResFileTime* which is always in seconds.

### Syntax

```
long St7SetResFileTypeUnit(long uID, long TimeUnit)
```

#### Input Parameters

uID

Strand7 model file ID number.

TimeUnit

Integration time unit, one of tuMilliSec, tuSec, tuMin, tuHour or tuDay.

### Errors

ERR7\_APINotInitialised, ERR7\_APINotLicensed,  
ERR7\_FileNotOpen, ERR7\_InvalidFileUnit,  
ERR7\_InvalidTimeUnit, ERR7\_NoError,  
ERR7\_ResFileIncompatibleQuantity, ERR7\_ResFileNotOpen

## St7GetResFileTypeUnit

---

### Description

Returns the time units displayed in the specified result file. Note that this setting does not affect the time output by *St7GetResFileTime* which is always in seconds.

### Syntax

```
long St7GetResFileTypeUnit(long uID, long* TimeUnit)
```

#### Input Parameters

uID

---

Strand7 model file ID number.

### Output Parameters

TimeUnit

Integration time unit, one of tuMilliSec, tuSec, tuMin, tuHour or tuDay.

### Errors

ERR7\_APINotInitialised, ERR7\_APINotLicensed,  
ERR7\_FileNotOpen, ERR7\_InvalidFileUnit, ERR7\_NoError,  
ERR7\_ResFileIncompatibleQuantity, ERR7\_ResFileNotOpen

## St7SetResFileQuantity

---

### Description

Includes a specified result quantity in a given result case.

### Syntax

```
long St7SetResFileQuantity(long uID, long CaseNum, long  
                           Entity, long Quantity)
```

### Input Parameters

uID

Strand7 model file ID number.

CaseNum

Result case number.

Entity

Entity type, one of tyNODE, tyBEAM, tyPLATE or tyBRICK.

Quantity

Result quantity, see *Custom Results* for additional information.

### Errors

ERR7\_APINotInitialised, ERR7\_APINotLicensed,  
ERR7\_FileNotOpen, ERR7\_InvalidEntity, ERR7\_InvalidFileUnit,  
ERR7\_NoError, ERR7\_ResFileDoesNotHaveEntity,  
ERR7\_ResFileIncompatibleQuantity, ERR7\_ResFileInvalidCase,  
ERR7\_ResFileInvalidQuantity, ERR7\_ResFileNotOpen

## St7GetResFileQuantity

---

### Description

Returns the status of an element result quantity in a given result case.

### Syntax

```
long St7GetResFileQuantity(long uID, long CaseNum, long Entity, long Quantity, bool* State)
```

### Input Parameters

uID

Strand7 model file ID number.

CaseNum

Result case number.

Entity

Entity type, one of tyNODE, tyBEAM, tyPLATE or tyBRICK.

Quantity

Result quantity, see *Custom Results* for additional information.

### Output Parameters

State

btTrue if the specified entity result quantity is included in the given result case.

### Errors

ERR7\_APINotInitialised, ERR7\_APINotLicensed,  
ERR7\_FileNotOpen, ERR7\_InvalidEntity, ERR7\_InvalidFileUnit,  
ERR7\_NoError, ERR7\_ResFileDoesNotHaveEntity,  
ERR7\_ResFileIncompatibleQuantity, ERR7\_ResFileInvalidCase,  
ERR7\_ResFileInvalidQuantity, ERR7\_ResFileNotOpen

## St7ClearResFileQuantity

---

### Description

Removes a specified result quantity from a given result case.

---

## Syntax

```
long St7ClearResFileQuantity(long uID, long CaseNum, long
    Entity, long Quantity)
```

## Input Parameters

uID

Strand7 model file ID number.

CaseNum

Result case number.

Entity

Entity type, one of tyNODE, tyBEAM, tyPLATE or tyBRICK.

Quantity

Result quantity, see *Custom Results* for additional information.

## Errors

```
ERR7_APINotInitialised, ERR7_APINotLicensed,
ERR7_FileNotOpen, ERR7_InvalidEntity, ERR7_InvalidFileUnit,
ERR7_NoError, ERR7_ResFileCantClearQuantity,
ERR7_ResFileDoesNotHaveEntity,
ERR7_ResFileIncompatibleQuantity, ERR7_ResFileInvalidCase,
ERR7_ResFileInvalidQuantity, ERR7_ResFileNotOpen
```

---

## St7SetResFileNodeResult

### Description

Sets the specified nodal result quantities for a given node and result case.

### Syntax

```
long St7SetResFileNodeResult(long uID, long CaseNum, long
    Node, long Quantity, double* Doubles)
```

### Input Parameters

uID

Strand7 model file ID number.

CaseNum

Result case number.

Node

Node number.

Quantity

Result quantity; one of rtNodeDisp, rtNodeVel, rtNodeAcc, rtNodeReact,  
rtNodeTemp or rtNodeFlux.

Doubles [0..5]

An array defining the specified nodal result quantity. See *Custom Results* for  
additional information.

## Errors

ERR7\_APINotInitialised, ERR7\_APINotLicensed,  
ERR7\_FileNotOpen, ERR7\_InvalidEntityNumber,  
ERR7\_InvalidFileUnit, ERR7\_NoError, ERR7\_ResFileInvalidCase,  
ERR7\_ResFileInvalidQuantity, ERR7\_ResFileNotOpen,  
ERR7\_ResFileQuantityNotExist

# St7GetResFileNodeResult

---

## Description

Returns the specified nodal result quantities for a given node and result case.

## Syntax

```
long St7GetResFileNodeResult(long uID, long CaseNum, long  
    Node, long Quantity, double* Doubles)
```

## Input Parameters

uID

Strand7 model file ID number.

CaseNum

Result case number.

Node

Node number.

Quantity

Result quantity; one of rtNodeDisp, rtNodeVel, rtNodeAcc, rtNodeReact,  
rtNodeTemp or rtNodeFlux.

---

## Output Parameters

Doubles [0..5]

An array defining the specified nodal result quantity. See *Custom Results* for additional information.

## Errors

ERR7\_APINotInitialised, ERR7\_APINotLicensed,  
ERR7\_FileNotOpen, ERR7\_InvalidEntityNumber,  
ERR7\_InvalidFileUnit, ERR7\_NoError, ERR7\_ResFileInvalidCase,  
ERR7\_ResFileInvalidQuantity, ERR7\_ResFileNotOpen,  
ERR7\_ResFileQuantityNotExist

# St7SetResFileBeamStations

---

## Description

Sets the number of result stations used to store beam results for a specified result case.

## Syntax

```
long St7SetResFileBeamStations(long uID, long CaseNum, long  
                               Stations)
```

## Input Parameters

uID

Strand7 model file ID number.

CaseNum

Result case number.

Stations

Number of result stations along the length of beam elements in the specified result case.

Note that only two stations (corresponding to the beam ends) are permitted for heat transfer results.

## Errors

ERR7\_APINotInitialised, ERR7\_APINotLicensed,  
ERR7\_FileNotOpen, ERR7\_InvalidFileUnit,  
ERR7\_InvalidNumBeamStations, ERR7\_NoError,  
ERR7\_ResFileInvalidCase, ERR7\_ResFileNotOpen

## St7GetResFileBeamStations

---

### Description

Returns the number of result stations used to store beam results for a specified result case.

### Syntax

```
long St7GetResFileBeamStations(long uID, long CaseNum,  
                                long* Stations)
```

### Input Parameters

uID

Strand7 model file ID number.

CaseNum

Result case number.

### Output Parameters

Stations

Number of result stations along the length of beam elements in the specified result case.

### Errors

ERR7\_APINotInitialised, ERR7\_APINotLicensed,  
ERR7\_FileNotOpen, ERR7\_InvalidFileUnit, ERR7\_NoError,  
ERR7\_ResFileInvalidCase, ERR7\_ResFileNotOpen

## St7SetResFileBeamResult

---

### Description

Sets the specified beam result quantities for a given beam element and result case.

### Syntax

```
long St7SetResFileBeamResult(long uID, long CaseNum, long  
                                Beam, long Quantity, double* Doubles)
```

### Input Parameters

uID

Strand7 model file ID number.

---

CaseNum

Result case number.

Beam

Beam number.

Quantity

Result quantity; one of rtBeamForce, rtBeamStrain, rtBeamNodeReact or rtBeamFlux.

Doubles[...]

An array defining the specified beam result quantity at each station along the beam. The quantities for the  $i^{\text{th}}$  station are stored in a block starting at:

Doubles[ (i-1) \* kBeamResFileSize ] - for rtBeamForce

Doubles[ (i-1) \* kBeamResFileStrainSize ] - for rtBeamStrain

Doubles[ (i-1) \* kBeamResFileReactSize ] - for rtBeamNodeReact

Doubles[ (i-1) \* kBeamResFileFluxSize ] - for rtBeamFlux.

See *Custom Results* for additional information.

## Errors

ERR7\_APINotInitialised, ERR7\_APINotLicensed,  
ERR7\_FileNotOpen, ERR7\_InvalidEntityNumber,  
ERR7\_InvalidFileUnit, ERR7\_NoError, ERR7\_ResFileInvalidCase,  
ERR7\_ResFileInvalidQuantity, ERR7\_ResFileNotOpen,  
ERR7\_ResFileQuantityNotExist

## St7GetResFileBeamResult

---

### Description

Returns the specified beam result quantities for a given beam element and result case.

### Syntax

```
long St7GetResFileBeamResult(long uID, long CaseNum, long  
Beam, long Quantity, double* Doubles)
```

## Input Parameters

`uID`

Strand7 model file ID number.

`CaseNum`

Result case number.

`Beam`

Beam number.

`Quantity`

Result quantity; one of `rtBeamForce`, `rtBeamStrain`, `rtBeamNodeReact` or `rtBeamFlux`.

## Output Parameters

`Doubles[...]`

An array defining the specified beam result quantity at each station along the beam. The quantities for the  $i^{\text{th}}$  station are stored in a block starting at:

`Doubles[ (i-1) *kBeamResFileSize ]` - for `rtBeamForce`

`Doubles[ (i-1) *kBeamResFileStrainSize ]` - for `rtBeamStrain`

`Doubles[ (i-1) *kBeamResFileReactSize ]` - for `rtBeamNodeReact`

`Doubles[ (i-1) *kBeamResFileFluxSize ]` - for `rtBeamFlux`.

See *Custom Results* for additional information.

## Errors

`ERR7_APINotInitialised`, `ERR7_APINotLicensed`,  
`ERR7_FileNotOpen`, `ERR7_InvalidEntityNumber`,  
`ERR7_InvalidFileUnit`, `ERR7_NoError`, `ERR7_ResFileInvalidCase`,  
`ERR7_ResFileInvalidQuantity`, `ERR7_ResFileNotOpen`,  
`ERR7_ResFileQuantityNotExist`

## St7SetResFilePlateResult

---

### Description

Sets the specified plate result quantities for a given plate element and result case.

---

## Syntax

```
long St7SetResFilePlateResult(long uID, long CaseNum, long  
Plate, long Quantity, bool NonlinearMaterial, double*  
Doubles)
```

### Input Parameters

uID

Strand7 model file ID number.

CaseNum

Result case number.

Plate

Plate number.

Quantity

Result quantity; one of rtPlateStress, rtPlateStrain, rtPlateNodeReact or  
rtPlateFlux.

NonlinearMaterial

btTrue if the results correspond to a material nonlinear analysis.

Doubles[...]

An array defining the specified plate result quantity at each Gauss point on  
the plate.

The results at the  $i^{\text{th}}$  Gauss point are stored in a block starting at:

Doubles[ (i-1)\*kPlateShellResFileStressSize] - for rtPlateStress

Doubles[ (i-1)\*kPlateShellResFileStrainSize] - for rtPlateStrain.

Doubles[ (i-1)\*kPlateResFileReactSize] - for rtPlateNodeReact.

Doubles[ (i-1)\*kPlateResFileFluxSize] - for rtPlateFlux.

Exceptionally for two-dimensional plates, the results at the  $i^{\text{th}}$  Gauss point are  
stored in a block starting at:

Doubles[ (i-1)\*kPlate2DResFileStressSize] - for rtPlateStress

Doubles[ (i-1)\*kPlate2DResFileStrainSize] - for rtPlateStrain.

See *Custom Results* for additional information.

## Errors

```
ERR7_APINotInitialised, ERR7_APINotLicensed,  
ERR7_FileNotOpen, ERR7_InvalidEntityNumber,  
ERR7_InvalidFileUnit, ERR7_NoError, ERR7_ResFileInvalidCase,  
ERR7_ResFileInvalidQuantity, ERR7_ResFileNotOpen,  
ERR7_ResFileQuantityNotExist
```

## St7GetResFilePlateResult

---

### Description

Returns the specified plate result quantities for a given plate element and result case.

### Syntax

```
long St7GetResFilePlateResult(long uID, long CaseNum, long  
Plate, long Quantity, bool* NonlinearMaterial, double*  
Doubles)
```

### Input Parameters

uID

Strand7 model file ID number.

CaseNum

Result case number.

Plate

Plate number.

Quantity

Result quantity; one of rtPlateStress, rtPlateStrain, rtPlateNodeReact or  
rtPlateFlux.

### Output Parameters

NonlinearMaterial

btTrue if the results correspond to a material nonlinear analysis.

Doubles[...]

An array defining the specified plate result quantity at each Gauss point on  
the plate.

---

The results at the  $i^{\text{th}}$  Gauss point are stored in a block starting at:

Doubles [  $(i-1) * kPlateShellResFileStressSize$ ] - for rtPlateStress

Doubles [  $(i-1) * kPlateShellResFileStrainSize$ ] - for rtPlateStrain.

Doubles [  $(i-1) * kPlateResFileReactSize$ ] - for rtPlateNodeReact.

Doubles [  $(i-1) * kPlateResFileFluxSize$ ] - for rtPlateFlux.

Exceptionally for two-dimensional plates, the results at the  $i^{\text{th}}$  Gauss point are stored in a block starting at:

Doubles [  $(i-1) * kPlate2DResFileStressSize$ ] - for rtPlateStress

Doubles [  $(i-1) * kPlate2DResFileStrainSize$ ] - for rtPlateStrain.

See *Custom Results* for additional information.

## Errors

```
ERR7_APINotInitialised, ERR7_APINotLicensed,  
ERR7_FileNotOpen, ERR7_InvalidEntityNumber,  
ERR7_InvalidFileUnit, ERR7_NoError, ERR7_ResFileInvalidCase,  
ERR7_ResFileInvalidQuantity, ERR7_ResFileNotOpen,  
ERR7_ResFileQuantityNotExist
```

# St7SetResFileBrickResult

---

## Description

Sets the specified brick result quantities for a given brick element and result case.

## Syntax

```
long St7SetResFileBrickResult(long uID, long CaseNum, long  
Brick, long Quantity, double* Doubles)
```

## Input Parameters

uID

Strand7 model file ID number.

CaseNum

Result case number.

Brick

Brick number.

Quantity

Result quantity; one of rtBrickStress, rtBrickStrain, rtBrickNodeReact or rtBrickFlux.

Doubles [ ... ]

An array defining the specified brick result quantity at each Gauss point on the brick.

The results at the  $i^{\text{th}}$  Gauss point are stored in a block starting at:

Doubles [  $(i-1) * \text{kBrickResFileStressSize}$  ] - for rtBrickStress

Doubles [  $(i-1) * \text{kBrickResFileStrainSize}$  ] - for rtBrickStrain.

Doubles [  $(i-1) * \text{kBrickResFileReactSize}$  ] - for rtBrickNodeReact.

Doubles [  $(i-1) * \text{kBrickResFileFluxSize}$  ] - for rtBrickFlux.

See *Custom Results* for additional information.

## Errors

ERR7\_APINotInitialised, ERR7\_APINotLicensed,  
ERR7\_FileNotOpen, ERR7\_InvalidEntityNumber,  
ERR7\_InvalidFileUnit, ERR7\_NoError, ERR7\_ResFileInvalidCase,  
ERR7\_ResFileInvalidQuantity, ERR7\_ResFileNotOpen,  
ERR7\_ResFileQuantityNotExist

# St7GetResFileBrickResult

---

## Description

Returns the specified brick result quantities for a given brick element and result case.

## Syntax

```
long St7GetResFileBrickResult(long uID, long CaseNum, long  
Brick, long Quantity, double* Doubles)
```

## Input Parameters

uID

Strand7 model file ID number.

---

CaseNum

Result case number.

Brick

Brick number.

Quantity

Result quantity; one of rtBrickStress, rtBrickStrain, rtBrickNodeReact or  
rtBrickFlux.

## Output Parameters

Doubles[...]

An array defining the specified brick result quantity at each Gauss point on  
the brick.

The results at the  $i^{\text{th}}$  Gauss point are stored in a block starting at:

Doubles[ (i-1)\*kBrickResFileStressSize] - for rtBrickStress

Doubles[ (i-1)\*kBrickResFileStrainSize] - for rtBrickStrain.

Doubles[ (i-1)\*kBrickResFileReactSize] - for rtBrickNodeReact.

Doubles[ (i-1)\*kBrickResFileFluxSize] - for rtBrickFlux.

See *Custom Results* for additional information.

## Errors

```
ERR7_APINotInitialised, ERR7_APINotLicensed,  
ERR7_FileNotOpen, ERR7_InvalidEntityNumber,  
ERR7_InvalidFileUnit, ERR7_NoError, ERR7_ResFileInvalidCase,  
ERR7_ResFileInvalidQuantity, ERR7_ResFileNotOpen,  
ERR7_ResFileQuantityNotExist
```

# Tools

## St7ToolConvertPatchLoads

---

### Description

Converts all load patches in a specified load case to distributed beam loads.

### Syntax

```
long St7ToolConvertPatchLoads(long uID, long CaseNum, bool  
Overwrite)
```

### Input Parameters

uID

Strand7 model file ID number.

CaseNum

Load case number.

Overwrite

btTrue to overwrite the existing beam loads.

### Errors

```
ERR7_APINotInitialised, ERR7_APINotLicensed,  
ERR7_FileNotOpen, ERR7_InvalidFileUnit,  
ERR7_InvalidLoadCase, ERR7_NoError,  
ERR7_NoPatchLoadsCreated, ERR7_ResultFileIsOpen
```

## St7ToolAttachParts

---

### Description

Generates attachment links based on the specified attachment attributes.

### Syntax

```
long St7ToolAttachParts(long uID, long* Integers, double*  
Doubles)
```

### Input Parameters

uID

Strand7 model file ID number.

---

Integers[0..5]

[ipDoEnds] - Attach beam ends, btTrue or btFalse.

[ipDoEdges] - Attach plate edges, btTrue or btFalse.

[ipDoFaces] - Attach brick/plate faces, btTrue or btFalse.

[ipSelectedOnly] - Act on selected elements only, btTrue or btFalse.

[ipDeleteExisting] - Delete existing attachments, btTrue or btFalse.

[ipAllBrickFaces] - btTrue to attach to all brick faces, btFalse to attach only to free (exposed) brick faces.

Doubles[0..0]

[ipAngleDelta] - Angle tolerance used when calculating attachment directions.

## Errors

ERR7\_APINotInitialised, ERR7\_APINotLicensed,  
ERR7\_FileNotOpen, ERR7\_InvalidAttachPartsParams,  
ERR7\_InvalidFileUnit, ERR7\_NoError, ERR7\_ResultFileIsOpen

# St7ToolAlignBeamAxes

---

## Description

Aligns the local beam axes with the axis of a specified UCS.

## Syntax

```
long St7ToolAlignBeamAxes(long uID, long BeamNum, long  
BeamAxis, long BeamAxisType, long UCSAxis, long UCSId)
```

## Input Parameters

uID

Strand7 model file ID number.

BeamNum

Beam number to align.

BeamAxis

The 1 or 2 local beam axis to align.

**BeamAxisType**

Local beam axis type - axBeamLocal or axBeamPrincipal.

**UCSAxis**

The 1,2 or 3 UCS axis to align with.

**UCSID**

ID number for the UCS to align with.

**Errors**

```
ERR7_APINotInitialised, ERR7_APINotLicensed,  
ERR7_ExceededTotal, ERR7_FileNotOpen,  
ERR7_InvalidAxisSystem, ERR7_InvalidAxis,  
ERR7_InvalidBeamAxisType, ERR7_InvalidEntityNumber,  
ERR7_InvalidFileUnit, ERR7_InvalidUCSID, ERR7_NoError,  
ERR7_ResultFileIsOpen, ERR7_ToolOperationFailed
```

## **St7ToolAlignPlateAxes**

---

**Description**

Aligns the local plates axes with the axis of a specified UCS.

**Syntax**

```
long St7ToolAlignPlateAxes(long uID, long PlateNum, long  
PlateAxis, long UCSAxis, long UCSId)
```

**Input Parameters**

**uID**

Strand7 model file ID number.

**PlateNum**

Plate number to align.

**PlateAxis**

The 1,2 or 3 local plate axis to align.

**UCSAxis**

The 1,2 or 3 UCS axis to align with.

**UCSID**

---

ID number of the UCS to align with.

## Errors

```
ERR7_APINotInitialised, ERR7_APINotLicensed,  
ERR7_ExceededTotal, ERR7_FileNotOpen,  
ERR7_InvalidAxisSystem, ERR7_InvalidAxis,  
ERR7_InvalidEntityNumber, ERR7_InvalidFileUnit,  
ERR7_InvalidUCSID, ERR7_NoError, ERR7_ResultFileIsOpen,  
ERR7_ToolOperationFailed
```

# St7ToolPolygonToFace

---

## Description

Converts one or more beam polygons to geometric faces. The beam elements used in the conversion must be selected via the *St7SetEntitySelectState* function.

## Syntax

```
long St7ToolPolygonToFace(long uID, long* Integers, double* Doubles)
```

## Input Parameters

uID

Strand7 model file ID number.

Integers[0..4]

[ipPolyToFaceFaceID] - Face ID number for new faces.

[ipPolyToFaceGroupIndex] - Group number for new faces.

[ipPolyToFacePropertyName] - Plate property number for new faces.

[ipPolyToFaceDeleteBeams] - Delete beams after conversion, either btTrue or btFalse.

[ipPolyToFaceKeepSelected] - Keep beams selected, either btTrue or btFalse.

Doubles[0..0]

[ipPolyToFaceEdgeTolerance] - Angle tolerance between adjacent polygon edges (degrees). Edges within tolerance may be smoothed via curve fitting.

## Errors

```
ERR7_APINotInitialised, ERR7_APINotLicensed,  
ERR7_FileNotOpen, ERR7_InvalidFileUnit,  
ERR7_InvalidPolygonToFaceParameters, ERR7_NoError,  
ERR7_NoPolygonWasConverted, ERR7_ResultFileIsOpen
```

# Type Definitions

The Strand7 API uses a number of pre-defined types for the input and output parameters of function calls. This section lists those types for Pascal implementations, what base types they inherit and the range of the array they represent.

