ModelDesk

Road Creation

For ModelDesk 5.5

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dSPACE

How to Contact dSPACE

Mail:	dSPACE GmbH Rathenaustraße 26 33102 Paderborn Germany
Tel.:	+49 5251 1638-0
Fax:	+49 5251 16198-0
E-mail:	info@dspace.de
Web:	http://www.dspace.com

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About This Document

Contents

This document introduces you to the Road Generator that is used to create road models and generate simulation models and 3-D objects of the roads.

Symbols

dSPACE user documentation uses the following symbols:

Symbol	Description
DANGER	Indicates a hazardous situation that, if not avoided, will result in death or serious injury.
WARNING	Indicates a hazardous situation that, if not avoided, could result in death or serious injury.
CAUTION	Indicates a hazardous situation that, if not avoided, could result in minor or moderate injury.
NOTICE	Indicates a hazard that, if not avoided, could result in property damage.
Note	Indicates important information that you should take into account to avoid malfunctions.
Tip	Indicates tips that can make your work easier.
	Indicates a link that refers to a definition in the glossary, which you can find at the end of the document unless stated otherwise.
	Precedes the document title in a link that refers to another document.

Naming conventions

dSPACE user documentation uses the following naming conventions:

%name% Names enclosed in percent signs refer to environment variables for file and path names.

< > Angle brackets contain wildcard characters or placeholders for variable file and path names, etc.

Special folders

Common Program Data folder A standard folder for application-specific configuration data that is used by all users.

```
%PROGRAMDATA%\dSPACE\<InstallationGUID>\<ProductName>
```

or

```
%PROGRAMDATA%\dSPACE\<ProductName>\<VersionNumber>
```

Documents folder A standard folder for user-specific documents.

```
%USERPROFILE%\Documents\dSPACE\<ProductName>\
<VersionNumber>
```

Local Program Data folder A standard folder for application-specific configuration data that is used by the current, non-roaming user.

```
%USERPROFILE%\AppData\Local\dSPACE\<InstallationGUID>\
<ProductName>
```

Accessing dSPACE Help and PDF Files

After you install and decrypt dSPACE software, the documentation for the installed products is available in dSPACE Help and as PDF files.

dSPACE Help (local) You can open your local installation of dSPACE Help:

- On its home page via Windows Start Menu
- On specific content using context-sensitive help via **F1**

dSPACE Help (Web) You can access the Web version of dSPACE Help at www.dspace.com/go/help.

To access the Web version, you must have a *mydSPACE* account.

PDF files You can access PDF files via the icon in dSPACE Help. The PDF opens on the first page.

Basics and Instructions

Where to go from here

Information in this section

Introduction to the Road Generator 24
The introduction gives you basic information on the Road Generator.

Basics on Roads 34
Before creating a road, you should understand its elements and how they are specified.

Creating a Road 69
The instructions show you how to create a road using the Road Generator.

Creating a Road Network 102
A road network consists of road elements and junctions. They are used when traffic scenarios are simulated.

Working with Roads 126
You can manage the roads you have built, work with them in the Road Generator, and visualize them in MotionDesk.

Working with Roads in OpenDRIVE Format 134
Provides information on importing and exporting road files in the OpenDRIVE format.

Introduction to the Road Generator

Where to go from here

Information in this section

Features of the Road Generator.....24
You need roads to visualize driving maneuvers. You can create road models with the Road Generator.

Graphical User Interface of the Road Network View.....25
The Road Network view allows you to specify road networks.

Graphical User Interface of the Road Element View.....27
The Road Element view allows you to specify road elements.

Graphical User Interface of the Junction View.....30
The Junction view allows you to specify junctions.

How to Switch Views in the Road Generator.....32
There are several ways to switch views in the Road Generator.

Features of the Road Generator

Introduction

You need roads to execute driving maneuvers. You can create road models with the Road Generator.

Features

Road Generator A component of ModelDesk that is used to generate road models. It has a user interface for defining road segments and specifying road features. It generates the files for integrating a road in a scene for animation in MotionDesk and for the simulation models.

With the Road Generator, you can:

- Create roads and specify their characteristics:
  - Horizontal profile
  - Height profile
  - Lateral slope profile
  - Lane sections and lanes (e.g., for modeling different numbers of lanes or road markings)
  - Special surface conditions (e.g., for modeling low μ areas)
  - Additional height profiles (e.g., for modeling a rough road)
  - Surface textures (e.g., arrows or crosswalks)
  - Scenery (e.g., for specifying the environment of a road)
  - Road length is limited only by the available memory

- Create junctions and connect them with roads to build a road network.
- Place static objects on roads or junctions (e.g., traffic signs)
- View roads, junctions, and road networks in a preview.
- Place and define shapes on roads or junctions (e.g., for roadworks):
  - Define additional road markings (e.g., parking lots)
  - Define continuous objects (e.g., concrete barriers)
  - Place repeating traffic objects (e.g., pylons)
- Define routes on road networks for the ASM and fellow vehicles.
- Define the traffic type for a road network.
- Define position markers as trigger points for the movement of the ASM and fellow vehicles on the road network.
- Inspect elements or areas of the generated road network scene in MotionDesk.
- Create the files:
  - For the simulation model of a road network to download them to a real-time application or Simulink
  - For visualization of a road network in MotionDesk

Standard roads

ModelDesk also provides standard roads, for example, a road for performing a lane change maneuver. You can use these roads as demo files in ModelDesk. They are in the `Pool/Environment/Road` folder of the project.

Export and import

You can export/import road models from/to the current project. When you import road models, the files are migrated into ModelDesk's road format and then stored in the Pool. When you export road models, the files are saved in the selected format. ModelDesk supports the MAT file format and OpenDRIVE format.

Related topics

Basics

Graphical User Interface of the Junction View.....30
Graphical User Interface of the Road Element View.....27
Graphical User Interface of the Road Network View.....25
Overview of Roads.....35

Graphical User Interface of the Road Network View

Introduction

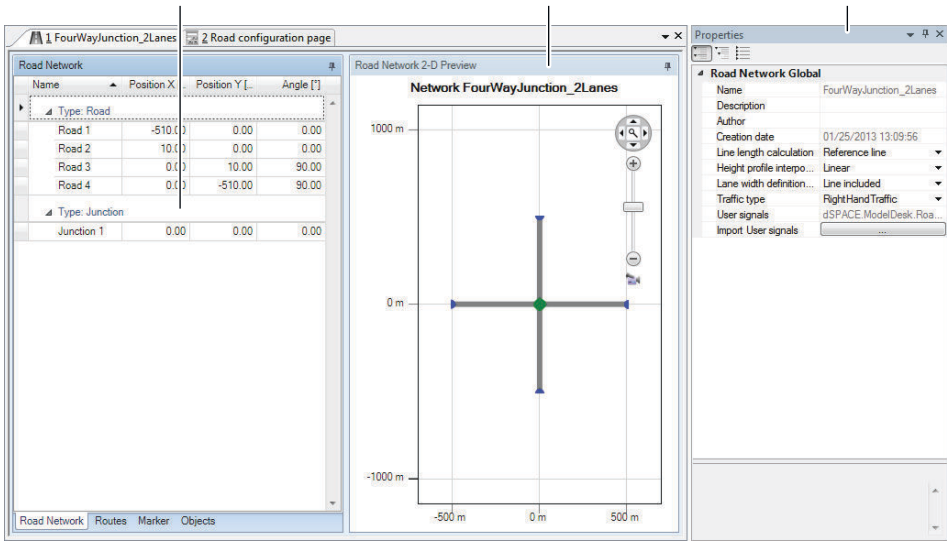
The Road Network view allows you to specify the properties of the whole road network

It provides different panes that you can arrange in any order. The following illustration shows an example of the **Road Network** view:

- Road Network pane
- Routes pane
- Marker pane
- Objects pane

Road Network 2-D Preview pane

Properties pane



Panes

Road Network pane Displays a list of all the road elements and junctions in the road network. The position of each element's starting point and the name can be modified in this pane. More properties can be modified in the **Properties** pane.

Routes pane Displays and lets you modify the routes on a road network. More properties can be modified in the **Properties** pane.

Marker pane Displays and lets you modify the position markers on a road network. More properties can be modified in the **Properties** pane.

Objects pane Displays the position of traffic objects (e.g., traffic signs) and lets you modify them. The **Traffic Object Manager** lets you specify the properties of the traffic objects.

Road network-2-D-preview pane Displays the horizontal profile of the road network in a 2-D preview. The currently selected element (road element, junction, position marker, route, traffic object, or connection point) is highlighted. Lets you specify the profile of the road network by dragging and connecting elements.

Properties pane Displays and lets you specify properties for different elements. The properties are grouped in categories. The contents of the pane depend on the pane that is currently active. The **Properties** pane can be hidden or shown by using the **Switch Controlbars** command in the **View - Controlbar** ribbon group.

Related topics

Basics

Graphical User Interface of the Junction View.....30
Graphical User Interface of the Road Element View.....27

HowTos

How to Customize the Screen Arrangement (ModelDesk Basics 🕮)
How to Switch Views in the Road Generator.....32

References

Reset Layout (ModelDesk Basics 🕮)

Graphical User Interface of the Road Element View

Introduction

The Road Element view allows you to specify the properties of a road element.

