HEXAGON
PPM

Intergraph Smart Materials

SAP Material Interface

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SECTION 1

Introduction

This documentation describes the interfaces between Intergraph Smart® Materials and the SAP software system. These interfaces have been specified by Intergraph in the course of workshops and user conventions involving many customers who use both Smart Materials and SAP.

The *General Overview* (on page 7) section provides a general overview and shows you the general plan for interfaces between Smart Materials and SAP.

The *Material Master Transfer* (on page 9) section describes the specific details of Material Master transfer (Smart Materials Idents > SAP Materials), and the conditions and assumptions required to make it possible for the two systems to operate side by side.

Because both Smart Materials and SAP are extremely flexible and setups can vary enormously, it is not possible to say what is THE optimum Smart Materials / SAP configuration. What is far more impressive is the interface concept, which allows the individual interfaces to be combined, with each one being configured to allow optimum customization and integration into the particular business case.

All the interfaces available in Smart Materials (for example, PDMS or OMI) that allow you to process company idents are adapted accordingly so that these interfaces are also able to process SAP material numbers (interface ident codes for corresponding SAP interfaces).

SECTION 2

General Overview

Infrastructure

One important reason for having a modular interface is the fact that on-site, the interface has to function with different SAP versions. The interface is adjustable on a per interface basis, thus giving support to different SAP versions at the one customer site.

An online link between Smart Materials and SAP is not required.

Automation

The interface is operated from the Smart Materials end. All transfers are logged.

An automated transfer is not possible.

Integrating Systems

The interface is designed so that the Smart Materials system can feed several SAP systems. In the case of several SAP systems, an interface-specific ident code is used to uniquely identify the SAP Material Numbers in Smart Materials. Each connected SAP system is assigned to an interface within this system, each with a valid client. This makes it possible to define different configurations for the different SAP systems.

This is on the condition that each SAP system is fed only by a Smart Materials system.

Implementing SAP

Exchanging IDocs connects Smart Materials and SAP. These can be transferred either by XML files or by using interface tables that contain the IDoc data. An application provided by the customer will then transfer the data to the SAP system. The functions for receiving IDocs are available in the SAP standard.

Smart Materials gives you the opportunity to record any enhancements you may need in the IDocs structure. These customer-specific enhancements must be set when configuring the interface. The enhancements must fall within the scope of the SAP interface upgrade concept.

System Requirements for Smart Materials

- Smart Materials Version 6.2 SP8 or higher
- The database parameter job_queue_processes must be > 0.

System Requirements for SAP

- You must have SAP Version 4.0b or higher.

Scope of Supply

- The modules and procedures for the SAP interface described in *Material Master Transfer* (on page 9) with accompanying tables and views
- IDoc structures SAP Version 4.0b
  - MATMAS03 (Material master)
  - CLFMAS01 (Classification)

SECTION 3

Material Master Transfer

Concept

The concept of the interface, applied specifically to material master transfer, that is, the transfer of Smart Materials idents to SAP materials, is described in this section. Boundary conditions are explained and fundamental questions answered.

Where are Material Numbers Assigned?

Smart Materials is the master system. Smart Materials is not responsible for any of the material masters (materials) directly created, modified, or deleted in SAP. Smart Materials is not able to guarantee this condition at the SAP end, because Smart Materials has no direct access of any kind to the SAP system. This must be guaranteed either by organizational measures or by direct precautions in the SAP system itself.

Smart Materials sets up (standardizes) all the material master records (idents) for SAP materials relevant to system construction; that is, Smart Materials generates the relevant (technical) part master data (idents) **exclusively**. A subset of this data is transferred to the SAP system as materials.

In addition to this, SAP can contain materials that have not been transferred by Smart Materials.

Which idents (Smart Materials material master) are transferred from Smart Materials to SAP as materials is determined by the maintenance of the interface ident code (that is, updating the SAP material numbers in Smart Materials for the relevant ident of each interface) and the restrictive Where condition in the SAP job screen **SAP 20.01 Transfer Jobs**.

It is **not planned** to transfer materials that are already in the SAP systems to Smart Materials when the interface is implemented. Also **not planned** is a merger of the different systems with regard to ident and material numbers. Smart Materials will only transfer the material master data (idents) to a newly defined (or reserved) area of SAP material master data.

Which System Defines the SAP Material Numbers?

Smart Materials defines the SAP material numbers by transferring the interface ident code assigned by Smart Materials to SAP and using it in SAP as the material number.

NOTE It is standard procedure for the interface ident code to be copied over from the ident code if this is set up in the interface configuration. The customer has the opportunity to use a CIP function to define separate logic to derive the interface ident code from the ident code.

In the case of manual transfer, the user can still modify the ident before starting the transfer, which means that he can generate any interface ident code/material number he likes, as long as it is unique.

Where is Transfer Initiated?

Idents can be transferred from the Smart Materials product group and from within a Smart Materials project.

How is Data Merged?

Smart Materials keeps logging tables for the transfer of Smart Materials idents to SAP and stores in them all the information transferred to the SAP systems.

No information is sent more than once. With a single ident, however, even if only one attribute is changed, all the ident information, that is, all the attributes, must be transferred again. This is necessary because otherwise, SAP would delete the features that are already in SAP and only create the new, modified feature.

Point 2 makes sure that the information in the logging tables corresponds to that in the SAP system. This is essential because Smart Materials CANNOT LOOK IN THE SAP system to see what information is available there. Smart Materials assumes that the SAP data is identical to that which is contained in the logging tables.

When a material is created in SAP (by the interface), it is given all the features and values defined in Smart Materials.

When an ident is deleted in Smart Materials, there is no way of checking whether the corresponding material is still being used in SAP (for example, for a purchase order).

Smart Materials can be totally unaware that a material transferred by Smart Materials to SAP has been deleted, because SAP cannot take the initiative to transfer data. It may be that Smart Materials dialog boxes or reports still show the old SAP material number even after the deletion. This can be particularly critical if the same SAP material number is then reused for other purposes. The system must be organized so that this situation does not happen.

What Data will be Transferred?

Generally, there are three kinds of data that can be transferred to SAP:

- Material Master Data (not plant-dependent) > screen **SAP 10.05**
- Plant-Dependent Material Master Data > screen **SAP 10.06**
- Classification Features (dependent on Material Class) > screen **SAP 10.07**

The value of all attribute types (on all three screens) can always be controlled by a filter (group, part, commodity code, and ident code).

There are the following different options for defining the value of attributes:

Attribute Value Types

Fixed - Fixed attributes are defined here, with values that are not developed as a direct function of the ident number.

Ident - All Smart Materials ident attributes can be assigned as attributes, that is, commodity attribute and/or object parameter details (geometry).

CIP Function - You can use any CIP function that you have defined or an ident function here to determine the value of the relevant attribute.

Ident Function - On Smart Materials screen A.60.13, ident functions can be defined.

They can be selected here and the return value will be submitted as an attribute value.

Master Data

To create a material in SAP, the following SAP material master data of a material must be defined in Smart Materials and transferred.

SAP	IDOC field	Smart Materials source
Industry	MBRSH (segment E2MARAM)	Mapped master data attribute (fixed by the filter setting)
Material type	MTART (segment E2MARAM)	Mapped master data attribute (fixed by the filter setting)
Base quantity unit	MEINS (segment E2MARAM)	Mapped master data attribute (by ident function or CIP)
Short text	MAKTX (segment E1MAKTM)	Mapped master data attribute (by ident function or CIP)
Product category	MATKL (segment E2MARAM)	Mapped master data attribute (fixed by the filter setting)
Material number	MATNR (segment E2MARAM)	Smart Materials interface ident code

Table 1: Mandatory SAP Material Master Data

The definition is made on screen **SAP 10.05**.

You also have the opportunity (as an option) to transfer any existing long layout ordering text from Smart Materials to SAP. Use IDoc MATMAS03 segments E1MTXHM master material long text header and E1MTXLM master material long text line for this transfer. Then, on screen **SAP 10.05**, the TDLine field will only be mapped to the corresponding CIP function that gives the Long text as a return value. The transfer does not change the formatting of the ordering text. Furthermore, you can complete the other IDoc fields as needed to define the ident correctly.

Plant-Dependent Master Data

You must maintain various plant-specific master data to be able to use an ident in a plant. You can find these plant-dependent master data in the segment tree E1MARCM of IDoc type MATMAS.

SAP	IDOC field	Smart Materials source
SAP plant	WERKS	Will be filled automatically and may not be mapped separately
Planned delivery time	PLIFZ	Mapped master data attribute (dependent on filter definition)
Recorder level	MINBE	Mapped master data attribute (by ident function or CIP)

SAP	IDOC field	Smart Materials source
Purchasing group	EKGRP	Mapped master data attribute (dependent on filter definition)
Test data group for availability check	MTVFP	Mapped master data attribute (by ident-function or CIP)
Availability indicator	DISPO	Smart Materials interface ident code (will be filled automatically and may not be mapped separately)
Dispatcher	DISMM	Mapped master data attribute (by ident-function or CIP)

Table 2: Mandatory Fields for Using an Ident within a Plant

The definition is done on screen **SAP 10.06**.

Material Class-Dependent Material Data

These material class-dependent features do not belong to the SAP master data, and they will be transferred in a separate IDoc (type CLFMAS). In SAP, this material data will be mapped to a material class. They must be defined in Smart Materials with the so-called "S.20.08 method". Therefore, a material class corresponds to the grouping function of the part in Smart Materials.

To be able to transfer a material class-dependent feature to SAP, you must do the following steps:

- Define feature names on screen **SAP 10.04**.
- Create SAP material classes with the S.20.08 method.
- Map the corresponding features and their values that are material class specific (**SAP 10.07**).

It is important to name the features and material classes in the same way as they are named in the SAP system.

How Do I Select the Idents to be Transferred?

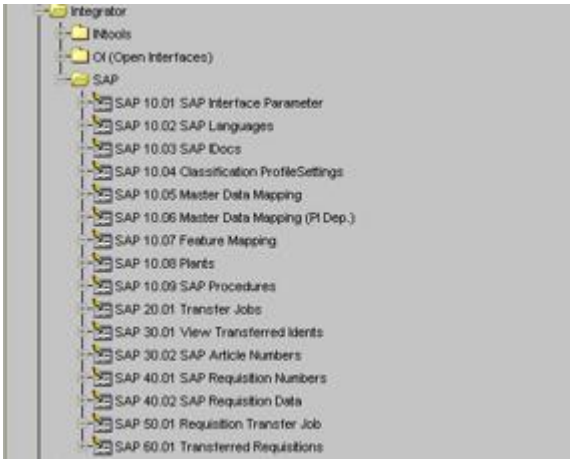
- Ident transfer can be explicitly initiated for one ident.
- An ident subset can be selected by defining where conditions.
- Idents are selected by specifying a modification period. Intergraph makes a (PL/SQL) function available that determines the date of the last modification of an ident.

Points 2 and 3 can be combined.

Screen **SAP 20.01** is used for the functions given above and is described in the *SAP 20.01 Transfer Jobs* (on page 36) section.

Module Extent

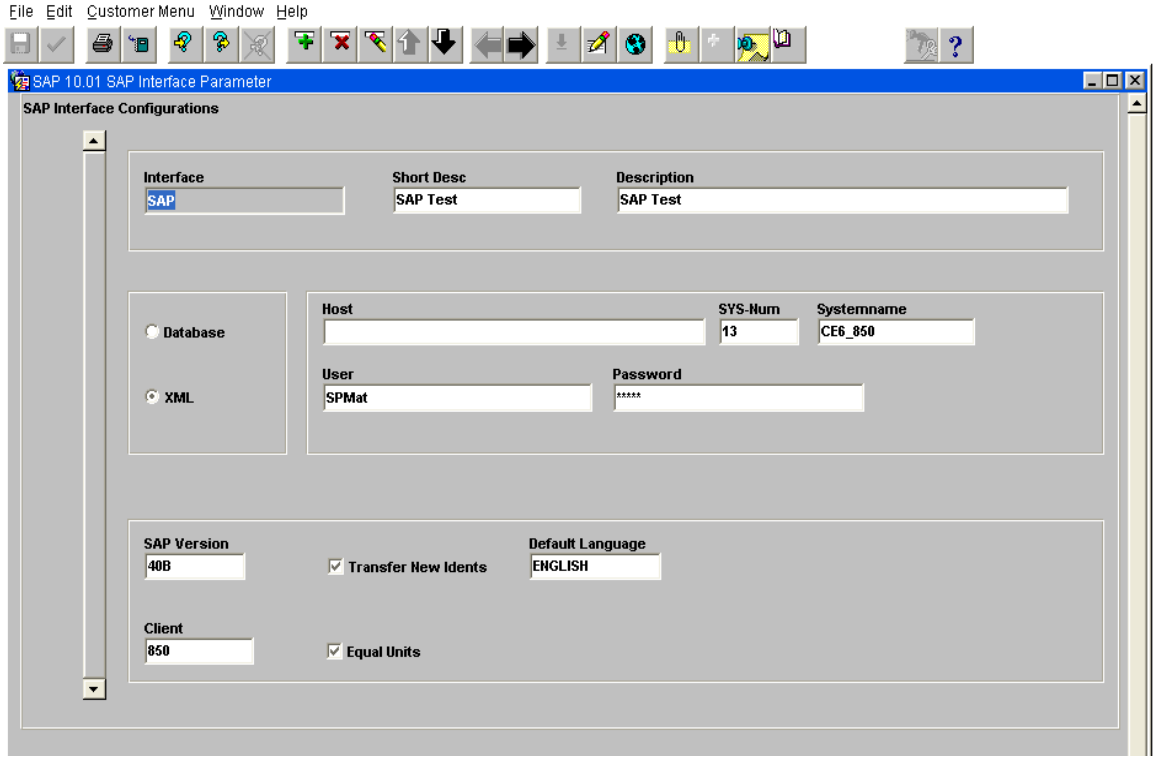
You can find the SAP interface screens in the Smart Materials menu under Integrator > SAP.



SAP 10.01 Interface Parameters

This screen contains all those configuration parameters for SAP interfaces that are DIRECTLY assigned to the interface; in other words, those that are NOT project/global/material-related.

An interface is defined for each SAP system with an accompanying client. This means that an interface must be defined for each client within an SAP system.



Field Descriptions

Interface (mandatory) - Via LOV, an interface is selected; this interface was defined in **A.70.01**. To provide more information, the **Short Desc** and **Description** fields can be used.

Connection Type (mandatory) - **Connection Type** is a mandatory field and you must choose between the following options:

- **Database**: Data is exchanged by creating the IDOC information in interface tables (XI..) in the M_SYS schema. For the further transfer to SAP, the customer must provide an appropriate program.
- **XML**: Data is exchanged by creating IDOCs as XML files and (optionally) transferring them to another system specified by the field 'Host'.

Host (optional) - Hostname or TCP IP address of the destination system for XML files.

Sys-Num (optional) - Number of the central instance of the SAP destination system.

Systemname (optional) - Name of the SAP destination.

User (optional) – User on the ftp server used as destination for the file transfer of XML IDocs.

Password (optional) – Password of the user for the ftp server.

★ IMPORTANT You need to assign the 'create external job' database privilege to M_SYS if you want to use the ftp transfer. On Windows, the OracleJobScheduler<sid> must be running.

SAP-Version (mandatory) - Via LOV, the corresponding version of the SAP destination system is selected. The various versions are entered on screen SAP 10.03.

SAP Client (mandatory) - The SAP client is also a mandatory field. You should specify a valid SAP client here. The interface definition will only be unique if you specify the SAP system (physical installation) and associated SAP client.

Transfer_New_Idents (mandatory) - This check box defines whether new idents are brought into the table INTERFACE_IDENTS automatically (that is, not by the user). The interface ident code will be created with the help of a CIP function and saved in table M_IDENT_INTERFACES in the field II_CODE.

The user can define the CIP function without any restrictions. The name of the CIP function will be defined by the value of the according interface setting variable (A.70.11 Interface Settings).

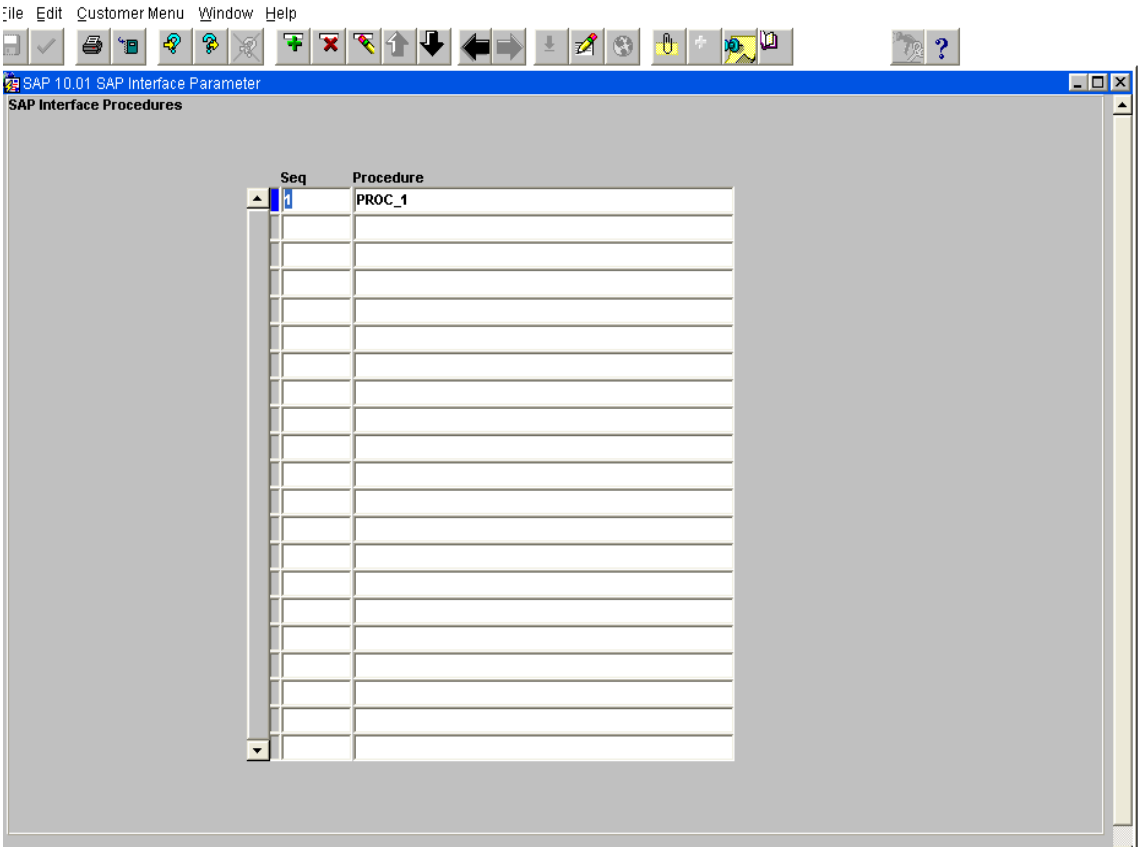
The function M_PCK_SAP_CUSTOM.BUILD_SAP_ART_NR will be delivered by Intergraph per default. The check box is set as default so that the SAP ident code depends on the CIP function.