Calls to functions in C do not use these types. However, the corresponding pointers must point to arrays that are similar in definition. That is, they must be of the same base type and contain at least as much pre-allocated space. If less space is allocated for functions that write to the arrays, then an access violation can occur.

Note that, by default, both the C and Pascal parameters are zero based. Many types are defined in size by other constants. These are listed below.

Predefined Type	Inherited Type	Range
CharString	Char	kMaxStrLen
EntityTotalsArray	Longint	kMaxEntityTotals
BeamDispArray	Double	kMaxDisp
ConnectionArray	Longint	kMaxElementNode+1
BigResultArray	Double	kMaxBeamResult
BeamResultArray	Double	kMaxBeamResult
BeamReleasedArray	Boolean	kMaxBeamRelease
BeamReleaseDoublesArray	Double	kMaxBeamRelease
BeamSectionArray	Double	kNumBeamSectionData
PlateResultArray	Double	kMaxPlateResult
BrickResultArray	Double	kMaxBrickResult
MaterialArray	Double	kNumMaterialData
UnitsArray	Longint	kLastUnit
AttributeDoublesArray	Double	kMaxAttributeDoubles
AttributeLongintArray	Longint	kMaxAttributeLongint
AttributeLogicalsArray	Boolean	kMaxAttributeLogicals
UCSDoublesArray	Double	kMaxUCSDoubles
NodeResultArray	Double	6

LoadCaseDefaultsArray	Double	13
FreedomCaseDefaultsArray	Double	6
Array3Longint	Longint	3
Array6Longint	Longint	6
Array2Doubles	Double	2
Array3Doubles	Double	3
Array4Doubles	Double	4
Array6Doubles	Double	6

### Constants to Define Range

Constant	Value
kMaxStrLen	255
kMaxEntityTotals	4
kMaxElementNode	20
kMaxBeamResult	4096
kNumBeamSectionData	20
kNumMaterialData	3
kMaxAttributeDoubles	12
kMaxAttributeLogicals	6
kMaxAttributeLongint	6
kLastUnit	6
kMaxPlateResult	1024
kMaxBrickResult	1024
kMaxBeamRelease	12
kMaxDisp	6
kAllStations	20
kMaxUCSDoubles	10



## Error Codes

The following lists the error codes that can be returned by function calls to the Strand7 API. The list is broken into two sections: non-solver and solver error codes. The error string and a description of the errors are included.

### Non-Solver Errors

`ERR7_InvalidRegionalSettings`

The regional settings, set in the Control Panel/Region and Language are invalid.

`ERR7_InvalidDLLsPresent`

`SlvPanel.dll` and/or `St6List.dll` are not compatible with `St7API.dll`.

`ERR7_APINotInitialised`

The API is not initialised. `St7Init` has not been called.

`ERR7_InvalidErrorCode`

An invalid error code was requested.

`ERR7_APINotLicensed`

The API is not licenced or correctly configured.

`ERR7_UnknownError`

An unknown error has occurred.

`ERR7_FileAlreadyOpen`

The file is already open.

`ERR7_FileNotFound`

File not found.

`ERR7_FileNotSt7`

The file is not an St7 file.

`ERR7_InvalidFileName`

---

The file name is not valid.

ERR7\_FileIsNewer

File is newer.

ERR7\_CannotReadFile

Cannot read from file.

ERR7\_InvalidScratchPath

The scratch folder is not valid.

ERR7\_FileNotOpen

The file is not open.

ERR7\_ExceededTotal

The total number of entities was exceeded.

ERR7\_DataNotFound

Data not found.

ERR7\_InvalidResultFile

The file is not a valid St7 result file.

ERR7\_ResultFileNotOpen

The result file is not open.

ERR7\_ExceededResultCase

The total number of result cases was exceeded.

ERR7\_UnknownResultType

The result type is not valid.

ERR7\_UnknownResultLocation

The result location is not valid.

ERR7\_UnknownSurfaceLocation

The surface location is not valid.

ERR7\_UnknownProperty

Unknown property number.

ERR7\_InvalidEntity

Invalid entity.

ERR7\_InvalidBeamPosition

Invalid beam position.

ERR7\_InvalidLoadCase

Invalid load case.

ERR7\_InvalidFreedomCase

Invalid freedom case.

ERR7\_UnknownTitle

Unknown title.

ERR7\_UnknownUCS

Unknown UCS.

ERR7\_TooManyBeamStations

Too many beam stations were specified.

ERR7\_UnknownSubType

Unknown result subtype.

ERR7\_GroupIdDoesNotExist

Group ID does not exist.

ERR7\_InvalidFileUnit

Invalid file unit.

ERR7\_CannotSaveFile

---

Cannot save file.

ERR7\_ResultFileIsOpen

A result file is open.

ERR7\_InvalidUnits

The unit type specified is invalid.

ERR7\_InvalidEntityNodes

An invalid number of nodes was specified.

ERR7\_InvalidUCSType

The UCS type specified is not valid.

ERR7\_InvalidUCSID

The UCS ID specified is not valid.

ERR7\_UCSIDAlreadyExists

The UCS ID already exists.

ERR7\_CaseNameAlreadyExists

The specified case name already exists.

ERR7\_InvalidEntityNumber

The specified entity number is not valid.

ERR7\_InvalidBeamEnd

The specified beam end is not valid.

ERR7\_InvalidBeamDir

The specified beam direction is not valid.

ERR7\_InvalidPlateEdge

The specified plate edge is not valid.

ERR7\_InvalidBrickFace

The specified brick face is not valid.

`ERR7_InvalidBeamType`

The specified beam type is not valid.

`ERR7_InvalidPlateType`

The specified plate type is not valid.

`ERR7_InvalidMaterialType`

The specified material type is not valid.

`ERR7_PropertyAlreadyExists`

The specified property already exists.

`ERR7_InvalidBeamSectionType`

The specified beam section type is not valid.

`ERR7_PropertyNotSpring`

The specified beam is not a spring.

`ERR7_PropertyNotCable`

The specified beam is not a cable.

`ERR7_PropertyNotTruss`

The specified beam is not a truss.

`ERR7_PropertyNotCutOffBar`

The specified beam is not a cutoff bar.

`ERR7_PropertyNotPointContact`

The specified beam is not a point contact.

`ERR7_PropertyNotBeam`

The specified beam is not of a beam type.

`ERR7_PropertyNotPipe`

---

The specified beam is not a pipe.

ERR7\_PropertyNotConnectionBeam

The specified beam is not a connection beam.

ERR7\_InvalidSectionParameters

The specified section parameters are not valid.

ERR7\_PropertyNotUserDefinedBeam

The specified beam is not a user defined beam.

ERR7\_MaterialIsUserDefined

The specified property uses a user defined material model.

ERR7\_MaterialNotIsotropic

The specified property does not use an isotropic material model.

ERR7\_MaterialNotOrthotropic

The specified property does not use an orthotropic material model.

ERR7\_InvalidRubberModel

The specified rubber model is not valid.

ERR7\_MaterialNotRubber

The specified property does not use a rubber material model.

ERR7\_InvalidSectionProperties

The specified section properties are not valid.

ERR7\_PlateDoesNotHaveThickness

The specified plate does not have a valid thickness.

ERR7\_IncompatibleMaterialCombination

Incompatible material combination.

ERR7\_UnknownSolver

The specified solver type is not valid.

`ERR7_InvalidSolverMode`

The specified solver mode is not valid.

`ERR7_InvalidMirrorOption`

The specified mirror option is not valid.

`ERR7_SectionCannotBeMirrored`

The section cannot be mirrored.

`ERR7_InvalidTableType`

The specified table type is not valid.

`ERR7_InvalidTableName`

The specified table name is not valid.

`ERR7_TableNameAlreadyExists`

The specified table already exists.

`ERR7_InvalidNumberOfEntries`

The specified number of table entries is not valid.

`ERR7_InvalidZipType`

The specified zip type is not valid.

`ERR7_TableDoesNotExist`

The specified table does not exist.

`ERR7_NotFrequencyTable`

The specified table is not a frequency table.

`ERR7_InvalidFrequencyType`

The specified frequency type is not valid.

`ERR7_InvalidTableSetting`

---

The specified table setting is not valid.

`ERR7_IncompatibleTableType`

The specified table is incompatible with the selected table type.

`ERR7_IncompatibleCriterionCombination`

Incompatible yield criterion combination.

`ERR7_InvalidModalFile`

The specified modal results file is not valid.

`ERR7_InvalidCombinationCaseNumber`

The specified load case combination number is not valid.

`ERR7_InvalidInitialCaseNumber`

The specified initial case number is not valid.

`ERR7_InvalidInitialFile`

The specified initial file is not valid.

`ERR7_InvalidModeNumber`

The specified mode number is not valid.

`ERR7_BeamIsNotBXS`

The specified beam property is not a BXS beam.

`ERR7_InvalidDampingType`

The specified damping type is not valid.

`ERR7_InvalidRayleighMode`

The specified Rayleigh mode is not valid.

`ERR7_CannotReadBXS`

The BXS data cannot be read.

`ERR7_InvalidResultType`

The specified result type is not valid.

`ERR7_InvalidSolverParameter`

The specified solver parameter is not valid.

`ERR7_InvalidModalLoadType`

The specified modal load type is not valid.

`ERR7_InvalidTimeRow`

The specified time step row is not valid.

`ERR7_SparseSolverNotLicenced`

The sparse solver is not licenced.

`ERR7_InvalidSolverScheme`

The specified solver storage scheme is not valid.

`ERR7_InvalidSortOption`

The specified sort option is not valid.

`ERR7_IncompatibleResultFile`

The current result file is incompatible with the requested result.

`ERR7_InvalidLinkType`

The specified link type is not valid.

`ERR7_InvalidLinkData`

The specified link data is not valid.

`ERR7_OnlyOneLoadCase`

The model contains only one load case, which cannot be deleted.

`ERR7_OnlyOneFreedomCase`

The model contains only one freedom case, which cannot be deleted.

`ERR7_InvalidLoadID`

---

The specified load ID is not valid.

ERR7\_InvalidBeamLoadType

The specified load type is not valid.

ERR7\_InvalidStringID

The specified string ID is not valid.

ERR7\_InvalidPatchType

The specified patch type is not valid.

ERR7\_IncrementDoesNotExist

The specified increment does not exist.

ERR7\_InvalidLoadCaseType

The specified load case type is not valid.

ERR7\_InvalidFreedomCaseType

The specified freedom case type is not valid.

ERR7\_InvalidHarmonicLoadType

The specified harmonic load type is not valid.

ERR7\_InvalidTemperatureType

The specified temperature type is not valid.

ERR7\_InvalidPatchTypeForPlate

The specified patch type is not valid for the selected element.

ERR7\_InvalidAttributeType

The specified attribute type is not valid.

ERR7\_MaterialNotAnisotropic

The specified property does not use an anisotropic material model.

ERR7\_InvalidMatrixType

The specified matrix type is not valid.

`ERR7_MaterialNotUserDefined`

The specified property does not use a user defined material model.

`ERR7_InvalidIndex`

The requested index is outside the allowable range.

`ERR7_InvalidContactType`

The specified contact type is not valid.

`ERR7_InvalidContactSubType`

The specified contact subtype is not valid.

`ERR7_InvalidCutoffType`

The specified cutoff type is not valid.

`ERR7_ResultQuantityNotAvailable`

The result quantity requested is not available.

`ERR7_YieldNotMCDP`

The yield criterion for the specified property is not Mohr Coulomb or Drucker Prager.

`ERR7_CombinationDoesNotExist`

The specified combination does not exist.

`ERR7_InvalidSeismicCase`

The specified seismic case is not valid.

`ERR7_InvalidImportExportMode`

The specified export mode is not valid.

`ERR7_CannotReadImportFile`

The import file cannot be read.

`ERR7_InvalidAnsysImportFormat`

---

The specified ANSYS import format is not valid.

`ERR7_InvalidAnsysArrayStatus`

The specified ANSYS array status is not valid.

`ERR7_CannotWriteExportFile`

The export file cannot be written.

`ERR7_InvalidAnsysExportFormat`

The specified ANSYS export format is not valid.

`ERR7_InvalidAnsysEndReleaseOption`

The specified ANSYS End Release option is not valid.

`ERR7_InvalidAnsysExportUnits`

The specified ANSYS export units is not valid.

`ERR7_InvalidSt7ExportFormat`

The specified ST7 export format is not valid.

`ERR7_InvalidUVPos`

The u-v position specified is not valid.

`ERR7_InvalidResponseType`

The response type specified is not valid.

`ERR7_InvalidLayoutID`

The specified concrete layout ID is not valid.

`ERR7_InvalidPlateSurface`

The specified plate surface is not valid.

`ERR7_MeshingErrors`

Surface meshing has generated an error.

`ERR7_InvalidZipTolerance`

The specified zip tolerance is not valid.

`ERR7_InvalidTaperAxis`

The specified taper axis is not valid.

`ERR7_InvalidTaperType`

The specified taper type is not valid.

`ERR7_InvalidTaperRatio`

The specified taper ratios are not valid.

`ERR7_InvalidPositionType`

The specified position type is not valid.

`ERR7_InvalidPreLoadType`

The specified pre-load type is not valid.

`ERR7_InvalidVertexType`

The specified vertex type is not valid.

`ERR7_InvalidVertexMeshSize`

The specified vertex mesh size is not valid.

`ERR7_InvalidGeometryEdgeType`

The specified geometry edge type is not valid.

`ERR7_InvalidPropertyNumber`

The specified property number is not valid.

`ERR7_InvalidFaceSurface`

The specified geometry face surface is not valid.

`ERR7_InvalidModType`

The specified time dependent modulus type is not valid.

`ERR7_MaterialNotSoil`

---

The specified property does not use a soil material model.

ERR7\_MaterialNotFluid

The specified property does not use a fluid material model.

ERR7\_SoilTypeNotDC

The specified property does not use a Duncan-Chang soil material model.

ERR7\_SoilTypeNotCC

The specified property does not use a Cam-Clay soil material model.

ERR7\_MaterialNotLaminate

The specified property does not use a laminate material model.

ERR7\_InvalidLaminateID

The specified laminate ID is not valid.

ERR7\_LaminateNameAlreadyExists

The specified laminate name already exists.

ERR7\_LaminateIDAlreadyExists

The specified laminate ID already exists.

ERR7\_PlyDoesNotExist

The specified ply does not exist.

ERR7\_ExceededMaxNumPlies

The maximum number of plies was exceeded.

ERR7\_LayoutIDAlreadyExists

The specified concrete layout ID already exists.

ERR7\_InvalidNumModes

The requested number of modes is not valid.

ERR7\_InvalidLTAMethod

The specified linear transient solver method is not valid.

`ERR7_InvalidLTASolutionType`

The specified linear transient solver solution type is not valid.

`ERR7_ExceededMaxNumStages`

The maximum number of stages was exceeded.

`ERR7_StageDoesNotExist`

The specified stage does not exist.

`ERR7_ExceededMaxNumSpectralCases`

The maximum number of spectral cases was exceeded.

`ERR7_InvalidSpectralCase`

The specified spectral case is not valid.

`ERR7_InvalidSpectrumType`

The specified spectrum type is not valid.

`ERR7_InvalidResultssSign`

The specified results sign is not valid.

`ERR7_InvalidPositionTableAxis`

The specified position table axis is not valid.

`ERR7_InvalidInitialConditionsType`

The specified initial conditions type is not valid.

`ERR7_ExceededMaxNumNodeHistory`

The maximum number of node history definitions was exceeded.

`ERR7_NodeHistoryDoesNotExist`

The specified node history does not exist.

`ERR7_InvalidTransientTempType`

---

The specified transient temperature input type is not valid.

ERR7\_InvalidTimeUnit

The time unit type specified is not valid.

ERR7\_InvalidLoadPath

The specified load path is not valid.

ERR7\_InvalidTempDependenceType

The specified temperature dependence type is not valid.

ERR7\_InvalidTrigType

The specified trigonometric type is not valid.

ERR7\_InvalidUserEquation

The specified user equation is not valid.

ERR7\_InvalidCreepID

The specified creep definition ID is not valid.

ERR7\_CreepIDAlreadyExists

The specified creep definition ID already exists.

ERR7\_InvalidCreepLaw

The specified creep law is not valid.

ERR7\_InvalidCreepHardeningLaw

The specified creep hardening law is not valid.

ERR7\_InvalidCreepViscoChainRow

The specified creep visco-elastic data row is not valid.

ERR7\_InvalidCreepFunctionType

The specified creep function/chain type is not valid.

ERR7\_InvalidCreepShrinkageType

The specified creep shrinkage type is not valid.

`ERR7_InvalidTableRow`

The specified table row is not valid.

`ERR7_ExceededMaxNumRows`

The maximum number of rows was exceeded.

`ERR7_InvalidLoadPathTemplateID`

The specified load path template ID is not valid.

`ERR7_LoadPathTemplateIDAlreadyExists`

The specified load path template ID already exists.

`ERR7_InvalidLoadPathLane`

The specified load path template lane is not valid.

`ERR7_ExceededMaxNumLoadPathTemplates`

The maximum number of load path templates was exceeded.

`ERR7_ExceededMaxNumLoadPathVehicles`

The maximum number of vehicles was exceeded.

`ERR7_InvalidLoadPathVehicle`

The specified load path template vehicle is not valid.

`ERR7_InvalidMobilityType`

The specified mobility type is not valid.

`ERR7_InvalidAxisSystem`

The specified axis system is not valid.

`ERR7_InvalidLoadPathID`

The specified load path ID is not valid.

`ERR7_LoadPathIDAlreadyExists`

---

The specified load path ID already exists.

`ERR7_InvalidPathDefinition`

The path definition is not valid.

`ERR7_InvalidLoadPathShape`

The specified load path shape is not valid.

`ERR7_InvalidLoadPathSurface`

The specified load path surface is not valid.

`ERR7_InvalidNumPathDivs`

The specified number of path divisions is not valid.

`ERR7_InvalidGeometryCavityLoop`

The specified geometry face cavity loop is not valid.

`ERR7_InvalidLimitEnvelope`

The specified limit envelope is not valid.

`ERR7_ExceededMaxNumLimitEnvelopes`

The maximum number of limit envelopes was exceeded.

`ERR7_InvalidCombEnvelope`

The specified combination envelope is not valid.

`ERR7_ExceededMaxNumCombEnvelopes`

The maximum number of combination envelopes was exceeded.

`ERR7_InvalidFactorsEnvelope`

The specified factors envelope is not valid.

`ERR7_ExceededMaxNumFactorsEnvelopes`

The maximum number of factors envelopes was exceeded.

`ERR7_InvalidLimitEnvelopeType`

The specified limit envelope type is not valid.

`ERR7_InvalidCombEnvelopeType`

The specified combination envelope type is not valid.

`ERR7_InvalidFactorsEnvelopeType`

The specified factors envelope type is not valid.

`ERR7_InvalidCombEnvelopeAccType`

The specified combination envelope accumulation type is not valid.

`ERR7_InvalidEnvelopeSet`

The specified envelope set is not valid.

`ERR7_ExceededMaxNumEnvelopeSets`

The maximum number of envelope sets was exceeded.

`ERR7_InvalidEnvelopeSetType`

The specified envelope set type is not valid.

`ERR7_InvalidCombResFile`

The specified combination result file is not valid.

`ERR7_ExceededMaxNumCombResFiles`

The maximum number of combination result files was exceeded.

`ERR7_CannotCombResFiles`

The result files cannot be combined.

`ERR7_InvalidStartEndTimes`

The specified start and end times are not valid.

`ERR7_InvalidNumSteps`

The specified number of steps is not valid.

`ERR7_InvalidLibraryPath`

---

The library folder is not valid.

ERR7\_InvalidLibraryType

The specified library type is not valid.

ERR7\_InvalidLibraryID

The specified library ID is not valid.

ERR7\_InvalidLibraryName

The specified library name is not valid.

ERR7\_InvalidLibraryItemID

The specified library item ID is not valid.

ERR7\_InvalidLibraryItemName

The specified library item name is not valid.

ERR7\_InvalidDisplayOptionsPath

The configuration file folder is not valid.

ERR7\_InvalidSolverPath

The solver folder is not valid.

ERR7\_InvalidCementHardeningType

The specified cement hardening type is not valid.

ERR7\_ZeroPlateElements

The model contains zero plate elements.

ERR7\_CannotMakeBXS

The beam section cannot be generated.

ERR7\_CannotCalculateBXSData

The beam section data cannot be calculated.

ERR7\_InvalidSurfaceMeshTargetType

The specified plate element target is not valid.

`ERR7_InvalidModalNodeReactType`

The specified node reaction type is not valid.

`ERR7_InvalidAxis`

The specified axis is not valid.

`ERR7_InvalidBeamAxisType`

The specified beam axis type is not valid.

`ERR7_InvalidStaadCountryCodeOption`

The specified STAAD country code option is not valid.

`ERR7_InvalidGeometryFormatProtocol`

The specified geometry format/protocol is not valid.

`ERR7_InvalidDXFBeamOption`

The specified DXF beam option is not valid.

`ERR7_InvalidDXFPlateOption`

The specified DXF plate option is not valid.

`ERR7_InvalidLoadPathLaneFactorType`

The specified load path template multi-lane factor type is not valid.

`ERR7_InvalidLoadPathVehicleInstance`

The specified load path template vehicle instance type is not valid.

`ERR7_InvalidNumBeamStations`

The specified number of beam stations is not valid.

`ERR7_ResFileUnsupportedType`

The specified solution type is not supported.

`ERR7_ResFileAlreadyOpen`

---

The result file is already open.

`ERR7_ResFileInvalidNumCases`

The specified number of result cases is not valid.

`ERR7_ResFileNotOpen`

The result file is not open.

`ERR7_ResFileInvalidCase`

The specified result case is not valid.

`ERR7_ResFileDoesNotHaveEntity`

The model does not contain this entity.

`ERR7_ResFileInvalidQuantity`

The specified result quantity is not valid.

`ERR7_ResFileQuantityNotExist`

The result file does not contain the specified result quantity.

`ERR7_ResFileCantSave`

The result file cannot be saved.

`ERR7_ResFileCantClearQuantity`

The specified quantity must always exist in a result file.

`ERR7_ResFileContainsNoElements`

The model does not contain any elements.

`ERR7_ResFileContainsNoNodes`

The model does not contain any nodes.

`ERR7_ResFileInvalidName`

The specified result file name is not valid.

`ERR7_ResFileAssociationNotAllowed`

Load and freedom case association is not supported by this result file type.

`ERR7_ResFileIncompatibleQuantity`

The specified quantity is not compatible with the result file type.

`ERR7_CannotEditSolverFiles`

Result files generated directly by the solver cannot be edited.

`ERR7_CannotOpenResultFile`

The result file cannot be opened.