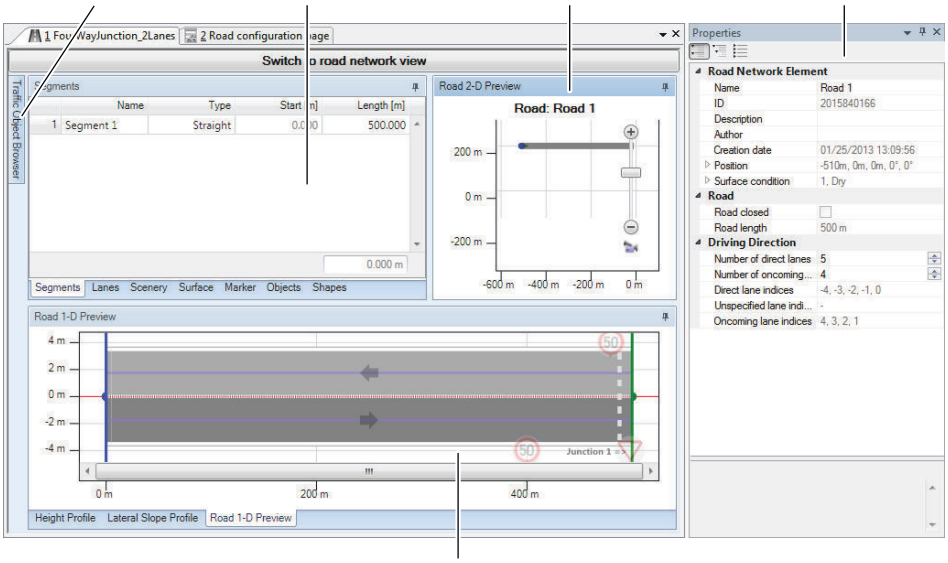
It provides different panes that you can arrange in any order. The following illustration shows an example of the **Road Element** view:

- Segments pane
- Lanes pane
- Surface pane
- Scenery pane
- Marker pane
- Objects pane
- Shapes pane

Traffic Object Browser

Road 2-D Preview pane

Properties pane



- Road 1-D Preview pane
- Height Profile pane
- Lateral Slope Profile pane

Panes

Lanes pane Lets you specify the lanes of the road element. You can specify several lane sections with different numbers of lanes or different lane characteristics, such as the direction of travel for each lane. The lanes can have different widths and road markings. The lane sections and lane properties can be specified in this pane and the **Properties** pane.

Segments pane Lets you specify the horizontal profile of the road element. A horizontal profile is made from several segments with different shapes (straight, circular, clothoid, or cubic spline) and sizes. The segment properties can be specified in this pane and the **Properties** pane.

Surface pane Lets you specify additional or alternative surface conditions. You can specify areas with a different friction coefficient or a different tire parameter set than the remaining road. You can also specify additional height profiles (in sinusoidal or trapezoidal form or by using a table) to add to the height profiles as potholes, bumpy roads, low-μ sections, etc. The values of the properties can be specified in this pane and the **Properties** pane.

Scenery pane Lets you specify an environment along the road. You can specify several scenery sections with different widths and types of margin. You can also define the type of scenery, which will influence the objects along the

road. The scenery properties can be specified in this pane and the **Properties** pane.

Marker pane Lets you add position markers to an element and modify them. More properties can be modified in the **Properties** pane.

Objects pane Displays the position of traffic objects (e.g., traffic signs) and lets you modify them. The **Traffic Object Manager** lets you specify the properties of the traffic objects.

Shapes pane Lets you add shapes to an element and modify their type and position. Lets you modify the node elements of shapes to specify their course. More properties of the shapes can be modified in the **Properties** pane.

Traffic Object Browser Displays all the traffic objects that are specified in the ModelDesk project. It lets you select traffic objects for the road or junction element.

Road 1-D Preview pane Displays the road element in a 1-D preview without any curves in the coordinate system which is related to the road (s and d coordinates). It gives you an overview of the positions of lanes, sections with special surface conditions, position markers, static objects, and scenery.

Height Profile pane Lets you specify the height profile of the road element by using several height points on the road's reference line. You can insert height points via context menu, and specify the positions and values graphically in this pane or numerically in the **Properties** pane.

When a height profile has more than 200 height points, the graphical representation is interpolated.

Lateral Slope Profile pane Lets you specify the lateral slope profile of the road element by defining several angle points along the road's reference line. You can insert angle points via context menu and specify the positions and values graphically in this pane or numerically in the **Properties** pane.

When a lateral slope profile has more than 200 angle points, the graphical representation is interpolated.

Road 2-D Preview pane Displays the horizontal profile of the road element in a 2-D preview. It highlights the currently active section (segment section, lane section, or scenery section) or marks the currently active point (position marker, surface point, height point, or lateral slope angle point).

Properties pane Displays and lets you specify properties for different elements. The properties are grouped in categories. The contents of the pane depend on the pane that is currently active. The **Properties** pane can be hidden or shown by using the **Switch Controlbars** command in the **View - Controlbar** ribbon group.

Related topics

Basics

Graphical User Interface of the Junction View..... 30

Graphical User Interface of the Road Network View.....25

HowTos

How to Customize the Screen Arrangement (ModelDesk Basics 🕮)
How to Switch Views in the Road Generator.....32

References

Reset Layout (ModelDesk Basics 🕮)

Graphical User Interface of the Junction View

Introduction

The Junction view allows you to specify the properties of a junction.

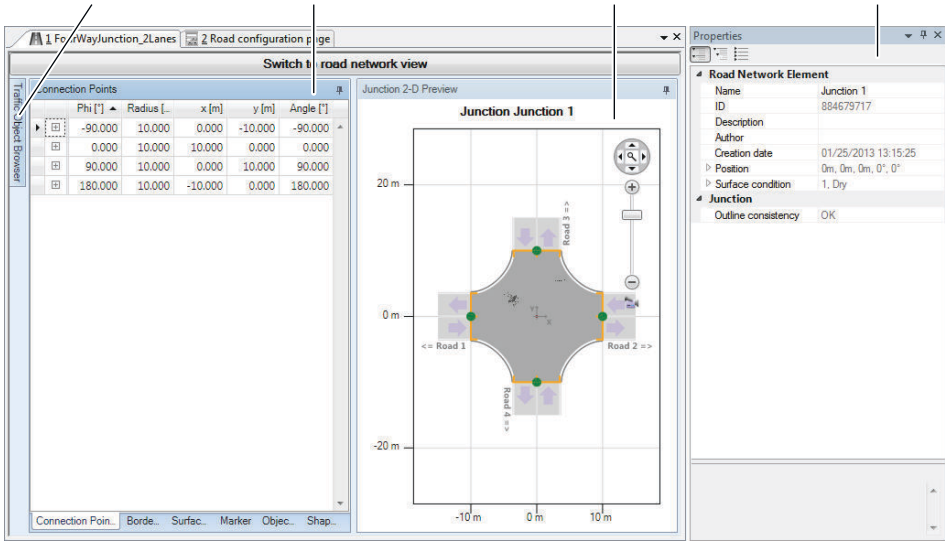
It provides different panes that you can arrange in any order. The following illustration shows an example of the Junction view:

- Connection Points pane
- Borders pane
- Surfaces pane
- Marker pane
- Objects pane
- Shapes pane

Traffic Object Browser

Junction 2-D Preview pane

Properties pane



Panes

Connection Points pane Displays a list of the junction's connection points. The positions and number of lanes in the connection points can be modified in this pane. More properties can be modified in the Properties pane.

Borders pane Lets you specify the type of border, the type of road marking, and the type of scenery for the junction's borders. More properties can be modified in the Properties pane.

Marker pane Lets you add position markers to an element and modify them. More properties can be modified in the Properties pane.

Surfaces pane Lets you specify additional or alternative surface conditions. You can specify areas with a different friction coefficient or a different tire parameter set than the remaining junction. The values of the properties can be specified in this pane and the Properties pane.

Objects pane Displays the position of traffic objects (e.g., traffic signs) and lets you modify them. The Traffic Object Manager lets you specify the properties of the traffic objects.

Shapes pane Lets you add shapes to an element and modify their type and position. Lets you modify the node elements of shapes to specify their course. More properties of the shapes can be modified in the Properties pane.

Traffic Object Browser Displays all the traffic objects that are specified in the ModelDesk project. It lets you select traffic objects for the road or junction element.

Junction 2-D preview pane Displays the profile of the junction in a 2-D preview. The currently selected element (position marker, surface condition, connection point, traffic objects, or border) is highlighted.

Properties pane Displays and lets you specify properties for different elements. The properties are grouped in categories. The contents of the pane depend on the pane that is currently active. The Properties pane can be hidden or shown by using the Switch Controlbars command in the View - Controlbar ribbon group.

Related topics

Basics

Graphical User Interface of the Road Element View.....27
Graphical User Interface of the Road Network View.....25

HowTos

How to Customize the Screen Arrangement (ModelDesk Basics 🕮)
How to Switch Views in the Road Generator.....32

References

Reset Layout (ModelDesk Basics 🕮)

How to Switch Views in the Road Generator

Objective

The Road Generator provides different views and different ways to switch them.

Views in the Road Generator

There are three different views in the Road Generator:

- Road Element view
- Junctions view
- Road Network view

Switching views

There are several ways to switch the view. See the following table:

From	To	By
Road network view	Road element view	▪ Double-clicking a road element in the Road Network 2-D Preview pane ▪ Double-clicking the arrow next to a road element's name in the Road Network pane ▪ Selecting a road in the Road Network pane and clicking Edit Road on the context menu
Road network view	Junction view	▪ Double-clicking a junction in the Road Network 2-D Preview pane ▪ Double-clicking the arrow next to a junction's name in the Road Network pane ▪ Selecting a junction in the Road Network pane and clicking Edit Junction on the context menu
Road element view	Junction view or Road Element view	▪ Double-clicking a connection point in the Height Profile or the Lateral Slope Profile pane
Road element view	Road network view	▪ Clicking Switch to road network view at the top of the Road Generator
Junction view	Road element view	▪ Double-clicking the name of a connected road element in the Junction 2-D Preview pane ▪ Double-clicking a connection point in the Junction 2-D Preview pane
Junction view	Road network view	▪ Clicking Switch to road network view at the top of the Road Generator

Related topics

Basics

Graphical User Interface of the Junction View.....30

Graphical User Interface of the Road Element View..... 27
Graphical User Interface of the Road Network View..... 25

Basics on Roads

Introduction

A road contains several elements which describe its horizontal profile, height profile, lateral profile, lanes, surface and scenery.