Equal Units (mandatory) - The standard assumption is that when idents are transferred, the quantity units can also be transferred in parallel. If this is not the case, the Equal **Units** check box should not be set and the relevant unit declarations must be set on screen **A.10.14**.

Default Language (mandatory) - The **Default Language** field defines the language information to be transferred to SAP per default. Smart Materials usually tries to transfer all IDoc fields that were defined as multilingual (actually, this only applies to the fields TDLINE [segment E1MTXLN] and MAKTX [segment E1MAKTM]) for all languages that are listed on *SAP 10.02 SAP Languages* (on page 20).

If this is not possible for a particular language (or for several languages) because there are no values available in Smart Materials, the values from the language listed under Default Language are transferred. This follows the principle of "better to have a description in a foreign language than no description at all". If there is no value available in this language either, then no value is transferred.

Window 2: SAP Interface Procedures



In this window, you can insert a number of SAP procedures defined on **SAP 10.09 SAP Procedures**. These procedures will be assigned to all new SAP transfer jobs. These procedures will work on the created IDOC information (XML file, database tables).

You build the SAP procedures on **SAP 10.09 SAP Procedures**.

If you create a new transfer job on **SAP 20.01,** the procedures defined here are assigned to the new job. Before you start the job, you can make changes.

If you duplicate an existing job, you copy those procedures assigned to the old job to the new.

On **SAP 20.01**, you can send the IDoc with or without executing the procedures in one step to SAP. You also have the choice to first build and save the IDoc, execute the procedures (one after the other), and, in a last step, send the (changed) IDoc to SAP. Or, you can send the original IDoc to SAP, make changes to the segment strings, and then send the changed IDoc to SAP.

Field Descriptions

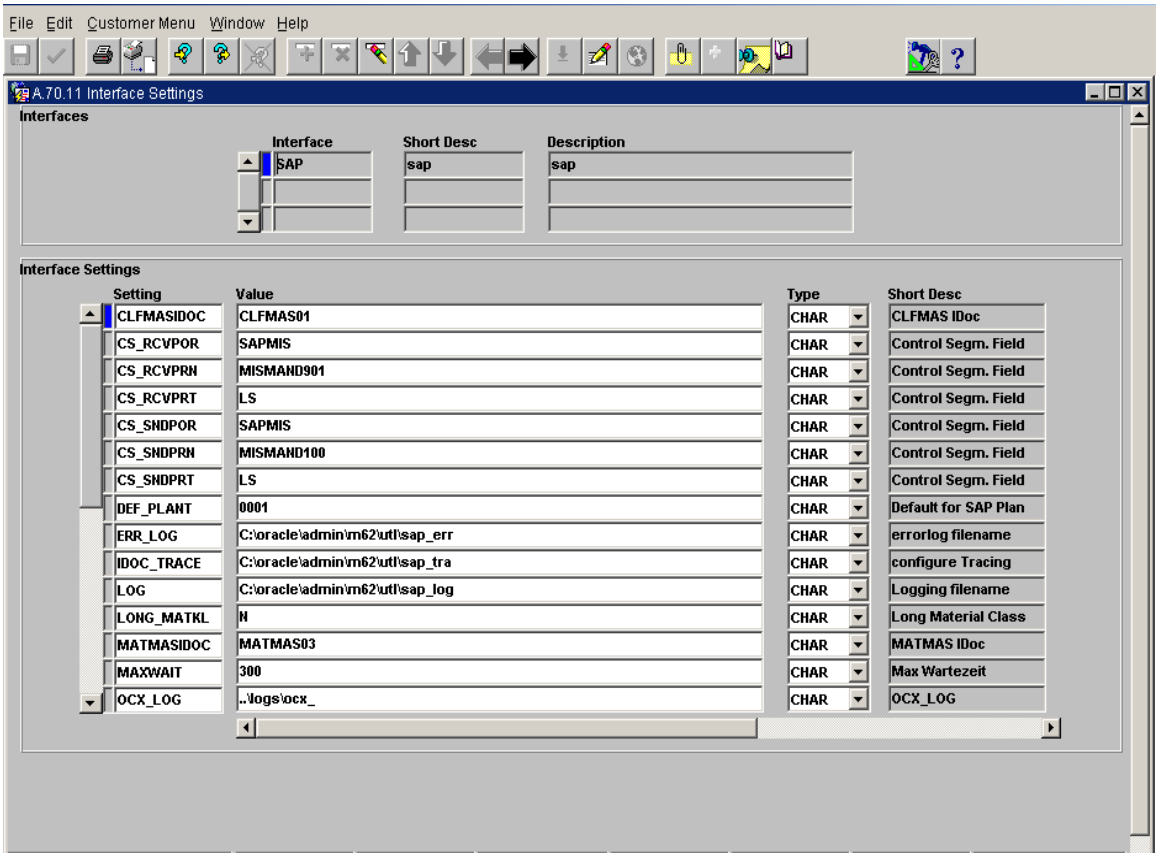
Seq - Sequence. If the SAP procedures are executed automatically, they will be executed in this sequence.

Procedure - Code of the procedures defined on **SAP 10.09** that are assigned to the SAP interface and therefore to every new created SAP transfer job.

A.70.11 Interface Settings

After you have defined the code(s) of the SAP interface(s) on A.70.01 Interfaces, you must save the "Interface Settings" on this screen in addition to each interface. This is various data, which, for example, will be evaluated by a specific interface.

The use of this screen is not restricted to the SAP interface. It is usable for all Smart Materials interfaces if "Interface Settings" are necessary for the respective interface.



Field Descriptions

Interfaces Block - Select the interface to which interface settings will be defined.

Interface - The interface that was defined on screen A.70.01 is selected via LOV. The **Description** and **Short Desc** fields contain additional information.

Interface Settings Block - Define the interface setting variables that are dependent on the interface, which can save specific additional information to an interface.

Setting - Name of the interface setting variable.

Value - Value of the interface setting variable.

Type - Type of the interface setting variable. Types "CHAR", "NUMBER", and "DATE" are available. Now, only type "CHAR" will be used.

Description and Short Desc - Language-dependent description of the interface setting variables.

For the Smart Materials SAP interface, the following interface settings are necessary for each defined SAP interface (some of them are used for the REQ interface; nevertheless, they must be inserted):

Setting Name	Value (example)	Description
ATWRT_SEP	#	Separator to split text into multiple lines in field ATWRT
CLFMASIDOC	CLFMAS01	IDoc name of type CLFMAS01, which is used by the SAP interface; because of this setting, it is possible to use IDocs that are new or modified by the customer
CRE_DELTA	Y	Creates delta information for a material compared to the previous transfer. This feature is only available for transfer mode ‘Database’
CS_RCVPOR	A000000015	Internal field for the ALE communication: > receiver port of the ALE module
CS_RCVPRN	LOGSPO0250	Internal field for the ALE communication: > partner number of the ALE receiver (alphanumeric)
CS_RCVPRT	LS	Internal field for the ALE communication: > partner type of the ALE receiver.
CS_SNDPOR	SAPH01	Internal field for the ALE communication: > transmitter port of the ALE module
CS_SNDPRN	LOGVUL0250	Internal field for the ALE communication: > partner number of the ALE transmitter (alphanumeric)
CS_SNDPRT	LS	Internal field for the ALE communication: > partner type of the ALE transmitter
DEF_PLANT	1000	Defines the default SAP plant for a specific Smart Materials SAP interface (needed for REQ)
FIX_PROG	Y	Y: Some fields in some segments are completed automatically (the program code is fixed); example: E1MARAM.MATNR is filled with the material number ‘N’: You must use fixed values or CIP functions for every mapped field If this interface setting is not found on A.70.11, the interface will work like ‘Y’ (the old way with the fixed

Setting Name	Value (example)	Description
		programming). This setting is not used in the REQ interface.
FTP_CMD	C:\WINDOWS\system32\ftp.exe	FTP command (full path required)
LONG_MATKL	'Y' or 'N'	For working with Material Classes (CLFMAS IDOC): Use the table detail short description instead of the table code as the name of the material class. (detailed information is in the *Definition of SAP Material Classes* (on page 52) section)
MATMASIDOC	MATMAS03	IDoc name of type MATMAS03, which is used by the SAP interface; because of this setting, it is possible to use IDocs that are new or modified by the customer
MAXIDENT	100	Maximum number of transferred idents per file
MAXREQS	10	Maximum number of transferred reqs per file
MAXWAIT	60	Maximum time of response (sec)
MKL_CHECK	Y or N	Activates the table detail check for SAP class profiles for table MATERIALKLASSE.
PRE_MATNR	0	Left-justified padding of the material number with given filler-characters. (here, "0"); if this interface setting won't be set, the material number will be transferred to SAP as it is saved in M_IDENT_INTERFACES. **This interface setting is not necessary for the function of the interface**.
PREQCRIDOC	PREQCR01	Defines the name of the PREQCR IDOC that is used from the Smart Materials SAP requisition interface. Normally, the delivered IDOC PREQCR01 must be entered here. But, if a customer wants to use his own customized PREQCR01, he must specify this here (needed for REQ)
SAP_ART_NR	M_PCK_SAP_CUSTOM.BUILD_SAP_ART_NR	Name of a CIP function that will be used to generate the SAP material number if it doesn't exist; the given CIP function will be delivered per default; it returns the ident code as the SAP material number
TAGTEXTFUN	M_pck_sap_custom. GET_TAG_TEXT	Defines a CIP function that builds the purchasing text especially for tagged items in Smart Materials that are not transferred as material to SAP, but should nevertheless be purchased in SAP. The function M_pck_sap_custom. GET_TAG_TEXT is delivered by Intergraph as an example (needed for

Setting Name	Value (example)	Description
		REQ).
TYP_OR_EXT	'TYP' or 'EXT'	Use interface settings for CLFMASIDOC, MATMASIDOC, and PREQCRIDOC as IDoc type or as IDoc extension (see below)
XML_DIR		Directory for XML files
USE_ECLASS	'Y' or 'N'	For working with Material Classes (CLFMAS IDOC): This setting is especially for customized SAP Systems that work with the ECLASS specification. The feature name specified on **SAP 10.04** will be changed internally into the Material Class concatenated with the feature_name defined on **SAP 10.04**. This new (internal) feature will be transferred to SAP. (Detailed information is in the *Definition of SAP Material Classes* (on page 52) section)
MESS_TYP		Message type from the control-record; the default is 'MATMAS'.

Interface Settings CLFMASIDOC, MATMASIDOC, PREQCRIDOC

The standard values for the interface settings CLFMASIDOC, MATMASIDOC, and PREQCRIDOC are:

- CLFMASIDOC = CLFMAS01
- MATMASIDOC = MATMAS03
- PREQCRIDOC = PREQCR01

Interface Setting TYP_OR_EXT

The possible values for TYP_OR_EXT are:

- TYP
- EXT

If the standard values are used, this interface setting has no influence, because in both cases, the IDoc type is the standard value, and the extension is a blank.

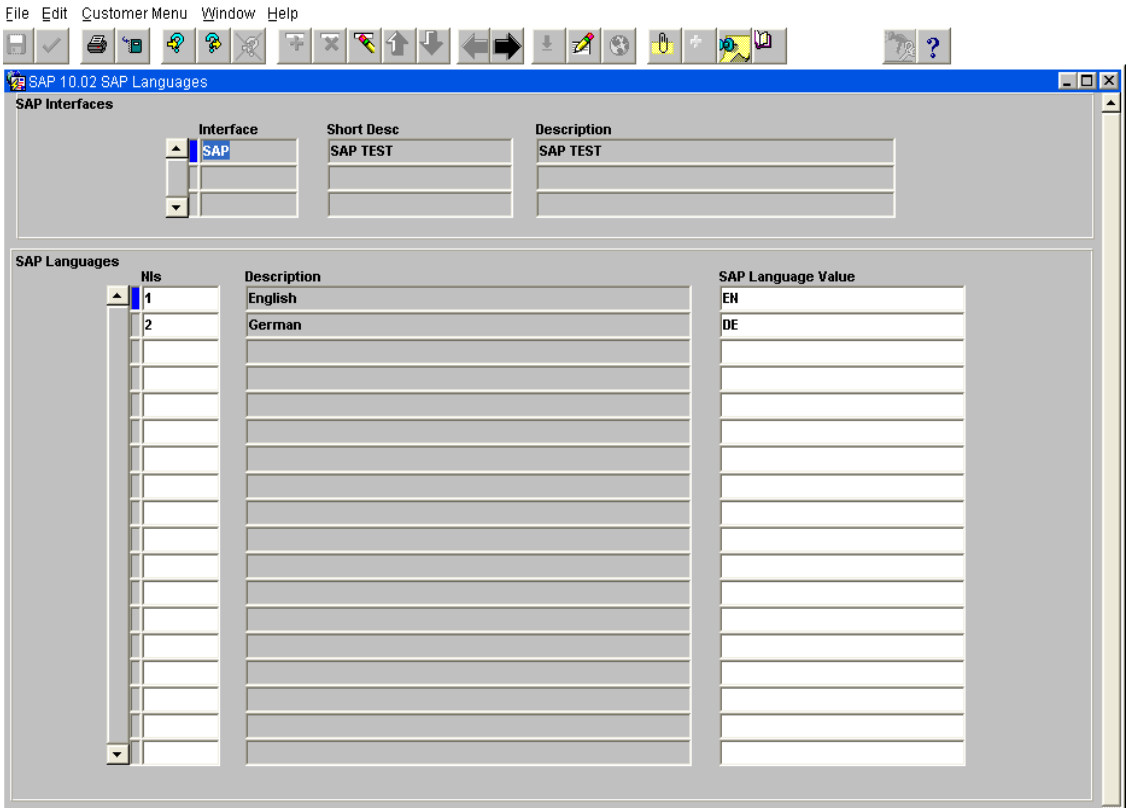
If other than the standard value is used:

TYP_OR_EXT = TYP > the value for CLFMASIDOC, MATMASIDOC, PREQCRIDOC is used for IDoc type, and the extension will be blank.

TYP_OR_EXT = EXT > the value for CLFMASIDOC, MATMASIDOC, PREQCRIDOC will be the standard value for the IDoc type, and the extension will be the found values for the settings.

SAP 10.02 SAP Languages

Screen **SAP 10.02 SAP Languages** is a detail screen for **SAP 10.01**. The various Smart Materials and SAP language codes to be transferred are mapped here and each must be entered for each SAP interface. Refer to the *SAP 10.01 Interface Parameters* description.



Each language to be transferred must be listed with the relevant SAP language identifier; for example:

- Smart Materials: 1 (=English) in SAP: E
- Smart Materials: 2 (=German) in SAP: D.

Field Descriptions

Interface (mandatory) - Via LOV, an interface will be selected that was defined on A.70.01. For more information, the Desc and Short Desc fields can be used.

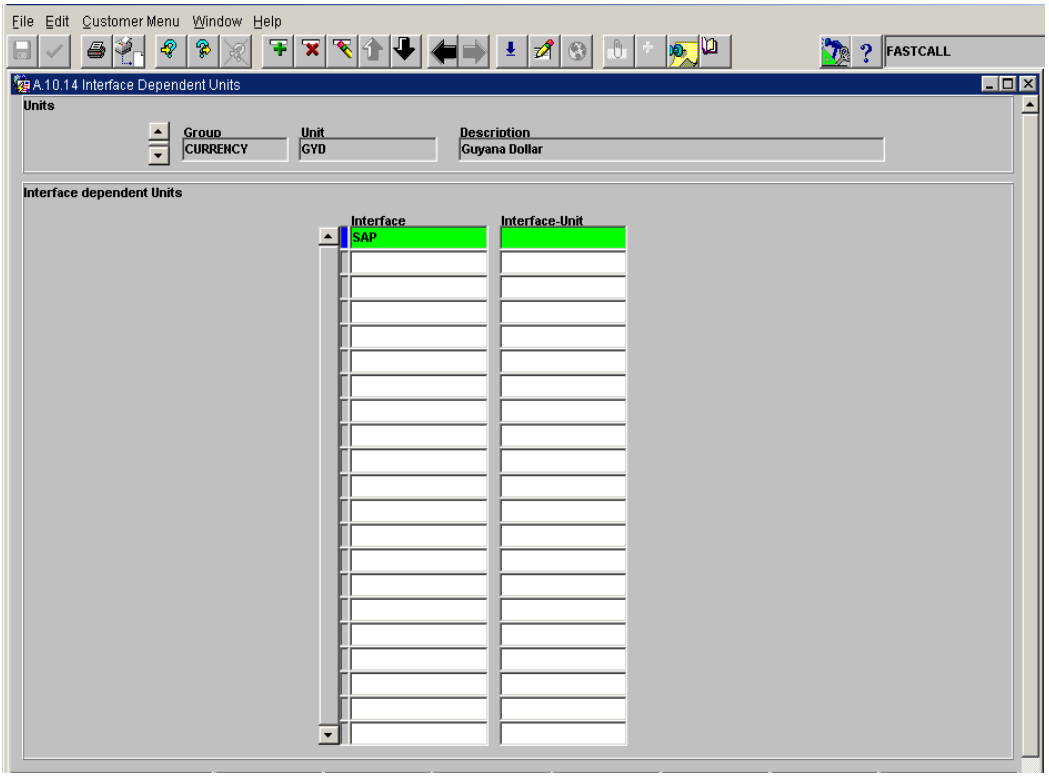
Nls - Unique number of a Smart Materials language.