`ERR7_CouldNotShowModelWindow`

The model window could not be displayed.

`ERR7_ModelWindowWasNotShowing`

The model window was not showing.

`ERR7_CantDoWithModalWindows`

Operation cannot be performed when modal dialogs are open.

`ERR7_InvalidSelectionEndEdgeFace`

The specified end, edge or face is not valid.

`ERR7_CouldNotCreateModelWindow`

The model window could not be created.

`ERR7_ModelWindowWasNotCreated`

The model window has not been created.

`ERR7_InvalidImageType`

The specified image type is not valid.

`ERR7_InvalidImageDimensions`

The specified image dimensions are not valid.

`ERR7_InsufficientRamToCreateImage`

---

Insufficient RAM to create image.

ERR7\_CannotSaveImageFile

Cannot save image file.

ERR7\_InvalidWindowDimensions

The specified window dimensions are not valid.

ERR7\_InvalidResultQuantity

The specified quantity is not valid.

ERR7\_InvalidResultSubQuantity

The specified sub-quantity is not valid.

ERR7\_InvalidComponent

The specified component is not valid.

ERR7\_ResultIsNotAvailable

The result is not available.

ERR7\_InvalidUCSIndex

The specified UCS index is not valid.

ERR7\_InvalidDiagramAxis

The specified diagram axis is not valid.

ERR7\_InvalidVectorComponents

The specified vector component is not valid.

ERR7\_TableTypeIsNotTimeBased

The specified table is not time based.

ERR7\_InvalidTableID

The specified table ID is not valid.

ERR7\_LinkNotMasterSlave

The specified link is not a master-slave link.

`ERR7_LinkNotSectorSymmetry`

The specified link is not a sector symmetry link.

`ERR7_LinkNotCoupling`

The specified link is not a coupling link.

`ERR7_LinkNotPinned`

The specified link is not a pinned link.

`ERR7_LinkNotRigid`

The specified link is not a rigid link.

`ERR7_LinkNotShrink`

The specified link is not a shrink link.

`ERR7_LinkNotTwoPoint`

The specified link is not a 2-point link.

`ERR7_LinkNotAttachment`

The specified link is not an attachment link.

`ERR7_LinkNotMultiPoint`

The specified link is not a multi-point link.

`ERR7_InvalidCoupleType`

The specified couple type is not valid.

`ERR7_InvalidRigidPlane`

The specified rigid plane is not valid.

`ERR7_InvalidMultiPointFactorsType`

The specified multi-point link factors type is not valid.

`ERR7_InvalidMultiPointLink`

---

The specified multi-point link is not valid.

ERR7\_InvalidAttachmentType

The specified attachment type is not valid.

ERR7\_ExceededMaxNumColumns

The maximum number of columns was exceeded.

ERR7\_CouldNotDestroyModelWindow

The model window could not be destroyed.

ERR7\_CannotSetWindowParent

Cannot set the specified model window parent.

ERR7\_InvalidLoadCaseFilePath

The ANSYS load case file folder is not valid.

ERR7\_InvalidStaadLengthUnit

The specified STAAD length unit is not valid.

ERR7\_InvalidStaadForceUnit

The specified STAAD force unit is not valid.

ERR7\_InvalidDuplicateFaceType

The specified duplicate face type is not valid.

ERR7\_InvalidNodeCoordinateKeepType

The specified node coordinate keep type is not valid.

ERR7\_CommentDoesNotExist

The specified comment does not exist.

ERR7\_InvalidFilePath

The file path is not valid.

ERR7\_InvalidContactYieldType

The specified contact yield type is not valid.

`ERR7_InvalidNumMeshingLoops`

The specified number of loops is not valid.

`ERR7_InvalidMeshPositionOnUCS`

The specified UCS position is not valid.

`ERR7_InvalidK0Expression`

Invalid K0 expression.

`ERR7_InvalidK1Expression`

Invalid K1 expression.

`ERR7_NoPatchLoadsCreated`

No patch loads were generated.

`ERR7_InvalidResOptsBeamEnvelope`

The specified beam envelope setting is invalid.

`ERR7_InvalidResOptsRotationUnit`

The specified rotation unit is invalid.

`ERR7_InvalidResOptsHRASetting`

The specified Harmonic Response Analysis result settings are invalid.

`ERR7_InvalidResOptsStageDisplacement`

The specified Staged Analysis displacement result setting is invalid.

`ERR7_InvalidToolOptsZipOptions`

The specified zip settings are invalid.

`ERR7_InvalidToolOptsSubdivideOptions`

The specified subdivide settings are invalid.

`ERR7_InvalidToolOptsCopyOptions`

---

The specified copy settings are invalid.

`ERR7_InvalidToleranceType`

The specified tolerance type is invalid.

`ERR7_InvalidAttachPartsParams`

Invalid attach parts parameters.

`ERR7_InvalidDrawParameters`

Invalid entity display parameters.

`ERR7_FilesStillOpen`

There are files still open.

`ERR7_SolverStillRunning`

There are solvers still running.

`ERR7_InvalidPolygonToFaceParameters`

Invalid polygon to face parameters.

`ERR7_InvalidResOptsStrainUnit`

Invalid strain unit.

`ERR7_FunctionNotSupported`

Function no longer supported.

`ERR7_SoilTypeNotMC`

The specified property does not use a Mohr-Coulomb soil material model.

`ERR7_SoilTypeNotDP`

The specified property type does not use a Drucker-Prager soil material model.

`ERR7_TooManyAnimations`

Maximum number of animations are already running.

`ERR7_InvalidAnimationFile`

The file is not a valid animation file.

`ERR7_InvalidAnimationMode`

The specified animation mode is not valid.

`ERR7_InsufficientFrames`

The specified number of frames is not sufficient to generate an animation.

`ERR7_AnimationDimensionsTooSmall`

Animation dimension is too small.

`ERR7_AnimationDimensionsTooLarge`

Animation dimension is too large.

`ERR7_ReducedAnimation`

Insufficient memory for complete animation.

`ERR7_InvalidAnimationType`

The specified animation file type is not valid.

`ERR7_CannotFindStubFile`

The stub file, "animator.stb", required for creating self-running animations, cannot be found.

`ERR7_CouldNotSaveAnimationFile`

An error occurred while saving the animation file.

`ERR7_AnimationHandleOutOfRange`

The specified animation handle is outside the valid range.

`ERR7_AnimationNotRunning`

The requested animation is not running.

`ERR7_SoilTypeNotLS`

The specified property does not use a Linear Elastic soil material model.

---

`ERR7_NoPolygonWasConverted`

No polygon was converted.

`ERR7_InvalidAlphaTempType`

The specified alpha vs temperature type is not valid

`ERR7_InvalidGravityDirection`

Invalid gravity direction.

`ERR7_InvalidAttachmentDirection`

The specified attachment direction is not valid.

`ERR7_InvalidHardeningType`

The specified hardening type is not valid.

`ERR7_ResultCaseNotInertiaRelief`

The result case is not restrained by inertial relief.

`ERR7_InvalidNumLayers`

The number of plate integration layers is invalid (less than 1 or greater than 100).

`ERR7_PlateDoesNotHaveLayers`

The plate property does not require integration layers.

`ERR7_ToolOperationFailed`

The Strand7 tool operation failed.

## Solver Errors

SE\_NoLoadCaseSelected

No load case selected.

SE\_IncompatibleRestartFile

Incompatible restart file.

SE\_ElementUsesInvalidProperty

An element uses an invalid property.

SE\_InvalidElement

Model contains an invalid element.

SE\_NeedNonlinearHeatSolver

Model requires the nonlinear heat solver.

SE\_TableNotFound

A table specified in the model was not found.

SE\_InvalidRestartFile

Invalid restart file.

SE\_InvalidInitialFile

Invalid initial file.

SE\_InvalidSolverResultFile

Invalid solver result file.

SE\_InvalidLink

Model contains an invalid link.

SE\_InvalidPlateCohesionValue

Invalid plate cohesion value.

SE\_InvalidBrickCohesionValue

---

Invalid brick cohesion value.

SE\_NonlinearSolverRequired

Model requires the nonlinear solver.

SE\_NoLoadTablesDefined

No load tables defined.

SE\_NoVelocityDataInInitialFile

No velocity data in initial file.

SE\_NoModesIncluded

No modes included for modal superposition method.

SE\_InvalidTimeStep

Invalid time steps used in model.

SE\_LoadIncrementsNotDefined

Load increments not defined.

SE\_NoFreedomCaseInIncrements

No freedom case in increments.

SE\_InvalidInitialTemperatureFile

Invalid initial temperature file.

SE\_InvalidFrequencyRange

Invalid frequency range.

SE\_ModelMixesAxiNonAxi

Model mixes axisymmetric elements with non-axisymmetric elements.

SE\_CompositeModuleNotAvailable

Composite module not available.

SE\_CannotFindSolver

Cannot find solver.

SE\_UnknownException

Unknown error.

SE\_DuplicateLinks

Duplicate links in model.

SE\_CannotAppendToFile

Cannot append to file.

SE\_CannotOverwriteFile

Cannot overwrite file.

SE\_CannotWriteToResultFile

Cannot write to result file.

SE\_CannotWriteToLogFile

Cannot write to log file.

SE\_CannotReadRestartFile

Cannot read restart file.

SE\_InitialConditionsNotValid

Initial conditions are not valid.

SE\_InvalidRayleighFactors

Invalid Rayleigh factors.

SE\_ShearPanelMustBeQuad4

Shear panel must be Quad4.

SE\_SingularPlateMatrix

Singular plate matrix.

SE\_SingularBrickMatrix

---

Singular brick matrix.

SE\_NoBeamProperties

No beam properties defined.

SE\_NoPlateProperties

No plate properties defined.

SE\_NoBrickProperties

No brick properties defined.

SE\_MoreLoadIncrementsNeeded

More load increments are required.

SE\_RubberRequiresGNL

Rubber material in model requires the geometry nonlinear option.

SE\_NoFreedomCaseSelected

No freedom case selected.

SE\_InvalidSpectralVectors

Invalid spectral vectors.

SE\_NoSpectralResultsSelected

No spectral results selected.

SE\_SpectralFactorsNotDefined

Spectral factors are not defined.

SE\_SpectralFactorsAllZero

Spectral factors are all zero.

SE\_NoTimeStepsSaved

No time steps are saved.

SE\_InvalidDirectionVector

Invalid direction vector.

SE\_HarmonicFactorsAllZero

Harmonic factors are all zero.

SE\_TemperatureDependenceCaseNotSet

Temperature dependence case is not set.

SE\_ZeroLengthRigidLinkGenerated

A link of zero length was generated.

SE\_InvalidStringGroupDefinition

An invalid string group was found.

SE\_InvalidPreTensionOnString

A string group with variable pre-tension was found.

SE\_StringOrderHasChanged

The string elements defined in the model are not compatible with those in the restart file.

SE\_BadTaperData

Beam element has invalid taper attributes.

SE\_TaperedPlasticBeams

Tapered beams do not support material nonlinearity.

SE\_NoMovingLoadPathsInCases

No load paths were found in the selected load cases.

SE\_NoResponseVariablesDefined

No response variables (entity attributes) have been defined.

SE\_InvalidPlateVariableRequested

Plate{s} have one or more invalid response variables assigned.

SE\_InvalidGravityCase

---

The load case selected as the soil/fluid gravity case is not valid.

`SE_InvalidUserPlateCreepDefinition`

The user defined creep table required by a plate property is not valid.

`SE_InvalidUserBrickCreepDefinition`

The user defined creep table required by a brick property is not valid.

`SE_InvalidPlateShrinkageDefinition`

The creep/shrinkage definition required by a plate property is not valid.

`SE_InvalidBrickShrinkageDefinition`

The creep/shrinkage definition required by a brick property is not valid.

`SE_InvalidLaminateID`

A plate property references an invalid laminate definition.

`SE_CannotReadWriteScratchPath`

The scratch path does not have sufficient read/write access to allow the solver to run.

`SE_CannotConvertAttachmentLink`

Attachment link is not valid as it generates a singular matrix.

`SE_SoilRequiresMNL`

Soil material in model requires the material nonlinear option.

`SE_ActiveStageHasNoIncrements`

Load increments are not defined for an active stage.

`SE_ConcreteCreepMNL`

Concrete creep and material stress-strain tables cannot be considered together.

`SE_CannotConvertInterpMultiPoint`

Mutlipoint link generated a singular matrix.

`SE_MissingInsituStress`

Some soil elements do not have in-situ stress attributes – an estimate based on element depth will be used.

**SE\_InvalidMaterialNonlinearString**

For material nonlinearity, all elements in a string group must use the same property set.

**SE\_TensileInsituPlateStress**

Some soil elements (plates) have tensile (positive) in-situ stress attributes.

**SE\_TensileInsituBrickStress**

Some soil elements (bricks) have tensile (positive) in-situ stress attributes.

**SE\_IncompatibleRestartUnits**

The units in the result file selected for appending are different to the units in the model.

**SE\_CreepTimeTooShort**

Creep curve fit time is too short.

**SE\_InvalidElements**

Elements with invalid connections were found.

**SE\_InufficientRestartFileSteps**

The restart file contains fewer result cases than the requested restart case.

**SE\_NeedNodeTempNTASolver**

Table Type nodal temperatures are not supported by the linear transient dynamic solver.

**SE\_SingleShotRestartFile**

The restart file contains only the last saved result case.

**SE\_SkylineUsesBadSort**

The Skyline scheme usually works best with the Tree and Geometry node orderings.

**SE\_StagedSolutionFileNotFound**

The file used in the initial staged analysis cannot be found or is invalid.

---

**SE\_NeedTemperatureTables**

This model contains temperature dependent material properties, which are ignored by the current solver settings.

**SE\_AttachmentsInWrongGroup**

One or more attachment links are active in stages where their targets are inactive.

**SE\_StagingHasChanged**

Stage definitions in the initial file are not compatible with the current stage definitions in this model.

**SE\_NoNodes**

The model must contain at least one node to run the solver.

**SE\_CQCRequiresDamping**

Spectral CQC results require damping.

## Title Types

The `St7GetTitle` function call can be used to retrieve information entered in the **Model Information** window in Strand7. This includes the model title, author and creation date entries. The following lists the integer value and title types (as defined in the include and header files).

TITLEModel	Model title
TITLEProject	Project title
TITLEReference	Reference
TITLEAuthor	Author
TITLECreated	Creation date
TITLEModified	Modification date

# Physical Unit Types

Every Strand7 model is described by a unit system accounting for how length, force, stress, mass, temperature and energy are measured. The *St7GetUnits* function call can be used to retrieve the unit system used by the currently open model. This is achieved with the *UnitsArray* output parameter. The following includes the position, type (defined in the include and header files) and unit for each entry in the *UnitsArray* vector.

ipLENGTHU	Length
ipFORCEU	Force
ipSTRESSU	Stress
ipMASSU	Mass
ipTEMPERU	Temperature
ipENERGYU	Energy

The following lists the value, type (defined in the include and header files) and unit type available for each unit.

## Length

luMETRE	Metre (m)
luCENTIMETRE	Centimetre (cm)
luMILLIMETRE	Millimetre (mm)
luFOOT	Foot (ft)
luINCH	Inch (in)

## Force

fuNEWTON	Newton (N)
fuKILONEWTON	Kilonewton (kN)
fuMEGANEWTON	Meganewton (MN)
fuKILOFORCE	Kilogram force (kgf)

## Physical Unit Types

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fuPOUNDFORCE	Pound force (lbf)
fuTONNEFORCE	Tonne (t)
fuKIPFORCE	Kilopound force (kip)

## Stress

suPASCAL	Pascal (Pa)
suKILOPASCAL	Kilopascal (kPa)
suMEGAPASCAL	Megapascal (MPa)
suKSCm	Kilograms force per square centimetre (kgf/cm <sup>2</sup> )
suPSI	Pounds per square inch (psi)
suKSI	Kilopounds per square inch (ksi)
suPSF	Pounds per square foot (psf)

## Mass

muKILOGRAM	Kilogram (kg)
muTONNE	Tonne (t)
muGRAM	Gram (g)
muPOUND	Pound (lb)
muSLUG	Slug (lb.sec <sup>2</sup> /ft)

## Temperature

tuCELSIUS	Celsius (C)
tuFAHRENHEIT	Fahrenheit (F)
tuKELVIN	Kelvin (K)

---

## **Energy**

euJOULE	Joule (J)
euBTU	British thermal units (Btu)
euFTLBF	Kelvin (K)

## Coordinate System Conventions

All coordinate systems in Strand7 define a right-hand set of locally orthogonal axes;  $\mathbf{i}_1$ ,  $\mathbf{i}_2$  and  $\mathbf{i}_3$ , with reference to the rectangular Global Cartesian axis directions. These axes are generically referred to as the 123 axis directions for translational degrees of freedom, and are always listed in this order.

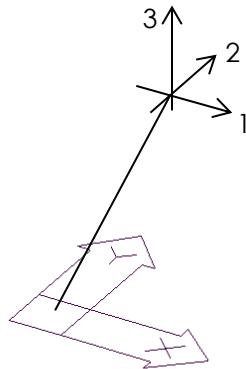
When there are rotational degrees of freedom defined by the right-hand rule about the  $\mathbf{i}_1$ ,  $\mathbf{i}_2$  and  $\mathbf{i}_3$  axes, they are listed after the 123 components in the same order. Collectively this is referred to as the 123456 axis convention.

### UCS Types

Strand7 supports a number of UCS (User Coordinate System) types including Cartesian, cylindrical, spherical and toroidal. The integer values and types (as defined in the include and header files) are shown below.

UCSCartesian

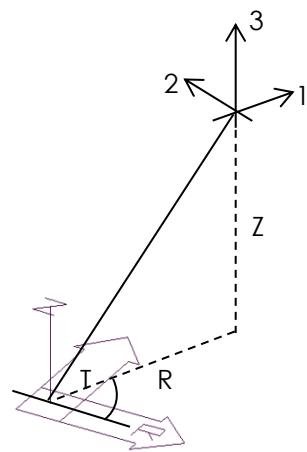
Cartesian system:



---

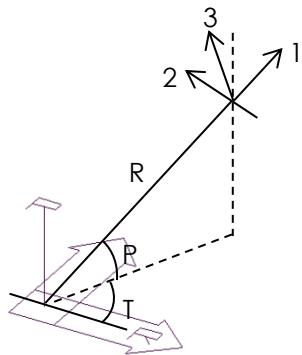
UCSCylindrical

Cylindrical system:



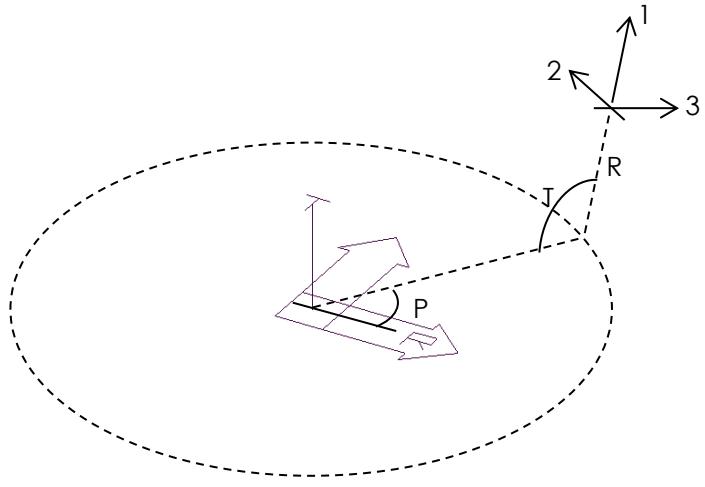
UCSpherical

Spherical system:



UCSToroidal

Toroidal system:



The UCSDoublesArray vector contains the definition of the UCS, including the origin point, and two points defining a plane. In the case of a toroidal system, an additional value defines the major radius of the torus. The following includes the positional information for the UCSDoublesArray vector.

### **UCS Doubles Array**

- [0 .. 2]      Origin point in Global Cartesian coordinates.
- [3 .. 5]      1st plane point in Global Cartesian coordinates.
- [6 .. 8]      2nd plane point in Global Cartesian coordinates.
- [9]            Toroidal radius.

---

## Global Load Cases

With the function `St7SetLoadCaseType` the type of inertia load may be set:

<code>kNoInertia</code>	No inertia load
<code>kGravity</code>	Load case type is set to gravity
<code>kAccelerations</code>	All velocities and accelerations are considered

Global load case parameters may be modified using the Strand7 API. The integer values and types (as defined in the include and header files) are shown below.

<code>ipRefTemp</code>	Reference temperature
<code>ipGlobOrigX</code>	Global angular X origin
<code>ipGlobOrigY</code>	Global angular Y origin
<code>ipGlobOrigZ</code>	Global angular Z origin
<code>ipGlobAccX</code>	Global X acceleration
<code>ipGlobAccY</code>	Global Y acceleration
<code>ipGlobAccZ</code>	Global Z acceleration
<code>ipGlobAngVelX</code>	Global angular X velocity
<code>ipGlobAngVelY</code>	Global angular Y velocity
<code>ipGlobAngVelZ</code>	Global angular Z velocity
<code>ipGlobAngAccX</code>	Global angular X acceleration
<code>ipGlobAngAccY</code>	Global angular Y acceleration
<code>ipGlobAngAccZ</code>	Global angular Z acceleration

## Global Freedom Cases

With the function `St7SetFreedomCaseType` the following freedom types may be set:

<code>kNormalFreedom</code>	normal freedom case
<code>kFreeBodyInertiaRelief</code>	free body inertia relief
<code>kSingleSymmetryInertiaXY</code>	single symmetry inertia relief about the XY-plane
<code>kSingleSymmetryInertiaYZ</code>	single symmetry inertia relief about the YZ-plane
<code>kSingleSymmetryInertiaZX</code>	single symmetry inertia relief about the ZX-plane
<code>kDoubleSymmetryInertiaX</code>	double symmetry inertia relief free along X-axis
<code>kDoubleSymmetryInertiaY</code>	double symmetry inertia relief free along Y-axis
<code>kDoubleSymmetryInertiaZ</code>	double symmetry inertia relief free along Z-axis

---

## Entity Types

There are five entity types in Strand7. These are nodes, beams, plates, bricks and links. Each of these entity types is referred to by a constant (as defined in the include and header files) and are listed below.

tyNODE	Nodes
tyBEAM	Beams
tyPLATE	Plates
tyBRICK	Bricks
tyLINK	Links

The total number of properties can be obtained for each element type by using the *St7GetTotalProperties* function call. Positions within the output parameters NumProperties and LastProperty can be accessed using the following constants:

ipBeamPropTotal	Beams
ipPlatePropTotal	Plates
ipBrickPropTotal	Bricks
ipPlyPropTotal	Plies

When referring to property types, such as in functions like *St7GetPropertyNames*, *St7DeleteProperty*, etc., use the following constants:

ptBEAMPROP	Beams
ptPLATEPROP	Plates
ptBRICKPROP	Bricks
ptPLYPROP	Plies

## Element Connections

The ConnectionArray vector is used to determine the nodal connections of an element. It is used for all element types ranging from Beam2 to Brick20 elements.