Where to go from here

Information in this section

Overview of Roads.....35
Gives you an introduction to the road.

Coordinate System Used by the Road Generator.....37
Provides information on the coordinate system which is used by the Road Generator.

Horizontal Profile of a Road Element.....40
The horizontal profile describes the longitudinal direction of a road in the x-y plane.

Profile of a Junction.....43
The profile of a junction in the x-y plane is determined by connection points and borders.

Height Profile of a Road Element.....45
Gives information on modeling the height profile of a road.

Lateral Slope Profile of a Road Element.....47
Gives information on modeling the lateral slope profile (vertical profile) of a road.

Lanes of a Road Element.....48
Gives information on lanes section, lanes, and road markings.

Lines.....51
Lines are used for road marking of lanes on road elements, the borders of a junction, and shape objects of a line type.

Surface Condition.....54
Gives information on modeling the surface condition.

Additional Height Profiles.....55
Gives information on modeling additional height profiles.

Scenery.....56
You can specify scenery type for the road in ModelDesk. MotionDesk can then generate scenery beside the road network.

Texture Maps for Roads.....60
Shows how to specify texture maps for road elements and junctions.

Static Objects.....61
In ModelDesk, you can specify which traffic objects are used as static objects. 3-D objects which correspond to the traffic objects are placed in the MotionDesk scene on the road and junction elements.

Position Markers.....61
Gives information on the use of position markers.

Shapes.....62
Using shapes on a road element or junction, you can add additional lines (independent from the lanes), rows of traffic objects, or barriers to a road. Shapes are also used to specify driving trajectories that are independent from road lanes.

Trajectories.....64
You can specify trajectories for road elements and junctions.

Routes on a Road Network.....66
Gives information on modeling routes.

Overview of Roads

Introduction

The following topics provide basic information on roads. The Road Generator is used to specify roads and afterwards to generate the road parameter data used in the simulation model and a 3-D object for visualization in MotionDesk.

A road is described by its geometry, appearance and characteristics. The parts of a road can be specified separately.

Road model

A road model can consist of several connected elements.

Road element An element of a road without junctions. It can have different shapes. Its height and lateral profile can be parameterized.

Junction An element of a road with at least two connections connecting road elements. Using junctions and road elements, you can model crossroads, for example. To get a steady connection between road elements and the junction, you can adapt the properties of the junction's connection points to the properties of the connected road elements. For example, the height, the lateral slope profile, and the lane settings.

Road network A road network consists of several connected road elements and junctions. Routes can be defined on a road network.

Road Any model created with the Road Generator.

Road element geometry

Horizontal profile A profile that describes the road in the x-y plane. The horizontal profile can consist of several segments of different shapes (straight, circular, clothoid, or cubic spline) that are connected seamlessly. The reference line of the road is also defined with the horizontal profile.

The road length is limited only by the memory available on the host PC and on the real-time platform.

Height profile A profile that describes the height of the road relative to its reference line. The height profile is specified by several height points. The height between the points is interpolated linearly or by specifying a transition length.

Lateral slope profile A profile that describes a slope in the road's lateral profile. The slope profile of the road is specified by several angle points. The slope of the road between the specified points is interpolated linearly.

Road element properties

The appearance and characteristics of a road element can be specified independently of its geometry via properties from these groups:

Lane section A road can have one or more lane sections. Each lane section can have up to 100 lanes.

Lane A lane can have an individual width and road markings. The central lane can have road markings on both sides, all other lanes can have road markings at the outside edge. The direction of travel for each lane has to be defined. For each possible direction of travel one lane has to be defined as the preferred one.

You can specify whether a lane can be used for driving.

Junction properties

Connection point Road elements and junctions are connected in connection points. The positions of the connection points can be parameterized, which will affect the road network's profile.

Borders The borders of a junction can be specified. There are two types of borders: straight and spline. There are also different types of road markings on the borders.

Road element and junction properties

These properties can be specified for road elements and junctions.

Position markers Position markers can be placed on road elements and junctions. They are used to define the movement of vehicles on road networks.

Surface condition The characteristics of the road's surface can be specified by a tire parameter set and the friction coefficient of the road. You can specify the parameters for the whole road and areas within the road such as low-μ areas.

Additional height profiles Additional height profiles can be added to the road's height (also defined by the height profile and the lateral slope profile for road elements) for areas within the road such as bumpy areas.

Scenery A road element can have one or more scenery sections in which the road's margin is specified. The junction's scenery can be specified for each border.

Shapes Objects that you can use to add multiple elements of the same type to a road network element. Shapes consist of two or more nodes that define a

course. Elements, such as lines, any kind of traffic objects, and barriers can be placed along this course. This feature is useful to model an area for a roadwork scenario.

Static objects Objects that are static in the environment for a simulation and used for object detection sensors. For visualization they are represented by 3-D objects in the scene.

Road network properties

Traffic type You can specify right-hand or left-hand traffic for a road network.

Routes Routes can be defined on a road network. Road elements and junctions can be added to or deleted from a route. These routes can be used in scenarios in ModelDesk.

Related topics

Basics

Features of the Road Generator.....24

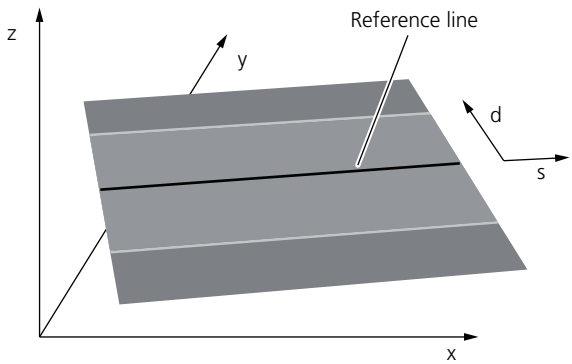
Coordinate System Used by the Road Generator

Introduction

The following topic provides information on the coordinate system which is used when a road network is specified in the Road Generator.

Coordinate system used for road elements

The following illustration shows the coordinate system which is used for specifying the positions and orientation of road elements:



x, y, z coordinates The position of a road element is specified in the earth coordinate system. As the road is a three-dimensional model, the coordinate

system is a Cartesian coordinate system with three axes (x, y, z). The road reference line is in the x-y plane and the road's height is in z direction.

s, d coordinates The horizontal profile specifies the reference line of the road element. The reference line is defined by the road segments in the x-y plane. The direction of the reference line is described by the s vector. The d vector is orthogonal to the s vector.

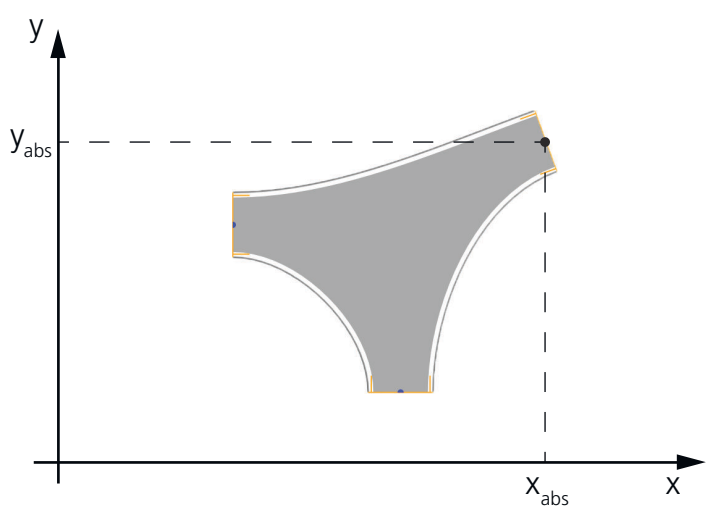
Coordinate system used for junctions

The position and orientation of a junction is determined by the position of a reference point and by its connection points. When a junction is created, a reference point is determined automatically. In the Junction 2-D Preview, this reference point is marked as the origin of the small x and y axes in the junction.

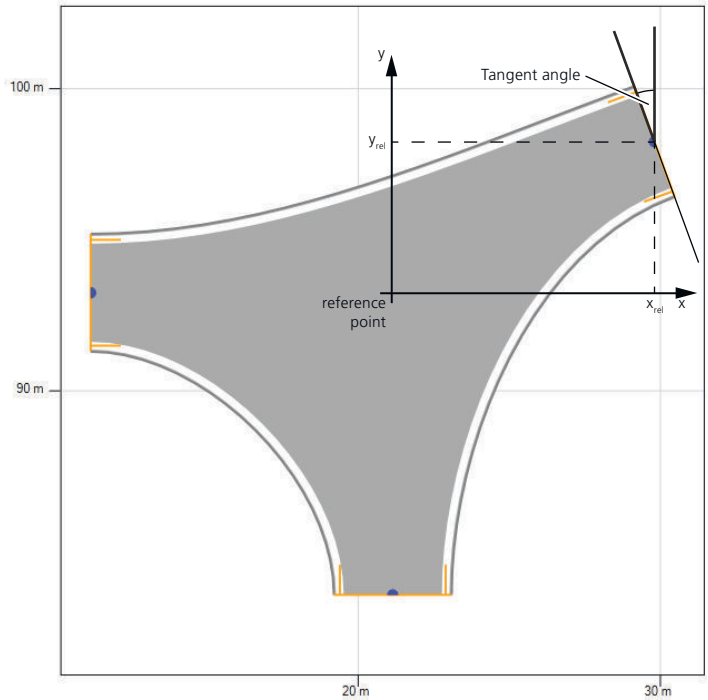
Absolute position of junction The absolute position of the junction can be defined by the position of its reference point in a Cartesian coordinate system with three axes (x, y, z). Its orientation is defined by a tangent angle.