Description - Description of the language.

SAP Language Value - SAP specific and unique value for an SAP language.

A.10.14 Interface Dependent Units

Screen A.10.14 Interface Dependent Units defines the particular translation for the relevant interface for each Smart Materials unit. The settings of this screen are only used for the SAP interface if the "same quantity unit indicator" (**Equal Units** check box on **SAP 10.01**) is not set for the associated SAP interface; that is, Smart Materials does not assume that the Smart Materials units are exactly the same as the SAP units. This is the only time you need to enter all the Smart Materials units with their corresponding SAP translation.



For example:

- Smart Materials: MM (millimeters) in SAP: 03
- Smart Materials: M3 (cubic centimeters) in SAP: 05

Field Descriptions

Block 1 - Select unit group and units for which you want to define interface specific units.

Group - Select via LOV a unit group that was already defined on screen **A.10.12 Units of Measure**.

Unit - Select via LOV a unit that was already defined on screen **A.10.12 Units of Measure**.

Description - Display of the language-dependent description of the unit.

Block 2 - Define an interface unit for each interface and each unit from Block 1.

Interface - Via LOV, an interface will be selected. This interface was defined earlier on A.70.01.

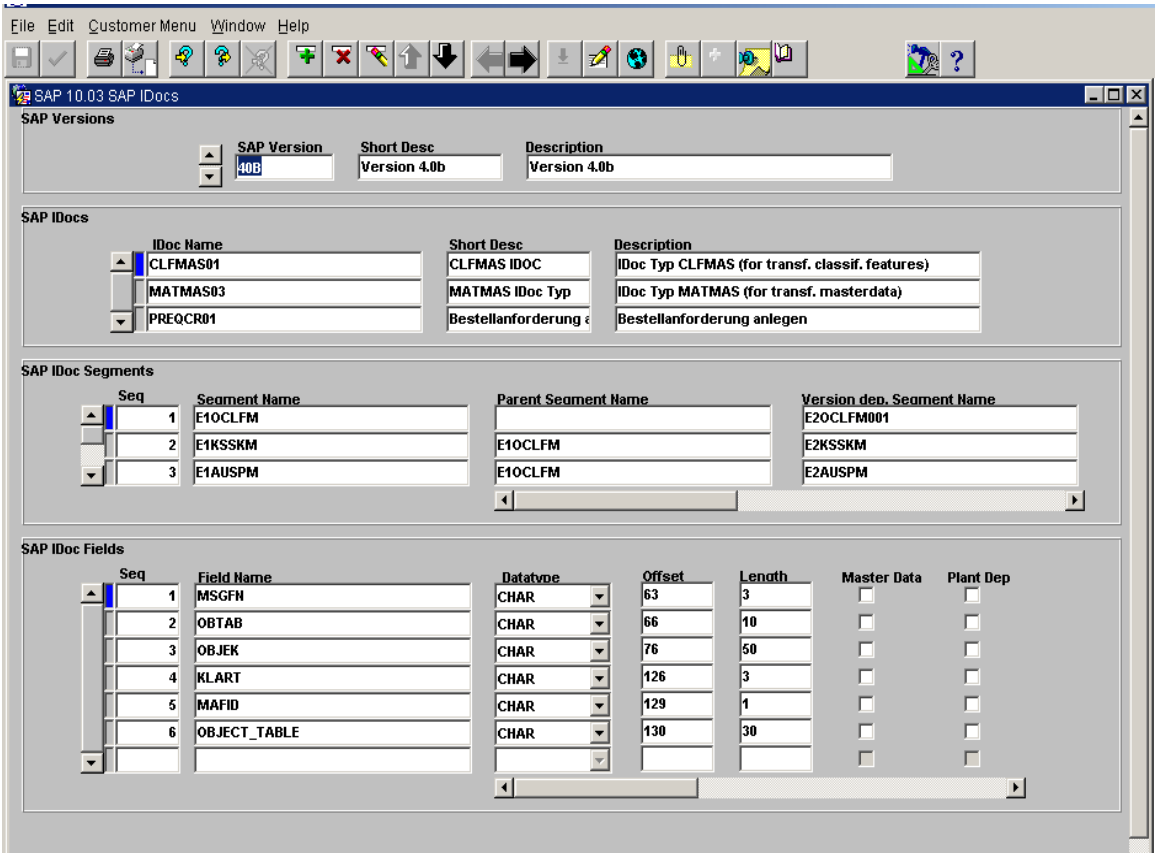
Interface Unit - Define the interface unit for the selected interface.

SAP 10.03 SAP IDocs

On this screen, you can define SAP IDocs for the different SAP versions, segment-by-segment or field-by-field. The fields are defined by specifying an offset value in the IDoc and by their length. You have the opportunity to define segment structures as a hierarchy (**Parent Segment** field), as options (**Optional** field), and in relation to number (**Min. Number** and **Max. Number** fields).

You also have the option to assign a default value to each of the fields in the IDoc.

Certain IDoc fields must contain specific values that are either set by a CIP function or with a fixed value (**Value Type** and **Value / Content** fields). This is necessary so that SAP can correctly interpret and process the IDocs.



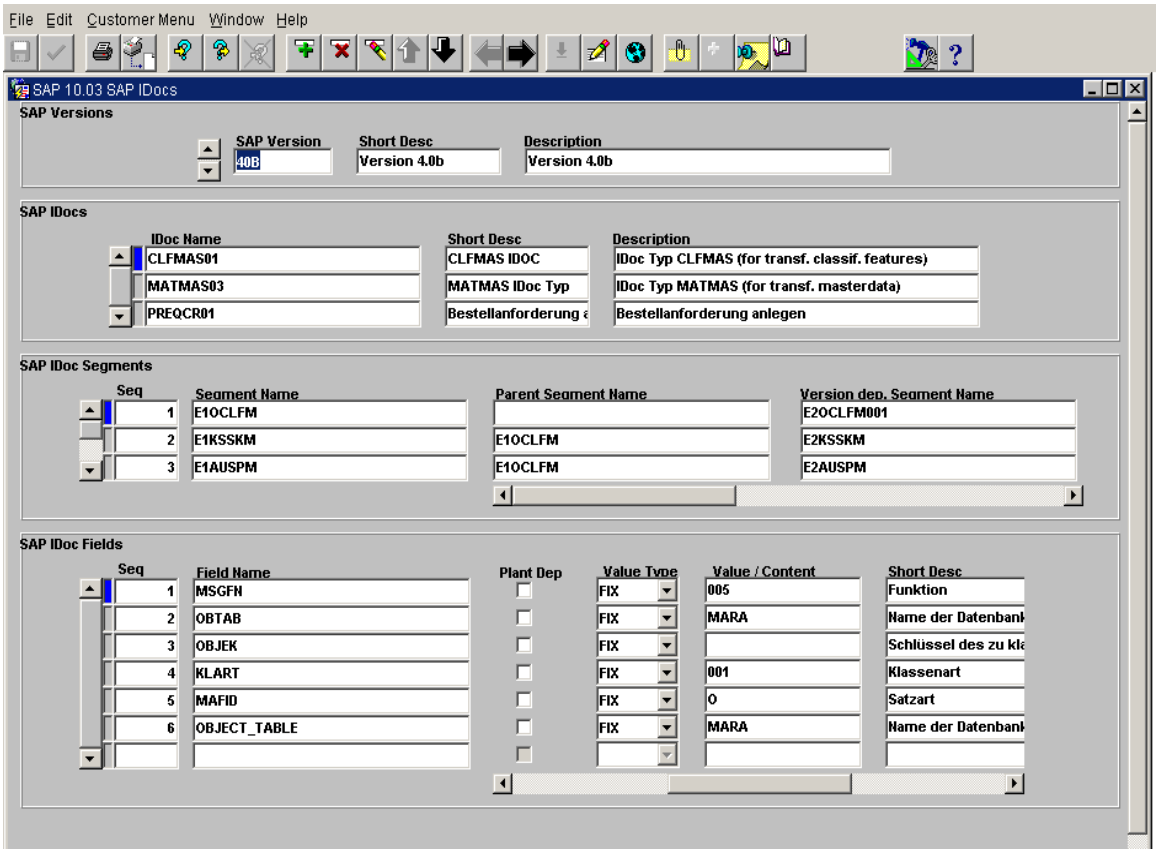
The **Master Data** or **Plant Dep**. check boxes are used to identify master data fields (**Master Data**) or plant-dependent master data fields (**Plant Dep**.).

These two fields decide which of the fields on screens **SAP 10.08 Feature Mapping (Master Data)** and **SAP 10.09 Feature Mapping (Plant-Dependent Master Data)** are used as LOV for the IDoc-Field on the screen.

If the **Master Data** check box is set, the field will be displayed in the LOV of the IDoc Field on screen **SAP 10.05 Master Data Mapping**.

If the **Master Data** and **Plant Dependent** check boxes are set, the field will be displayed in the LOV of the IDoc Field on screen **SAP 10.06 Master Data Mapping (Plant Dependent)**.

The data for IDOCS MATMATS03 and CLFMAS01 is included with SAP Version 4.0b. However, it is still necessary to select the requisite master data or plant-dependent master data fields (see above) by setting the **Master Data** and **Plant Dep.** check boxes for using the fields on the two screens mentioned above.



Field Descriptions

SAP Versions Block - In this block, the various versions of the SAP systems that are supported by the Smart Materials SAP interface are listed.

SAP Version - Enter the name of the SAP version given by SAP. The Description and Short Desc fields can contain additional language-dependent information.

SAP Idocs Block - In this block, the various IDocs are saved. The IDocs MATMAS03 and CLFMAS01 are part of the delivery. The user has the opportunity to copy and modify IDocs with the "Tree-Copy-Method," but it is important to maintain it in SAP in the same way to ensure an error-free function.

IDoc Name - Name of the IDoc.

Short Desc and Description – Language-dependent description and short description.

SAP IDoc Segments Block - An IDoc consists of various segments that can have hierarchical relations to each other. Segments can recur and they can be optional. The minimum and maximum number can be set.

Seq - This field serves to define the unique sequence of the segments within an IDoc.

Segment Name - Segment name of the IDoc segment. It is defined in SAP. If IDocs will be copied and user-modified, the segment names must remain unchanged and they must not be renamed.

Parent Segment Name - With this field, hierarchical segment relations can be set. Via LOV, the possible parent segments can be selected. Only segments with a lesser Seq number are available.

Version dep. Segmentname - This is an additional name of SAP for the segment. Its purpose is for the versioning of the segments and it will get a version number in the case of changes (only expansions for backwards compatibility).

Min Number - The segment must occur at least n times within this IDoc.

Max Number - The segment can occur at most n times within this IDoc.

Optional - Detail if this segment is a mandatory field or not.

Short Desc and Description – Language-dependent description of the segment.

SAP IDoc Fields Block - The single IDoc fields are the elements of the IDoc segments. They will be defined within a segment by a fixed position, length, and type. Here you can find the real information. Each IDoc field has a value that is given by a value type (Data Type).

Seq - Defines the order of the single segment fields.

Field Name - Name of the IDoc field.

Data Type - Internal SAP data type of the IDoc field. Valid values include: "CHAR", "UNIT", "DATS", "NUMC", "QUAN", "DEC", "INT2", "LANG", "CURR", and "FLTP". For the meaning of the respective values, please refer to the SAP documentation.

Offset - Within an IDoc segment, each field has a fixed position. The offset determines the position of a defined structure within the segment at which the field will begin.

Length - The length of the IDoc field within the segment structure.

Master Data - The activated check box defines an IDoc field as master data so that it can be selected on screen SAP 10.05 Master Mapping and be filled by the procedures that are available there.

Plant Dep. Data - The activated check box (in combination with Master Data check box) defines an IDoc field as plant-dependent master data so that it can be selected on screen **SAP 10.05 Master Mapping (Plant Dependent)** and be filled by the procedures that are available there.

Value Type - This field defines the ways of interpreting the default of the Value/ Content field. There are the following possibilities:

- **FIX** – The value in the Value/ Content field will be assigned to the respective IDoc as a fixed value.
- **CIP** - The value in the Value/Content field will be interpreted as a CIP function. The return value will be assigned as the default value in the corresponding IDoc field. The first input parameter of the CIP function is the ID of the SAP interface, so the CIP may do different things depending on the SAP interface.

The CIP function must have the following syntax:

```
FUNCTION m_pck_sap_custom.<functionname>
      ( p_interface_id IN m_interfaces.interface_id%TYPE,
       ,p_ident        IN m_idents.ident%TYPE
       ,p_nls_id       IN m_nls.nls_id%TYPE
```

```
        ,p_sp_id        IN m_sap_plants.sp_id%TYPE )
return varchar2;
```

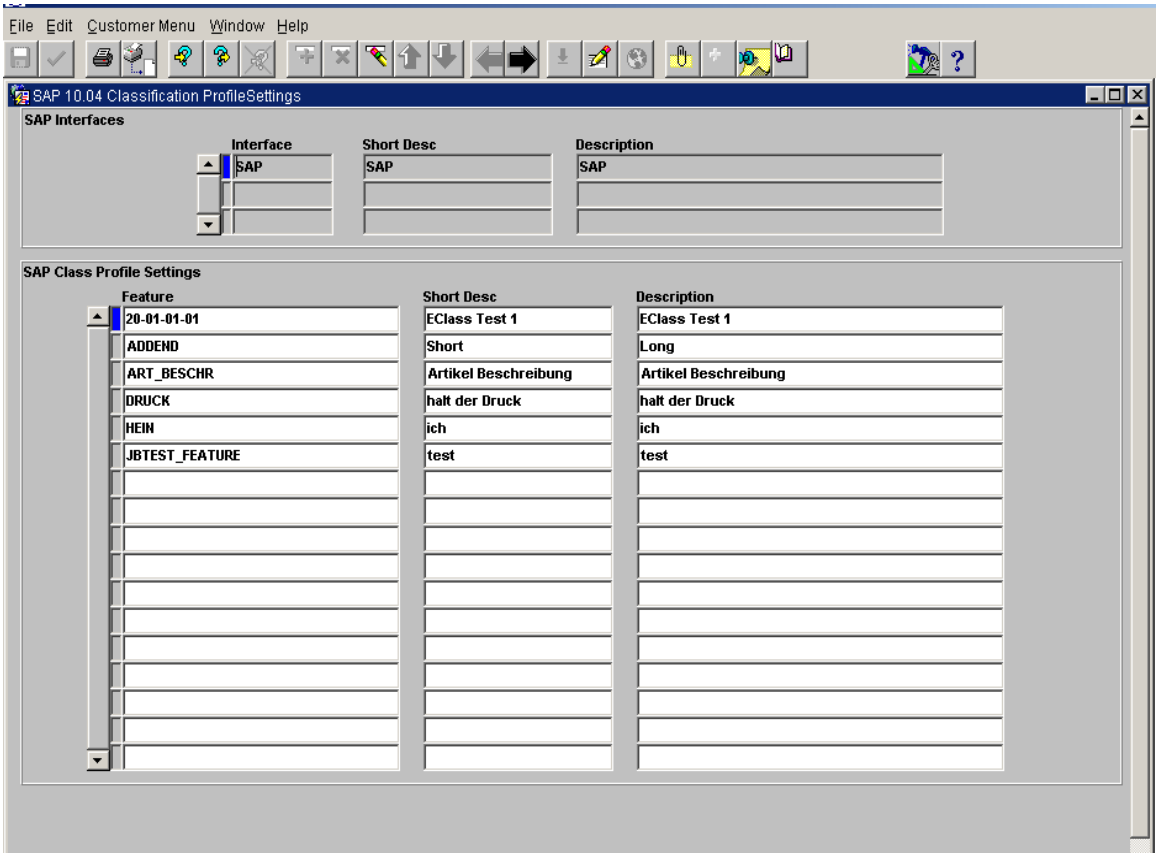
Value / Content - This field defines a standard value for the IDoc field. Depending on the Value Type field, either the real value will be transferred (Value Type = "FIX") or it will be interpreted as a CIP function (Value Type = "CIP") of which the return value then will be used as the default value.

Short Desc and Description – Language-dependent descriptions of the IDoc fields.

SAP 10.04 Classification Profile Settings

You define the possible classification profiles for each SAP version on this screen. These are transferred to SAP by the IDOC CLFMAS.

The classification profiles defined here can be allocated to a SAP material class on screen *SAP 10.07 Feature Mapping (Classification Profiles)* (on page 31). The field will then either be given a fixed value, the value of the ident or ident attribute, or completed by an ident function or a relevant CIP function (see screen *SAP 10.07 Feature Mapping (Classification Profiles)* (on page 31)).



Field Descriptions

SAP Interfaces Block - In this block, the SAP interfaces that were defined on **SAP 10.01** are selected. These interfaces are the interfaces for which SAP class profiles will be defined.

Interface - Select the SAP interface via LOV.

Short Desc and Description – Language-dependent description of the SAP interface.

Block 2: SAP Class Profile Settings - This block defines the class profiles that are possible within an interface. These profiles then can get values on SAP 10.07 depending on the material class. This description must correspond to the class description in SAP.

Features - Name of the SAP feature.

Short Desc and Description – Language-dependent description of the feature.

SAP 10.05 Master Data Mapping

This screen is a detail screen for **SAP 10.01 Interface Parameters**; that is, the values are SAP interface specific. All the SAP master data features for the idents that are to be transferred by the interface are mapped on this screen.

The IDocs fields with which the information is transferred are mapped on this screen. Each Master Data field in SAP corresponds to a field in the IDoc data structure. The user must have accurate knowledge about the IDocs field names and the internal SAP master data fields.