The first position in the ConnectionArray vector, ConnectionArray[0], holds the number of nodes in the element. Positions thereafter hold the ordered nodal connections. For a Beam2 element, ConnectionArray[0..2] is filled, with ConnectionArray[0] = 2, ConnectionArray[1] = Node1 and ConnectionArray[2] = Node2 respectively. A Brick20 element will use the entire vector in a similar fashion.

Refer to *Beam Local Coordinates*, *Plate Local Coordinates* and *Brick Local Coordinates* for element node connection sequences for all element types.

## Beam Local Coordinates

Each beam element in Strand7 possesses a node numbering scheme that defines the default orientation of the principal coordinate system of the beam, denoted 1-2-3. The principal coordinate system is a right-handed coordinate system defined by the beam's properties such that over the cross-section  $S$  in the 1-2 plane

$$I_{12} = \int_S x_1 x_2 dA = 0.$$

Note that this is generally a rotation away from the native x-y directions in which the beam cross-section is defined. These x-y directions with the z-direction that completes the right-hand coordinate system, is termed the local beam axis system.

The default orientation for Beam2 elements is defined by:

- $\mathbf{i}_3$  – is the unit vector directed from Node 1 to Node 2.
- $\mathbf{i}_2$  – is the unit vector arising from  $\mathbf{i}_2 = \mathbf{Z} \times \mathbf{i}_3$  where  $\mathbf{Z}$  is the unit vector in the global Z-direction
- $\mathbf{i}_1$  – completes the right handed system such that  $\mathbf{i}_1 \times \mathbf{i}_2 = \mathbf{i}_3$

The default orientation for Beam3 elements is defined by:

- $\mathbf{i}_3$  – is the unit vector directed from Node 1 to Node 2.
- $\mathbf{i}_2$  – is the unit vector perpendicular to  $\mathbf{i}_3$ , lying in the plane defined by Nodes 1, 2 and 3, directed towards Node 3.
- $\mathbf{i}_1$  – completes the right handed system such that  $\mathbf{i}_1 \times \mathbf{i}_2 = \mathbf{i}_3$

The principal axes (hence the beam itself) may be rotated about the 3-axis from the default orientation using `St7SetBeamReferenceAngle` 1.

The principal axes can be interrogated using `St7GetBeamAxisSystem`.

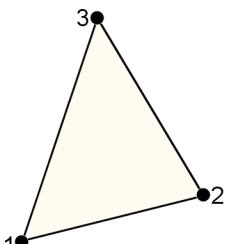
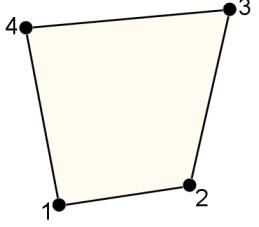
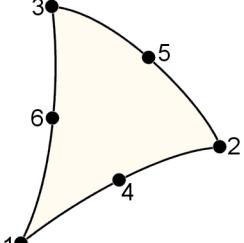
### Beam End Numbering

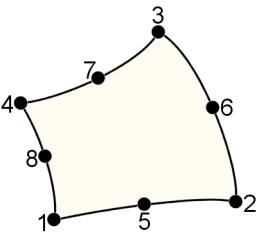
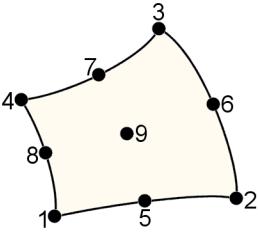
Attributes may also be applied to a particular end of a beam element. End 1 is defined as the end occurring at Node 1, and End 2 is defined as the end occurring at Node 2. Where  $I$  is the distance in the 3-direction from Node 1 along the beam, and  $L$  is the length of the beam, the relative length position is defined as  $I / L$ .

# Plate Local Coordinates

## Intrinsic Coordinate System

Each plate element in Strand7 possesses a node and edge numbering scheme, and a set of intrinsic coordinates UV that parameterise its extent in Global Cartesian space. The intrinsic coordinates are defined by the node numbering scheme, summarised in the table below. They may be queried using *St7GetPlateUV*.

Element Type	Nodal Intrinsic Coordinates			Edges	
Numbering	Node	U	V	Edge	Nodal definition
Tri3 	1	0	0	1	1-2
	2	1	0	2	2-3
	3	0	1	3	3-1
Quad4 	1	-1	-1	1	1-2
	2	1	-1	2	2-3
	3	1	1	3	3-4
	4	-1	1	4	4-1
Tri6 	1	0	0	1	<b>1-4-2</b>
	2	1	0	2	<b>2-5-3</b>
	3	0	1	3	<b>3-6-1</b>
	4	0.5	0		
	5	0.5	0.5		
	6	0	0.5		

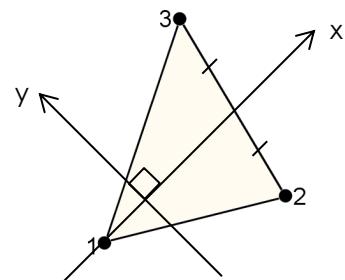
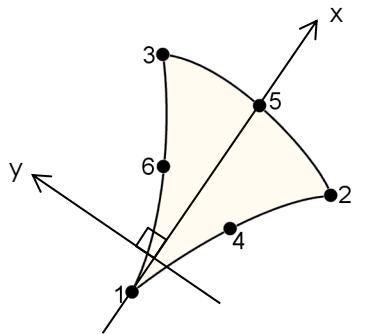
Quad8		1	-1	-1	1	<b>1-5-2</b>
		2	1	-1	2	<b>2-6-3</b>
		3	1	1	3	<b>3-7-4</b>
		4	-1	1	4	<b>4-8-1</b>
		5	0	-1		
		6	1	0		
		7	0	1		
		8	-1	0		
		1	-1	-1	1	<b>1-5-2</b>
Quad9		2	1	-1	2	<b>2-6-3</b>
		3	1	1	3	<b>3-7-4</b>
		4	-1	1	4	<b>4-8-1</b>
		5	0	-1		
		6	1	0		
		7	0	1		
		8	-1	0		
		9	0	0		

## Local Coordinate System

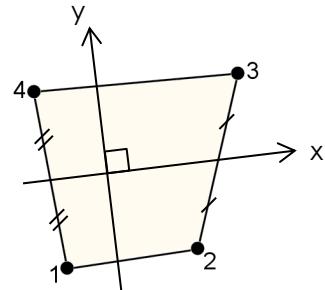
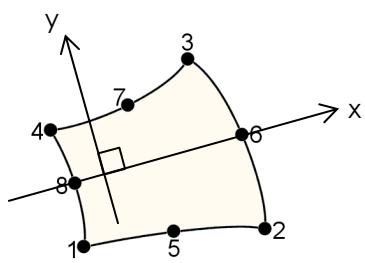
The intrinsic coordinate system is generally curvilinear and non-orthogonal. An orthogonal local coordinate system is also defined for plates for the purpose of applying directional attributes and material properties.

The local coordinate system is a right-handed coordinate system defined such that the x-y plane lies in the median plane of the plate. The median plane of the plate is that plane which minimizes the sum of squared perpendicular distances to it (calculated by a principal components analysis).

By default the local coordinate system is aligned relative to the plate nodes such that for triangular elements:



For quadrilateral elements:



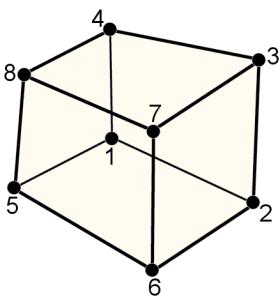
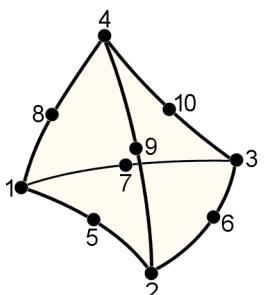
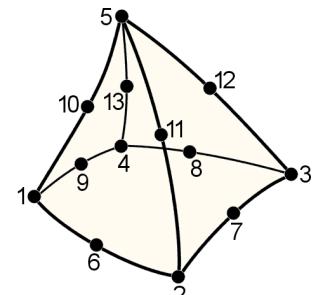
The local x-y axes may be rotated about the local z axis using `St7SetPlateXAngle1`. The local z axis is invariant, and completes the right-hand coordinate system.

# Brick Local Coordinates

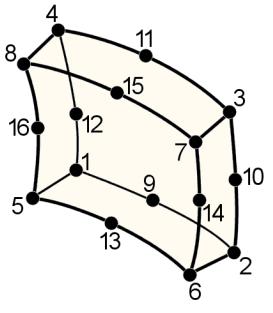
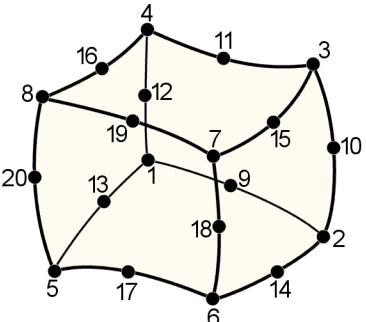
## Intrinsic Coordinate System

Each brick element in Strand7 possesses a node and face numbering scheme, and a set of intrinsic coordinates UVW that parameterise its extent in XYZ space. The intrinsic coordinates are defined by the node numbering scheme, summarised in the table below. They may be queried using `St7GetBrickUVW`.

Element Type	Nodal Intrinsic Coordinates				Faces	
Numbering	Node	U	V	W	Face	Nodal definition
Tet4	1	0	0	0	1	1-2-3
	2	1	0	0	2	4-1-3
	3	0	1	0	3	4-2-1
	4	0	0	1	4	4-3-2
Pyra5	1	-1	-1	0	1	1-2-3-4
	2	1	-1	0	2	5-1-4
	3	1	1	0	3	5-2-1
	4	-1	1	0	4	5-3-2
	5	0	0	1	5	5-4-3
Wedge6	1	0	0	-1	1	1-2-3
	2	1	0	-1	2	5-2-1-4
	3	0	1	-1	3	4-6-5
	4	0	0	1	4	4-1-3-6
	5	1	0	1	5	6-3-2-5
	6	0	1	1		

 Hex8	1	-1	-1	-1	1	1-2-3-4
	2	1	-1	-1	2	7-3-2-6
	3	1	1	-1	3	6-5-8-7
	4	-1	1	-1	4	5-1-4-8
	5	-1	-1	1	5	8-4-3-7
	6	1	-1	1	6	6-2-1-5
	7	1	1	1		
	8	-1	1	1		
 Tet10	1	0	0	0	1	<b>1-5-2-6-3-7</b>
	2	1	0	0	2	<b>4-8-1-7-3-10</b>
	3	0	1	0	3	<b>4-9-2-5-1-8</b>
	4	0	0	1	4	<b>4-10-3-6-2-9</b>
	5	0.5	0	0		
	6	0.5	0.5	0		
	7	0	0.5	0		
	8	0	0	0.5		
	9	0.5	0	0.5		
	10	0	0.5	0.5		
 Pyra13	1	-1	-1	0	1	<b>1-6-2-7-3-8-4-9</b>
	2	1	-1	0	2	<b>5-10-1-9-4-13</b>
	3	1	1	0	3	<b>5-11-2-6-1-10</b>
	4	-1	1	0	4	<b>5-12-3-7-2-11</b>
	5	0	0	1	5	<b>5-13-4-8-3-12</b>
	6	0	-1	0		
	7	1	0	0		
	8	0	1	0		

Wedge15	9	-1	0	0	
	10	-0.5	-0.5	0.5	
	11	0.5	-0.5	0.5	
	12	0.5	0.5	0.5	
	13	-0.5	0.5	0.5	
	1	0	0	-1	
	2	1	0	-1	
	3	0	1	-1	
	4	0	0	1	
	5	1	0	1	
	6	0	1	1	
	7	0.5	0	-1	
	8	0.5	0.5	-1	
	9	0	0.5	-1	
	10	0	0	0	
	11	1	0	0	
	12	0	1	0	
	13	0.5	0	1	
	14	0.5	0.5	1	
	15	0	0.5	1	
	1	-1	-1	-1	
	2	1	-1	-1	
	3	1	1	-1	
	4	-1	1	-1	
	5	-1	-1	1	
	6	1	-1	1	

 Hex16	7	1	1	1		
	8	-1	1	1		
	9	0	-1	-1		
	10	1	0	-1		
	11	0	1	-1		
	12	-1	0	-1		
	13	0	-1	1		
	14	1	0	1		
	15	0	1	1		
	16	-1	0	1		
 Hex20	1	-1	-1	-1	1	<b>1-9-2-10-3-11-4-12</b>
	2	1	-1	-1	2	<b>7-15-3-10-2-14-6-18</b>
	3	1	1	-1	3	<b>6-17-5-20-8-19-7-18</b>
	4	-1	1	-1	4	<b>5-13-1-12-4-16-8-20</b>
	5	-1	-1	1	5	<b>8-16-4-11-3-15-7-19</b>
	6	1	-1	1	6	<b>6-14-2-9-1-13-5-17</b>
	7	1	1	1		
	8	-1	1	1		
	9	0	-1	-1		
	10	1	0	-1		
	11	0	1	-1		
	12	-1	0	-1		
	13	-1	-1	0		
	14	1	-1	0		
	15	1	1	0		
	16	-1	1	0		

---

	17	0	-1	1	
	18	1	0	1	
	19	0	1	1	
	20	-1	0	1	

## **Local Coordinate System**

The intrinsic coordinate system is generally curvilinear and non-orthogonal. An orthogonal local coordinate system is also defined for bricks for the purpose of applying directional attributes and material properties.

By default the local coordinate system is aligned with the Global Cartesian coordinates, but may be realigned to any other UCS using *St7SetBrickLocalAxes1*.

## **Face Axis System**

Some attributes are defined with reference to a coordinate system defined on a given face of a brick. The face axis system is oriented with respect to the nodes in the face's definition (listed above) such that it coincides with the default local axis system of a plate element with the same nodal definition.

The face axis system for a face on a particular brick element can be interrogated using *St7GetBrickFaceAxisSystem*.

## Attribute Types

Attribute types are identified by an integer constant as defined in the header files.

Individual functions are provided to set and get attribute data, and the

*St7DeleteAttribute* function can be used to delete attributes.

Attribute instances are uniquely identified by the arguments Entity, EltNum, AttributeType, CaseNum, LocalID and ID. The entity type, element number and attribute type arguments are required for all attributes. The case number, local ID and ID arguments are dependent on the attribute type. When these arguments are not required they are ignored.

---

## Node Attributes

---

### **Restraint**

Type

ATTRFreedom

Parameters

CaseNum - Freedom case number.

---

### **Force**

Type

ATTRForce

Parameters

CaseNum - Load case number.

---

### **Moment**

Type

ATTRMoment

Parameters

CaseNum - Load case number.

---

### **Temperature**

Type

ATTRTemperature

Parameters

CaseNum - Load case number.

---

### **Translational Mass**

Type

ATTRMTranslation

Parameters

None.

## **Rotational Mass**

---

Type

ATTRMRotation

Parameters

None.

## **Translational Stiffness**

---

Type

ATTRKTranslation

Parameters

CaseNum - Freedom case number.

## **Rotational Stiffness**

---

Type

ATTRKRotation

Parameters

CaseNum - Freedom case number.

## **Damping**

---

Type

ATTRDamping

Parameters

CaseNum - Freedom case number.

## **Non-Structural Mass**

---

Type

ATTRNSMass

Parameters

CaseNum - Load case number.

---

## **Influence**

---

Type

ATTRNodeInfluence

Parameters

CaseNum - Load case number.

## **Heat Source**

---

Type

ATTRNodeHeatSource

Parameters

CaseNum - Load case number.

## **Initial Velocity**

---

Type

ATTRNodeVelocity

Parameters

Case Num - Load case number.

## **Acceleration**

---

Type

ATTRNodeAcceleration

Parameters

CaseNum - Load case number.

## Beam Attributes

### **Angle**

---

Type

ATTRBeamAngle

Parameters

None.

### **Offset**

---

Type

ATTRBeamOffset

Parameters

None.

### **Translational End Release**

---

Type

ATTRBeamTEndRelease

Parameters

LocalNum - Beam end, either 1 or 2.

### **Rotational End Release**

---

Type

ATTRBeamREndRelease

Parameters

LocalNum - Beam end, either 1 or 2.

### **Support**

---

Type

ATTRBeamSupport

Parameters

None.

---

## **Pre-Load**

---

Type

ATTRBeamPreTension

Parameters

CaseNum - Load case number.

## **Cable Free-Length**

---

Type

ATTRCableFreeLength

Parameters

None.

## **Local Distributed Load**

---

Type

ATTRBeamDLL

Parameters

CaseNum - Load case number.

LocalNum - Local axis direction, one of 1, 2 or 3.

ID - Distribution ID number.

## **Global Distributed Load**

---

Type

ATTRBeamDLG

Parameters

CaseNum - Load case number.

LocalNum - Global axis direction, one of 1, 2 or 3.

ID - Distribution ID number.

## **Local Point Force**

---

Type

## Beam Attributes

---

ATTRBeamCFL

### Parameters

CaseNum - Load case number.

ID - Force ID number.

## **Global Point Force**

---

### Type

ATTRBeamCFG

### Parameters

CaseNum - Load case number.

ID - Force ID number.

## **Local Point Moment**

---

### Type

ATTRBeamCML

### Parameters

CaseNum - Load case number.

ID - Moment ID number.

## **Global Point Moment**

---

### Type

ATTRBeamCMG

### Parameters

CaseNum - Load case number.

ID - Moment ID number.

## **Temperature Gradient**

---

### Type

ATTRBeamTempGradient

### Parameters

---

CaseNum - Load case number.

## **Convection**

---

Type

ATTRBeamConvection

Parameters

CaseNum - Load case number.

LocalNum - Beam end, either 1 or 2.

## **Radiation**

---

Type

ATTRBeamRadiation

Parameters

CaseNum - Load case number.

LocalNum - Beam end, either 1 or 2.

## **Heat Flux**

---

Type

ATTRBeamFlux

Parameters

CaseNum - Load case number.

LocalNum - Beam end, either 1 or 2.

## **Heat Source**

---

Type

ATTRBeamHeatSource

Parameters

CaseNum - Load case number.

## **Pipe Radius**

---

Type

## Beam Attributes

---

ATTRBeamRadius

### Parameters

None.

## Pipe Pressure

---

### Type

ATRPPipePressure

### Parameters

CaseNum - Load case number.

## Non-Structural Mass

---

### Type

ATTRBeamNSMass

### Parameters

CaseNum - Load case number.

ID - Mass distribution ID number.

## Pipe Temperature

---

### Type

ATRPPipeTemperature

### Parameters

CaseNum - Load case number.

## Local Distributed Moment

---

### Type

ATTRBeamDML

### Parameters

CaseNum - Load case number.

LocalNum - Local axis direction, one of 1, 2 or 3.

ID - Distribution ID number.

---

## **String Group**

---

Type

ATTRBeamStringGroup

Parameters

None.

## **Taper**

---

Type

ATTRBeamTaper

Parameters

LocalNum - Local axis direction, either 1 or 2.

## **Influence**

---

Type

ATTRBeamInfluence

Parameters

CaseNum - Load case number.

## **Cross-Section Factor**

---

Type

ATTRBeamSectionFactor

Parameters

None.

## **Creep Loading Age**

---

Type

ATTRBeamCreepLoadingAge

Parameters

None.

## **End Attachment**

---

Type

ATTRBeamEndAttachment

Parameters

LocalNum - Beam end, either 1 or 2.

## **Connection UCS**

---

Type

ATTRBeamConnectionUCS

Parameters

None.

## **Stage Property**

---

Type

ATTRBeamStageProperty

Parameters

None.

---

## Plate Attributes

### **Axis Angle**

---

Type

ATTRPlateAngle

Parameters

None.

### **Offset**

---

Type

ATTRPlateOffset

Parameters

None.

### **Pre-Load**

---

Type

ATTRPlatePreLoad

Parameters

CaseNum - Load case number.

### **Normal Pressure**

---

Type

ATTRPlateFacePressure

Parameters

CaseNum - Load case number.

### **Shear Stress**

---

Type

ATTRPlateFaceShear

Parameters

CaseNum - Load case number.

## **Edge Normal Pressure**

---

Type

ATTRPlateEdgePressure

Parameters

CaseNum - Load case number.

LocalNum - Edge number, one of 1, 2, 3 or 4.

## **Edge Shear Stress**

---

Type

ATTRPlateEdgeShear

Parameters

CaseNum - Load case number.

LocalNum - Edge number, one of 1, 2, 3 or 4.

## **Edge Normal Shear Stress**

---

Type

ATTRPlateEdgeNormalShear

Parameters

CaseNum - Load case number.

LocalNum - Edge number, one of 1, 2, 3 or 4.

## **Temperature Gradient**

---

Type

ATTRPlateTempGradient

Parameters

CaseNum - Load case number.

## **Edge Support**

---

Type

ATTRPlateEdgeSupport

---

Parameters

LocalNum - Edge number, one of 1, 2, 3 or 4.

## **Face Support**

---

Type

ATTRPlateFaceSupport

Parameters

None.

## **Edge Convection**

---

Type

ATTRPlateEdgeConvection

Parameters

CaseNum - Load case number.

LocalNum - Edge number, one of 1, 2, 3 or 4.

## **Edge Radiation**

---

Type

ATTRPlateEdgeRadiation

Parameters

CaseNum - Load case number.

LocalNum - Edge number, one of 1, 2, 3 or 4.

## **Heat Flux**

---

Type

ATTRPlateFlux

Parameters

CaseNum - Load case number.

LocalNum - Edge number, one of 1, 2, 3 or 4.

## Plate Attributes

---

### **Heat Source**

---

Type

ATTRPlateHeatSource

Parameters

CaseNum - Load case number.

### **Global Pressure**

---

Type

ATTRPlateGlobalPressure

Parameters

CaseNum - Load case number.

### **Edge Release**

---

Type

ATTRPlateEdgeRelease

Parameters

LocalNum - Edge number, one of 1, 2, 3 or 4.

### **Thickness**

---

Type

ATTRPlateThickness

Parameters

None.

### **Non-Structural Mass**

---

Type

ATTRPlateNSMass

Parameters

CaseNum - Load case number.

---

## **Load Patch**

---

Type

ATTRLoadPatch

Parameters

None.

## **Point Force**

---

Type

ATTRPlatePointForce

Parameters

CaseNum - Load case number.

## **Point Moment**

---

Type

ATTRPlatePointMoment

Parameters

CaseNum - Load case number.

## **Face Convection**

---

Type

ATTRPlateFaceConvection

Parameters

CaseNum - Load case number.