The positions of the connection points can be defined in three different ways:

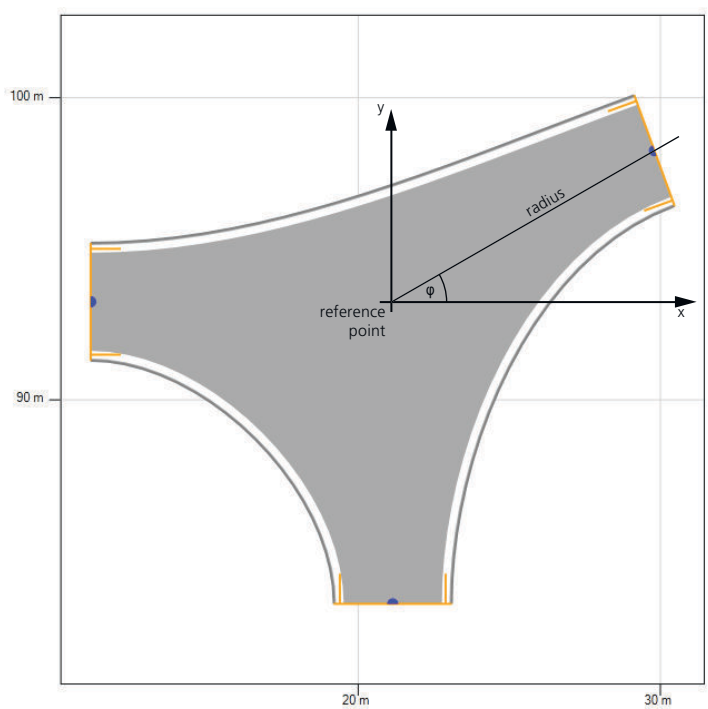
Absolute position of connection point The absolute position of a connection point is described in a Cartesian coordinate system with three axes (x, y, z). The connection point is specified by its position in this coordinate system and by the tangent angle (= the angle of the tangent in the connection point). See the following illustration:



Relative position of connection point with Cartesian coordinates When a junction is created, a reference point is determined automatically. There is a Cartesian coordinate system with three axes (x, y, z) with this reference point as its origin. The connection point can be specified by its position in this coordinate system and the tangent angle (= the angle of the tangent in the connection point). See the following illustration:



Relative position of connection points with polar coordinates The position of a connection point can be defined with polar coordinates. The radius (= the distance from the junction's reference point) and the φ-angle (= the angle by which the connection point is rotated counterclockwise from the x-axis) on this point can be specified. See the following illustration:



Horizontal Profile of a Road Element

Introduction

The horizontal profile describes the longitudinal direction of a road element in the x-y plane.

Segment types

A horizontal profile consists of several segments which are connected to build a road element in longitudinal direction. The **Road Generator** provides four segment types:

- Straight segment
- Circular segment
- Clothoid segment
- Cubic spline segment

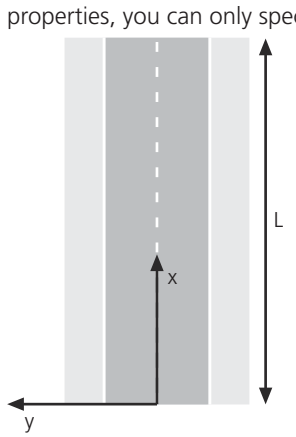
The coordinates and angle of a segment's starting point are equal to the coordinates and angle of the end point of the preceding segment. The first segment starts with the coordinates and angle that are specified for the road element.

The segments specify the road's horizontal profile in the x-y plane. The other profiles (height and lateral) can be specified independently of the horizontal profile.

Roads can be either open or closed. In a closed road, the end point is connected to the start point and the vehicles can drive numerous laps.

Straight segment

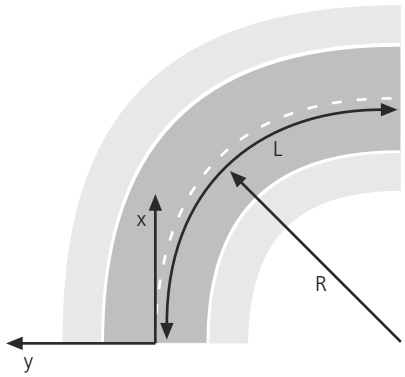
A straight segment is specified by its starting point and length. In the horizontal properties, you can only specify the segment's length.



Circular segment

A circular segment has a constant radius. In the horizontal properties, the circular segment can be described by two of three parameters (length, radius or angle). You can specify two parameters and the Road Generator calculates the third parameter. The parameters are measured with the center line as the reference

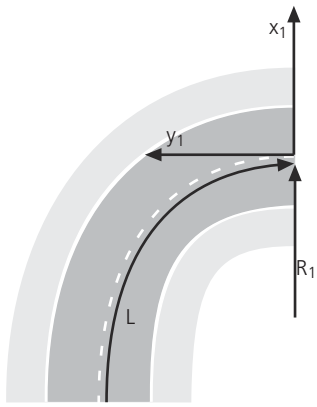
line. See the illustration below. A positive radius creates a left-hand bend, and a negative radius creates a right-hand bend.



The segment's length and radius specify its curve and the coordinates and angle of its end point.

Clothoid segment

A clothoid segment is a transition curve with a variable curvature which you can use for smooth transitions between segments. This makes it easy to drive along the road because the curvature is smooth.

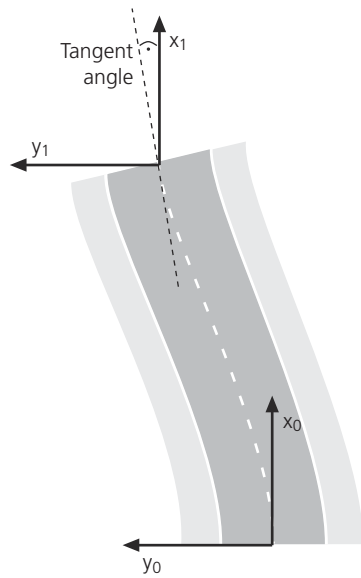


A clothoid segment is a transition curve with a variable curvature. The curvature monotonically changes from a start radius to a specified radius at the segment's end point. The start radius is identical to the end radius of the preceding segment.

You can specify the segment's length and end radius in the horizontal properties. A positive radius creates a left-hand bend, and a negative radius creates a right-hand bend. An infinite radius creates a straight line at the segment´s end point, which is needed for the transition to a straight line in the next segment.

Cubic spline segment

With a cubic spline segment, you can connect the preceding segment to a specific point in the horizontal without having to specify the segment's shape directly. The Road Generator creates a smooth transition by creating a fourth-order spline.



A cubic spline segment is an interpolated curve specified by its starting and end points, and a tangent angle. It is also possible to specify the coefficients of two polynomial functions (one for the x coordinate and one for the y coordinate) to define the cubic curve of the spline.

Specifying by end values You can specify the segment's end point by the point's coordinates and the segment's tangent angle in the horizontal properties. The tangent angle specifies the angle between the tangent in the end point and the x-axis of the segment's starting point. An end point with a positive angle value is counterclockwise from the x-axis, and an end point with a negative value is clockwise.

You can specify relative or absolute segment coordinates. Relative coordinates are set in relation to the preceding segment. The x-axis of the cubic spline segment is aligned to the end point's tangent of the preceding segment. Absolute coordinates are set in relation to the origin of the coordinate system.

Specifying polynomial functions Advanced users can specify the coefficients of polynomial functions. In this case, the x coordinates are calculated with the following formula valid for 0 ≤ t ≤ 1:

$$x(t) = A_x + B_x\, t + C_x\, t^2 + D_x\, t^3$$

$A_x \ldots D_x$ are the coefficients for the polynomial function in the x direction.

The y coordinates are calculated with the following formula valid for 0 ≤ t ≤ 1:

$$y(t) = A_y + B_y\, t + C_y\, t^2 + D_y\, t^3$$

$A_y \ldots D_y$ are the coefficients for the polynomial function in the y direction.

Related topics

Basics

Coordinate System Used by the Road Generator.....37

HowTos

How to Specify the Horizontal Profile of a Road Element.....76

Profile of a Junction

Introduction

The profile of a junction in the x-y plane is determined by connection points and borders.

Connection points

A junction has at least two connection points. Each connection point provides the connection between the junction and one road element. Several road elements can be connected to a junction. The profile and orientation of a junction is determined by the number and positions of its connection points. A connection point can have different states, which indicate whether it is consistent.

To get a steady connection of the connection points of junctions and road elements, some properties must be identical:

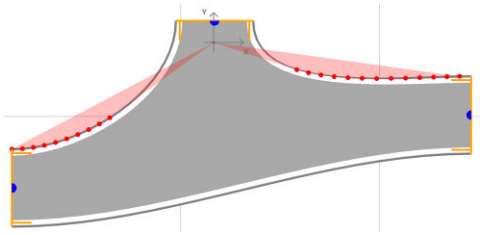
- The position (x, y, and z coordinates) and orientation
- The border width
- The lateral slope
- The arrangement and number of the lanes

Reference point

The reference point is the origin of the coordinate system on the junction. It defines the absolute position and orientation of the junction. You can define the x and y-rotation and the z coordinate of a reference point. The junction's profile results from the definition of the reference point and the definition of its connection points.

Valid junction

A junction is valid when each point of its border and connection points has a unique angle related to the reference point. The following illustration displays an invalid junction. This is indicated by red dots on the border.

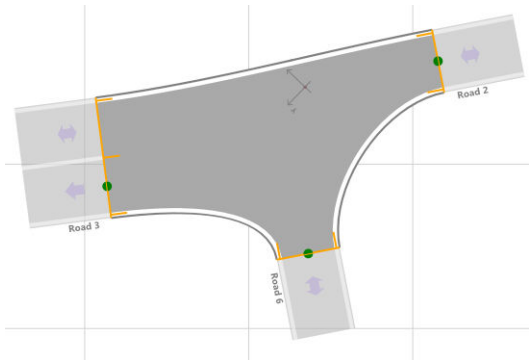


You can make a junction consistent by moving its reference point manually (refer to Move Reference Point to Here on page 223) or automatically (refer to Find Valid Reference Point on page 216).