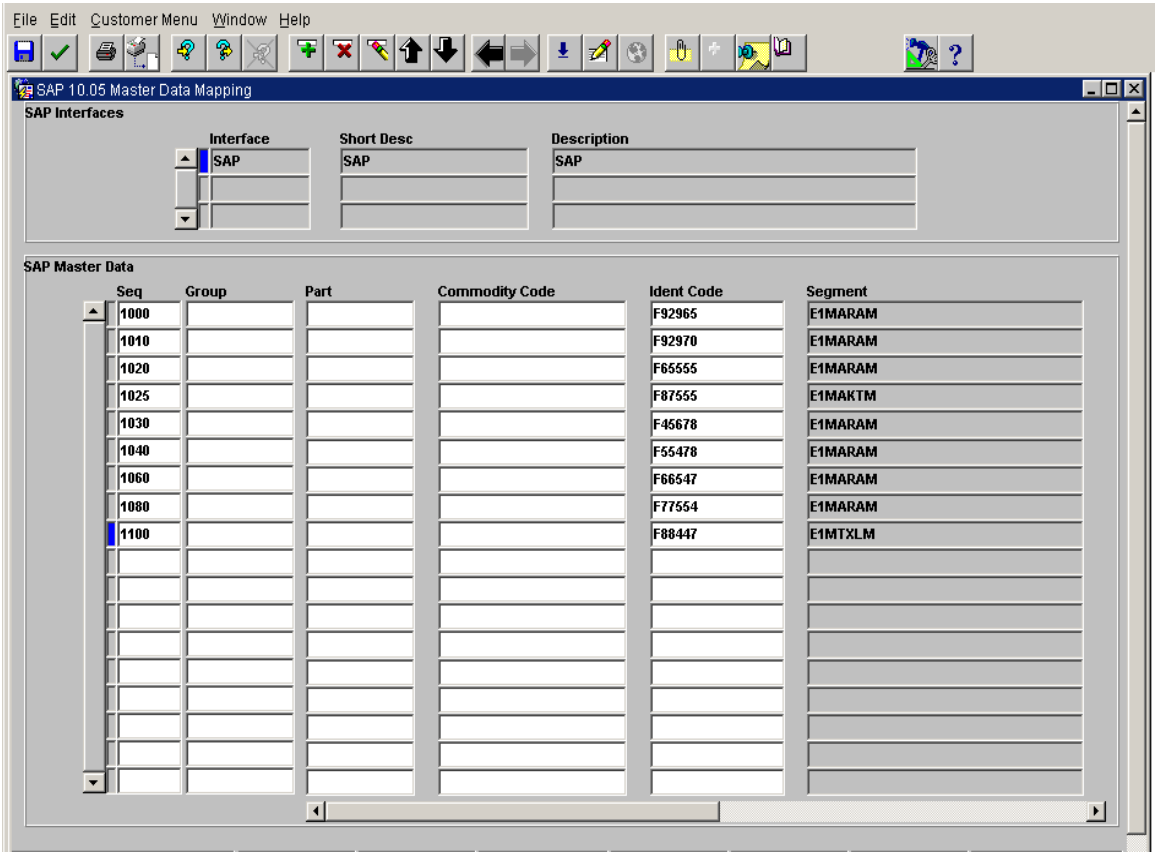
The IDoc fields that are available for selection in the LOV (**IDoc Field**) correspond to the fields from IDoc MATMAS03 (SAP master data), which are flagged on screen **SAP 10.03 SAP IDocs** as plant-independent master data.

The interface setting variable MATMASIDOD defines which MATMAS IDoc of the respective interface is active. The name of the desired MATMAS IDocs must be assigned to this variable (refer to the description of *A.70.11 Interface Settings* (on page 16)). This is important if a user-modified MATMAS IDoc is used besides the delivered MATMAS03 IDoc.

The IDoc fields' values are defined by the filter, which is set up by the Group, Part, Commodity Code, and Ident Code fields. This means that IDoc field assignments can be handled globally (without any filter entries) or respectively grouped (by filter entry).

While mapping the IDoc fields, the sequence has to be considered, particularly if exceptions shall be set up. An example is if the value for the IDoc field MAKTX (SAP short description) will be determined by a CIP function "CIP1". All idents belonging to the group "Pipes" will be exceptions and the Idoc field MAKTX will be set up by the CIP function "CIP2". The first step is to declare all exceptions by assigning the smallest sequence numbers to the smallest granularities (idents).

CIP functions and ident functions are not part of the delivery and they will not be maintained by Intergraph.



Field Descriptions

Block 1: SAP Interfaces - In this block, the interfaces that were defined on **SAP 10.01** are selected. These interfaces are the interfaces for which the SAP IDoc master data fields will be mapped.

Interface - Name of the SAP interface.

Short Desc and Description – Language-dependent description of the SAP interface.

Block 2: SAP Master Data - In this block, the non-dependent SAP master data IDoc fields (**Master Data** check box on **SAP 10.03, IDoc Fields** block) will be mapped to Smart Materials information. This can be fixed values, ident attributes, CIP functions, or ident functions.

Seq - Order sequence for the order of the mapped IDoc master data fields. This sequence is particularly important if an IDoc field will be global and for example, assigned to a specific ident, which is contained within the "generality". The value that is mapped first will be assigned to the IDoc field, so it is very important to assign the first (lower sequence number) the appropriate exceptions and only then (higher sequence number) the ident groups that are higher in granularity.

Group - Group Code Filter. By selecting a group code, the assignment of the mapped IDoc fields is carried out only for those fields that belong to this group.

Part - Part Filter. By selecting a part code, the assignment of the mapped IDoc fields is carried out only for those fields that belong to this group.

Commodity Code - By selecting a commodity code, the assignment of the mapped IDoc fields is carried out only for those fields belonging to this group.

Ident - Ident filter. By selecting an ident, the assignment of the mapped IDoc fields is carried out only for the chosen ident.

Segment - Displays the segment belonging to the IDoc field.

IDoc Field - The IDoc field that will be mapped must be selected. There is an LOV containing any plant-independent IDoc fields of the valid MATMAS IDoc, which means any IDoc fields defined on **SAP 10.03** as master data fields (**Master Data** check box).

Value Type - The values of the IDoc fields will be determined in different ways. You can choose among the following value types:

- **Fixed** - Features with a fixed value can be transferred to SAP. This means that the value in the Value/Content field will be actually assigned to the IDoc field.
- **Ident** - All the Smart Materials ident attributes can be assigned to IDoc fields, that is, commodity attribute and/or object parameter details (geometry). If you select "Ident" as the Feature type, an LOV in the **Value/Content** field will display all the available Smart Materials ident attributes. The value of the ident attribute will be assigned to the respective IDoc field.
- **CIP function** - You can define any CIP function or ident function to use here. The CIP function must return a string (VARCHAR2) as the return value, which then will be transferred as the value to SAP. The first input parameter of the CIP function is the ID of the SAP interface, so the CIP may do different things depending on the SAP interface.

The CIP functions must have the following syntax:

```
FUNCTION m_pck_sap_custom.<functionname>
      ( p_interface_id IN m_interfaces.interface_id%TYPE,
       ,p_ident        IN m_idents.ident%TYPE
       ,p_nls_id       IN m_nls.nls_id%TYPE
       ,p_sp_id        IN m_sap_plants.sp_id%TYPE )
return varchar2;
```

The return value of the CIP function will be assigned to the respective IDoc field.

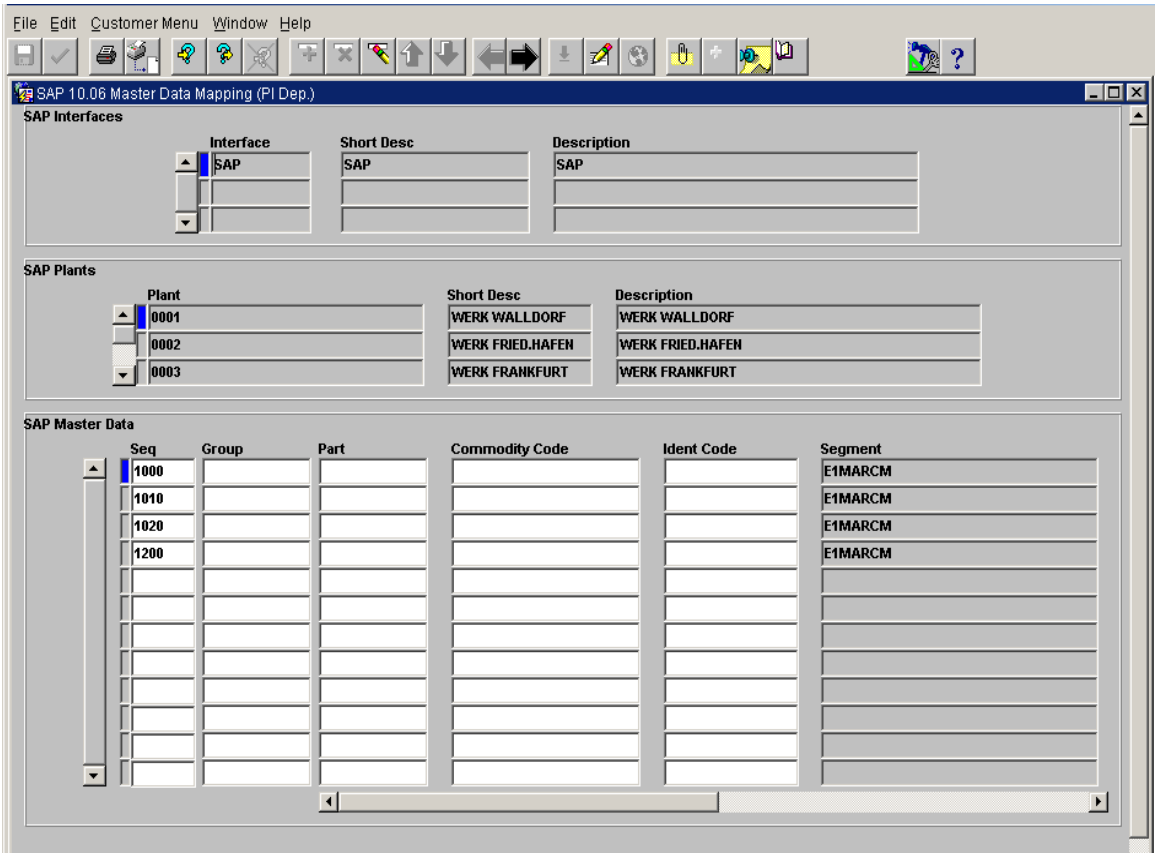
- Ident function - Can be defined on Smart Materials screen **A.60.13**. The Ident field is transferred and the function returns a character (VARCHAR2) value, which then will be transferred to SAP. In this way, it is possible to use any valid ident function to transfer its return value to SAP. If "CIP" is selected as the attribute type, an LOV in the **Value** / **Content** field displays all the available Smart Materials ident functions or CIP functions.

Value/Content - This field contains the value of the IDoc field, but it will be interpreted depending on the **Value Type** field.

Multi Language -The **Multi Language** check box defines if the corresponding attribute is to be managed in a multi-lingual way. In most cases, this applies to descriptive IDoc fields (**MAKTX** field in segment **MAKTM**, **TDLINE** field in **MTXLM** Segment).

SAP 10.06 Master Data Mapping (Plant Dependent)

This screen has the same functions as **SAP 10.05**, except that in the following screen the features (**Master Data** fields) are defined as plant-dependent. The IDoc fields presented for selection in the LOV (**IDOC** field) correspond to the fields from the active IDoc of type MATMAS (SAP Master Data), which have been marked on screen **SAP 10.06** as plant-dependent (**Master Data** check box and **Plant Dependent** check box).



Field Descriptions

SAP Interfaces Block - In this block, the interfaces, defined on SAP 10.01, for which plant-dependent SAP IDoc master data fields will be mapped, are chosen.

Interface - Name of the SAP interface.

Short Desc and Description - Language-dependent description of the SAP interfaces.

SAP Master Data Block - Here the SAP plants will be selected for which plant- dependent SAP IDoc fields will be mapped.

Plant - Name of the SAP plant.

Short Description and Description - Language-dependent description of the SAP plants.

SAP Master Data Block - In this block, the plant-dependent SAP master data IDoc fields (**Master Data** check box and **Plant Dependent** check box on screen **SAP 10.03, IDoc Fields** block) will

be assigned to Smart Materials information. This data can be fixed values, ident attributes, CIP functions, or ident functions.

Seq - Order sequence for the order of the mapped IDoc master data fields. This sequence is particularly important if an IDoc field will be global as well as, for example assigned to a specific ident, which is contained within the "generality". The value that is mapped first will be assigned to the IDoc field, so it is very important to assign the first (lower sequence number) the appropriate exceptions and only then (higher sequence number) the ident groups that are higher in granularity.

Group - Group Code filter. By selecting a group code, the assignment of the mapped IDoc fields will be carried out only for those fields that belong to this group.

Part - Part filter. By selecting a part code, the assignment of the mapped IDoc fields will be carried out only for those fields that belong to this group.

Commodity Code - Commodity Code filter. By selecting a commodity code, the assignment of the mapped IDoc fields will be carried out only for those fields that belong to this commodity code.

Ident - Ident filter. By selecting an ident, the assignment of the mapped IDoc fields will be carried out only for the chosen ident.

Segment - Displays the segment belonging to the IDoc field.

IDoc Field - The IDoc field that will be mapped is chosen. There is an LOV containing any plant-dependent IDoc fields of the valid MATMAS IDoc, which means any IDoc fields defined on **SAP 10.03** as master data fields (**Master Data** check box).

Value Type - The values of the IDoc fields will be determined in different ways. You can choose among the following value types:

- **Fixed** - Features with a fixed value can be transferred to SAP. This means that the value in the **Value/Content** field will be assigned to the IDoc field.
- **Ident Attributes** - All the Smart Materials ident attributes can be assigned to IDoc fields, that is, commodity attribute and/or object parameter details (geometry). If you select "Ident" as the attribute type, an LOV in the Value/Content field will display all the available Smart Materials ident attributes. The value of the ident attribute will be assigned to the respective IDoc field.
- **CIP function** - You can define any CIP function or ident function to use here. The CIP function is dependent on the SAP interface and must return a string (VARCHAR2) as a return value, which then will be transferred as the value to SAP. The CIP function must have the following syntax:

```
FUNCTION m_pck_sap_custom.<functionname>
      ( p_interface_id IN m_interfaces.interface_id%TYPE,
       ,p_ident        IN m_idents.ident%TYPE
       ,p_nls_id       IN m_nls.nls_id%TYPE
       ,p_sp_id        IN m_sap_plants.sp_id%TYPE )
return varchar2;
```

The return value will be assigned to the respective IDoc field.

Ident function - Ident functions can be defined on the Smart Materials screen A.60.13. The ident field is transferred, and the function returns a character (VARCHAR2) value, which then will be transferred to SAP. In this way, it is possible to use any valid ident function to transfer its return value to SAP. If "CIP" is selected as the attribute type, an LOV in the **Value / Content** field displays all the available Smart Materials ident functions or CIP functions.

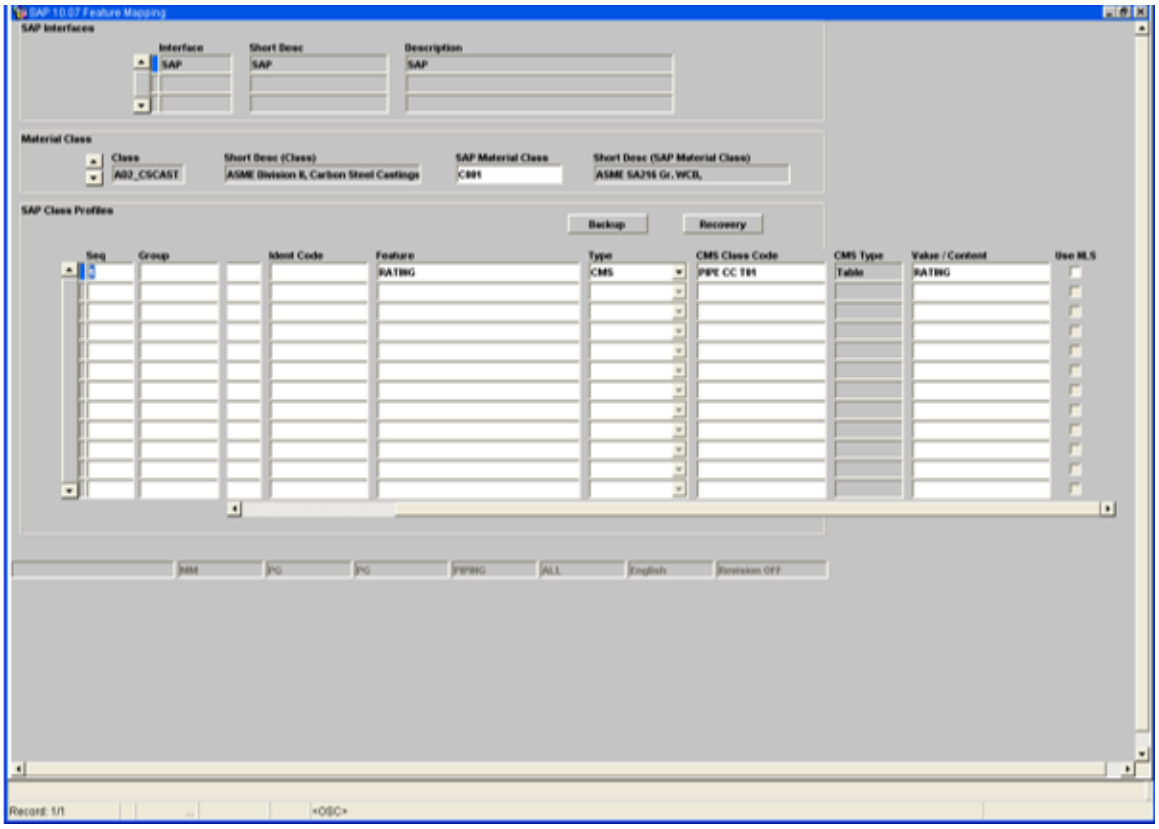
Value/Content - This field contains the value of the IDoc field. However, it will be interpreted depending on the **Value Type** field.

SAP 10.07 Feature Mapping (Classification Profiles)

On this screen, classifying SAP features will be assigned with dependence on a material class. The selectable features will be defined specific to interfaces on screen **SAP 10.04 Classification Profile Settings** as classifying attributes.

The definition of the material classes takes place with the so-called "S.20.08 method". For more information, refer to the *Definition of SAP Material Classes* (on page 52) section.SAP

All other procedures of mapping attributes correspond to screen **SAP 10.05** and can be looked up there.