## **Face Radiation**

---

Type

ATTRPlateFaceRadiation

Parameters

CaseNum - Load case number.

## Plate Attributes

---

### Influence

---

Type

ATTRPlateInfluence

Parameters

CaseNum - Load case number.

### Soil Stress

---

Type

ATTRPlateSoilStress

Parameters

None.

### Soil Ratio

---

Type

ATTRPlateSoilRatio

Parameters

None.

### Creep Loading Age

---

Type

ATTRPlateCreepLoadingAge

Parameters

None.

### Edge Attachment

---

Type

ATTRPlateEdgeAttachment

Parameters

LocalNum - Edge number, one of 1, 2, 3 or 4.

---

## **Face Attachment**

---

Type

ATTRPlateFaceAttachment

Parameters

LocalNum - Plate surface, one of psPlateMidPlane, psPlateZMinus or psPlateZPlus.

---

## **Stage Property**

---

Type

ATTRPlateStageProperty

Parameters

None.

## Brick Attributes

### Face Pressure

---

Type

ATTRBrickPressure

Parameters

CaseNum - Load case number.

LocalNum - Brick face number, one of 1, 2, 3, 4, 5 or 6.

### Shear Stress

---

Type

ATTRBrickShear

Parameters

CaseNum - Load case number.

LocalNum - Brick face number, one of 1, 2, 3, 4, 5 or 6.

### Face Support

---

Type

ATTRBrickFaceFoundation

Parameters

LocalNum - Brick face number, one of 1, 2, 3, 4, 5 or 6.

### Convection

---

Type

ATTRBrickConvection

Parameters

CaseNum - Load case number.

LocalNum - Brick face number, one of 1, 2, 3, 4, 5 or 6.

### Radiation

---

Type

---

## ATTRBrickRadiation

### Parameters

CaseNum - Load case number.

LocalNum - Brick face number, one of 1, 2, 3, 4, 5 or 6.

---

## Heat Flux

### Type

ATTRBrickFlux

### Parameters

CaseNum - Load case number.

LocalNum - Brick face number, one of 1, 2, 3, 4, 5 or 6.

---

## Heat Source

### Type

ATTRBrickHeatSource

### Parameters

CaseNum - Load case number.

---

## Global Pressure

### Type

ATTRBrickGlobalPressure

### Parameters

CaseNum - Load case number.

LocalNum - Brick face number, one of 1, 2, 3, 4, 5 or 6.

---

## Non-Structural Mass

### Type

ATTRBrickNSMass

### Parameters

CaseNum - Load case number.

## Brick Attributes

---

LocalNum - Brick face number, one of 1, 2, 3, 4, 5 or 6.

### **Local Axes**

---

Type

ATTRBrickLocalAxes

Parameters

None.

### **Pre-Load**

---

Type

ATTRBrickPreLoad

Parameters

CaseNum - Load case number.

### **Point Force**

---

Type

ATTRBrickPointForce

Parameters

CaseNum - Load case number.

### **Influence**

---

Type

ATTRBrickInfluence

Parameters

CaseNum - Load case number.

### **Soil Stress**

---

Type

ATTRBrickSoilStress

Parameters

None.

---

## **Soil Ratio**

---

Type

ATTRBrickSoilRatio

Parameters

None.

## **Creep Loading Age**

---

Type

ATTRBrickCreepLoadingAge

Parameters

None.

## **Face Attachment**

---

Type

ATTRBrickFaceAttachment

Parameters

LocalNum - Brick face number, one of 1, 2, 3, 4, 5 or 6.

## **Stage Property**

---

Type

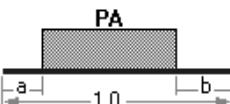
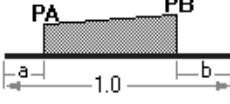
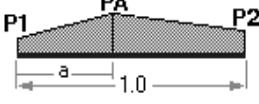
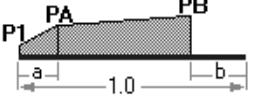
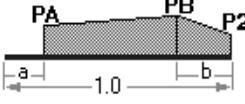
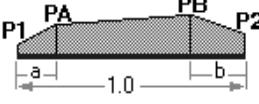
ATTRBrickStageProperty

Parameters

None.

## Beam Distribution Types

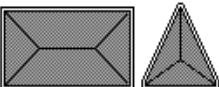
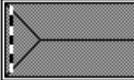
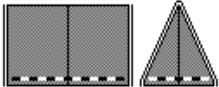
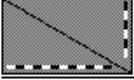
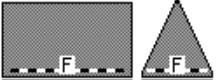
There are six beam distribution types in Strand7, used by the API functions `St7SetBeamDLL6ID`, `St7SetBeamDML6ID`, `St7SetBeamDLG6ID`, `St7SetBeamNSMass10ID`, `St7GetBeamDLL6ID`, `St7GetBeamDML6ID`, `St7GetBeamDLG6ID` and `St7GetBeamNSMass10ID`. The beam distribution types are referred to by the constants listed below. The data required for each type are specified in the Doubles input parameter.

<b>DLType</b>	<b>Distribution</b>	<b>Definition</b>
kConstantDL		
kLinearDL		Doubles [0] = PA Doubles [1] = PB
kTriangularDL		Doubles [2] = P1 Doubles [3] = P2 Doubles [4] = a Doubles [5] = b
kThreePoint0DL		
kThreePoint1DL		
kTrapezoidalDL		

## Load Patch Types

There are six load patch types in Strand7, used by the API functions

`St7SetPlateLoadPatch4` and `St7GetPlateLoadPatch4`. The load patch types are referred to by the constants listed below. The weights required by `ptManual` type are specified in the Doubles input parameter.

Type	Patch Distribution	Factor
<code>ptAuto4</code>		N/A
<code>ptAuto3</code>		N/A
<code>ptAuto2</code>		N/A
<code>ptAuto1</code>		N/A
<code>ptAngleSplit</code>		N/A
<code>ptManual</code>		<p>Doubles[0] = Edge 1 weight Doubles[1] = Edge 2 weight Doubles[2] = Edge 3 weight Doubles[3] = Edge 4 weight</p>

The four least significant bits in the four byte integer EdgeBits correspond to the four (possible) edges of the load patch. The least significant bit corresponds to Edge 1, the second least significant bit corresponds to Edge 2, and so on. Each bit specifies whether

the edge is selected to define the load patch: a bit value of 1 indicates that an edge is selected. For ptAuto1, ptAuto2 and ptAuto3 only one edge bit is set. For ptAngleSplit, two adjacent edge bits must be set. For ptManual, at least one edge bit must be set.

For example,

```
b'00000000 00000000 00000000 00000001' = 1 : Edge 1  
b'00000000 00000000 00000000 00000010' = 2 : Edge 2  
b'00000000 00000000 00000000 00000100' = 4 : Edge 3  
b'00000000 00000000 00000000 00001000' = 8 : Edge 4  
b'00000000 00000000 00000000 00001001' = 9 : Edges 1 and 4
```

---

## Table Types

Strand7 accepts a number of table types for use in nonlinear solutions. The types for these tables are listed below.

### General Table Types

ttVsTime - Factor vs time.  
ttVsTemperature - Factor vs temperature.  
ttVsFrequency - Factor vs frequency.  
ttStressStrain - Stress vs strain.  
ttForceDisplacement - Force vs displacement.  
ttMomentCurvature - Moment vs curvature.  
ttMomentRotation - Moment vs rotation.  
ttAccVsTime - Acceleration vs time.  
ttForceVelocity - Force vs velocity.  
ttVsPosition - Factor vs position.  
ttStrainTime - Strain vs time.

### Frequency Table Types (only applies to factor vs frequency table type)

tyPeriod - vs period.  
tyFrequency - vs Frequency.

### Beam Property Table Types

ptBeamStiffModVsTemp - Stiffness modulus vs temperature.  
ptBeamAlphaVsTemp - Expansion coefficient vs temperature.  
ptBeamConductVsTemp - Conductivity vs temperature.

## Table Types

---

ptBeamCpVsTemp - Specific heat vs temperature.  
ptBeamStiffModVsTime - Stiffness modulus vs time.  
ptBeamConductVsTime - Conductivity vs time.  
ptSpringAxialVsDisp - Spring axial force vs displacement.  
ptSpringTorqueVsTwist - Spring torque vs twist.  
ptSpringAxialVsVelocity - Spring axial force vs velocity.  
ptTrussAxialStressVsStrain - Truss axial stress vs strain.  
ptBeamAxialStressVsStrain - Beam axial stress vs strain.  
ptBeamMomentK1 - Beam moment vs curvature on plane 1.  
ptBeamMomentK2 - Beam moment vs curvature on plane 2.  
ptConnectionShear1 - Connection shear table.  
ptConnectionShear2 - Connection shear table.  
ptConnectionAxial - Connection axial table.  
ptConnectionBend1 - Connection bending table.  
ptConnectionBend2 - Connection bending table.  
ptConnectionTorque - Connection torque table.  
ptBeamYieldVsTemp - Yield vs Temperature.

## Plate Property Table Types

ptPlateModVsTemp - Modulus vs temperature.  
ptPlateAlphaVsTemp - Expansion coefficient vs temperature.  
ptPlateConductVsTemp - Conduction vs temperature.  
ptPlateCpVsTemp - Specific heat vs temperature.  
ptPlateModVsTime - Modulus vs time.  
ptPlateConductVsTime - Conductivity vs time.

---

ptPlateStressVsStrain - Stress vs strain.

ptPlateYieldVsTemp - Yield vs temperature.

### **Brick Property Table Types**

ptBrickModVsTemp - Modulus vs temperature.

ptBrickAlphaVsTemp - Expansion coefficient vs temperature.

ptBrickConductVsTemp - Conductivity vs temperature.

ptBrickCpVsTemp - Specific heat vs temperature.

ptBrickModVsTime - Modulus vs time.

ptBrickConductVsTime - Conductivity vs time.

ptBrickStressVsStrain - Stress vs strain.

ptBrickYieldVsTemp - Yield vs temperature.

## Solver Options

The solvers can be launched by the Strand7 API using the functions `St7RunSolver` and `St7RunSolverProcess`. The following lists the solver types and solver modes. The solver modes determine how the solver is launched – it may be launched with the full window as expected during normal solver runs with Strand7, it may be launched to only display a small window with a progress bar or, alternatively, it may be launched without displaying any window at all.

### Solver Types

`stLinearStaticSolver` - Linear static solver.

`stLinearBucklingSolver` - Linear buckling solver.

`stNonlinearStaticSolver` - Nonlinear static solver.

`stNaturalFrequencySolver` - Natural frequency solver.

`stHarmonicResponseSolver` - Harmonic response solver.

`stSpectralResponseSolver` - Spectral response solver.

`stLinearTransientDynamicSolver` - Linear transient dynamic solver.

`stNonlinearTransientDynamicSolver` - Nonlinear transient dynamic solver.

`stSteadyHeatSolver` - Steady heat solver.

`stTransientHeatSolver` - Transient heat solver.

`stLoadInfluenceSolver` - Load influence solver.

`stQuasiStaticSolver` - Quasi static solver.

### Solver Modes

`smNormalRun` - Full solver dialog is displayed, process waits for manual termination.

`smNormalCloseRun` - Full solver dialog is displayed, process terminates on completion.

`smProgressRun` - Solver progress bar is displayed, process terminates on completion.

`smBackgroundRun` - No solver dialog is created, process terminates on completion.

---

## **Result Types**

`hrNodeFlux` - Node heat flux.

`hrBeamFlux` - Beam heat flux.

`hrPlateFlux` - Plate heat flux.

`hrBrickFlux` - Brick heat flux.

`frBeamForcePattern` - Beam force pattern.

`frBeamStrainPattern` - Beam strain pattern.

`frPlateStressPattern` - Plate stress pattern.

`frPlateStrainPattern` - Plate strain pattern.

`frBrickStressPattern` - Brick stress pattern.

`frBrickStrainPattern` - Brick strain pattern.

`srNodeReaction` - Node reaction.

`srNodeVelocity` - Node velocity.

`srNodeAcceleration` - Node acceleration.

`srBeamForce` - Beam force.

`srBeamMNLStress` - Beam MNL stresses.

`srBeamStrain` - Beam strain.

`srPlateStress` - Plate stress.

`srPlateStrain` - Plate strain.

`srBrickStress` - Brick stress.

`srBrickStrain` - Brick strain.

`srElementNodeForce` - Element node force.

## Logical Solver Parameters

spDoSturm - Sturm check.

spNonlinearMaterial - Nonlinear material option.

spNonlinearGeometry - Nonlinear geometry option.

spAddKg - Use Kg option.

spCalcDampingRatios - Calculate damping ratios.

spIncludeLinkReactions - Include link reactions.

spFullSystemTransient - Full system option for transient solution.

spNonlinearHeat - Nonlinear option for heat solution.

spLumpedLoadBeam - Lumped beam loads.

spLumpedLoadPlate - Lumped plate loads.

spLumpedLoadBrick - Lumped brick loads.

spLumpedMassBeam - Lumped beam mass.

spLumpedMassPlate - Lumped plate mass.

spLumpedMassBrick - Lumped brick mass.

spForceDrillCheck - Force drilling check.

spSaveRestartFile - Save restart file option.

spSaveIntermediate - Save sub-increments option.

spExcludeMassX - Exclude mass X component.

spExcludeMassY - Exclude mass Y component.

spExcludeMassZ - Exclude mass Z component.

spSaveSRSSSpectral - Save SRSS spectral results.

spSaveCQCSpectral - Save CQC spectral results.

spDoResidualsCheck - Perform residuals check.

---

spSuppressAllSingularities - Suppress all singularities.

spSaveModalResults - Save modal results.

spSpectralReactionAsInertia - Set node reactions as inertia force.

spReducedLogFile - Generate reduced log-file.

spIncludeRotationalMass - Include rotational mass components.

spIgnoreCompressiveBeamKg - Do not include KG terms for compressive beams.

spAutoScaleKg - Auto scale KG terms.

spAutoShift - In natural frequency analysis, allow frequency shift if rigid body movement detected.

spSaveTableInsertedSteps - Save results at steps at defined points in tables.

spSaveLastRestartStep - Only keep last complete load increment in restart file.

spAutoAssignPathDivisions - Uses a number of load-path divisions appropriate for the specified time-steps.

spDoInstantNTA - Establish quasi-static initial stress state for Creep problems.

spAllowExtraIterations - Allow extra nonlinear iterations beyond spMaxIterationNonlin when solution is convergent.

spPredictImpact - Insert extra time-steps at contact activation events.

## **Integer Solver Parameters**

spTreeStartNumber - Tree start number.

spNumFrequency - Number of modes for natural frequency solution.

spNumBucklingModes - Number of modes for linear buckling solution.

spMaxIterationEig - Maximum number of iterations for an eigenvalue (buckling/frequency) solution.

spMaxIterationNonlin - Maximum number of iterations for a nonlinear solution.

spNumBeamSlicesSpectral - Number of beam slices to be generated for spectral results.

spMaxConjugateGradientIter - Maximum number of PCG iterations.

spMaxNumWarnings - Maximum number of log-file warnings.

spFiniteStrainDefinition - Strain definition; 0, 1 or 2 for **Nominal**, **Engineering** or **Green's** strains, respectively.

spBeamLength - Nonlinear beam length formulation; 0 for **Initial**, 1 for **Update**.

spFormStiffMatrix - Nonlinear stiffness matrix formation option; 0, 1, 2 or 3 for **At every iteration**, **First two iterations**, **First iteration** or **Automatic**, respectively.

spMaxUpdateInterval - Maximum number of iterations between stiffness matrix formations.

spFormNonlinHeatStiffMatrix - Nonlinear heat transfer matrix option; 0, 1 or 2 for **At start of each row in the time step table**, **After every saved step** or **At every timestep**, respectively.

spExpandWorkingSet - Additional modes included in sub-space iteration.

spMinNumViscoUnits - Minimum number of visco-elastic creep units.

spMaxNumViscoUnits - Maximum number of visco-elastic creep units.

spCurveFitTimeUnit - Creep curve fit time unit, one of tuMilliSec, tuSec, tuMin, tuHour or tuDay.

spStaticAutoStepping - Static sub-stepping option; 0, 1, 2 or 3 for **None**, **Load Scaling**, **Displacement Scaling** or **Displacement Control (Arc Length)**, respectively.

spDynamicAutoStepping - Dynamic sub-stepping option; 0, 1 or 2 for **None**, **Time Scaling** or **Displacement Scaling**, respectively.

spBeamKgType - Nonlinear beam Kg matrix calculation option; 0 for **Simplified**, 1 for **Complete**.

### Double Solver Parameters

spEigenTolerance - Eigenvalue tolerance.

spFrequencyShift - Frequency shift.

spBucklingShift - Buckling shift.

spNonlinDispTolerance - Displacement tolerance.

---

`spNonlinResidualTolerance` - Residual tolerance.

`spTransientReferenceTemperature` - Reference temperature for transient solution.

`spRelaxationFactor` - Relaxation factor.

`spNonlinHeatTolerance` - Nonlinear heat tolerance.

`spMinimumTimeStep` - Minimum time step size.

`spWilsonTheta` - Wilson Theta number.

`spNewmarkBeta` - Newmark Beta number.

`spGlobalZeroDiagonal` - Matrix zero diagonal.

`spConjugateGradientTol` - Conjugate gradient solver tolerance.

`spMinimumDimension` - Minimum element dimension.

`spMinimumInternalAngle` - Minimum element internal angle.

`spZeroForce` - Zero point force factor.

`spZeroDiagonal` - Zero matrix diagonal factor.

`spZeroContactFactor` - Zero contact element factor.

`spFrictionCutoffStrain` - Cutoff strain factor.

`spZeroTranslation` - Zero translational displacement factor.

`spZeroRotation` - Zero rotational displacement factor.

`spMaxNormalsAngle` - Maximum plate normal angle.

`spDrillStiffFactor` - Drilling stiffness multiplier.

`spMaximumRotation` - Maximum allowable rotation.

`spZeroDisplacement` - Zero displacement factor.

`spMaximumDispRatio` - Maximum displacement ratio.

`spMinimumLoadReductionFactor` - Minimum load increment reduction factor.

`spMaxDispChange` - Maximum residual displacement change.

`spMaxResidualChange` - Maximum residual force change.

spZeroFrequency - Zero frequency factor.

spZeroBucklingEigen - Zero buckling factor.

spCurveFitTime - Creep curve fit time parameter.

spSpacingBias - Creep curve fit spacing bias.

spTimeStepParam - Time step parameter.

spSlidingFrictionFactor - Sliding friction factor.

spMNLiTangentRatio - Nonlinear material tangent ratio.

spStickingFrictionFactor - Sticking friction factor.

spMinArcLengthFactor - Minimum arc length reduction factor.

spMaxFibreStrainInc - Maximum MNL beam fibre strain in an increment.

### Modal Load Types

mtBaseAcc - Base acceleration.

mtBaseVel - Base velocity.

mtBaseDisp - Base displacement.

mtAppliedLoad - Base applied load.

---

# Node Results

Node results include displacement, velocity, acceleration, phase, reaction, temperature, heat flux and influence. The `St7GetNodeResult` and `St7GetNodeResultUCS` functions can be used to access these result quantities.

Result types can be selected by the following input:

## ResultType

The result quantity to be returned, one of `rtNodeDisp`, `rtNodeVel`, `rtNodeAcc`, `rtNodePhase`, `rtNodeReact`, `rtNodeTemp`, `rtNodeFlux` or `rtNodeInfluence`.

Results are returned as a 6 element array of data. Depending on the result type requested this array is formatted as follows:

## Displacement

[0 .. 2] - Translations in the 123 axis directions for the specified UCS.

[3 .. 5] - Rotations about the 123 axis directions for the specified UCS.

## Velocity

[0 .. 2] - Translational velocities in the 123 axis directions for the specified UCS.

[3 .. 5] - Angular velocities about the 123 axis directions for the specified UCS.

## Acceleration

[0 .. 2] - Translational accelerations in the 123 axis directions for the specified UCS.

[3 .. 5] - Angular accelerations about the 123 axis directions for the specified UCS.

## Phase

[0 .. 2] - Translational components in the 123 axis directions for the specified UCS.

[3 .. 5] - Angular components about the 123 axis directions for the specified UCS.

### **Reaction**

[0..2] - Reaction forces in the 123 axis directions for the specified UCS.

[3..5] - Reaction moments about the 123 axis directions for the specified UCS.

### **Temperature**

[0] - Temperature.

### **Flux**

[0] - Heat flux.

### **Influence**

[0..2] - Translational components in the 123 axis directions for the specified UCS.

[3..5] - Rotational components about the 123 axis directions for the specified UCS.

# Beam Results

Beam results include force, stress, strain, release, cable position, flux, creep strain, strain energy, beam displacement and beam reactions. The *St7GetBeamResultArray*, *St7GetBeamResultArrayPos*, *St7GetBeamResultEndPos*, *St7GetBeamResultSinglePos* and *St7GetBeamReleaseResult* functions can be used to access these result quantities.

Result quantities can be selected via a combination of the following inputs:

## ResultType

The result type to be returned, one of *rtBeamForce*, *rtBeamStrain*, *rtBeamStress*, *rtBeamTRelease*, *rtBeamRRelease*, *rtBeamCableXYZ*, *rtBeamFlux*, *rtBeamGradient*, *rtBeamCreepStrain*, *rtBeamEnergy*, *rtBeamDisp* or *rtBeamNodeReact*.

## ResultSubType

The quantity sub-type, one of *stBeamLocal*, *stBeamPrincipal* or *stBeamGlobal*.

Results are returned in a one-dimensional array *BeamRes* which consists of contiguous blocks of data. Each block corresponds to a location along the beam. The length *NumColumns* of each block is also returned by the function as it depends on the requested result quantity.

The number of these blocks is dependent on the function that is called – for example, *St7GetBeamResultSinglePos* will return one such block, whereas *St7GetBeamResultArray* will return an array containing *NumStations* such blocks.

Constants are provided that index specific result quantities within each block of data. For example, the axial force at the *i<sup>th</sup>* beam station is stored in the location:

```
BeamRes [ (i-1) *NumColumns+ipBeamAxialF ]
```

These constants are specific to the result type requested – appropriate constants for each result type are listed in the rest of this section.

### **Force Results for stBeamLocal and stBeamPrincipal**

ipBeamSF1 - Shear force in the 1-axis direction.  
ipBeamBM1 - Bending moment in the 1-axis direction.  
ipBeamSF2 - Shear force in the 2-axis direction.  
ipBeamBM2 - Bending moment in the 2-axis direction.  
ipBeamAxialF - Axial force.  
ipBeamTorque - Torque.