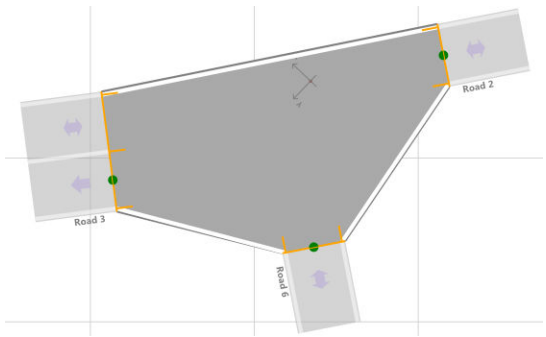
Borders

There are two types of junction borders:

- Spline



- Straight



The type of border influences the profile of the junction, not its orientation.

You can use predefined line types to specify lines for marking the border, or you can specify your own line type. Refer to Lines on page 51.

Related topics

Basics

Coordinate System Used by the Road Generator..... 37

References

Road Network 2-D Preview Pane..... 188

Height Profile of a Road Element

Introduction

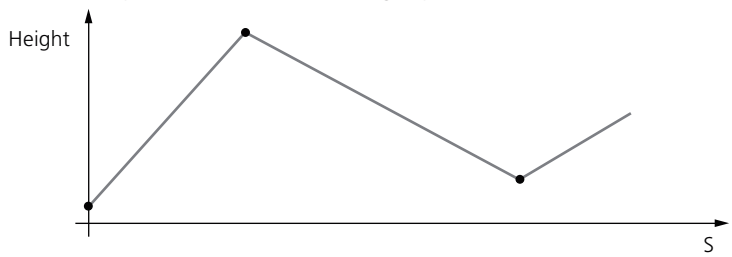
This topic gives information on modeling a road element's height profile.

Height profile

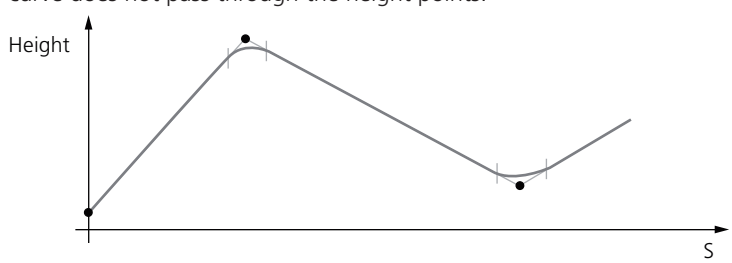
The height profile is defined by several sampling points (height points). The sampling points define the height of the road element's reference line.

The height of the road between the height points is interpolated. You can choose between three interpolation methods.

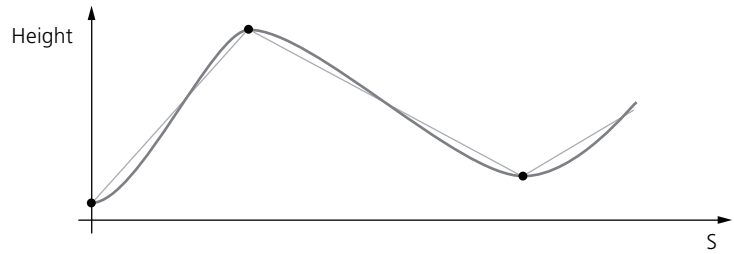
- Linear interpolation between the height points



- Smoothing interpolation within an interval around the height points. The size of the interval can be set individually for each height point. The smoothed curve does not pass through the height points.

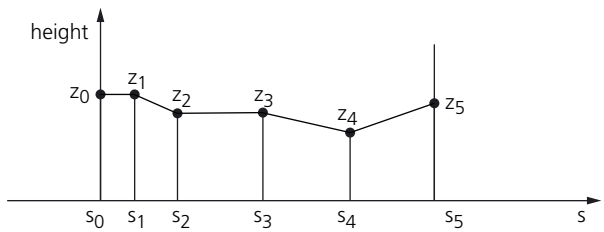


- Piecewise cubic spline interpolation between the height points. The interpolated curve passes through all height points.

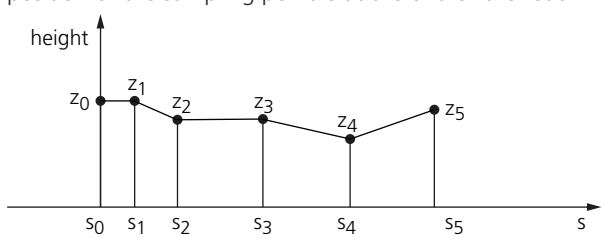


The height of the road's starting point is equal to the z value which is specified as the start parameter for the road.

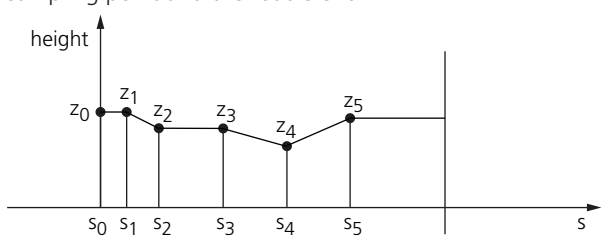
If the road is closed, the Road Generator sets the height of the road's end equal to the height of the road's starting point, see the following illustration where $z_0 = z_5$.



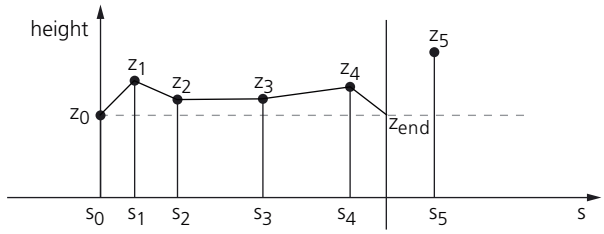
If the road is not closed, the height of the road's end is equal to the height of the last sampling point. The following illustration shows the height profile if the position of the sampling point is at the end of the road.



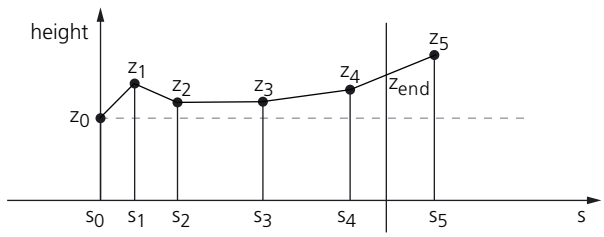
The following illustration shows the height profile if the last sampling point is before the road's end. In this case, the height is constant between the last sampling point and the road's end.



If a sampling point is after the road's end and the road is closed, the sampling point is ignored and the height of the road's end is equal to the road's starting point, see the following illustration.



If a sampling point is after the road's end and the road is open, the height of the road's end is calculated by linear interpolation, see the following illustration.



Related topics

HowTos

How to Specify the Height Profile of a Road Element 77

References

Height Properties 250

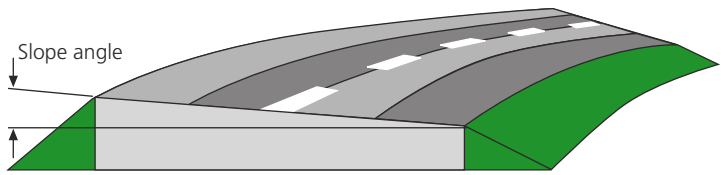
Lateral Slope Profile of a Road Element

Introduction

This topic gives information on the modeling of a road element's lateral profile (vertical profile).

Lateral profile

The lateral profile defines the profile of a road orthogonal to the longitudinal profile. The lateral profile lets you model slopes from one side of the road to the other. A slope is defined by a slope angle, see the following illustration.



The lateral profile is defined by several sampling points (slope angle points). A sampling point specifies the slope angle at a position within the road. The slope angle between the slope angle points is interpolated linearly.

If the road is closed, the **Road Generator** sets the slope angle of the road's end equal to the slope angle of its starting point.

If the last sampling point is before the road's end, the slope angle is constant between the last sampling point and the road's end.

Related topics

HowTos

How to Specify the Lateral Slope Profile of a Road Element..... 80

References

Lateral Slope Properties..... 253

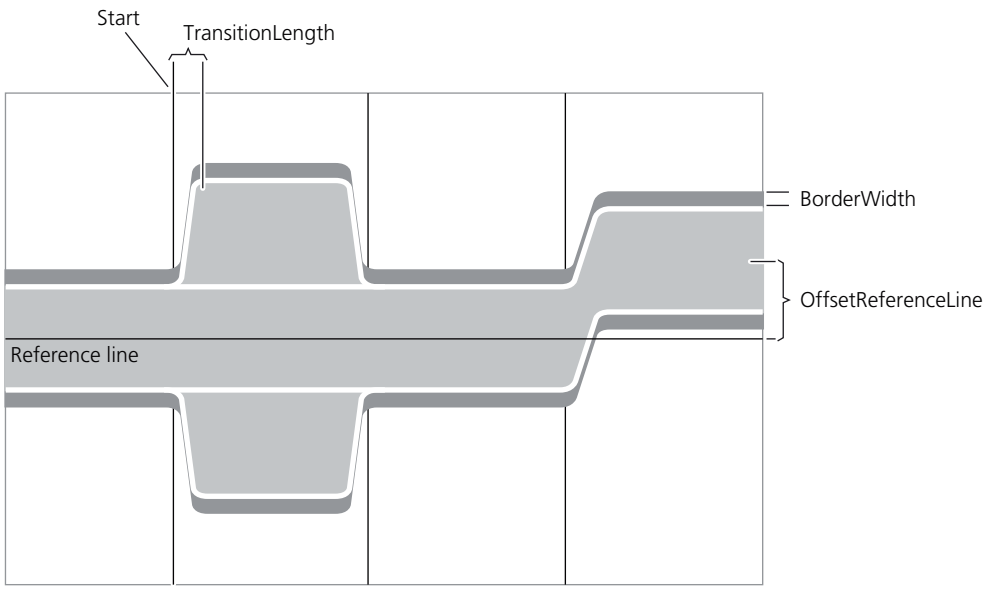
Lanes of a Road Element

Introduction

The topic gives information on lane section, lanes, and road markings.