Field Descriptions

SAP Interfaces Block - In this block, the interfaces defined on SAP 10.01 for which material class-dependent SAP attributes will be mapped are chosen.

Interface - Name of the SAP interface.

Short Desc and Description - Language-dependent description of the SAP interfaces.

Block 2

SAP Material Class - Here the SAP material class is selected in which dependency SAP attributes will be defined. The already defined material classes will be displayed in an LOV; they can only be selected, not created. The creation of material classes is done using the "S.20.08 method". For more information, refer to *Definition of SAP Material Classes* (on page 52).

Class - The name of the SAP class in Smart Materials. For each material class that will be created, there must be a table group.

Short Desc (Class) - Language-dependent description of the table group.

SAP Material Class - Table detail that is assigned to the table group. It is used to save and assign a part independent of the material class.

Short Desc (SAP Material Class) - Language-dependent description of the table detail.

Block 3

SAP Class Profiles - In this block, SAP attributes can be specified as material class dependent and given respective values. To determine the attribute (feature) values, you can assign fixed values, ident attributes, CIP functions, or ident functions (see also **Value Type** and **Value/Content** fields).

Seq - Order sequence for the order of the mapped IDoc attributes. This sequence is particularly important if an IDoc field will be global as well as, for example, assigned to a specific ident, which is contained within the "generality". The value that is mapped first will be assigned to the IDoc field, so it is very important to assign the first (lower sequence number) the appropriate exceptions and only then (higher sequence number) the ident groups that are higher in granularity.

Group/Part

Group Code Filter/Part Code Filter - Selecting of a group is not possible because the selection of a material class is like an indirect selection of group and part. By defining a material class, the respective part was assigned, so that the part and group will be displayed after the selection of material class in block 2 and cannot be modified.

Commodity Code

Commodity Code Filter - By selecting a commodity code, the assignment of the mapped IDoc fields will be carried out only for those fields that belong to this commodity code.

Ident

Ident Filter - By selecting an ident, the assignment of the mapped IDoc fields will be carried out only for the chosen ident.

Feature - The feature that will be mapped is chosen. There is an LOV containing any features defined on SAP 10.04 as material class-dependent features.

Value Type - The values of the attributes (content of the Value/Content field) will be determined in different ways. You can choose among the following value types:

- **Fixed** - Attributes with a fixed value can be transferred to SAP. This means that the value in the **Value/Content** field will be actually assigned to the IDoc field.
- **Ident Attributes** - All the Smart Materials ident attributes can be assigned to attributes, that is, commodity attribute and/or object parameter details (Geometry). If you select "Ident" as the

feature type, an LOV in the Value/Content field will display all the available Smart Materials ident attributes. The value of the ident attribute will be assigned to the respective IDoc field.

- **CIP function** - You can define any CIP function or ident function to use here. The CIP function is dependent on the SAP interface and must return a string (VARCHAR2) as the return value, which then will be transferred as the value to SAP. The first input parameter of the CIP function is the ID of the SAP interface, so the CIP may do different things depending on the SAP interface.

The CIP function must have the following syntax:

```
FUNCTION m_pck_sap_custom.<functionname>
      ( p_interface_id IN m_interfaces.interface_id%TYPE,
       ,p_ident        IN m_idents.ident%TYPE
       ,p_nls_id       IN m_nls.nls_id%TYPE
       ,p_sp_id        IN m_sap_plants.sp_id%TYPE )
return varchar2;
```

The return value will be assigned to the respective attribute.

- **Ident function** - Ident functions can be defined on Smart Materials screen A.60.13. The ident field is transferred, and the function returns a character (VARCHAR2) value, which then will be transferred to SAP. In this way, it is possible to use any valid ident function to transfer its return value to SAP. If "CIP" is selected as the attribute type, an LOV in the **Value / Content** field displays all the available Smart Materials ident functions or CIP functions.
- **CMS** - You define Class Systems with properties in Smart Reference Data Plus in the screens XC1010, XC1020 and XC1030. The property values assigned to the idents are maintained in XC20 CMS Component Manager (see the CMS documentation for details). The class properties can now be used for setting the values transferred to SAP.

CMS Class Code – This field contains the CMS class (only allowed for Type CMS). Entering a CMS class code will transfer the value only for idents belonging to the selected CMS class.

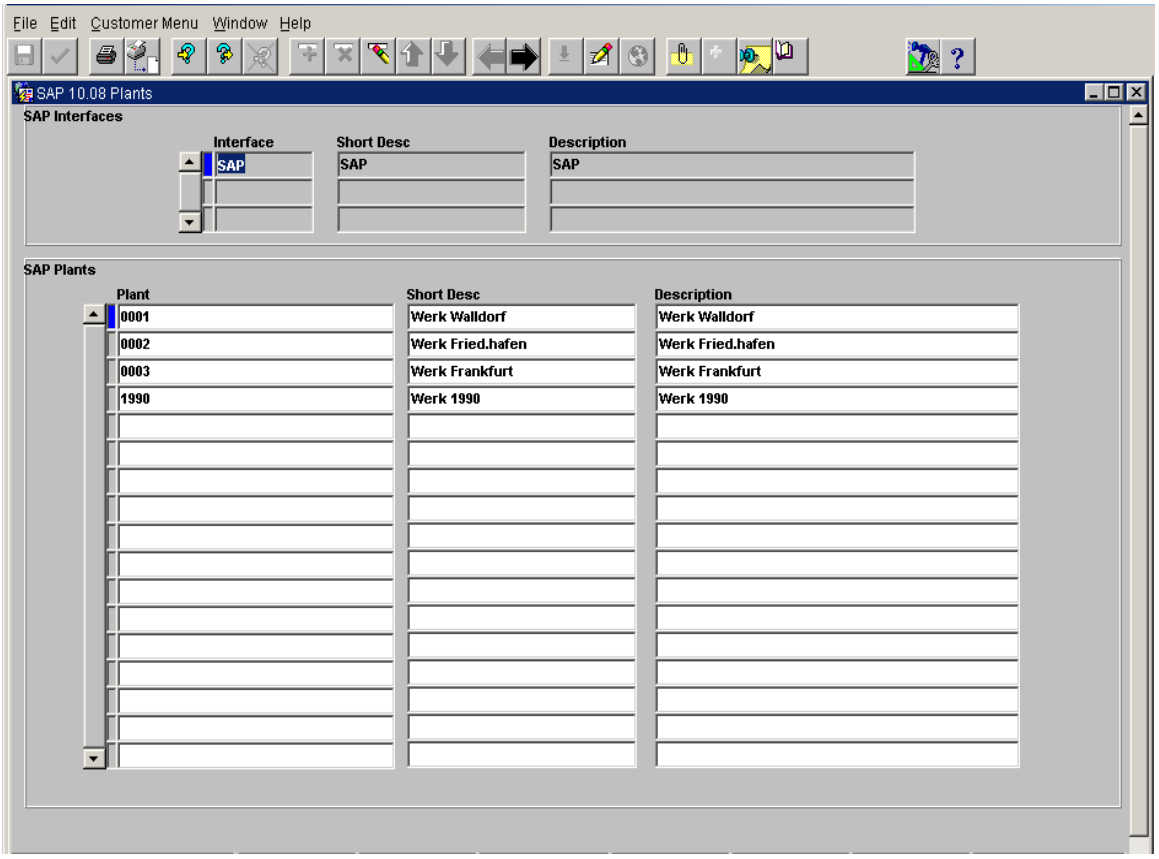
CMS Type – For Type CMS this field contains the CMS type of the property used for the mapping (Table/Attribute). This field will be filled automatically by the system when selecting a CMS property in the field Value/Content.

Value/Content - This field contains the value of the attribute, but it will be interpreted depending on the **Value Type** field.

Use NLS – This field determines for the mapping type CMS whether the table detail code or the NLS description in the SAP default language is used for the value transferred to SAP (CMS Type Table). For CMS type Attribute the NLS dependent value is used when checked. Note that the attribute definition (NLS dependent/independent) automatically takes precedence.

SAP 10.08 Plants

On this screen, the SAP plants will be saved as interface specific. It is important that the plant name is exactly the same as the corresponding name in SAP. Because the plant in SAP is not named with detailed information, the **Short Desc** and **Description** fields can be used for more information.



Field Descriptions

Block 1

SAP Interfaces - In this block, the interface that was defined on **SAP 10.01** is selected. This interface is the interface for which SAP plants will be defined.

Interface - Name of the SAP interface.

Short Desc and Description - Language-dependent description of the SAP interfaces.

Block 2

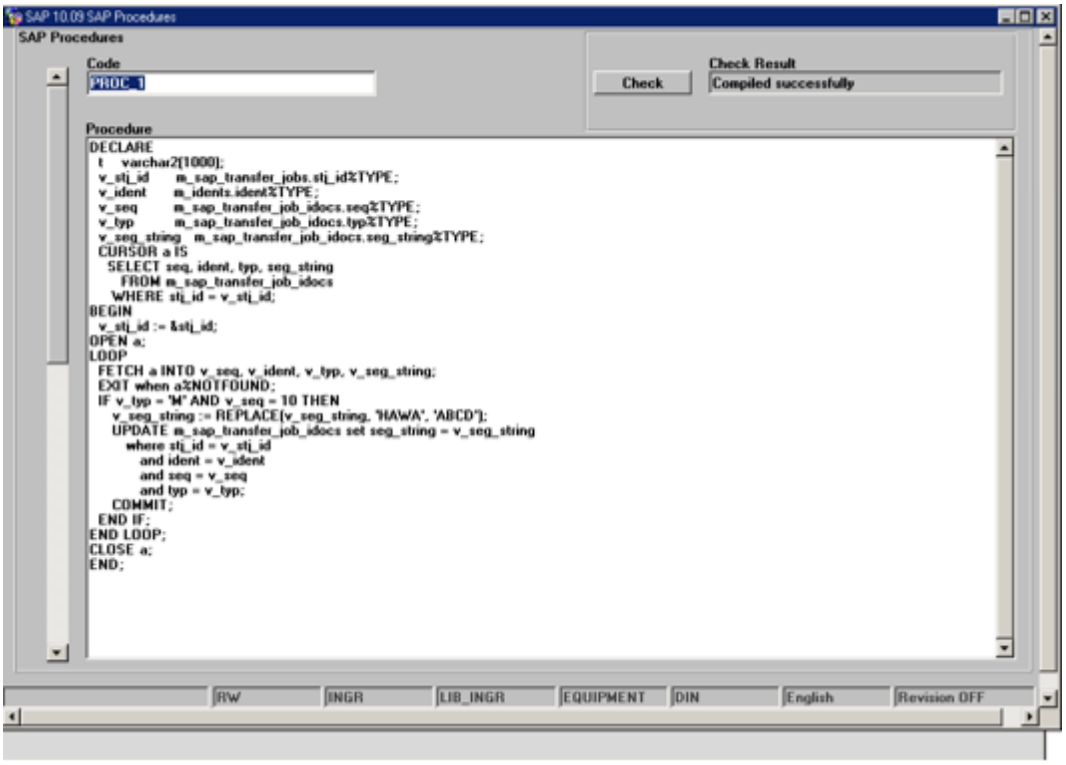
SAP Plants - Here the SAP plants within an SAP interface will be defined.

Plant - The name of the SAP plant.

Short Desc (Class) - Language-dependent description of the SAP plant.

SAP 10.09 SAP Procedures

Define your SAP procedures on this screen.



On this screen, you can create, delete, and update your SAP procedures. After defining a name for the procedure, type the procedure.

A click on the Check button checks the procedure for syntax errors; the result of the check is written into item ‘Check Result’.

The procedure(s) can be executed on the created IDOC data (either the XML files or the records in the database). To make sure that the procedure is used for the IDocs of this special job, use &SJT_ID > This variable will be replaced by the ID of the transfer job when it is executed on **SAP 20.01**.

Assign procedures to SAP interfaces in the window 2 of **SAP 10.01.**

Define the procedures to be executed on a transfer job on **SAP 20.01**, tab page SAP Procedures.

SAP 20.01 Transfer Jobs

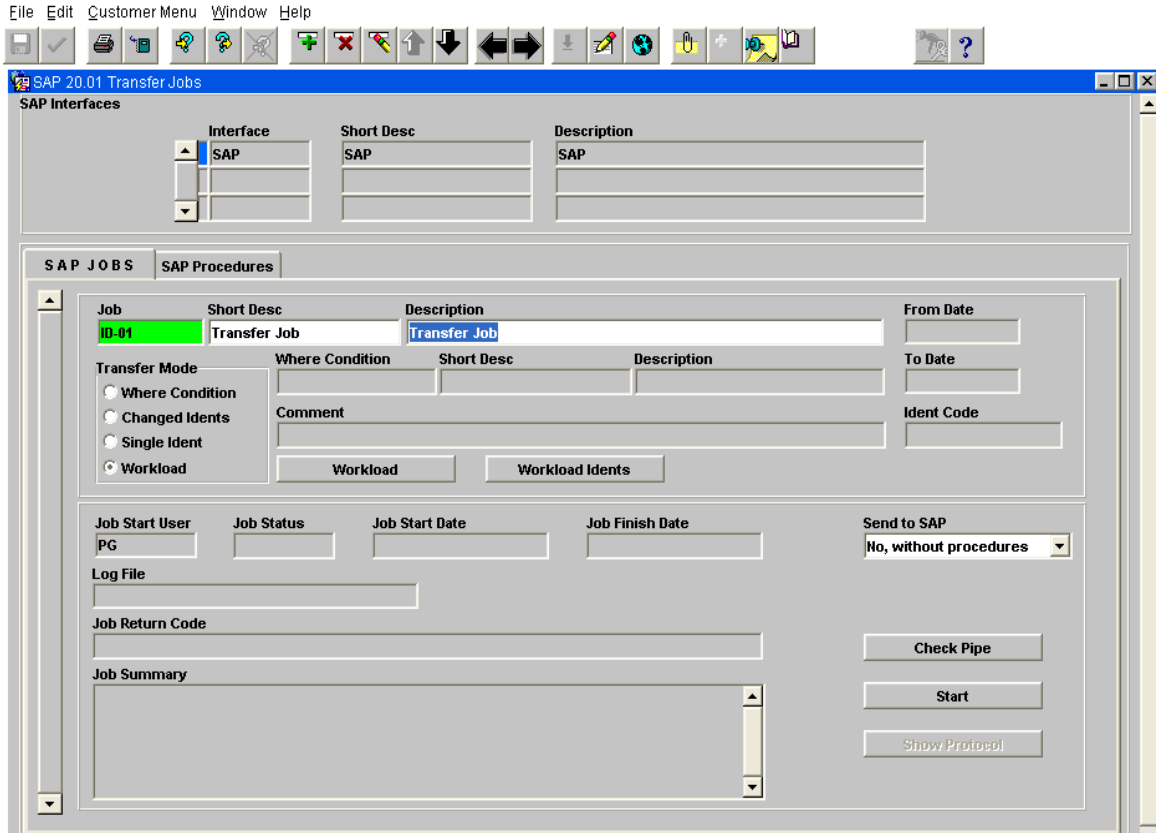
On this screen, the data transfer can be started. For this transfer, jobs will be defined for each interface. They will transfer the idents to the SAP system.

Each job is given a unique name. **Short Desc** and **Description** are optional fields and can contain additional information to describe the particular job.

The set of idents to be transferred will be determined by a so-called "where condition", which can be defined on screen **A.60.06 Where Conditions**. If the user has the respective rights, they are available in the LOV for the **Where-Condition** field.

In addition, all idents that have changed after a transfer job can be transferred. In addition, a single ident can also be transferred to SAP (radio button group in **Data Options**).

Also, there is the option all idents belonging to a list of selected workloads to transfer to SAP. When starting the job, a Where Condition will be created automatically in A.60.06. There is no need for the user to maintain this where condition manually.



After defining an interface, determining a job name and choosing a where condition, the job can be started by clicking the Start button.

The transfer can be either in online or batch mode. If it is started in online mode, the user must wait for the job to finish. In this case a progress bar will be displayed. The user name as well as the start and end time of the job will be saved in a log file. Furthermore, the user will get feedback in the **Job Return Code** field with information about errors that occurred.

★ IMPORTANT The job cannot be started twice.

Block 1

SAP Interfaces - In this block, the interface that was defined on SAP 10.01 is selected. This interface is the interface for which SAP transfer jobs will be defined.

Interface - Name of the SAP interface.

Short Desc and Description - Language-dependent description of the SAP interface.

Block 2: TAB page SAP Jobs

SAP Plants - Here the necessary parameters to start a job must be defined.

Job - The name of the transfer job. It must be unique.

Short Desc and Description - Language-dependent description of the transfer job.

Where Condition - A where condition (valid for screen **SAP 20.01**) can be selected via LOV. This where condition can be defined on screen **A.60.06 Where Conditions**. The condition provides an easy way of restricting the total number of idents in accordance with certain criteria.

Ident Code - Select an ident that will be transferred to SAP separately.

From Date/To Date - Complete these fields if you want to transfer idents that have been modified after a transfer.

Radio Group Transfer Mode - These options define how to determine the set of idents that will be transferred.

Short Desc and Description - Language dependent description of the where conditions.

Comment - Display of the Comment field on screen A.60.06.Where Condition.

Workload - This button allows the selection of one or more CMS Workloads defined in Smart Reference Data Plus. All idents belonging to the workloads will be transferred to SAP.

Workload Idents – This button will show a list of all idents belonging to the selected workload(s).

Job Start User - Name of the user who has started this job.

Job Status - Status of this job. There are the following possible statuses:

- **OK** - The job has finished successfully.
- **Failed** - The job stopped with an error. The exact error message is displayed in the Job Return Code field and can be looked up in the error file.
- **Ready to run** - The job was already defined but not run until now.

Job Start Date - Start date of the job.

Job Finish Date - End date of the job.

Logfile - Name of the log file for this job. The log file will be created in the directory specified by the DBA setting LOG_FILE_DEST or the project default ZX_MAR_LOG. The content of the log file is dependent on the 'Message Level' setting in A.60.61 User Preferences. Recommended values when running SAP transfer jobs are

- **5** – includes basic information
- **20** – includes standard information
- **99** – includes all log information available for the transfer

Job Return Code - In this field, the result of the transfer job is displayed. If there has been an error during the job, it will be displayed in a shortened form.