### **Force Results for stBeamGlobal**

ipBeamFX - Internal force in the Global X direction.  
ipBeamMX - Internal moment in the Global X direction.  
ipBeamFY - Internal force in the Global Y direction.  
ipBeamMY - Internal moment in the Global Y direction.  
ipBeamFZ - Internal force in the Global Z direction.  
ipBeamMZ - Internal moment in the Global Z direction.

At any cut section, the forces/moment are those required to keep End 2 of the beam in equilibrium.

### **Stress**

ipMinFibreStress - Minimum fibre stress.  
ipMaxFibreStress - Maximum fibre stress.  
ipMaxShearStress1 - Maximum shear stress in the 1-axis direction.  
ipMaxShearStress2 - Maximum shear stress in the 2-axis direction.  
ipAvShearStress1 - Average shear stress in the 1-axis direction.  
ipAvShearStress2 - Average shear stress in the 2-axis direction.

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ipTorqueStress - Torsional stress.  
ipMaxPrincipalStress - Maximum principal stress.  
ipMinPrincipalStress - Minimum principal stress.  
ipMinPipeHoopStress - Minimum hoop stress.  
ipMaxPipeHoopStress - Maximum hoop stress.  
ipMinAxialStress - Minimum axial stress.  
ipMaxAxialStress - Maximum axial stress.  
ipMinBendingStress1 - Minimum bending stress in the 1-axis direction.  
ipMaxBendingStress1 - Maximum bending stress in the 1-axis direction.  
ipMinBendingStress2 - Minimum bending stress in the 2-axis direction.  
ipMaxBendingStress2 - Maximum bending stress in the 2-axis direction.  
ipYieldRatio - Portion of beam section that has yielded.

## **Flux**

ipBeamFlux - Heat flux.  
ipBeamTempGradient - Temperature gradient.

## **Strain**

ipAxialStrain - Axial strain.  
ipCurvature1 - Curvature in the 1-axis direction.  
ipCurvature2 - Curvature in the 2-axis direction.  
ipTwist - Twist.

## **Release**

ipRelEnd1Dir1 - End 1 release in the 1-axis direction.

ipRelEnd1Dir2 - End 1 release in the 2-axis direction.

ipRelEnd1Dir3 - End 1 release in the 3-axis direction.

ipRelEnd2Dir1 - End 2 release in the 1-axis direction.

ipRelEnd2Dir2 - End 2 release in the 2-axis direction.

ipRelEnd2Dir3 - End 2 release in the 3-axis direction.

### **Energy**

ipBeamEnergyStored - Stored energy.

ipBeamEnergySpent - Spent energy.

## Plate Results

Plate results include stress, strain, strain energy, force moment, curvature, ply stress, ply strain, ply reserve, heat flux, temperature gradient, reinforcement design, creep strain, soil characteristics, nodal reactions and user defined quantities. The *St7GetPlateResultArray* function can be used to access these result quantities.

Result quantities can be selected via a combination of the following inputs:

### ResultType

The result type to be returned, one of *rtPlateStress*, *rtPlateStrain*, *rtPlateEnergy*, *rtPlateForce*, *rtPlateMoment*, *rtPlateCurvature*, *rtPlatePlyStress*, *rtPlatePlyStrain*, *rtPlatePlyReserve*, *rtPlateFlux*, *rtPlateGradient*, *rtPlateReoDesign*, *rtPlateCreepStrain*, *rtPlateSoil*, *rtPlateUser*, *rtPlateNodeReact* or *rtPlateNodeDisp*.

### ResultSubType

The result sub-type, one of *stPlateLocal*, *stPlateGlobal*, *stPlateCombined*, *stPlateSupport*, *stPlateDevLocal*, *stPlateDevGlobal*, *stPlateDevCombined* or the ID of a UCS in the model into which components the result is to be resolved. Note the Global Cartesian coordinate system is defined as UCS 1.

Results are returned in a one-dimensional array *PlateResult* which consists of contiguous blocks of data. Each block corresponds to a location on the plate. The length *NumColumns* of each block depends on the requested result quantity and is returned by *St7GetPlateResultArray*. The total number of these blocks *NumPoints* depends on the input *SampleLocation* and is also returned. The total number of quantities returned in *PlateResult* is therefore *NumPoints*\**NumColumns*.

Constants are provided that index specific result quantities within each block of data. For example, the plate local xy force at the *i*<sup>th</sup> Gauss point is stored in the location:

```
PlateResult[ (i-1) *NumColumns+ipPlateLocalxy]
```

These constants are specific to the result type requested – appropriate constants for each result type are listed in the rest of this section.

**Stress, Strain, Creep Strain, Moment, Curvature and Force results for stPlateLocal**

ipPlateLocalxx - Local xx component.

ipPlateLocallyy - Local yy component.

ipPlateLocalzz - Local zz component.

ipPlateLocalxy - Local xy component.

ipPlateLocalyz - Local yz component.

ipPlateLocalzx - Local zx component.

**Stress results for stPlateDevLocal**

ipPlateLocalMean - Mean.

ipPlateLocalDevxx - Deviatoric xx component.

ipPlateLocalDevyy - Deviatoric yy component.

**Stress results for stPlateSupport**

ipPlateEdgeSupport - Edge support component.

ipPlateFaceSupport - Face support component.

**Stress, Strain, Creep Strain, Moment, Curvature and Force results for stPlateGlobal**

ipPlateGlobalXX - Global XX component.

ipPlateGlobalYY - Global YY component.

ipPlateGlobalZZ - Global ZZ component.

ipPlateGlobalXY - Global XY component.

ipPlateGlobalYZ - Global YZ component.

ipPlateGlobalZX - Global ZX component.

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### **Stress results for stPlateDevGlobal**

ipPlateGlobalMean - Mean.  
ipPlateGlobalDevXX - Deviatoric XX component.  
ipPlateGlobalDevYY - Deviatoric YY component.  
ipPlateGlobalDevZZ - Deviatoric ZZ component.

### **Stress, Strain, Creep Strain, Moment, Curvature and Force results for a UCS ID result sub-type**

ipPlateUCSXX - UCS 11 component.  
ipPlateUCSYY - UCS 22 component.  
ipPlateUCSZZ - UCS 33 component.  
ipPlateUCSXY - UCS 12 component.  
ipPlateUCSYZ - UCS 23 component.  
ipPlateUCSZX - UCS 31 component.

### **Stress, Strain, Creep Strain, Moment, Curvature and Force results for stPlateCombined**

ipPlateCombPrincipal11 - Principal 11 component.  
ipPlateCombPrincipal22 - Principal 22 component.  
ipPlateCombPrincipalAngle - Principal axis angle.  
ipPlateCombVonMises - Von Mises quantity.  
ipPlateCombTresca - Tresca quantity.  
ipPlateCombMohrCoulomb - Mohr Coulomb quantity.  
ipPlateCombDruckerPrager - Drucker-Prager quantity.  
ipPlateCombPlasticStrain - Plastic strain.  
ipPlateCombCreepEffRate - Effective creep rate.

ipPlateCombCreepShrinkage - Creep shrinkage.

ipPlateCombYieldIndex - Yield index.

### **Stress results for stPlateDevCombined**

ipPlateCombMean - Mean.

ipPlateCombDev11 - Deviatoric principal 11 component.

ipPlateCombDev22 - Deviatoric principal 22 component.

### **Stress, Strain and Creep Strain results for stPlateGlobal (Axisymmetric)**

ipPlateAxiGlobalRR - Axisymmetric RR component.

ipPlateAxiGlobalZZ - Axisymmetric ZZ component.

ipPlateAxiGlobalTT - Axisymmetric TT component.

ipPlateAxiGlobalRZ - Axisymmetric RZ component.

### **Stress, Strain and Creep Strain results for stPlateDevGlobal (Axisymmetric)**

ipPlateAxiGlobalMean - Mean.

ipPlateAxiGlobalDevRR - Axisymmetric deviatoric RR component.

ipPlateAxiGlobalDevZZ - Axisymmetric deviatoric ZZ component.

ipPlateAxiGlobalDevTT - Axisymmetric deviatoric TT component.

### **Stress, Strain and Creep Strain results for stPlateCombined (Axisymmetric)**

ipPlateAxiCombPrincipal11 - Axisymmetric principal 11 component.

ipPlateAxiCombPrincipal22 - Axisymmetric principal 22 component.

ipPlateAxiCombPrincipal33 - Axisymmetric principal 33 component.

ipPlateAxiCombVonMises - Axisymmetric Von Mises quantity.

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ipPlateAxiCombTresca - Axisymmetric Tresca quantity.  
ipPlateAxiCombMohrCoulomb - Axisymmetric Mohr-Coulomb quantity.  
ipPlateAxiCombDruckerPrager - Axisymmetric Drucker-Prager quantity.  
ipPlateAxiCombPlasticStrain - Axisymmetric plastic strain quantity.  
ipPlateAxiCombCreepEffRate - Axisymmetric effective creep rate.  
ipPlateAxiCombCreepShrinkage - Axisymmetric creep shrinkage.  
ipPlateAxiCombYieldIndex - Axisymmetric yield index.

### **Stress results for stPlateDevCombined (Axisymmetric)**

ipPlateAxiCombMean - Mean.  
ipPlateAxiCombDev11 - Axisymmetric deviatoric principal 11 component.  
ipPlateAxiCombDev22 - Axisymmetric deviatoric principal 22 component.  
ipPlateAxiCombDev33 - Axisymmetric deviatoric principal 33 component.

### **Ply Stress**

ipPlyStress11 - Ply 11 stress component.  
ipPlyStress22 - Ply 22 stress component.  
ipPlyStress12 - Ply 12 stress component.  
ipPlyIILSx - Interlamina Sx component.  
ipPlyIILSy - Interlamina Sy component.

### **Ply Strain**

ipPlyStrain11 - Ply 11 strain component.  
ipPlyStrain22 - Ply 22 strain component.  
ipPlyStrain12 - Ply 12 strain component.

### Ply Reserve

ipPlyMaxStress - Maximum stress.  
ipPlyMaxStrain - Maximum strain.  
ipPlyTsaiHill - Tsai-Hill measure.  
ipPlyModTsaiWu - Modified Tsai-Wu measure.  
ipPlyHoffman - Hoffman measure.  
ipPlyInterlam - Interlamina stress.

### Soil

ipPlateSoilTotalPorePressure - Total pore pressure.  
ipPlateSoilExcessPorePressure - Excess pore pressure.  
ipPlateSoilOCRIndex - OCR index.  
ipPlateSoilStateIndex - Failure index.  
ipPlateSoilVoidRatio - Void ratio.

### Flux and Temperature Gradient results for stPlateLocal

ipPlateFluxLocalx - Local x component.  
ipPlateFluxLocaly - Local y component.  
ipPlateFluxLocalxy - Local xy component.

### Flux and Temperature Gradient results for stPlateGlobal

ipPlateFluxGlobalX - Global X component.  
ipPlateFluxGlobalY - Global Y component.  
ipPlateFluxGlobalZ - Global Z component.

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ipPlateFluxGlobalXY - Global XY component.

ipPlateFluxGlobalYZ - Global YZ component.

ipPlateFluxGlobalZX - Global ZX component.

ipPlateFluxGlobalSRSS - Global SRSS component.

### **Flux and Temperature Gradient results for a UCS ID result sub-type**

ipPlateFluxUCSX - UCS 1 component.

ipPlateFluxUCSY - UCS 2 component.

ipPlateFluxUCSZ - UCS 3 component.

ipPlateFluxUCSXY - UCS 12 component.

ipPlateFluxUCSYZ - UCS 23 component.

ipPlateFluxUCSZX - UCS 31 component.

ipPlateFluxUCSSRSS - UCS SRSS component.

### **Reinforcement Design**

ipPlateRCWoodArmerMoment - Wood-Armer moment.

ipPlateRCWoodArmerForce - Wood-Armer force.

ipPlateRCSteelArea - Steel area.

ipPlateRCSteelAreaLessBase - Steel area less base area.

ipPlateRCSteelStress - Steel stress.

ipPlateRCConcreteStrain - Concrete strain ratio.

ipPlateRCBlockRatio - Block ratio.

### **Node Reaction**

ipPlateNodeReactFX - FX component.

## Plate Results

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ipPlateNodeReactFY - FY component.

ipPlateNodeReactFZ - FZ component.

ipPlateNodeReactMX - MX component.

ipPlateNodeReactMY - MY component.

ipPlateNodeReactMZ - MZ component.

## Energy

ipPlateEnergyStored - Stored energy.

ipPlateEnergySpent - Spent energy

---

## Brick Results

Brick results include stress, strain, strain energy, heat flux, temperature gradient, creep strain, soil characteristics, nodal reactions and user defined quantities. The *St7GetBrickResultArray* function can be used to access these result quantities.

Result quantities can be selected via a combination of the following inputs:

### ResultType

The result type to be returned, one of rtBrickStress, rtBrickStrain, rtBrickEnergy, rtBrickFlux, rtBrickGradient, rtBrickCreepStrain, rtBrickSoil, rtBrickUser, rtBrickNodeReact or rtBrickNodeDisp.

### ResultSubType

The result sub-type, one of stBrickLocal, stBrickGlobal, stBrickCombined, stBrickSupport, stBrickDevLocal, stBrickDevGlobal, stBrickDevCombined or the ID of a UCS in the model into which components the result is to be resolved. Note the Global Cartesian coordinate system is defined as UCS 1.

Results are returned in a one-dimensional array *BrickRes* which consists of contiguous blocks of data. Each block corresponds to a location on the brick. The length *NumColumns* of each block depends on the requested result quantity and is returned by *St7GetBrickResultArray*. The total number of these blocks *NumPoints* depends on the input *SampleLocation* and is also returned. The total number of quantities returned in *BrickRes* is therefore *NumPoints*\**NumColumns*.

Constants are provided that index specific result quantities within each block of data. For example, the brick local xy stress component at the *i*<sup>th</sup> Gauss point is stored in the location:

```
BrickRes [ (i-1) *NumColumns+ipBrickLocalxy]
```

These constants are specific to the result type requested – appropriate constants for each result type are listed in the rest of this section.

### **Stress, Strain and Creep Strain results for stBrickLocal**

ipBrickLocalxx - Local xx component.

ipBrickLocallyy - Local yy component.

ipBrickLocalzz - Local zz component.

ipBrickLocalxy - Local xy component.

ipBrickLocalyz - Local yz component.

ipBrickLocalzx - Local zx component.

### **Stress results for stBrickDevLocal**

ipBrickLocalMean - Mean.

ipBrickLocalDevxx - Local deviatoric xx component.

ipBrickLocalDevyy - Local deviatoric yy component.

ipBrickLocalDevzz - Local deviatoric zz component.

### **Stress results for stBrickSupport**

ipBrickFaceSupport - Face support.

### **Stress, Strain and Creep Strain results for stBrickGlobal**

ipBrickGlobalXX - Global XX component.

ipBrickGlobalYY - Global YY component.

ipBrickGlobalZZ - Global ZZ component.

ipBrickGlobalXY - Global XY component.

ipBrickGlobalYZ - Global YZ component.

ipBrickGlobalZX - Global ZX component.

---

### **Stress results for stBrickDevGlobal**

ipBrickGlobalMean - Mean.

ipBrickGlobalDevXX - Global deviatoric XX component.

ipBrickGlobalDevYY - Global deviatoric YY component.

ipBrickGlobalDevZZ - Global deviatoric ZZ component.

### **Stress, Strain and Creep Strain results for a UCS ID result sub-type**

ipBrickUCSXX - UCS 11 component.

ipBrickUCSYY - UCS 22 component.

ipBrickUCSZZ - UCS 33 component.

ipBrickUCSXY - UCS 12 component.

ipBrickUCSYZ - UCS 23 component.

ipBrickUCSZX - UCS 31 component.

### **Stress, Strain and Creep Strain results for stBrickCombined**

ipBrickCombPrincipal11 - Principal 11 component.

ipBrickCombPrincipal22 - Principal 22 component.

ipBrickCombPrincipal33 - Principal 33 component.

ipBrickCombVonMises - Von Mises quantity.

ipBrickCombTresca - Tresca quantity.

ipBrickCombMohrCoulomb - Mohr-Coulomb quantity.

ipBrickCombDruckerPrager - Drucker-Prager quantity.

ipBrickCombPlasticStrain - Plastic strain.

ipBrickCombCreepEffRate - Effective creep rate.

ipBrickCombCreepShrinkage - Creep shrinkage.

ipBrickCombYieldIndex - Yield index.

### **Stress results for stBrickDevCombined**

ipBrickCombMean - Mean.

ipBrickCombDev11 - Principal 11 deviatoric component.

ipBrickCombDev22 - Principal 22 deviatoric component.

ipBrickCombDev33 - Principal 33 deviatoric component.

### **Soil**

ipBrickSoilTotalPorePressure - Total pore pressure.

ipBrickSoilExcessPorePressure - Excess pore pressure.

ipBrickSoilOCRIndex - OCR index.

ipBrickSoilStateIndex - Failure index.

ipBrickSoilVoidRatio - Void ratio.

### **Flux and Temperature Gradient results for stBrickLocal**

ipBrickFluxLocalx - Local X component.

ipBrickFluxLocaly - Local Y component.

ipBrickFluxLocalz - Local Z component.

ipBrickFluxLocalxy - Local XY component.

ipBrickFluxLocalyz - Local YZ component.

ipBrickFluxLocalzx - Local ZX component.

ipBrickFluxLocalRMS - Local RMS component.

---

### **Flux and Temperature Gradient results for stBrickGlobal**

ipBrickFluxGlobalX - Global X component.  
ipBrickFluxGlobalY - Global Y component.  
ipBrickFluxGlobalZ - Global Z component.  
ipBrickFluxGlobalXY - Global XY component.  
ipBrickFluxGlobalYZ - Global YZ component.  
ipBrickFluxGlobalZX - Global ZX component.  
ipBrickFluxGlobalRMS - Global RMS component.

### **Flux and Temperature Gradient results for a UCS ID result sub-type**

ipBrickFluxUCSX - UCS 1 component.  
ipBrickFluxUCSY - UCS 2 component.  
ipBrickFluxUCSZ - UCS 3 component.  
ipBrickFluxUCSXY - UCS 12 component.  
ipBrickFluxUCSYZ - UCS 23 component.  
ipBrickFluxUCSZX - UCS 31 component.  
ipBrickFluxUCSRMS - UCS RMS component.

### **Node Reaction**

ipBrickNodeReactFX - FX component.  
ipBrickNodeReactFY - FY component.  
ipBrickNodeReactFZ - FZ component.

### **Energy**

ipBrickEnergyStored - Stored energy.

ipBrickEnergySpent - Spent energy.

## User Defined Results

The calculation of user defined result quantities based on primary result quantities is made possible by *User Defined Results*. In the Strand7 GUI, this is a contour option made available for plates and bricks in the **Results Settings** dialog, in which a simple text equation may be entered. The functions *St7SetPlateResultUserEquation*, *St7GetPlateResultUserEquation*, *St7SetBrickResultUserEquation* and *St7GetBrickResultUserEquation* parse the same text equation to define the result, input as the string *Equation*.

The following syntax is used for this string, note that its interpretation is case-insensitive and whitespace is ignored.

Primary result quantities are enclosed in square brackets, with the following convention;

[ABC]

A - Result type; one of stress S, strain E, or additionally force per unit length F, moment per unit length M or curvature K for plates.

B - Component; one of XX, YY, ZZ, XY, YZ, ZX where XYZ refer to the 123 axis directions defined by the coordinate system.

C - Coordinate system; one of local L, global G or the selected UCS U.

BC - Combined tensorial invariants; one of 11, 22, 33, MEAN, VM, TR.

Optionally for plate stresses and strains, the surface from which the result comes can be specified; one of mid-plane [ABC-MP], negative z [ABC-NZ] or positive z [ABC-PZ]. Note that if this is not specified, then the positive z value is taken when the plates are rendered as surfaces, and the value varies through the thickness when the plates are rendered as solids.

User defined results for plates also have two extra quantities; membrane thickness [TM] and bending thickness [TB].

Constants are entered in either simple floating point format #.# (period decimal point) or in scientific notation #.#E# where E separates the mantissa from the exponent (order of ten).

For manipulation of the above quantities, the standard operators are defined; addition +, subtraction -, multiplication \*, division / and exponentiation ^, as well as brackets ( . ) to control the order of operations (otherwise the standard BODMAS convention applies). Additionally, there are the following functions F ( . ).

## User Defined Results

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ABS - absolute value

SQRT - square root

SQR - square

LN - Natural log (base  $e$ )

LOG - Log base 10

EXP - Natural exponent (base  $e$ )

SIN - sine

COS - cosine

TAN - tangent

ARCSIN - arcsine

ARCCOS - arccosine

ARCTAN - arctangent

IFPOS - returns argument when argument is positive, zero otherwise

IFNEG - returns argument when argument is negative, zero otherwise

---

## Creep Definitions

A number of the creep laws available in Strand7 require that a number of basic coefficients be specified. These coefficients are defined via the Doubles array in the `St7SetCreepBasicData` and `St7GetCreepBasicData` as follows:

### **Primary Power Law Creep**

[0 .. 3] - Coefficients C1, C2, C3 and CT.

### **Secondary Power Law Creep**

[0 .. 2] - Coefficients C1, C2 and CT.

### **Primary + Secondary Power Law Creep**

[0 .. 6] - Coefficients C1, C2, C3, CT1, C4, C5 and CT2.

### **Secondary Hyperbolic Creep**

[0 .. 3] - Coefficients C1, C2, C3 and CT.

### **Secondary Exponential Creep**

[0 .. 2] - Coefficients C1, C2 and CT.

### **Theta Projection Creep**

[0 .. 3] - Coefficients A1, A2, A3 and A4.

[4 .. 7] - Coefficients B1, B2, B3 and B4.

[8 .. 11] - Coefficients C1, C2, C3 and C4.

[12 .. 15] - Coefficients D1, D2, D3 and D4.

**Generalised Graham Creep**

[0..7] - Coefficients C1, C2, C3, C4, C5, C6, C7 and CT.

**Generalised Blackburn Creep**

[0..6] - Coefficients C1, C2, C3, C4, C5, C6 and C7.

---

# Entity Display Settings

There are a variety of display settings for each of the different entity types in Strand7. These settings can be specified for each entity type via an Integer array parameter.

The following sets of constants are used when defining display options:

## **Node/Vertex Symbols**

syDot1, syDot2, syDot3, syDot4, sySquare1, sySquare2, syDisk1, syDisk2, syCircle1, syCircle2, syCircle3, sy3D1, sy3D2, sy3D3.

## **Filled Modes**

fmPropertyColour, fmGroupColour, fmGlobalColour, fmPropertyWireframe, fmGroupWireframe, fmOutlineWireframe, fmOrientation.

## **Number Modes**

nmNone, nmByElement, nmByProperty, nmByPropertyName, nmByID.

## **Display Modes**

dmLine, dmSection, dmSolid, dmSlice.