Lane section

A road can have one or more lane sections that can be specified independently of the road's segments. Because there is no gap between lane sections, the start position of a lane section results from the end position of the previous lane section. The following illustration shows an example of lane sections.



You can specify the following properties for each lane section:

- Number of lanes
- Length of the section
- Transition length (length within a lane section where it is adjusted to the previous lane section)
- Offset to the reference line (distance between the center of the central lane and the reference line)
- Width of the border

Lanes

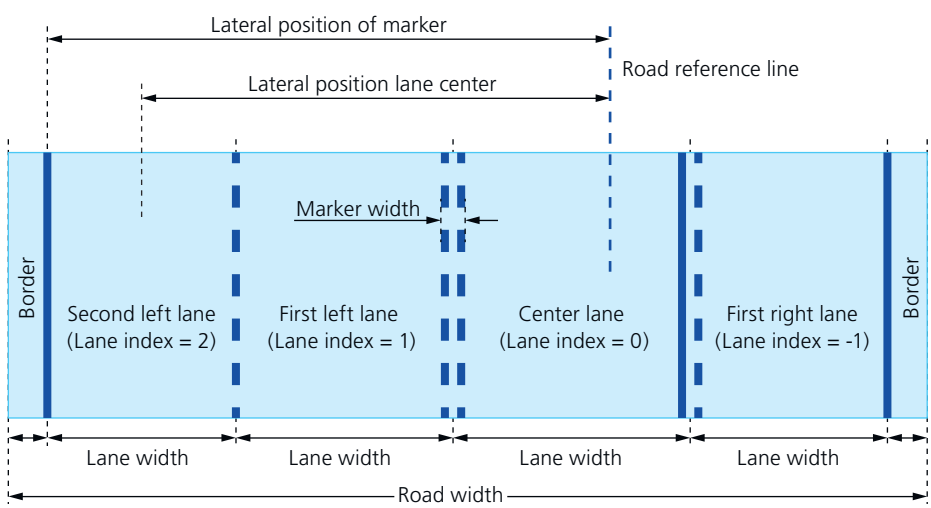
A lane section can contain up to 100 lanes. It has at least one lane (central lane) and can contain additional lanes (outer lanes).

You can specify the following properties for each lane:

- Width
- Lateral offset to the reference line (central lane only)
- Road markings on both sides for the central lane and on the outer sides for the outer lanes, see below
- Direction of travel
- Is preferred (direct or oncoming)
- Is drivable

Lane index

Each lane has an index. The central lane has index 0, left-side lanes have positive indices 1, 2, 3, … and right-side lanes have negative indices -1, -2, -3, ….



Lateral offset

The central lane can have a lateral offset to the road reference line.

The curvature calculated by the road depends on the lateral offset d to the road reference line according to the following formula:

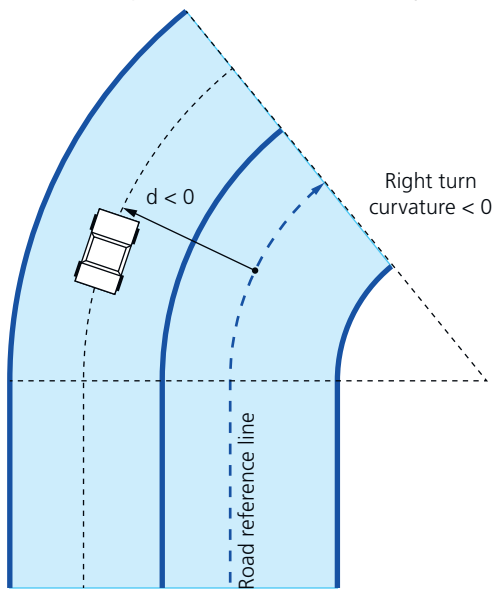
$$\kappa(\mathrm{s,d}) = \frac{\kappa_{rl}(\mathrm{s})}{(1 - d\,\kappa_{rl}(\mathrm{s}))}$$

Where

$\kappa_{rl}(\mathrm{s})$ Is the curvature of the reference line at position s

$\kappa(\mathrm{s,d})$ Is the curvature at the lateral offset d on the road

The lateral offset is positive on the left side of the road reference line and the curvature is positive for a left turn, always seen in direction of increasing s.

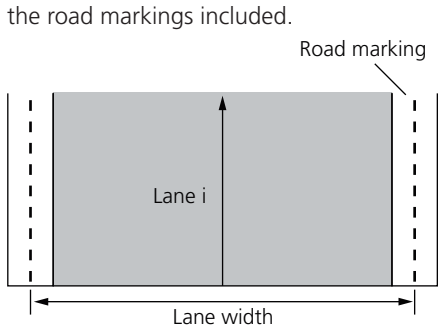


Road markings

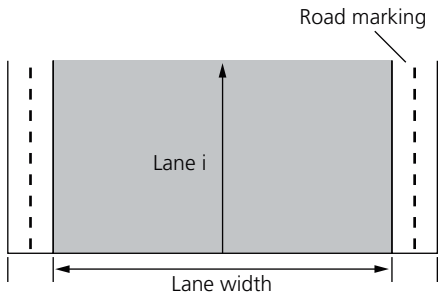
You can specify lines for the road marking of the lanes. A central lane can have road markings on both sides. The outer lanes can have only a road marking at the outer side. You can use predefined line types or specify your own line type. Refer to Lines on page 51.

Lane width and road markings

The width of the lane can be defined with or without the road markings. The following illustration shows an example where the lane width is measured with the road markings included.



The following illustration shows an example where the lane width is measured without the road markings.



The lane width definition is specified with a global road property, so it is valid for all lane sections.

Direction of travel

The direction of travel on a lane can be specified as one of the following:

- Direct
- Oncoming
- Bidirectional

Preferred lane

In each direction of travel, one lane can be specified as the preferred one. This means that the lane is normally used by vehicles traveling in this direction.

Is drivable

You can mark lanes as not drivable. If a lane is not drivable, the vehicles cannot drive on this lane nor crossing this lane. You can use this feature to model a separation between oncoming and direct directions of travel on highways, for example.

Related topics

HowTos

How to Specify Lane Sections and Lanes on Road Elements..... 81

Lines

Introduction

The Road Generator lets you specify lines for lane sections of a road, the borders of junctions, and shape objects of the Line type.

Line properties

The Road Generator provides solid, dashed, and bi-colored lines. You can specify the following properties for a line:

- Line width
- Line color
- Initial offset
- Length of the gap and the line for dashed lines
- 2 colors and 2 line lengths for bi-colored lines

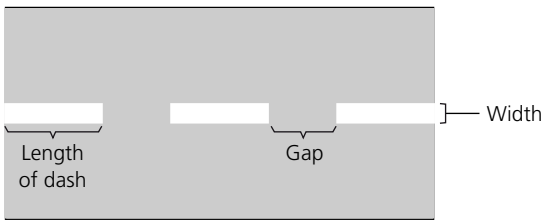
For lines on lane sections of road elements and on borders of junctions, you can specify a double line (number of lines: 2). Then you can specify the two lines independently as described above. You can also specify the following additional properties:

- Distance between the lines
- Color of the space between the lines
- A texture, such as stripes, in the space between the lines
- Margin of the lines

Preset line types

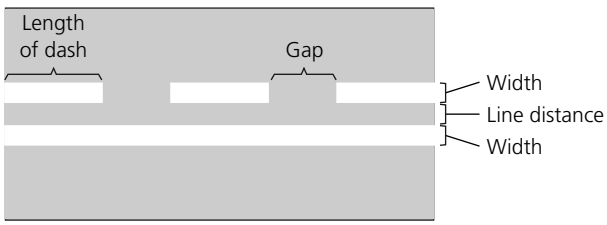
The Road Generator provides several presets of lines that you can use to get initial settings for lines.

Dash A Dash preset has one dashed line.

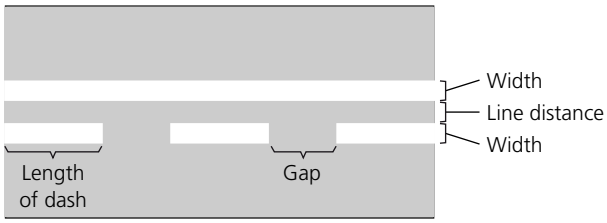


Solid A Solid preset has one solid line.

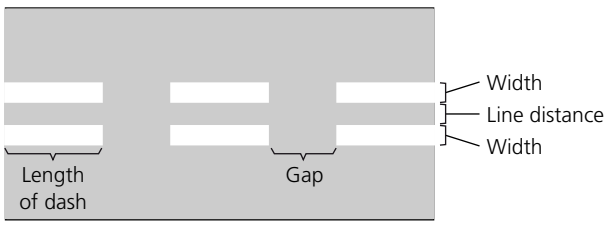
DashSolid A DashSolid preset has two lines: a dashed line and a solid line. The DashSolid preset is not available for shape objects.



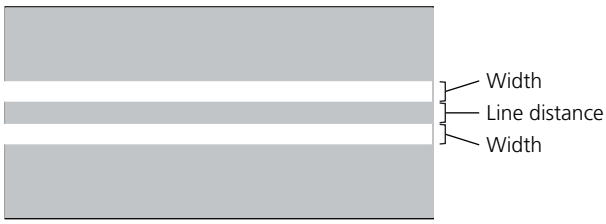
SolidDash A SolidDash preset has two lines: a solid line and a dashed line. The SolidDash preset is not available for shape objects.



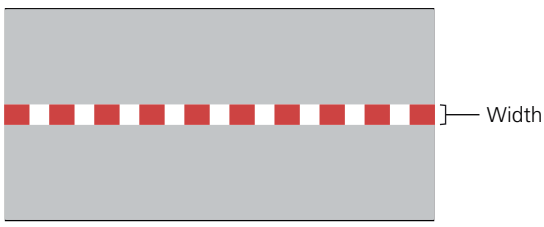
DoubleDash A DoubleDash preset has two dashed lines. The DoubleDash preset is not available for shape objects.