Job Summary - This is a summary about the number of transferred idents and attributes and the errors that occurred.

Send To SAP: There are four possibilities for starting a job:

- only build the IDocs and store them as XML files or in the interface tables
- build and store IDocs and execute SAP procedures
- build and store IDocs and transfer the XML files using FTP to the SAP server
- build and store IDocs, execute procedures, and transfer the XML files to the SAP server

Check Pipe - A click on this button checks some fundamentals necessary to start a transfer job; the results of these checks are written into a log file. After the check, the log file is opened automatically to display the results (to make sure that the procedure can open and write into a log file, DBA setting (**A 60.04**) LOG_FILE_DEST must specify the UTL directory).

First, the interface settings are checked for existence and, if found, the value is written into the log file. In the next step, the software checks that at least one language is inserted on **SAP 10.02 SAP Language**. Next, the software checks whether it is possible to work with a pipe and to work with jobs.

Start - Clicking this button starts the job online so that the user has to wait until the job has finished. The progress of the job is displayed by a special "progress screen," which informs the user about the transfer time, the estimated remaining time, and about how many idents have been transferred.

Show Protocol - After the job has finished successfully or stopped with an error, the user can display the protocol of the job by clicking this button. He will get more detailed information about the processing of the job.

IDocs are always stored in M_SAP_TRANSFER_JOB_IDOCS before (or not) they are sent to SAP and are displayed (after the job has finished) on the next window of **SAP 20.01**, called **SAP 20.01 SAP IDoc Segment Strings**.

SAP transfer using XML files

The following files are created when the transfer type XML has been selected in SAP 10.01:

MATMAS_jobnr_seqnr.XML	XML file of IDOC type MATMAS
MATMAS_jobnr_seqnrN.XML	XML file of IDOC type MATMAS for SAP without line feed and leading blanks (only this file will be transmitted by ftp)
CLFMAS_jobnr_seqnr.XML	XML file of IDOC type CLFMAS
CLFMAS_jobnr_seqnrN.XML	XML file of IDOC type CLFMAS for SAP without line feed and leading blanks (only this file will be transmitted by ftp)

NOTE The import of the XML files into SAP is described in a separate document.

SAP transfer using database tables

The SAP transfer for material and requisition data now allows you to use the following transfer modes:

- Generation of XML files
- Export into database tables

Use **SAP 10.01 SAP Interface Parameter** to select the desired mode.

Interface tables will be created the first time the export for database tables is started.

The tables are created in the M_SYS schema.

The system will generate a table for each segment defined in **SAP 10.03 SAP IDocs** for the SAP version defined in **SAP 10.01**. The name of the tables will be 'XI_'+<Segmentname>.

The tables (called from now on XI-tables) will include as columns the fields defined for the segment.

Before each run of the export for database tables a check is performed whether the table definitions still match the IDOC definitions in SAP 10.03. If this is not the case, then missing fields will be added as new columns to the table. Also, the column size will be increased accordingly.

The ID field of each table is used to identify all segments of an IDOC.

Additional fields ID1, ID2, ID3 (depending on the IDOC definition) represent the sequence and hierarchy of the IDOC because the IDOC information is distributed over different tables.

The fields always start with 1 and are increased for each segment on the same hierarchy level.

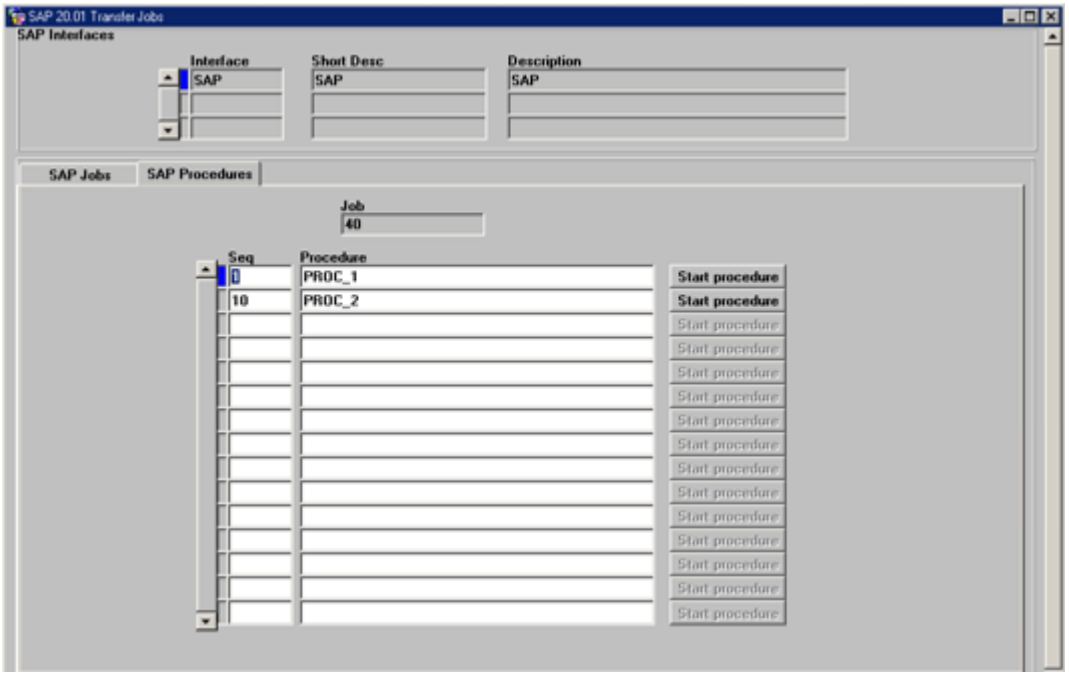
Example	1		
	1	1	
	1	2	
	2	1	
	2	1	1
	2	2	
	2	2	1

To control access to the tables, you can use the column STATUS. This is filled by default with the value '01'.

A new user SAP_XI will be created the first time when the transfer for tables is started. This user will have access to all interface tables.

Block 2: TAB page SAP Procedures

Assign your SAP procedures for this transfer job here (after committing the new job on the other TAB page). These procedures can be executed between building and storing the IDoc and sending the IDoc to SAP.

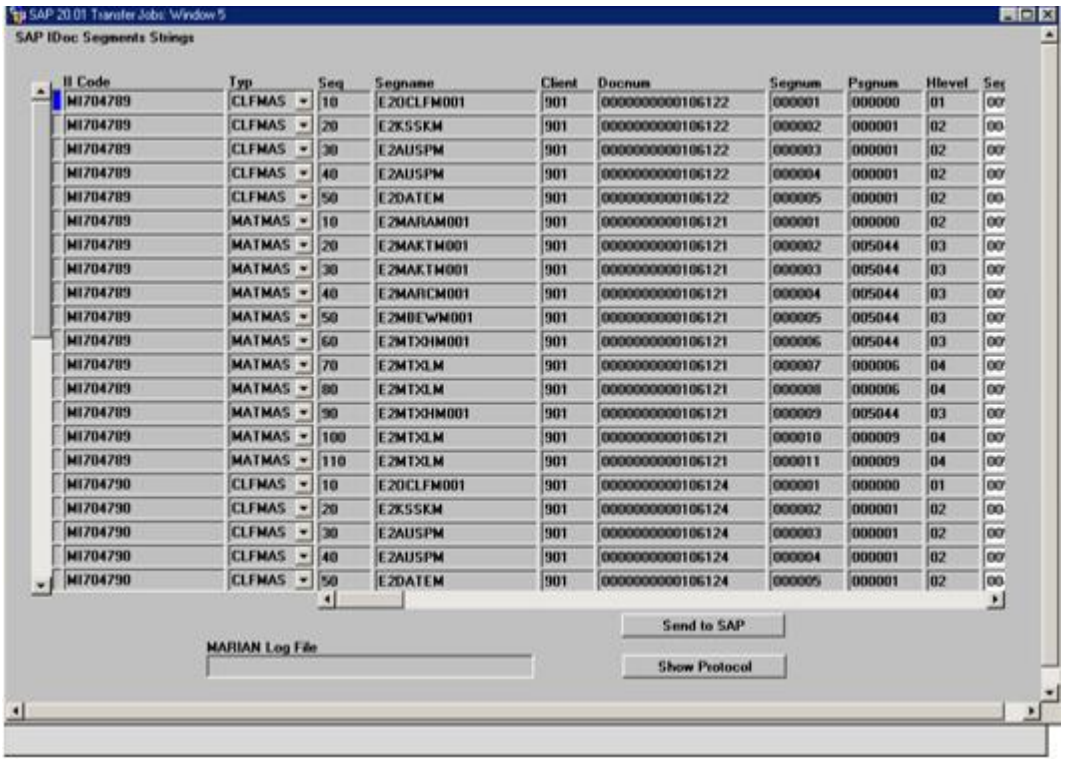


You must create the SAP procedures on **SAP 10.09**. On the **SAP 10.01**, window 2, you can assign some (or all) of these procedures to your SAP interface(s). If you create a new transfer job (TAB page SAP Jobs), you can find the procedures of **SAP 10.01** here. If you duplicate an existing job, you can find the procedures of the old job here. After committing the new job and before starting the job, you can make changes to the assigned procedures.

Clicking the **Start Procedure** button starts the corresponding SAP procedure.

Block 3: Page SAP IDoc Segment Strings

If you choose a transfer job that has already been executed, you can view the IDocs if you switch to the next window.



If you start a transfer job for every IDENT within the WHERE condition, one IDoc is built. As an intermediate step, the IDoc is inserted into the table M_SAP_TRANSFER_JOB_IDOCS.

If you choose the possibility of building, inserting, executing the SAP procedure(s) for this job, and sending to SAP, the IDocs will read out of M_SAP_TRANSFER_JOB_IDOCS before they are sent to SAP, so that changes done by the procedures will be seen.

One other way of working is to first create and store the IDocs without sending them to SAP. You can view the IDocs before sending them by clicking the button ‘Send to SAP’ (window SAP IDoc Segment Strings). The real segment string is a concatenation of ‘Segname,’ ‘Client,’ and so forth; the string is divided into the visible elements and each element is shown in its own item.

If you have an order sequence, a sequence is also inserted into this table and displayed on the screen. ‘Typ’ gives you information about this segment string of a MATMAS- or a CLFMAS IDoc.

If you want, you can make changes to one or more segment strings. You can do this manually in this window, but you also can do this with your SAP procedures. You can execute each of the SAP procedures by clicking the **Start Procedure** button on TAB page SAP Procedures.

TIP Before executing a SAP procedure, copy the original (cut and paste) into an editor or a file. If the procedure does not show the result that you want, it is easy to rebuild the original segment string again.

If you then want to send the IDoc(s) of this job to SAP again, click the **Send to SAP** button in this window. The IDocs are then built again from the (changed) records of the table

M_SAP_TRANSFER_JOB_IDOCS and then sent. In this way, you can send the IDocs, built by one transfer job, to SAP several times.

A log file is written, and you can open it by clicking the Show Protocol button in this window. For details about the directory and content, see the description for window 1 of SAP 20.01.

Choosing between online and batch mode:

You can use the project default ZX_BTH_OPT to determine the desired behavior:

ONLINE	Job is run as an online process
BATCH	Job is run immediately as a batch process
CHOOSE	A dialog is displayed where you can choose to run the job in online or batch mode

When starting a job in batch mode, after completion of the job, an email is sent automatically to the user who started the job. This functionality requires to be set up as described in the document about the mailing functionality of Smart Materials.

Using the change history for the SAP material transfer

This functionality is available from Smart Materials 6.3.4 on. It can only be used if in **SAP 10.01** the transfer type 'Database' is selected. To activate this functionality, define the interface setting **CRE_DELTA** in **A.70.11** for your SAP interface and assign the value Y to it. This will cause the SAP transfer to check the entries in the interface tables (XI_...) for a previous transfer of the same material which was successfully transferred to SAP (status > '01 and status < '99').

Identification of the material:

MATMAS Idoc: The field MATNR in the E1MARAM segment is regarded as the unique identifier for the material

CLFMAS Idoc: The field OBJEK in the E1OCLFM segment is regarded as the unique identifier for the material

If the program detects differences for a segment/field, then this information will be stored in the table M_SAP_TRANSFER_DELTAS. This table has the following structure:

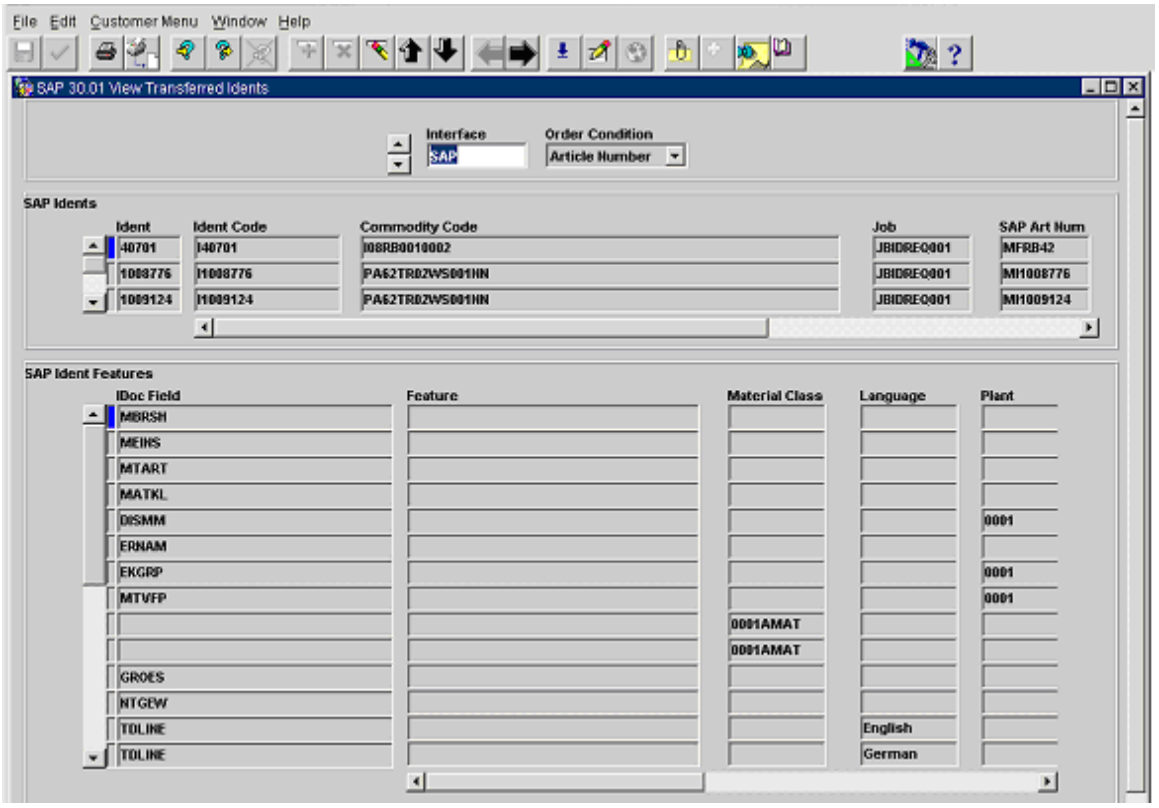
SATD_ID	Unique identifier of each record
STJ_ID	ID of the current SAP transfer job
STJ_ID_OLD	ID of the previous SAP transfer job which has already been transferred
SAP_KEY	Either the value of MATNR or OBJEK
IDOC_NAME	CLFMAS/MATMAS
SEGMENT_CODE	Segment code from **SAP 10.03**
FIELD_NAME	Idoc field name from **SAP 10.03**

ID1	ID1 of the record from the interface table
USR_ID	Internal Smart Materials field
LMOD	Internal Smart Materials field
INT_REV	Internal Smart Materials field
OLD_VALUE	Value from the previous transfer
NEW_VALUE	Value from the current transfer
ID2	ID2 of the record from the interface table (empty if ID2 doesn't exist)
ID3	ID3 of the record from the interface table (empty if ID3 doesn't exist)

Information about the delta processing is also written to the log file.

SAP 30.01 View Transferred Idents

This screen shows all the information of the idents transferred to SAP. This is a master detail screen in which all the idents are displayed and their associated attributes that have been transferred to the SAP system(s). This screen is for monitoring purposes and is only usable in read-only mode.



Field Descriptions

Block 1

SAP Configs - In this block, select the interface and the order criteria for the display of the transferred idents and their attributes.

Interface - Select an SAP interface via LOV.

Order Condition - Select the order criteria for the second block.

Block 2

SAP Idents - In this block, the idents that were transferred to the interface are displayed, along with important information.

Ident - Ident.

Ident Code - Ident code.

Commodity Code - Commodity code.

Job - Name of the transfer job that has transferred this ident to the respective interface.

SAP Art Num - SAP material number.

Status - Status of the transferred ident. The following statuses are possible:

- Transfer ok
- Transfer failed
- Transfer not done (not yet executed)

Action - Shows which action was executed. The following actions are possible:

- Insert (The SAP material number was transferred the first time)
- Update (The transmission of the material number was executed at least the second time)

Timestamp - Timestamp for the transmission of this ident.

Block 3

SAP Ident Features - This block displays all transferred IDoc fields and material-dependent attributes of the ident in the second block, which were transferred to SAP.

IDoc Field - If an IDoc field was used for the transmission to SAP, it is displayed here.

Feature - If a material-dependent attribute was used for the transmission to SAP, it is displayed here.

Material Class - Material class of the corresponding attribute/feature.