The Integer array can be specified for each entity type as follows:

### **Node**

ipNodeSelectedColour - Selected node colour as a 32 bit RGB value.

ipNodeUnselectedColour - Unselected node colour as a 32 bit RGB value.

ipNodeShowFree - Show free nodes, either btTrue or btFalse.

ipNodeNumberMode - Numbering mode for node numbers, see Number Modes for additional information.

ipNodeSymbol - Symbol for node display, see *Node/Vertex Symbols* for additional information.

### Beam Element

ipBeamDisplay - Beam display settings, see *Display Modes* for additional information.

ipBeamShowRefNode - Show reference nodes, either btTrue or btFalse.

ipBeamShowOffset - Show offsets, either btTrue or btFalse.

ipBeamMoveToOffset - Move to offset, either btTrue or btFalse.

ipBeamLightShade - Render with light shade, either btTrue or btFalse.

ipBeamGlobalColour - Global beam colour as a 32 bit RGB colour.

ipBeamOutlineColour - Outline colour as a 32 bit RGB colour.

ipBeamEnd1Colour - End 1 colour as a 32 bit RGB colour.

ipBeamEnd2Colour - End 2 colour as a 32 bit RGB colour.

ipBeamRefNodeColour - Reference line colour as a 32 bit RGB colour.

ipBeamFilledMode - Beam filled mode, one of dmLine, dmSection, dmSolid or dmSlice.

ipBeamContour - Beam contour type, see *Beam Contour Types* for additional information.

ipBeamShrink - Shrink value as a percentage.

ipBeamRoundFacets - Number of facets used to render round beams.

ipBeamSpringCoils - Number of coils used to display springs.

ipBeamSpringAspect - Aspect ratio for spring elements.

ipBeamThickness - Line thickness.

ipBeamSections - Number of length-wise sections.

ipBeamOutlines - Show outlines, either omOutlineOn or omOutlineOff.

ipBeamShowAxes - Show element axes, either btTrue or btFalse.

---

`ipBeamNumberMode` - Numbering mode for beam numbers, see *Number Modes* for additional information.

## **Plate Element**

`ipPlateDisplay` - Plate display settings, see *Display Modes* for additional information.

`ipPlateLightShade` - Render with light shade, either `btTrue` or `btFalse`.

`ipPlateGlobalColour` - Global plate colour as a 32 bit RGB colour.

`ipPlateOutlineColour` - Outline colour as a 32 bit RGB colour.

`ipPlateZPlusColour` - Z-plus orientation colour as a 32 bit RGB value.

`ipPlateZMinusColour` - Z-minus orientation colour as a 32 bit RGB colour.

`ipPlateOffsetColour` - Offset line colour as a 32 bit RGB value.

`ipPlateFilledMode` - Plate filled mode, see *Filled Modes* for additional information.

`ipPlateContour` - Plate contour type, see *Plate Contour Types* for additional information.

`ipPlateShrink` - Shrink value as a percentage.

`ipPlateOutlines` - Show plate outlines, one of `omOutlineOn`, `omOutlineOff` or `omOutlineFacet`.

`ipPlateOutlineThickness` - Plate outline line thickness.

`ipPlateShowAxes` - Show plate axes, either `btTrue` or `btFalse`.

`ipPlateAxisOnPly` - Ply number for axes display.

`ipPlateOffset` - Show plate offsets, either `btTrue` or `btFalse`.

`ipPlateMoveToOffset` - Move to offsets, either `btTrue` or `btFalse`.

`ipPlateNumberMode` - Plate numbering modes, see *Number Modes* for additional information.

## **Brick Element**

`ipBrickLightShade` - Render with light shade, either `btTrue` or `btFalse`.

ipBrickGlobalColour - Brick global colour as a 32 bit RGB value.

ipBrickOutlineColour - Outline colour as a 32 bit RGB value.

ipBrickFilledMode - Brick filled mode, see *Filled Modes* for additional information.

ipBrickContour - Brick contour type, see *Brick Contour Types* for additional information.

ipBrickShrink - Shrink value as a percentage.

ipBrickOutlines - Show outlines, one of omOutlineOn, omOutlineOff or omOutlineFacet.

ipBrickOutlineThickness - Brick outline thickness.

ipBrickShowFreeFaces - Show brick free faces, either btTrue or btFalse.

ipBrickAxes1 - Show brick 1-axis, either btTrue or btFalse.

ipBrickAxes2 - Show brick 2-axis, either btTrue or btFalse.

ipBrickAxes3 - Show brick 3-axis, either btTrue or btFalse.

ipBrickNumberMode - Brick number mode, see *Number Modes* for additional information.

ipBrickShowAllFaces - Show all brick faces, either btTrue or btFalse.

### Link

ipLinkGlobalColour - Link global colour as a 32 bit RGB value.

ipLinkMasterSlaveColour - Master-Slave link colour as a 32 bit RGB value.

ipLinkSectorSymmColour - Sector-symmetry link colour as a 32 bit RGB value.

ipLinkCouplingColour - Coupling link colour as a 32 bit RGB value.

ipLinkPinnedColour - Pinned link colour as a 32 bit RGB value.

ipLinkRigidColour - Rigid link colour as a 32 bit RGB value.

ipLinkShrinkColour - Shrink link colour as a 32 bit RGB value.

ipLinkTwoPointColour - Two-Point link colour as a 32 bit RGB value.

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`ipLinkAttachmentColour` - Attachment link colour as a 32 bit RGB value.

`ipLinkMultiPointColour` - Multi-Point link colour as a 32 bit RGB value.

`ipLinkFilledMode` - Link filled mode, see *Filled Modes* for additional information.

`ipLinkNumberMode` - Link numbering mode, see *Number Modes* for additional information.

## **Load Path**

`ipLoadPathColour` - Load path colour as a 32 bit RGB value.

`ipLoadPathColourMode` - Load path colour mode, one of  
`cmLoadPathTemplateColour`, `cmLoadPathGroupColour`, `cmLoadPathColour` or  
`cmLoadPathGlobalColour`.

`ipLoadPathNumberMode` - Load path numbering mode, see *Number Modes* for additional information.

`ipLoadPathShowDivisions` - Show path divisions, either `btTrue` or `btFalse`.

`ipLoadPathThickness` - Load path thickness.

## **Vertex**

`ipVertexFreeColour` - Free vertex colour as a 32 bit RGB value.

`ipVertexFixedColour` - Fixed vertex colour as a 32 bit RGB value.

`ipVertexSelectedColour` - Selected vertex colour as a 32 bit RGB colour.

`ipVertextNumberMode` - Vertex numbering mode, see *Number Modes* for additional information.

`ipVertexSymbol` - Vertex symbol, see *Node/Vertex Symbols* for additional information.

## **Geometry Edge**

`ipEdgeShow` - Show edges, either `btTrue` or `btFalse`.

`ipEdgeShowNonInterp` - Show non-interpolated edges, either `btTrue` or `btFalse`.

ipEdgeStyle - Edge style, either esThinEdge or esThickEdge.

ipEdgeColourMode - Edge colour mode.

ipEdgeColour - Edge colour as a 32 bit RGB value.

ipEdgeNonInterpColour - Non-Interpolated edge colour as a 32 bit RGB value.

### Geometry Face

ipFaceWireframeColour - Wireframe colour as a 32 bit RGB value.

ipFaceShowWireframes - Show wireframes, either btTrue or btFalse.

ipFaceShowControlPoints - Show control points, either btTrue or btFalse.

ipFaceShowNormals - Show face normals, either btTrue or btFalse.

ipFaceWireframeStyle - Wireframe style, either wsDepthShaded or wsConstantColour.

ipFaceWireframeColourMode - Wireframe colour mode.

ipFaceWireframeDensity - Wireframe density.

The following pre-processor contour types can be specified for each entity type:

### Beam Contour Types

ctBeamNone - No contour.

ctBeamLength - Contours of beam length.

ctBeamAxis1 - Contours of local axis 1 component.

ctBeamAxis2 - Contours of local axis 2 component.

ctBeamAxis3 - Contours of local axis 3 component.

ctBeamEA - Contours of EA product.

ctBeamEI11 - Contours of EI11 product.

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ctBeamEI22 - Contours of EI22 product.

ctBeamGJ - Contours of GJ product.

ctBeamEAFactor - Contours of EA factor.

ctBeamEI11Factor - Contours of EI11 factor.

ctBeamEI22Factor - Contours of EI22 factor.

ctBeamGJFactor - Contours of GJ factor.

ctBeamOffset1 - Contours of offset in the local 1 axis direction.

ctBeamOffset2 - Contours of offset in the local 2 axis direction.

ctBeamStiffnessFactor1 - Contours of stiffness factor 1.

ctBeamStiffnessFactor2 - Contours of stiffness factor 2.

ctBeamStiffnessFactor3 - Contours of stiffness factor 3.

ctBeamStiffnessFactor4 - Contours of stiffness factor 4.

ctBeamStiffnessFactor5 - Contours of stiffness factor 5.

ctBeamStiffnessFactor6 - Contours of stiffness factor 6.

ctBeamMassFactor - Contours of mass factor.

ctBeamSupport1 - Contours of support in the local 1 axis direction.

ctBeamSupport2 - Contours of support in the local 2 axis direction.

ctBeamTemperature - Contours of applied temperature.

ctBeamPreTension - Contours of pre-tension.

ctBeamPreStrain - Contours of pre-strain.

ctBeamTempGradient1 - Contours of applied temperature gradient in the local 1 axis direction.

ctBeamTempGradient2 - Contours of applied temperature gradient in the local 2 axis direction.

ctBeamPipePressureIn - Contours of internal pipe pressure.

ctBeamPipePressureOut - Contours of external pipe pressure.

ctBeamPipeTempIn - Contours of internal pipe temperature.  
ctBeamPipeTempOut - Contours of external pipe temperature.  
ctBeamConvectionCoeff - Contours of convection coefficient.  
ctBeamConvectionAmbient - Contours of ambient convection temperature.  
ctBeamRadiationCoeff - Contours of radiation coefficient.  
ctBeamRadiationAmbient - Contours of ambient radiation temperature.  
ctBeamHeatFlux - Contours of applied beam heat flux.  
ctBeamHeatSource - Contours of heat source.  
ctBeamAgeAtFirstLoading - Contours of age at first loading.

### Plate Contour Types

ctPlateNone - No Contour.  
ctPlateAspectRatioMin - Contours of minimum aspect ratio.  
ctPlateAspectRatioMax - Contours of maximum aspect ratio.  
ctPlateWarping - Contours of warping.  
ctPlateInternalAngle - Contours of internal angle.  
ctPlateInternalAngleRatio - Contours of internal angle ratio.  
ctPlateDiscreteThicknessM - Contours of discrete membrane thickness.  
ctPlateContinuousThicknessM - Contours of continuous membrane thickness.  
ctPlateDiscreteThicknessB - Contours of discrete bending thickness.  
ctPlateContinuousThicknessB - Contours of continuous bending thickness.  
ctPlateOffset - Contours of normal offset.  
ctPlateArea - Contours of area.  
ctPlateAxis1 - Contours of axis 1 component.  
ctPlateAxis2 - Contours of axis 2 component.

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ctPlateAxis3 - Contours of axis 3 component.

ctPlateTemperature - Contours of applied temperature.

ctPlateEdgeSupport - Contours of edge support.

ctPlateFaceSupport - Contours of face support.

ctPlatePreStressX - Contours of applied pre-stress in the local x axis direction.

ctPlatePreStressY - Contours of applied pre-stress in the local y axis direction.

ctPlatePreStressZ - Contours of applied pre-stress in the local z axis direction.

ctPlatePreStressMagnitude - Contours of applied pre-stress magnitude.

ctPlatePreStrainX - Contours of applied pre-strain in the local x axis direction.

ctPlatePreStrainY - Contours of applied pre-strain in the local y axis direction.

ctPlatePreStrainZ - Contours of applied pre-strain in the local z axis direction.

ctPlatePreStrainMagnitude - Contours of applied pre-strain magnitude.

ctPlateTempGradient - Contours of applied temperature gradient.

ctPlateEdgePressure - Contours of applied edge pressure.

ctPlateEdgeShear - Contours of applied edge shear.

ctPlateEdgeNormalShear - Contours of applied edge normal shear.

ctPlatePressureNormal - Contours of applied normal pressure.

ctPlatePressureGlobal - Contours of applied global pressure.

ctPlatePressureGlobalX - Contours of applied pressure in the global X axis direction.

ctPlatePressureGlobalY - Contours of applied pressure in the global Y axis direction.

ctPlatePressureGlobalZ - Contours of applied pressure in the global Z axis direction.

ctPlateFaceShearX - Contours of applied face shear in the local x axis direction.

ctPlateFaceShearY - Contours of applied face shear in the local y axis direction.

ctPlateFaceShearMagnitude - Contours of applied face shear magnitude.

ctPlateNSMass - Contours of non-structural mass.

ctPlateDynamicFactor - Contours of non-structural mass dynamic factor.

ctPlateConvectionCoeff - Contours of convection coefficient.

ctPlateConvectionAmbient - Contours of convection ambient temperature.

ctPlateRadiationCoeff - Contours of radiation coefficient.

ctPlateRadiationAmbient - Contours of radiation ambient temperature.

ctPlateHeatFlux - Contours of applied heat flux.

ctPlateConvectionCoeffZPlus - Contours of upper face convection coefficient.

ctPlateConvectionCoeffZMinus - Contours of lower face convection coefficient.

ctPlateConvectionAmbientZPlus - Contours of upper face convection ambient temperature.

ctPlateConvectionAmbientZMinus - Contours of lower face convection ambient temperature.

ctPlateRadiationCoeffZPlus - Contours of upper face radiation coefficient.

ctPlateRadiationCoeffZMinus - Contours of lower face radiation coefficient.

ctPlateRadiationAmbientZPlus - Contours of upper face radiation ambient temperature.

ctPlateRadiationAmbientZMinus - Contours of lower face radiation ambient temperature.

ctPlateHeatSource - Contours of applied heat source.

ctPlateSoilStressSV - Contours of applied soil stress SV.

ctPlateSoilStressKO - Contours of applied soil stress KO.

ctPlateSoilStressSH - Contours of applied soil stress SH.

ctPlateSoilRatioOCR - Contours of applied soil ratio OCR.

ctPlateSoilRatioEO - Contours of applied soil ratio EO.

ctPlateAgeAtFirstLoading - Contours of applied age at first loading.

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## **Brick Contour Types**

ctBrickNone - No contour.

ctBrickAspectRatioMin - Contours of minimum aspect ratio.

ctBrickAspectRatioMax - Contours of maximum aspect ratio.

ctBrickVolume - Contours of brick volume.

ctBrickDeterminant - Contours of determinant.

ctBrickInternalAngle - Contours of internal angle.

ctBrickMixedProduct - Contours of mixed product.

ctBrickDihedral - Contours of dihedral.

ctBrickAxis1 - Contours of axis 1 component.

ctBrickAxis2 - Contours of axis 2 component.

ctBrickAxis3 - Contours of axis 3 component.

ctBrickTemperature - Contours of applied temperature.

ctBrickSupport - Contours of face support.

ctBrickPreStressX - Contours of pre-stress in the local x axis direction.

ctBrickPreStressY - Contours of pre-stress in the local y axis direction.

ctBrickPreStressZ - Contours of pre-stress in the local z axis direction.

ctBrickPreStressMagnitude - Contours of pre-stress magnitude.

ctBrickPreStrainX - Contours of pre-strain in the local x axis direction.

ctBrickPreStrainY - Contours of pre-strain in the local y axis direction.

ctBrickPreStrainZ - Contours of pre-strain in the local z axis direction.

ctBrickPreStrainMagnitude - Contours of pre-strain magnitude.

ctBrickNormalPressure - Contours of applied normal pressure.

ctBrickGlobalPressure - Contours of applied global pressure.

## Entity Display Settings

---

ctBrickGlobalPressureX - Contours of global pressure in the local x axis direction.

ctBrickGlobalPressureY - Contours of global pressure in the local y axis direction.

ctBrickGlobalPressureZ - Contours of global pressure in the local z axis direction.

ctBrickShearX - Contours of face shear in the local x axis direction.

ctBrickShearY - Contours of face shear in the local y axis direction.

ctBrickShearMagnitude - Contours of face shear magnitude.

ctBrickNSMass - Contours of non-structural mass.

ctBrickDynamicFactor - Contours of non-structural mass dynamic factor.

ctBrickConvectionCoeff - Contours of convection coefficient.

ctBrickConvectionAmbient - Contours of convection ambient temperature.

ctBrickRaditionCoeff - Contours of radiation coefficient.

ctBrickRadiationAmbient - Contours of radiation ambient temperature.

ctBrickHeatFlux - Contours of applied heat flux.

ctBrickHeatSource - Contours of heat source.

ctBrickSoilStressSV - Contours of soil stress SV.

ctBrickSoilStressKO - Contours of soil stress KO.

ctBrickSoilStressSH - Contours of soil stress SH.

ctBrickSoilRatioOCR - Contours of soil ratio OCR.

ctBrickSoilRatioEO - Contours of soil ratio EO.

ctBrickAgeAtFirstLoading - Contours of age at first loading.

---

# Result Display Options

Element result contours can be displayed when viewing a model using the Strand7 API model window with a result file open. These contours can be configured and generated via the Integers array used in the *St7SetBeamResultDisplay*, *St7SetPlateResultDisplay* and *St7SetBrickResultDisplay* functions.

## Result Display Types

*rtAsNone* - No result display.

*rtAsContour* - Display result as element contour.

*rtAsDiagram* - Display result as element diagram.

*rtAsVector* - Display result as element vector.

## Common Result Display Quantities

*icDispC* - Displacement results.

*icVelC* - Velocity results.

*icAccC* - Acceleration results.

*icPhaseC* - Phase results.

*icReactC* - Reaction results.

*icTempC* - Temperature results.

*icNodeForceC* - Element node force results.

*icNodeFluxC* - Flux results.

## Beam Result Display Quantities

*icBeamForceC* - Beam force results.

*icBeamStrainC* - Beam strain results.

*icBeamStressC* - Beam stress results.

icBeamCreepStrainC - Beam creep strain results.

icBeamEnergyC - Beam energy results.

icBeamFluxC - Beam heat flux results.

icBeamTGradC - Beam temperature gradient results.

### **Plate Result Display Quantities**

icPlateForceC - Plate force results.

icPlateMomentC - Plate moment results.

icPlateStressC - Plate stress results.

icPlateStrainC - Plate strain results.

icPlateCurvatureC - Plate curvature results.

icPlateCreepStrainC - Plate creep strain results.

icPlateEnergyC - Plate energy results.

icPlateFluxC - Plate heat flux results.

icPlateTGradC - Plate temperature gradient results.

### **Brick Result Display Quantities**

icBrickStressC - Brick stress results.

icBrickStrainC - Brick strain results.

icBrickCreepStrainC - Brick creep strain results.

icBrickEnergyC - Brick energy results.

icBrickFluxC - Brick heat flux results.

icBrickTGradC - Brick temperature gradient results.

---

## **Result Display Axis**

stBeamLocal - use beam local axes.

stBeamPrincipal - use beam principal axes.

stBeamGlobal - use global axes.

stPlateLocal - use plate local axes.

stPlateGlobal - use plate global axes.

stPlateCombined - show plate combined results.

stBrickLocal - use brick local axes.

stBrickGlobal - use brick global axes.

stBrickCombined - show brick combined results.

OR the ID of a UCS in the model into which to resolve the result. Note the UCS IDs in a model begin at an index of 2.

## **Result Display Components**

This parameter is defined using an integer value and should be set according to the **Results Settings** dialog available within Strand7. Indices start at 1 and increment downwards and then to the right. For example, when displaying a contour of displacement results for plates D(XYZ) the index is 10.

## **Diagram Result Display Components**

The following diagram quantities are interpreted based on the result quantity selected as in the **Results Settings** dialog. The results Integers array needs the following data defined.

ipDiagram1 - btTrue or btFalse.

ipDiagram2 - btTrue or btFalse.

ipDiagram3 - btTrue or btFalse.

ipDiagram4 - btTrue or btFalse.

ipDiagram5 - btTrue or btFalse.

ipDiagram6 - btTrue or btFalse.

### Vector Result Display Components

The following vector quantities are interpreted based on the result quantity selected as in the **Results Settings** dialog. The results Integers array needs the following data defined. The results UCS is controlled using the *St7SetWindowUCSCase* function.

ipVector1 - btTrue or btFalse.

ipVector2 - btTrue or btFalse.

ipVector3 - btTrue or btFalse.

ipVector4 - btTrue or btFalse.

ipVector5 - btTrue or btFalse.

ipVector6 - btTrue or btFalse.

---

# Custom Results

User defined results files can be created directly using the Strand7 API. Once created, these results can be opened and manipulated in the same way as normal Strand7 result files.

Custom results can be specified for the following basic quantities:

## **Node Results**

`rtNodeDisp`, `rtNodeVel`, `rtNodeAcc`, `rtNodeReact`, `rtNodeTemp` or `rtNodeFlux`.

## **Beam Results**

`rtBeamForce`, `rtBeamStrain`, `rtBeamFlux` or `rtBeamNodeReact`.

## **Plate Results**

`rtPlateStress`, `rtPlateStrain`, `rtPlateFlux` or `rtPlateNodeReact`.

## **Brick Results**

`rtBrickStress`, `rtBrickStrain`, `rtBrickFlux` or `rtBrickNodeReact`.

The following set of constants are available for indexing the Doubles array for the appropriate functions of; `St7SetResFileNodeResult`, `St7GetResFileNodeResult`, `St7SetResFileBeamResult`, `St7GetResFileBeamResult`, `St7SetResFilePlateResult`, `St7GetResFilePlateResult`, `St7SetResFileBrickResult` or `St7GetResFileBrickResult`.

## **Nodal Displacement, Velocity, Acceleration and Reaction**

`ipNodeResFileDX` - Translational result in the X axis direction.

`ipNodeResFileDY` - Translational result in the Y axis direction.

`ipNodeResFileDZ` - Translational result in the Z axis direction.

`ipNodeResFileRX` - Rotational result about the X axis.

`ipNodeResFileRY` - Rotational result about the Y axis.

`ipNodeResFileRZ` - Rotational result about the Z axis.

Note that nodal rotations are measured in degrees.

## Nodal Temperature and Flux

ipNodeResTemp - Temperature result.

## Beam Force

ipBeamResFileSF1 - Shear force in the principal 1 axis direction.

ipBeamResFileSF2 - Shear force in the principal 2 axis direction.

ipBeamResFileAxial - Axial force.

ipBeamResFileBM1 - Bending moment in the principal 1 axis direction.

ipBeamResFileBM2 - Bending moment in the principal 2 axis direction.

ipBeamResFileTorque - Torque.