DoubleSolid A DoubleSolid preset has two solid lines. The DoubleSolid preset is not available for shape objects.



Race A Race preset has one line with two colors.



Related topics

References

Line Sensor (ASM Traffic Reference 🕮)
Lines Properties..... 254

Surface Condition

Introduction

This topic gives information on modeling the surface condition of road elements and junctions.

The surface condition is determined by the tire parameter set used for the simulated vehicle and the friction coefficient of the road surface.

Tire parameter set

You can specify 4 tire parameter sets in the ASMs. A parameter set corresponds to a particular weather/road condition (dry, damp, wet, or icy). When a tire of the ASM vehicle drives on the specified area, the selected parameter set is used in the simulation.

One tire parameter set is selected as a global property for each road element or junction.

In addition, you can specify areas within the element where another tire parameter set is used. You can place these areas anywhere on and outside of the road and specify their sizes.

For road elements, an area's position is defined by their starting points, one s value for the distance along the road reference line and one d value for the lateral offset perpendicular to the reference line. If you specify overlapping areas, the simulation model uses the settings of the area with the highest s coordinate for each position on the road.

For junctions, the tire parameter set can be specified by the x and y values and the tangent angle in relation to the junction's reference point, or in absolute coordinates.

Friction coefficient

You can use the friction coefficient to include the effects of weather conditions on the road. The parameter reduces the friction of the road's surface.

One friction coefficient is specified as a global property for each road element or junction.

In addition, you can specify areas within the element where different friction coefficients are used. These areas can be placed freely on and outside of the road.

For road elements, an area's position is defined by the starting points, one s value for the distance along the road reference line and one d value for the lateral offset perpendicular to the reference line. If you specify overlapping areas, the simulation model uses the settings of the area with the highest s coordinate for each position on the road.

For junctions, the tire parameter set can be specified by the x and y values and the tangent angle in relation to the junction's reference point, and in absolute coordinates.

Outside of the road network

Outside of the road element or junction, the friction coefficient is set to constant 0.7 and the tire parameter set is set to 1 (dry).

Related topics

Basics

Coordinate System Used by the Road Generator.....37

HowTos

How to Specify Areas with Specific Surface Conditions or Textures.....86

Additional Height Profiles

Introduction

This topic gives information on modeling additional height profiles that are specified by areas within the road's surface.

Basics

Additional height profiles are specified for areas within the road. They are added to the road's height profile and to the height defined by the lateral slope. You can use this feature to model a bumpy road. If several height profiles overlap, all their height is added to form the total height at that point.

The Road Generator provides two ways to specify additional height profiles:

- You can use areas where the additional height profiles are described by a sinusoidal or trapezoidal function.

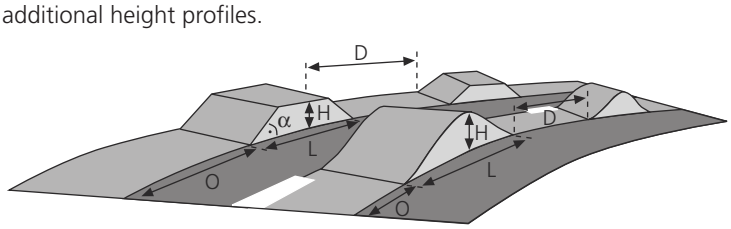
  This is only possible for road elements, not for junctions.
- You can specify an area by a map.

  This is possible for road elements and junctions.

Trapezoidal or sinusoidal profiles

Trapezoidal or sinusoidal areas usually have several additional height profiles of the same type and with the same parameters. The additional height profiles in an area are consecutive.

The following illustration shows an example of two areas, each with two additional height profiles.



An area and its profiles are specified with the following parameters:

- Profile type (sinusoidal or trapezoidal)
- Starting point of the area in s and d coordinates, see Coordinate System Used by the Road Generator on page 37
- Length of the area
- Width of the area
- Lengths of the profiles
- Heights of the profiles
- Number of profiles
- Distance between profiles
- Leading angle of the trapezoidal profile

Maps

In map areas, you can specify the additional height profile using sampling points. These are defined by s and d coordinates on road elements and by absolute or relative coordinates on junctions. The additional height profile between the specified sampling points is interpolated linearly. An area with a map is specified with the following parameters:

- Starting point of the area
  - On road elements: relative to the road elements starting point (s and d coordinates)
  - On junctions: in absolute coordinates or relative to the junction's reference point (x, y and z value and tangent angle)
- Length and Width
- Table containing the sampling points

Tip

You can use a texture map on the same area to visualize the map with additional height profiles, refer to How to Specify Areas with Specific Surface Conditions or Textures on page 86.

Related topics

Basics

Coordinate System Used by the Road Generator.....37

Scenery

Introduction

You can specify scenery type for the road in ModelDesk. MotionDesk can then generate scenery beside the road network. This is a convenient way to create basic scenery, which you can add to and modify in MotionDesk.

Scenery

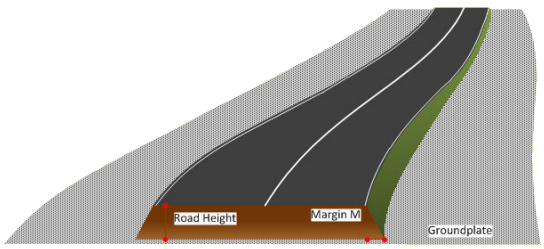
There are different configurations of scenery with different properties to be specified. The margin and scenery of a road element are defined by scenery sections, each of which can have one of these configurations: Batter, Bridge, Country road, City, Alley (tree-lined road), or Highway.

The vehicle can drive on the road scenery. The height of the road margin is calculated according to the scenery configuration. The height outside of the road scenery is zero.

Note that only two scenery configurations are possible for junctions: batter and bridge.

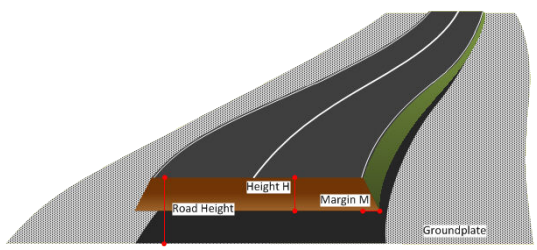
Batter

In a batter configuration the height of the margin is specified by the height of the road (distance of the road to the base plate).



Bridge

In a bridge configuration the height of the margin can be specified to model a bridge with a road. In contrast to a batter, the road section is not connected to the base plate.



Country road

In a country road configuration, there are trees and reflector posts along the scenery section. The following illustration shows an example of a country road in MotionDesk.

City

In a city configuration, there are buildings, sidewalks and street lights along the scenery section. You can specify different types of buildings: rural, urban, or metro. The following illustration shows an example of a rural city in MotionDesk.

The following illustration shows an example of an urban city.

The following illustration shows an example of a metro city.

Tree-lined road

In a tree-lined road configuration, there are lines of trees and reflector posts along the scenery section. The following illustration shows an example of a tree-lined road.

Highway

In a highway configuration, there are noise barriers, guardrails, and reflector posts along the scenery section. The following illustration shows an example of a highway.

Related topics

HowTos

How to Specify Scenery Sections.....88

Texture Maps for Roads

Introduction

This topic gives information on specifying areas with special textures for road elements and junctions.

Texture maps

With texture maps you can improve the realism of road elements and junctions. It is possible to visualize road markings like arrows, crosswalks, stop lines, etc. Instead of a monotonous gray surface, the road surface can visualize potholes, gully holes, fatigue cracking, etc.

The texture maps are only visible on the road 3-D object in MotionDesk. They do not influence the simulation model.

The following illustration shows an example of a junction with several textures.

Related topics

Basics

Coordinate System Used by the Road Generator.....37

HowTos

How to Specify Areas with Specific Surface Conditions or Textures.....86

Static Objects

Introduction

In ModelDesk, you can specify which traffic objects are used as static objects. 3-D objects which correspond to the traffic objects are placed in the MotionDesk scene on the road and junction elements. You can do this to specify traffic signs for a scene, for example.

Traffic objects

You can use traffic objects on road elements and junctions. Traffic objects correspond to 3-D objects from the MotionDesk object library. When the scene for MotionDesk is generated, the 3-D objects are placed in the scene at the specified position.

In addition, you can define sensor properties for static objects. This makes it possible for object detection sensors to recognize them in the simulation.

For details on traffic objects, refer to Basics of Traffic Objects (ModelDesk Traffic Object Management 🕮).

Related topics

HowTos

How to Add Static Traffic Objects 90

Position Markers

Introduction

This topic gives information on the use of position markers in ModelDesk.

Basics

Position markers serve as trigger points for additional end conditions in the **Scenario Editor**. After specifying position markers in the **Road Generator**, you can define the behavior of a vehicle in relation to them.

Position markers can be specified for each road element or junction individually. The **Markers** pane in the **Road Network** view provides a list of all position markers on the road network.

The position of a position marker can be defined in relative or absolute coordinates. For a road element, the position is defined relative to the start point by its d and s values.

For a junction, the position can be defined relative to the junction's reference point or by its absolute position.

Related topics

Basics

Coordinate System Used by the Road Generator.....37
Creating Traffic of Scenarios (ModelDesk Scenario Creation 🕮)

Shapes

Introduction

You can use shapes on a road element or junction to add additional lines (independent from the lanes), rows of traffic objects, or barriers to a road. Shapes are also used to specify driving trajectories that are independent from road lanes.

Basics on shapes

Shape types Shapes are defined by two or more nodes that form a course. If you use shapes, you can add objects to a road network element or specify trajectories. For example, refer to the following table.

Shape Type	Purpose
Line type	To draw road markings in addition to the lines specified for lanes sections.
Repeating type	To add a series of traffic objects.
Continuous type	To add a predefined continuous barrier.
Trajectory	To add a driving trajectory.