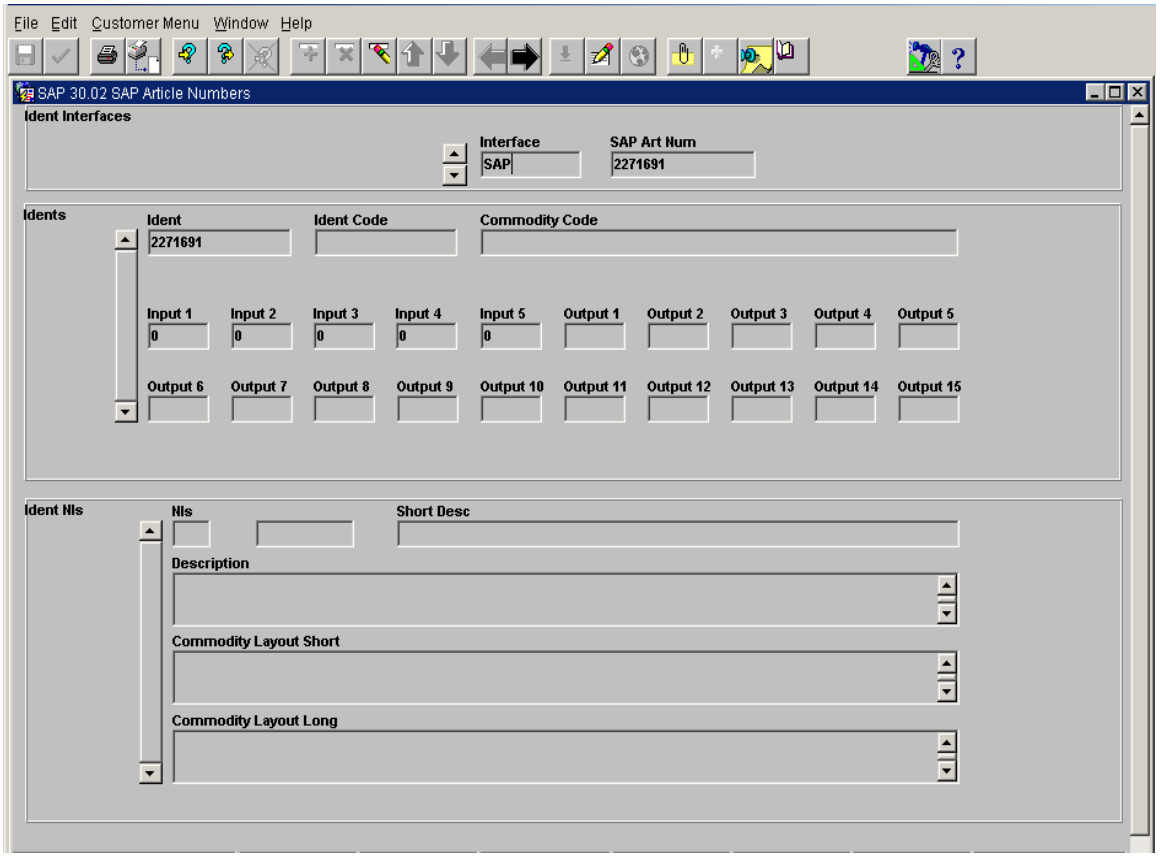
Language - If an IDoc field was transferred as language-dependent, this field displays the language information.

Plant - If an IDoc field was transferred as plant-dependent, this field displays the respective plant.

Value - Value of the IDoc field or the material class-dependent attribute (**Feature** field).

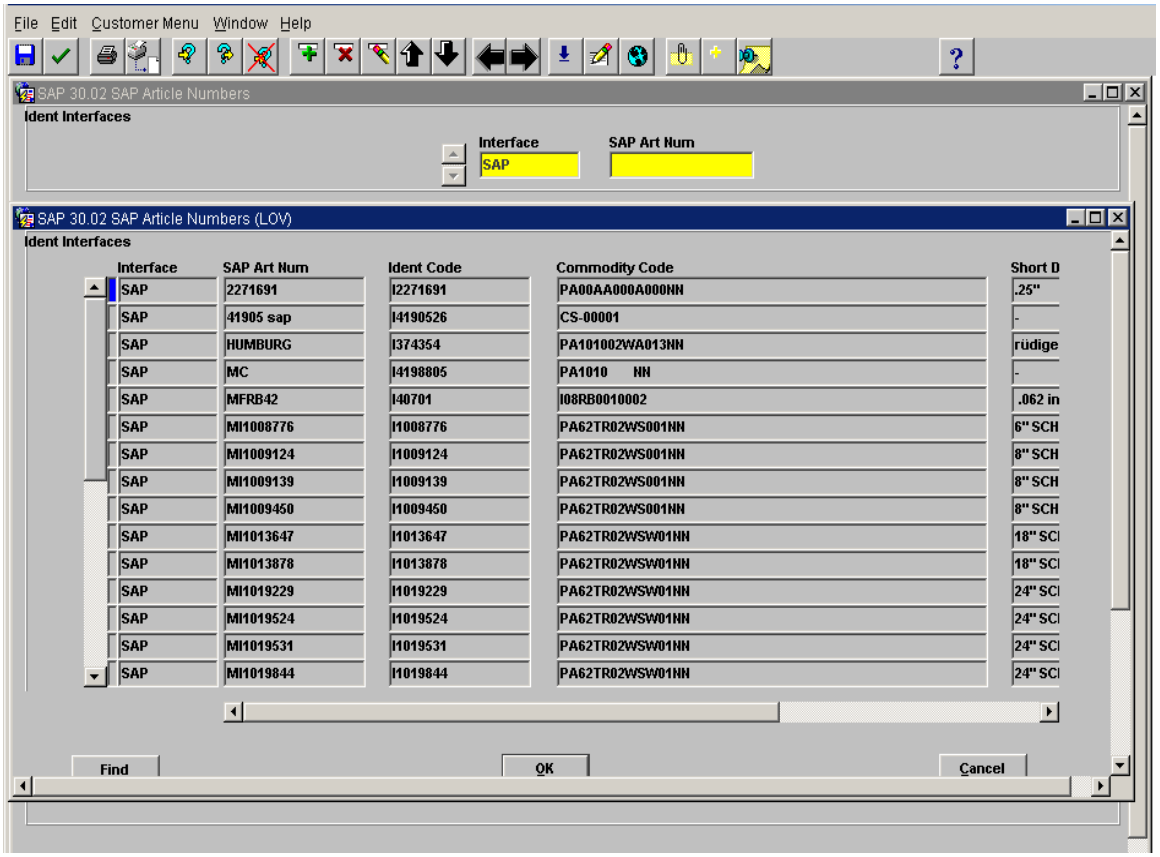
SAP 30.02 Interface Idents

This screen allows you to search for SAP material numbers (interface idents) in Smart Materials and to display the information from Standardization.



SAP 30.02 Article Number LOV

This screen is a substitute for an LOV and is called from the screens **SAP 30.02** (**SAP Art Num** field) and **SAP 20.01** (**Ident Code** field). All transferred idents / SAP article numbers can be displayed and selected per interface.



Field Descriptions

Interface - Select an SAP interface by LOV.

SAP Art Num - SAP article number.

Ident Code - Ident code.

Commodity Code - Commodity code.

Short Description and Description - Language-dependent description for the commodity code.

Workflow

This section describes the steps and their order to create a new SAP interface. In addition, it describes how to do the minimum settings for the functionality of the new interface. The following sections must be worked through in the following order to create a new SAP interface:

Activity	Screen	Optional	Description
Prerequisites			
Create an Interface	A.70.01		
Base Configuration of a New SAP Interface			
Interface Settings	SAP 10.01		
Language Definitions	SAP 10.02		
Unit Definitions	A.10.14		
Definition of SAP Material Classes	A.50.02, S.20.I.02, S.20.I.03, A.50.I.01, S.20.08	X	Only necessary if material-dependent attributes will be transferred
IDoc Settings / Modifications / Extensions	SAP 10.03		
Definition of SAP Attributes	SAP 10.04		
SAP Master Data Mapping	SAP 10.05, SAP 10.06		
Mapping of the Classifying SAP Attributes/Features	SAP 10.07	X	Only necessary if material class-dependent attributes will be transferred.
The Transfer Job	SAP 20.01		
Check of the IDoc Receipt in SAP	-------		

Prerequisites

SAP

- The client under which the data shall be imported is known.
- ALE customizing was done. A transmitter ALE object and a receiver ALE object (the SAP system itself is the receiver) must be set up. Both names are known, and the user mentioned above has the rights to use both ALE objects.
- The distribution of the ALE connection was maintained. For example, the IDoc types that will be transferred with the ALE connection must be defined. Normally, there are the types MATMAS and CLFMAS. That applies also for the user modified IDocs, which will be used for transmission. In any case, this requirement is met as long as the modifications are based on the IDoc types MATMAS and CLFMAS.

Create an Interface

Call screen **A.70.01 Interfaces** and define a new interface (for example, "SAP").

Base Configuration of a New SAP Interface

Then go to screen **SAP 10.01 Interface Parameters**. Here, the interface that was defined on A.70.01 will be declared as a SAP interface. The following data of the SAP destination system must be indicated:

Field	Value (example)	Description
Interface	SAP	Select the interface that was defined on A.70.01 via LOV
Host (optional)	Spock	Hostname or TCP IP address of the destination system for XML files.
SYS-Num (optional)	01	Entry corresponds to system TCP IP port over which the communication to SAP will be handled. This entry corresponds to the entry in the SAP logon>Features> system number.
system name (optional)	H02	RFC destination name that was defined in SAP for communication with Smart Materials
User (optional)	test user	User for the ftp file transfer
Password (optional)	test	User password

Field	Value (example)	Description
client	250	Client in SAP
SAP version	40b	The version of the SAP target system will be assigned to the interface (LOV exist)
default language	German	A standard language must be assigned to the interface via LOV (this is relevant for language-dependent data).

The TRFC check box must be selected as the coupling type between Smart Materials and SAP.

TIP For more information about settings, please refer to the *SAP 10.01 Interface Parameters* section.

Interface Settings

For the functionality of the SAP interface to work properly, Smart Materials needs more information. This information will be maintained as **Interface Settings** on screen **A.70.11**.

The following interface setting variables must be maintained for each SAP interface.

Setting Name	Value (Example)	Description
CLFMASIDOC	CLFMAS01	IDoc name of type CLFMAS01, which will be used by the SAP interface; because of this setting, it is possible to use IDocs which are entered as new or modified by the customer
CS_RCVPOR	A000000015	Internal field for the ALE communication: à receiver port of the ALE module
CS_RCVPRN	LOGSPO0250	Internal field for the ALE communication: > partner number of the ALE receiver (alphanumeric)
CS_RCVPRT	LS	Internal field for the ALE communication: > partner type of the ALE receiver.
CS_SNDPOR	SAPH01	Internal field for the ALE communication: > transmitter port of the ALE module
CS_SNDPRN	LOGVUL0250	Internal field for the ALE communication: >partner number of the ALE transmitter (alphanumeric)
CS_SNDPRT	LS	Internal field for the ALE communication: > partner type of the ALE transmitter
DEF_PLANT	1000	Defines the default SAP plant for a specific Smart Materials SAP interface (needed for

Setting Name	Value (Example)	Description
		REQ)
FIX_PROG	Y	Y: Some fields in some segments are filled automatically (the program code is fixed), example: E1MARAM.MATNR is filled with the material number 'N': You must use fixed values or CIP function for every mapped field If this interface setting is not found in A70.11, the interface will work like 'Y' (the old way with the fix programming). This setting is not used in the REQ interface.
IDOC_TRACE	E:\oradata\m51\utl\idoc_trace	Name and path of the IDoc trace file; the actual name will be unique by assigning the current job ID; this will write up the processed IDocs if the interface setting variable „Trace" >0 was entered (see below)
LONG_MATKL	'Y' or 'N'	For working with Material Classes (CLFMAS IDOC): Use the table detail short description instead of the table code as the name of the material class. (Detailed information is in the *Definition of SAP Material Classes (on page 52)* section)
MATMASIDOC	MATMAS03	IDoc name of type MATMAS03, which will later be used by the SAP interface; because of this setting, it is possible to use IDocs that are new or modified by the customer
MAXWAIT	60	Maximum time of response (sec)
PRE_MATNR	0	Left-justified padding of the material number with given filler-characters. (here "0"); if this interface setting won't be set, the material number will be transferred to SAP as it is saved in M_IDENT_INTERFACES. **This interface setting is not necessary for the function of the interface**.
PREQCRIDOC	PREQCR01	Defines the name of the PREQCR IDOC that is used from the Smart Materials SAP requisition interface. Normally, the delivered IDOC PREQCR01 must be entered here. But, if a customer wants to use his own customized PREQCR01, he must specify this here (needed

Setting Name	Value (Example)	Description
		for REQ)
SAP_ART_NR	M_PCK_SAP_CUSTOM.BUILD_SAP_ART_NR	Name of a CIP function that will be used to generate the SAP material number if it doesn't exist; the given CIP function will be delivered per default; it returns the ident code as the SAP material number
TAGTEXTFUN	M_pck_sap_custom.GET_TAG_TEXT	Defines a CIP function that builds the purchasing text especially for tagged items in Smart Materials that are not transferred as material to SAP, but should nevertheless be purchased in SAP. The function M_pck_sap_custom.GET_TAG_TEXT will be delivered by Intergraph as an example (needed for REQ).
TYP_OR_EXT	'TYP' or 'EXT'	Use interface settings for CLFMASIDOC, MATMASIDOC, PREQCRIDOC as IDoc type or as IDoc extension (see below)
USE_ECLASS	'Y' or 'N'	For working with Material Classes (CLFMASIDOC): Especially for customized SAP Systems that are working with the ECLASS specification. The feature name specified on **SAP 10.04** will be changed internally into the Material Class concatenated with the feature_name defined on **SAP 10.04.** This new (internal) feature will be transferred to SAP. (Detailed information is in the *Definition of SAP Material Classes (on page 52)* section)

Language Definitions

Within the interface, it is possible to transfer data in a multilingual manner if the data is marked accordingly. On screen **SAP 10.02 Languages**, the languages must be entered that will be transferred by Smart Materials in the case of a multi-lingual workflow (**Multilanguage** check box on screens **SAP 10.05** and **SAP 10.06**). You must enter the SAP language indicator for each Smart Materials language.

TIP For more information on screen **SAP 10.02**, refer to the *Workflow* (on page 47) section.

Unit Definitions

If SAP uses different units from Smart Materials (**Equal Units** check box on **SAP 10.02** is not marked), the translations for the Smart Materials units must be defined on screen **A.10.14**.

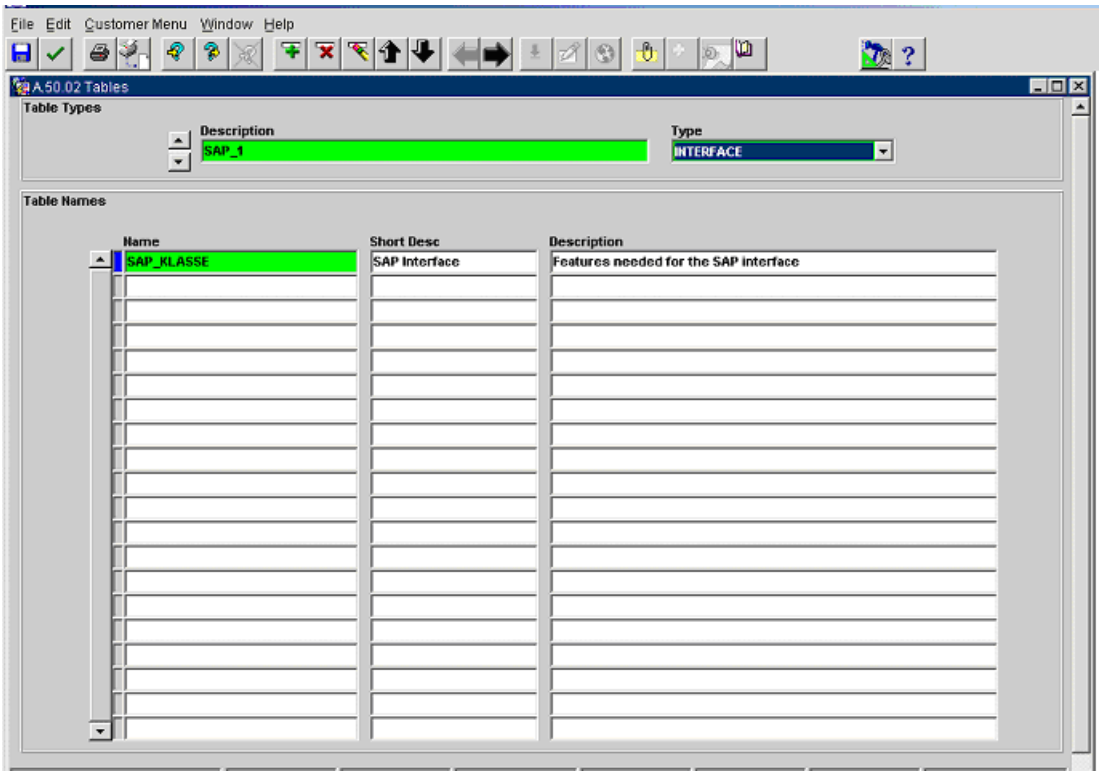
TIP For more information, refer to the *A.10.14 Interface Dependent Units* (on page 21) section.

Definition of SAP Material Classes

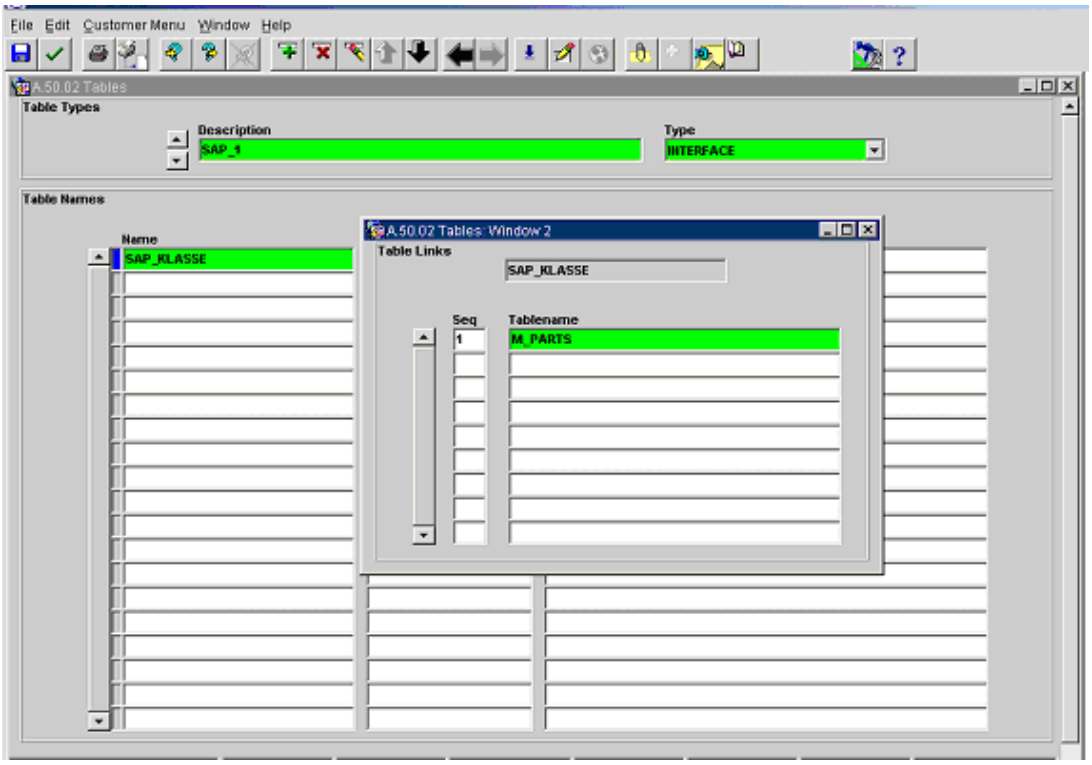
If you want to transfer material class-dependent attributes/features, first you must define the material classes in Smart Materials. A material class will be assigned to the ident grouping part so that an ident belongs to exactly one material class.