The above constants index contiguous blocks of results for each beam station, where each block is kBeamResFileForceSize long. For example, the axial force at the  $i^{\text{th}}$  beam station is stored at:

```
Doubles [ (i-1) * kBeamResFileForceSize + ipBeamResFileAxial ].
```

## Beam Strain

ipBeamResFileAxialStrain - Axial strain.

ipBeamResFileCurvature1 - Curvature in the principal 1 axis direction.

ipBeamResFileCurvature2 - Curvature in the principal 2 axis direction.

ipBeamResFileTwist - Twisting strain.

The above constants index contiguous blocks of results for each beam station, where each block is kBeamResFileStrainSize long.

## Beam Nodal Reaction

ipBeamResFileFX - Force reaction in the X axis direction.

---

ipBeamResFileFY - Force reaction in the Y axis direction.  
ipBeamResFileFZ - Force reaction in the Z axis direction.  
ipBeamResFileMX - Moment reaction in the X axis direction.  
ipBeamResFileMY - Moment reaction in the Y axis direction.  
ipBeamResFileMZ - Moment reaction in the Z axis direction.

The above constants index contiguous blocks of results for each beam end, where each block is kBeamResFileReactSize long.

## **Beam Flux**

ipBeamResFileF - Beam heat flux.  
ipBeamResFileG - Beam temperature gradient.

The above constants index contiguous blocks of results for each beam end, where each block is kBeamResFileFluxSize long.

## **Plate Stress**

Plate stress results for linear analyses comprise the following eight constants only:

ipPlateShellResFileNxx - Plate force in the local x axis direction.  
ipPlateShellResFileNyy - Plate force in the local y axis direction.  
ipPlateShellResFileNxy - Plate force in the local xy axis direction.  
ipPlateShellResFileMxx - Plate moment in the local x axis direction.  
ipPlateShellResFileMyy - Plate moment in the local y axis direction.  
ipPlateShellResFileMxy - Plate moment in the local xy axis direction.  
ipPlateShellResFileQxz - Plate shear force in the local xz axis direction.  
ipPlateShellResFileQyz - Plate shear force in the local yz axis direction.

Plate stress results for nonlinear analyses additionally comprise the following nine constants:

ipPlateShellResFileZMinusSxx - Plate stress in the local x axis direction, at the minus Z plate surface.

ipPlateShellResFileZMinusSyy - Plate stress in the local y axis direction, at the minus Z plate surface.

ipPlateShellResFileZMinusSxy - Plate stress in the local xy axis direction, at the minus Z plate surface.

ipPlateShellResFileMidPlaneSxx - Plate stress in the local x axis direction, at the midplane plate surface.

ipPlateShellResFileMidPlaneSyy - Plate stress in the local y axis direction, at the midplane plate surface.

ipPlateShellResFileMidPlaneSxy - Plate stress in the local xy axis direction, at the midplane plate surface.

ipPlateShellResFileZPlusSxx - Plate stress in the local x axis direction, at the plus Z plate surface.

ipPlateShellResFileZPlusSyy - Plate stress in the local y axis direction, at the plus Z plate surface.

ipPlateShellResFileZPlusSxy - Plate stress in the local xy axis direction, at the plus Z plate surface.

The above constants index contiguous blocks of results for each plate Gauss point, where each block is kPlateShellResFileStressSize long.

## **Plate Strain**

ipPlateShellResFileExx - Plate strain in the local x axis direction.

ipPlateShellResFileEyy - Plate strain in the local y axis direction.

ipPlateShellResFileExy - Plate strain in the local xy axis direction.

ipPlateShellResFileEzz - Plate strain in the local z axis direction.

ipPlateShellResFileKxx - Plate curvature in the local x axis direction.

ipPlateShellResFileKyy - Plate curvature in the local y axis direction.

ipPlateShellResFileKxy - Plate curvature in the local xy axis direction.

---

ipPlateShellResFileTxz - Transverse plate strain in the local zx axis direction.  
ipPlateShellResFileTyz - Transverse plate strain in the local yz axis direction.  
ipPlateShellResFileStoredE - Stored elastic strain energy density.  
ipPlateShellResFileSpentE - Irreversible work performed, as an energy density.

The above constants index contiguous blocks of results for each plate Gauss point, where each block is kPlateShellResFileStrainSize long.

## 2D Plate Stress

ipPlate2DResFileSXX - Plate stress in the global X axis direction.  
ipPlate2DResFileSYY - Plate stress in the global Y axis direction.  
ipPlate2DResFileSXY - Plate stress in the global XY axis direction.  
ipPlate2DResFileSZZ - Plate stress in the global Z axis direction.

The above constants index contiguous blocks of results for each plate Gauss point, where each block is kPlate2DResFileStressSize long.

## 2D Plate Strain

ipPlate2DResFileEXX - Plate strain in the global X axis direction.  
ipPlate2DResFileEYY - Plate strain in the global Y axis direction.  
ipPlate2DResFileEXY - Plate strain in the global XY axis direction.  
ipPlate2DResFileEZ - Plate strain in the global Z axis direction.  
ipPlate2DResFileStoredE - Stored elastic strain energy density.  
ipPlate2DResFileSpentE - Irreversible work performed, as an energy density.

The above constants index contiguous blocks of results for each plate Gauss point, where each block is kPlate2DResFileStrainSize long.

### **Plate Nodal Reaction**

ipPlateResFileFX - Plate node reaction in the global X axis direction.

ipPlateResFileFY - Plate node reaction in the global Y axis direction.

ipPlateResFileFZ - Plate node reaction in the global Z axis direction.

ipPlateResFileMX - Plate node reaction about the global X axis direction.

ipPlateResFileMY - Plate node reaction about the global Y axis direction.

ipPlateResFileMZ - Plate node reaction about the global Z axis direction.

The above constants index contiguous blocks of results for each plate node, where each block is kPlateResFileReactSize long.

### **Plate Flux**

ipPlateResFileFxx - Plate heat flux in the local x axis direction.

ipPlateResFileFyy - Plate heat flux in the local y axis direction.

ipPlateResFileGxx - Plate temperature gradient in the local x axis direction.

ipPlateResFileGyy - Plate temperature gradient in the local y axis direction.

The above constants index contiguous blocks of results for each plate Gauss point, where each block is kPlateResFileFluxSize long.

### **Brick Stress**

ipBrickResFileSXX - Brick stress in the local x axis direction.

ipBrickResFileSYY - Brick stress in the local y axis direction.

ipBrickResFileSZZ - Brick stress in the local z axis direction.

ipBrickResFileSXY - Brick stress in the local xy axis direction.

ipBrickResFileSYZ - Brick stress in the local yz axis direction.

ipBrickResFileSZX - Brick stress in the local zx axis direction.

---

The above constants index contiguous blocks of results for each brick Gauss point, where each block is kBrickResFileStressSize long.

### **Brick Strain**

ipBrickResFileExx - Brick strain in the local x axis direction.

ipBrickResFileEyy - Brick strain in the local y axis direction.

ipBrickResFileEzz - Brick strain in the local z axis direction.

ipBrickResFileExy - Brick strain in the local xy axis direction.

ipBrickResFileEyz - Brick strain in the local yz axis direction.

ipBrickResFileEzx - Brick strain in the local zx axis direction.

ipBrickResFileStoredE - Stored elastic strain energy density.

ipBrickResFileSpentE - Irreversible work performed, as an energy density.

The above constants index contiguous blocks of results for each brick Gauss point, where each block is kBrickResFileStrainSize long.

### **Brick Nodal Reaction**

ipBrickResFileFX - Brick node reaction in the global X axis direction.

ipBrickResFileFY - Brick node reaction in the global Y axis direction.

ipBrickResFileFZ - Brick node reaction in the global Z axis direction.

The above constants index contiguous blocks of results for each brick node, where each block is kBrickResFileReactSize long.

### **Brick Flux**

ipBrickResFileFXX - Brick heat flux in the local x axis direction.

ipBrickResFileFYy - Brick heat flux in the local y axis direction.

ipBrickResFileFZZ - Brick heat flux in the local z axis direction.

ipBrickResFileGXX - Brick temperature gradient in the local x axis direction.

ipBrickResFileGYY - Brick temperature gradient in the local y axis direction.

ipBrickResFileGZZ - Brick temperature gradient in the local z axis direction.

The above constants index contiguous blocks of results for each brick Gauss point, where each block is kBrickResFileFluxSize long.

---

## Obsolete Functions

There are a number of functions that have become obsolete due to continued development. For backwards compatibility, these functions will continue to be available in the Strand7 API, although they will not be fully documented and their continued use is not recommended. Typically an alternative function will be available, that supports enhanced functionality.

In rare situations functions may no longer be supported in the Strand7 API. In these cases the functions will still be available, but will always return the *ERR7\_FunctionNotSupported* error code. A function will only be discontinued in this way if its behaviour is no longer valid, otherwise the function will simply become undocumented as described above.

The following list outlines obsolete functions and the recommended alternatives:

---

### **St7ZipMesh**

Status

Undocumented.

Alternatives

St7CleanMesh, St7SetCleanMeshData, St7GetCleanMeshData.

---

### **St7SetBeamSectionProperties**

Status

Undocumented.

Alternatives

St7SetBeamSectionPropertyData.

---

### **St7CalcBeamSectionProperties**

Status

Undocumented.

Alternatives

St7CalculateBeamSectionProperties.

---

### **St7AddNonlinearIncrement**

Status

Undocumented.

Alternatives

St7AddNLAIcrement.

### **St7InsertNonlinearIncrement**

---

Status

Undocumented.

Alternatives

St7InsertNLAIcrement.

### **St7DeleteNonlinearIncrement**

---

Status

Undocumented.

Alternatives

St7DeleteNLAIcrement.

### **St7SetNonlinearLoadIncrementFactor**

---

Status

Undocumented.

Alternatives

St7SetNLALoadIncrementFactor.

### **St7SetNonlinearFreedomIncrementFactor**

---

Status

Undocumented.

Alternatives

St7SetNLAFreedomIncrementFactor.

### **St7GetNonlinearLoadIncrementFactor**

---

Status

Undocumented.

---

Alternatives

St7GetNLALoadIncrementFactor.

---

### **St7GetNonlinearFreedomIncrementFactor**

Status

Undocumented.

Alternatives

St7GetNLAFreedomIncrementFactor.

---

### **St7AddLoadCaseCombination**

Status

Undocumented.

Alternatives

St7AddLSACombination.

---

### **St7InsertLoadCaseCombination**

Status

Undocumented.

Alternatives

St7InsertLSACombination.

---

### **St7DeleteLoadCaseCombination**

Status

Undocumented.

Alternatives

St7DeleteLSACombination.

---

### **St7SetLoadCaseCombinationFactor**

Status

Undocumented.

Alternatives

St7SetLSACombinationFactor.

### **St7GetLoadCaseCombinationFactor**

---

Status

Undocumented.

Alternatives

St7GetLSACombinationFactor.

### **St7EnableNonlinearLoadCase**

---

Status

Undocumented.

Alternatives

St7EnableNLALoadCase.

### **St7DisableNonlinearLoadCase**

---

Status

Undocumented.

Alternatives

St7DisableNLALoadCase.

### **St7EnableNonlinearFreedomCase**

---

Status

Undocumented.

Alternatives

St7GetNLALoadCaseState, St7EnableNLAFreedomCase.

### **St7DisableNonlinearFreedomCase**

---

Status

Undocumented.

Alternatives

St7DisableNLAFreedomCase.

---

## **St7GetNonlinearLoadCaseState**

---

Status

Undocumented.

Alternatives

St7GetNLALoadCaseState.

## **St7GetNonlinearFreedomCaseState**

---

Status

Undocumented.

Alternatives

St7GetNLAFreedomCaseState.

## **St7EnableFrequencyNSMassCase**

---

Status

Undocumented.

Alternatives

St7EnableNFANonStructuralMassCase.

## **St7DisableFrequencyNSMassCase**

---

Status

Undocumented.

Alternatives

St7DisableNFANonStructuralMassCase.

## **St7GetFrequencyNSMassCaseState**

---

Status

Undocumented.

Alternatives

St7GetNFANonStructuralMassCaseState.

### **St7GetBeamResult**

---

#### Status

Undocumented.

#### Alternatives

St7GetBeamResultArray, St7GetBeamResultArrayPos,  
St7GetBeamResultEndPos, St7GetBeamResultSinglePos.

### **St7GetBeamForceResultPos**

---

#### Status

Undocumented.

#### Alternatives

St7GetBeamResultArray, St7GetBeamResultArrayPos,  
St7GetBeamResultEndPos, St7GetBeamResultSinglePos.

### **St7GetBeamResultPos**

---

#### Status

Undocumented.

#### Alternatives

St7GetBeamResultArray, St7GetBeamResultArrayPos,  
St7GetBeamResultEndPos, St7GetBeamResultSinglePos.

### **St7GetBeamDispResultPos**

---

#### Status

Undocumented.

#### Alternatives

St7GetBeamResultArray, St7GetBeamResultArrayPos,  
St7GetBeamResultEndPos, St7GetBeamResultSinglePos.

### **St7GetPlateResult**

---

#### Status

Undocumented.

#### Alternatives

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St7GetPlateResultArray.

### **St7GetPlateResultUCS**

---

Status

Undocumented.

Alternatives

St7GetPlateResultArray.

### **St7GetBrickResult**

---

Status

Undocumented.

Alternatives

St7GetBrickResultArray.

### **St7GetBrickResultUCS**

---

Status

Undocumented.

Alternatives

St7GetBrickResultArray.

### **St7 GetUserSpectralName**

---

Status

Undocumented.

Alternatives

St7GetLSACombinationSpectralName.

### **St7SetNodeKTranslation3**

---

Status

Undocumented.

Alternatives

St7SetNodeKTranslation3F.

### **St7SetNodeKRotation3**

---

Status

Undocumented.

Alternatives

St7SetNodeKRotation3F.

### **St7SetNodeKDamping3**

---

Status

Undocumented.

Alternatives

St7SetNodeKDamping3F.

### **St7SetNodeNSMass2**

---

Status

Undocumented.

Alternatives

St7SetNodeNSMass5.

### **St7GetBeamProperty**

---

Status

Undocumented.

Alternatives

St7GetBeamPropertyData.

### **St7GetPlateProperty**

---

Status

Undocumented.

Alternatives

St7GetPlatePropertyData.

---

## **St7GetBrickProperty**

---

Status

Undocumented.

Alternatives

St7GetBrickPropertyData.

## **St7SetBeamSupport2**

---

Status

Undocumented.

Alternatives

St7SetBeamSupport2F.

## **St7SetBeamDLL4**

---

Status

Undocumented.

Alternatives

St7SetBeamDLL6ID.

## **St7SetBeamDML4**

---

Status

Undocumented.

Alternatives

St7SetBeamDML6ID.

## **St7SetBeamDLG4**

---

Status

Undocumented.

Alternatives

St7SetBeamDLG6ID.

## **St7SetBeamCFL4**

---

Status

Undocumented.

Alternatives

St7SetBeamCFL4ID.

## **St7SetBeamCFG4**

---

Status

Undocumented.

Alternatives

St7SetBeamCFG4ID.

## **St7SetBeamCML4**

---

Status

Undocumented.

Alternatives

St7SetBeamCML4ID.

## **St7SetBeamCMG4**

---

Status

Undocumented.

Alternatives

St7SetBeamCMG4ID.

## **St7SetBeamNSMass7ID**

---

Status

Undocumented.

Alternatives

St7SetBeamNSMass10ID.

---

## **St7SetPipePressure2**

---

Status

Undocumented.

Alternatives

St7SetPipePressure2AF.

## **St7SetPipeTemperature2**

---

Status

Undocumented.

Alternatives

St7SetPipeTemperature2OT.

## **St7SetBeamPreTension1**

---

Status

Undocumented.

Alternatives

St7SetBeamPreLoad1.

## **St7SetPlatePreStress3**

---

Status

Undocumented.

Alternatives

St7SetPlatePreLoad3.

## **St7SetPlateFaceSupport1**

---

Status

Undocumented.

Alternatives

St7SetPlateSupport1F.

### **St7SetPlateEdgeSupport1**

---

Status

Undocumented.

Alternatives

St7SetPlateEdgeSupport1F.

### **St7SetPlateNSMass2**

---

Status

Undocumented.

Alternatives

St7SetPlateNSMass5.

### **St7SetPlateConvection2**

---

Status

Undocumented.

Alternatives

St7SetPlateEdgeConvection2.

### **St7SetPlateRadiation2**

---

Status

Undocumented.

Alternatives

St7SetPlateEdgeRadiation2.

### **St7SetBrickSupport1**

---

Status

Undocumented.

Alternatives

St7SetBrickSupport1F.

---

## **St7SetBrickPreStress3**

---

Status

Undocumented.

Alternatives

St7SetBrickPreLoad3.

## **St7SetBrickNSMass2**

---

Status

Undocumented.

Alternatives

St7SetBrickNSMass5.

## **St7EnableLoadCase**

---

Status

Undocumented.

Alternatives

St7EnableLSALoadCase.

## **St7DisableLoadCase**

---

Status

Undocumented.

Alternatives

St7DisableLSALoadCase.

## **St7GetLoadCaseStatus**

---

Status

Undocumented.

Alternatives

St7GetLSALoadCaseState.

## **St7SetLinearBucklingInitialFile**

---

Status

Undocumented.

Alternatives

St7SetLBAInitialFile.

## **St7GetLinearBucklingInitialFile**

---

Status

Undocumented.

Alternatives

St7GetLBAInitialFile.

## **St7SetNaturalFrequencyInitialFile**

---

Status

Undocumented.

Alternatives

St7SetNFAInitialFile.

## **St7GetNaturalFrequencyInitialFile**

---

Status

Undocumented.

Alternatives

St7GetNFAInitialFile.

## **St7SetNonlinearStaticInitialFile**

---

Status

Undocumented.

Alternatives

St7SetNLInitialFile.

---

## **St7GetNonlinearStaticInitialFile**

---

Status

Undocumented.

Alternatives

St7GetNLAinitialFile.

## **St7SetTransientInitialConditions**

---

Status

Undocumented.

Alternatives

St7SetTransientInitialConditionsType, St7SetTransientInitialConditionsVectors.

## **St7GetTransientInitialConditions**

---

Status

Undocumented.

Alternatives

St7GetTransientInitialConditionsType, St7GetTransientInitialConditionsVectors.

## **St7SetNonlinearTransientInitialFile**

---

Status

Undocumented.

Alternatives

St7SetNTAinitialFile.

## **St7GetNonlinearTransientInitialFile**

---

Status

Undoumented.

Alternatives

St7GetNTAinitialFile.

### **St7SetLinearTransientInitialFile**

---

Status

Undocumented.

Alternatives

St7SetLTInitialFile.

### **St7GetLinearTransientInitialFile**

---

Status

Undoumented.

Alternatives

St7GetLTInitialFile.

### **St7SetTransientHeatInitialFile**

---

Status

Undocumented.

Alternatives

St7SetTHInitialFile.

### **St7GetTransientHeatInitialFile**

---

Status

Undocumented.

Alternatives

St7GetTHInitialFile.

### **St7SetModalDampingType**

---

Status

Undocumented.

Alternatives

St7SetDampingType.

---

## **St7GetModalDampingType**

---

Status

Undocumented.

Alternatives

St7GetDampingType.

## **St7SetHarmonicRange**

---

Status

Undocumented.

Alternatives

St7SetHRARange.

## **St7GetHarmonicRange**

---

Status

Undocumented.

Alternatives

St7GetHRARange.

## **St7SetHeatLoadCase**

---

Status

Undocumented.

Alternatives

St7EnableHeatLoadCase.

## **St7GetHarmonicBaseVector**

---

Status

Undocumented.

Alternatives

St7GetHRABaseVector.

### **St7SetHarmonicBaseVector**

---

Status

Undocumented.

Alternatives

St7SetHRABaseVector.

### **St7SetHarmonicLoadType**

---

Status

Undocumented.

Alternatives

St7SetModalLoadType.

### **St7GetHarmonicLoadType**

---

Status

Undocumented.

Alternatives

St7GetModalLoadType.

### **St7SetLSAFreedomCase**

---

Status

Undocumented.

Alternatives

Load/Freedom case combinations are not defined explicitly, see  
St7EnableLSALoadCase, St7DisableLSALoadCase, St7GetLSALoadCaseState.

### **St7SetSolverLogicalParameter**

---

Status

Undocumented.

Alternatives

St7SetSolverDefaultsLogical.

---

## **St7GetSolverLogicalParameter**

---

Status

Undocumented.

Alternatives

St7GetSolverDefaultsLogical.

## **St7SetSolverIntegerParameter**

---

Status

Undocumented.

Alternatives

St7SetSolverDefaultsInteger.

## **St7GetSolverIntegerParameter**

---

Status

Undocumented.

Alternatives

St7GetSolverDefaultsInteger.

## **St7SetSolverDoubleParameter**

---

Status

Undocumented.

Alternatives

St7SetSolverDefaultsDouble.

## **St7GetSolverDoubleParameter**

---

Status

Undocumented.

Alternatives

St7GetSolverDefaultsDouble.

## **St7GetAttribute**

---

Status

Undocumented.

Alternatives

Specific Set/Get functions are now available for all attribute types.

## **St7GetAttributeID**

---

Status

Undocumented.

Alternatives

Specific Set/Get functions are now available for all attribute types.

## **St7GetElementGroup**

---

Status

Undocumented.

Alternatives

St7GetEntityGroup.

## **St7SetElementGroup**

---

Status

Undocumented.

Alternatives

St7SetEntityGroup.

## **St7DeleteAttributeID**

---

Status

Undocumented.

Alternatives

St7DeleteAttribute.

---

## **St7NewTable**

---

Status

Not supported.

Alternatives

St7GetNumTables, St7GetTableInfoByIndex.

## **St7DeleteTable**

---

Status

Not supported.

Alternatives

St7DeleteTableType.

## **St7GetTableType**

---

Status

Not supported.

Alternatives

None. The type of all tables is now explicit.

## **St7GetTableName**

---

Status

Not supported.

Alternatives

St7GetTableTypeName.

## **St7GetNumTableRows**

---

Status

Not supported.

Alternatives

St7GetNumTableTypeRows.

### **St7GetTableData**

---

Status

Not supported.

Alternatives

St7GetTableTypeData.

### **St7SetTableData**

---

Status

Not supported.

Alternatives

St7SetTableTypeData.

### **St7SetLinkData**

---

Status

Undocumented.

Alternatives

Specific Set/Get functions are now available for all link types.

### **St7GetLinkData**

---

Status

Undocumented.

Alternatives

Specific Set/Get functions are now available for all link types.

### **St7SetLinkDoubles**

---

Status

Undocumented.

Alternatives

Specific Set/Get functions are now available for all link types.

---

## **St7GetLinkDoubles**

---

### Status

Undocumented.

### Alternatives

Specific Set/Get functions are now available for all link types.

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# Making finite element analysis easier.

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