The material classes must be defined separately for each interface as described below:

Creating the Attribute Table in A.50.02



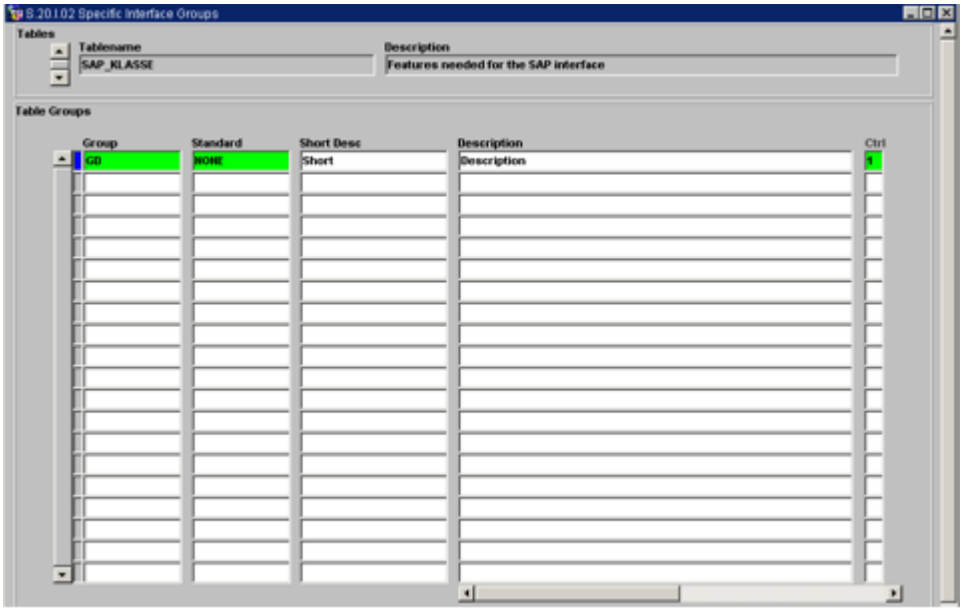
The picture provides an example. You can choose any name. This table must then be linked to the M_PARTS table by Next Block and LOV selection.



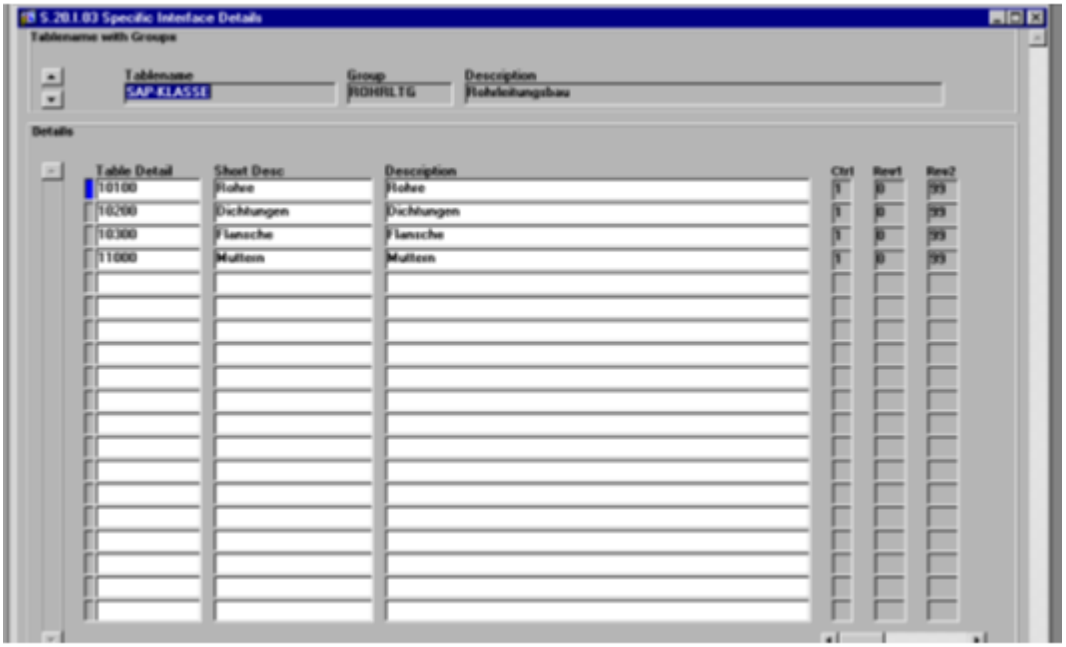
Creating Table Groups

SAP material classes are stored in Smart Materials as ident groups. The groups are used to divide up the SAP material classes logically and do not have any processing logic.

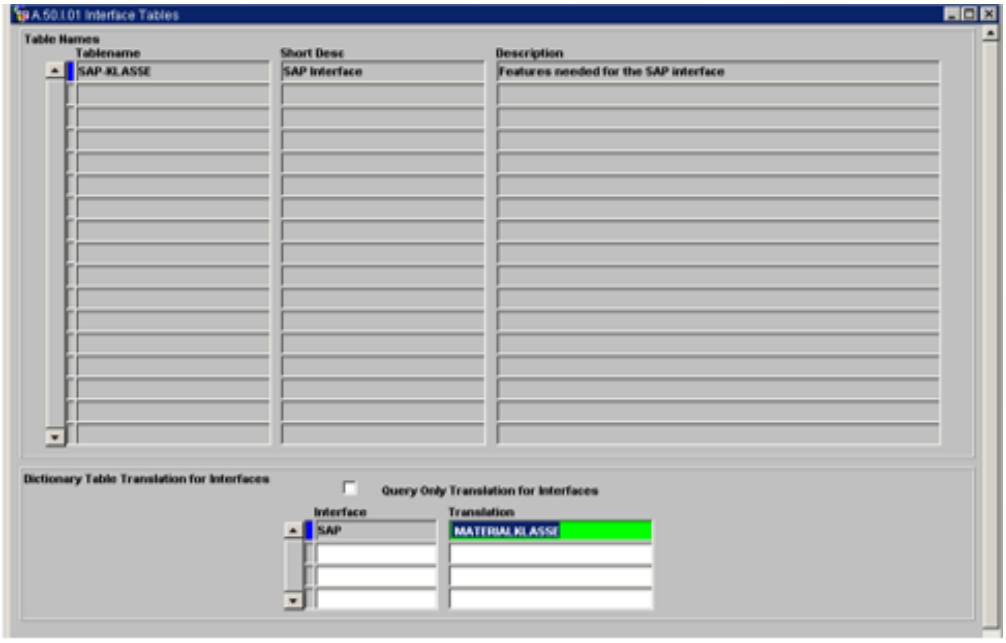
Because the SAP material classes are recorded using the Smart Materials model of table details (see next section), you must have previously created at least one table group.



Creating SAP Material Classes

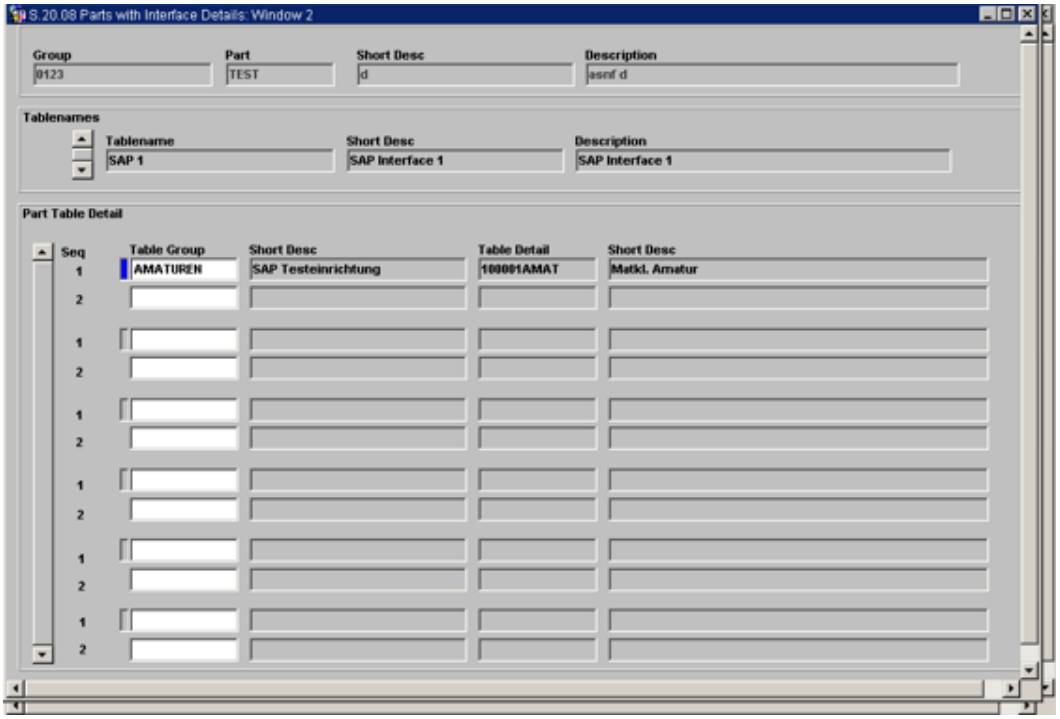


Allocating Material Class Tables to Interfaces



NOTE The Translation Name 'MATERIALKLASSE' is set permanently by Intergraph and it must be defined with this name exactly (see interface setting MKL_CHECK).

Allocating Smart Materials Material to a SAP Material Class



IDoc Settings / Modifications / Extensions

The IDoc structures MATMAS03 and CLFMAS01 will be delivered by Intergraph with interface. It is helpful or necessary to pre-allocate special IDoc fields using default values. You should do this step at this point.

Furthermore ,you can determine by setting the **Master Data** and **Plant Dependent** check boxes if an IDoc field on screens **SAP 10.05 Master Data Mapping** (**Master Data** check box on **SAP 10.03**) or **SAP 10.06 Master Data Mapping** (**Plant Dependent**) (**Master Data** check box and **Plant Dep**. check box on **SAP 10.03**) will be displayed in the LOV or not.

All fields that are "not absolutely meaningful" were deactivated by Intergraph with delivery. This applies particularly for the settings regarding the plant dependent IDoc fields (**Plant Dep**. check box on **SAP 10.03**).

TIP For more information, refer to the *SAP 10.03 SAP IDocs (on page 22)* section.

Definition of SAP Attributes

On the screen **SAP 10.04 Classification Profile Settings**, you can enter the attributes that you want to use. The attributes are entered as interface-dependent; they can become material class-dependent on screen **SAP 10.07 Classification**.

If you only want to transfer master data, you do not need to execute the definition of the SAP attributes.

SAP Master Data Mapping

The data transfer to SAP takes place with the help of the IDoc data structures. The IDoc type MATMAS is available for the master data transfer. The fields of the IDocs will be filled with data according to their meaning. This takes place on screens **SAP 10.05 Master Data Mapping** and **SAP 10.06 Master Data Mapping** (**Plant Dependent**).

You can find the description of the two screens in the following sections: *SAP 10.05 Master Data Mapping* (on page 26) and *SAP 10.06 Master Data Mapping (Plant Dependent)* (on page 29).

To transfer the ident as material to SAP, a certain number of IDoc fields must be filled. All fields that must at least be mapped are listed in a table in the Master Data section.

The described fields relate to an SAP standard installation, so the user can have additional mandatory fields. This depends on the customization of the SAP installation.

If material will be saved as also plant-dependent, additional IDoc fields must be mapped. These are shown in a table in the *Plant-Dependent Master Data* section.

IMPORTANT Mapping of data should only be done by people who have appropriate knowledge about IDocs and SAP as well as knowledge about Smart Materials standardization and ident generation.

Mapping of the Classifying SAP Attributes/Features

To transfer classifying attributes to SAP, the SAP features that are dependent on the material classes must be mapped. This step is optional and can be executed later on screen **SAP 10.07 Feature Mapping** (**Class Profiles**).

First, you must define the SAP material classes as described in *Definition of SAP Material Classes* (on page 52).

The Transfer Job

After all settings are done, transfer jobs can be defined on screen **SAP 20.01**, which finally executes the actual data transfer.

To do this, enter a name for the job after the selection of an interface and select a where condition (which was defined earlier) to select a number of idents for the data transfer.

Where conditions must be created on screen **A.60.06**; they provide a way to group idents with various criteria together.

After entering all data and saving the record, you can start the job by clicking the Start button. Depending on the project default ZX_BTH_OPT the transfer will be started either in Online or Batch mode or you will a dialog field to choose the desired transfer mode. If the job is started in online mode, the cursor will change to the hourglass symbol and a "progress screen" will show the transfer of the data. The elapsed time, the estimated remaining time, and the transferred idents are displayed.

Depending on the data volume, server speed, and network performance, the transfer will vary.

On the screen, you can see a summary about the transfer job in the fields below. In addition, you can look in the log file and the error file of the job by clicking the **Show Protocol** and **Show Errorfile** buttons.

★ IMPORTANT A successful data transfer to SAP means only a successful creation of the IDocs data in either XML format or in the XI-interface tables and says nothing about the processing result by SAP.

Check of the IDoc Receipt in SAP

It is necessary to check the further processing of the received IDocs in SAP. You can do this check as follows:

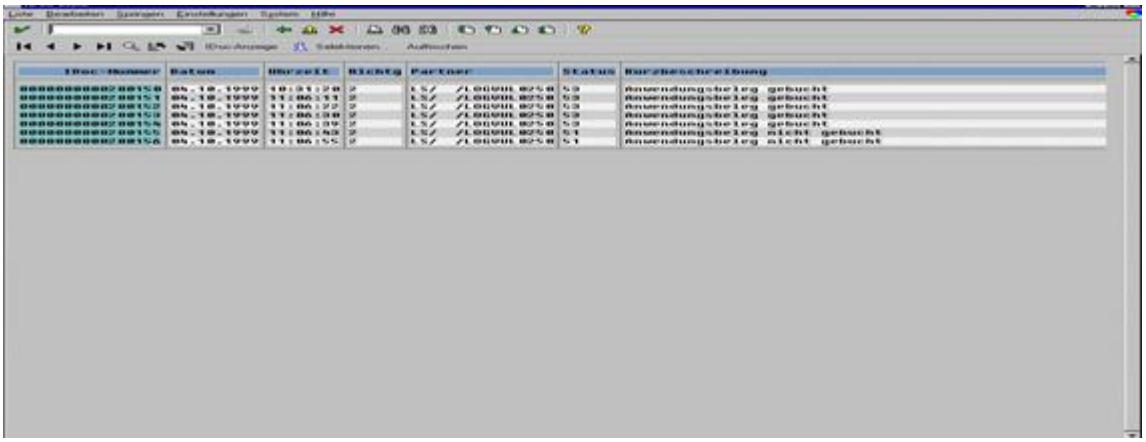
From the main menu, click **Tools** > **Business Framework** > **ALE** > **Administration**. Now you are on the SAP screen ALE.

On the menu, choose **Monitoring** > **Display Idocs** with enhanced options. Now you are on the screen IDoc lists.

Click the **Execute** button (small green hook with clock behind it) and look for the IDocs that were received. Note whether processing has taken place or not.

To get more information about the IDoc structures, double-click the respective IDoc; the Segment and field contents will be displayed.

In addition, in case of faulty processing, you can find a detailed description of the error that occurred in the status record of the ident.



SECTION 4

Glossary

Smart Materials Terms

Material Master (**Smart Materials**) - The Smart Materials idents with their various accompanying attributes.

Material Master Transfer - The transfer of Smart Materials idents to SAP. SAP saves the idents and all accompanying attributes and features as materials in the SAP Material Master.

Material Master Features (**Smart Materials**) - All the attributes and information that exist in Smart Materials for this ident. This information also includes the SAP-specific features "mapped to it" in the interface.

Material Master Record - If you are talking about a Material Master Record in connection with the Smart Materials/SAP interface, this means the ident and all its attributes.

Material Master Data - See Material Master Record.

Attribute - This means Smart Materials commodity attributes and/or object parameter details (geometry).

Features - In connection with the Smart Materials /SAP interface, features are both attributes (see above) and the features "also mapped" in the SAP interface.

Material Class - Within Smart Materials, SAP Material Classes are reproduced. This is done by grouping idents, using Smart Materials parts.

SAP Terms

Material - Corresponds to the Smart Materials ident.

Material Number - Material Numbers are a unique alphanumeric description of the SAP Materials.

Material Master (**SAP**) - The set of SAP Materials, including all the Features.

Material Master Data

Features - Correspond to the SAP Master Data fields.

Classification Profiles - Features that can be allocated to a Material Class.

Material Master Features (**SAP**) - Full set of Material Master Data Features and Classification Profiles.

SAP Material Class - Within SAP, Features (Classification Profiles) can be allocated to a Material Class.

Idocs - Corresponds to a sort of data capsule in which logical SAP data can be transferred. It includes, for example, Materials, supply requests (BANF‘EN), and so forth.

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