On road elements, the course between the nodes is specified as an offset to the reference line. The offset can be linear or smooth. The coordinates of the shape and its nodes are specified in the coordinate system of the road (s and d coordinates).

On junctions, the course between the nodes is specified linearly (direct connections) or as spline curves. When you select spline section types, you can specify start and end angles to get a suitable course. The coordinates of the shape and its nodes are specified in the coordinate system of the junction (Cartesian coordinate system).

Line type

A shape of the Line type is a line drawn as a road marking on a road network element. You can specify the line in the same way as lines on a lane section, but a Line shape can only be of solid, dashed, or bi-colored type. To specify double lines, you can use two Line shapes.

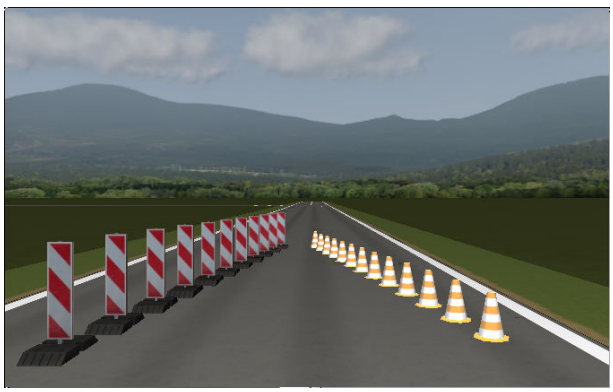
You can specify a level for a Line type. A road network element can have several Line shapes and lines specified by the lane section or border. By specifying the level of a Line type, you can determine which line is visible when the lines overlap.

The following illustration shows an example of using Line shapes. Two Line shapes are used to cross out the arrow of the left turn lane. Other Line shapes are used to draw lines on the junction.

Repeating type

A shape of the Repeating type adds a series of traffic objects to the road network element. You can select one traffic object and specify the course of the shape. Then the traffic object is placed multiple times on the course of the shape. You can specify the distance between the objects and their orientation.

The following illustration shows an example of two Repeating shapes:

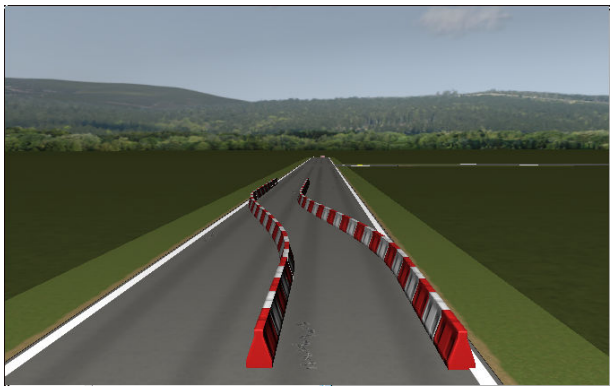


Continuous type

A shape of Continuous type adds a barrier along the course of the shape. ModelDesk provides three different kinds of barriers: concrete barrier, red-and-white barrier, and yellow barrier.

Concrete Barrier	Red-and-White Barrier	Yellow Barrier

The following illustration shows an example of two red-and-white barriers:



Trajectory

A shape of the Trajectory type specifies a course for the ASM vehicle on a road network element. When a route is defined on the road network, the trajectory can be used as an alternative to the preferred lane of the road or automatically calculated junction crossing course. To avoid a gap in the route, the trajectory must always start and end at connection points of the road network element.

Related topics

HowTos

How to Specify Shapes 96
How to Specify Trajectories 121

Trajectories

Introduction

You can specify trajectories for road elements and junctions.

Basics of trajectories

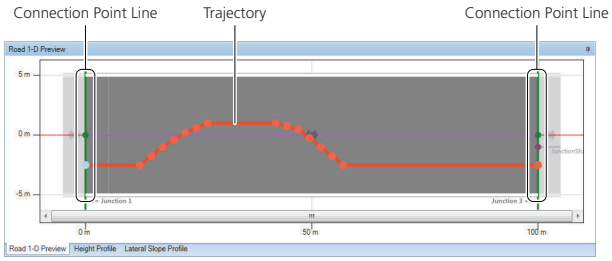
A trajectory describes a path on a road element or a junction. When the movement of a vehicle is simulated, it can follow the path that is specified by the trajectory. You can select trajectories when you specify a route. When a vehicle drives the route, it uses the path defined by the trajectory instead of the default path, which is specified by the preferred lane on road elements or an automatically calculated course for junctions.

Use scenarios

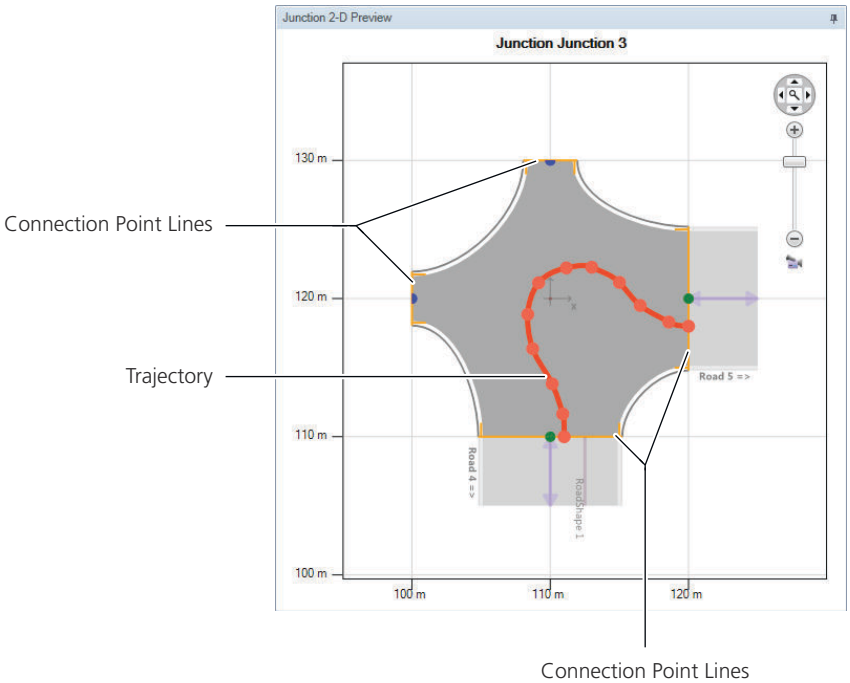
By default, the vehicles follow the path that is defined by the preferred lane of the road network element. When you specify routes, you can select a trajectory as alternative to the default path.

You can use this feature to model use scenarios where the vehicle must drive outside the default path.

The following example shows a preview of a trajectory on a road element. It shows the path of a vehicle that should drive around something which is on its way.



The following example shows a preview of a trajectory on a junction. It shows the path of a truck when it turns to the right and must use a larger radius than a normal vehicle.



Creating a trajectory

A trajectory is a chain of nodes that describes the path. Because they are used in routes, the first node and the last node must be positioned on the connection point line. The connection point line is a line in the lateral direction from the connection point. Only then can the routes be built without gaps.

Trajectories are a type of shapes that you can specify for a road network element. They are specified in the same way as the other shape types. Refer to How to Specify Trajectories on page 121.

Tip

ASM provides a tool that you can use to automatically create a trajectory of a (closed) road. The calculation of the following trajectories is possible:

- Geometrically optimal trajectory with minimal curvature.
- Geometrically optimal trajectory with shortest path length.
- Geometrically optimal trajectory with a compromise between minimal curvature and shortest path length.

Refer to CreateGeoOptTrajectory.py (ASM User Guide 🕮).

Using trajectories

Simulation When trajectories are used in a route, they are considered in the simulation. For details, refer to Fellow Signal Labels (ASM Traffic Reference 🕮).

Visualization Trajectories are not visible in MotionDesk. If you want to visualize their path, you can copy & paste the trajectory in the **Shape** pane. After that you can change the type of the new element to Line. Shapes of the Line type are visible in MotionDesk.

Related topics

Basics

Routes on a Road Network..... 66

HowTos

How to Specify Routes on Road Networks..... 123
How to Specify Trajectories..... 121

References

Shape Properties..... 272

Routes on a Road Network

Introduction

This topic gives information on specifying routes in the **Road Generator**.

Basics

A road model can be used for maneuver and traffic creation in ModelDesk. As a road network can have junctions, a vehicle can take different routes on it. You can define routes in the Road Generator.

To specify a route on a road, the road does not need to be closed.

The **Routes** pane in the **Road Network** view provides a list of all routes on the road network.

A route consists of a list of road elements and junctions that are driven over one after the other.

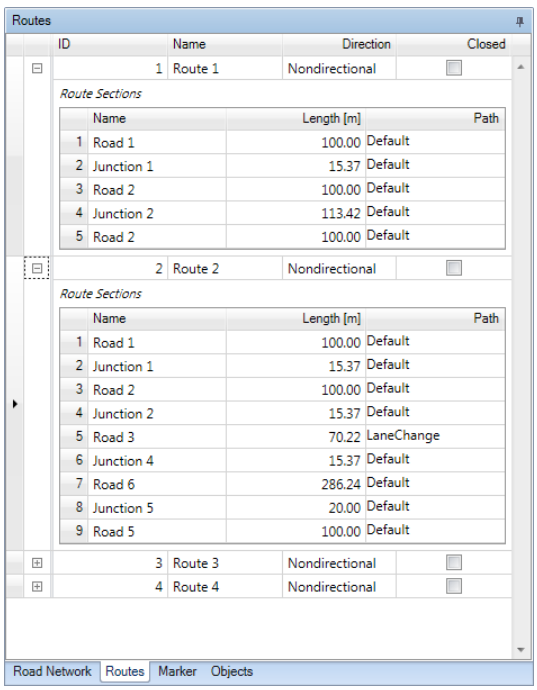
It is possible to specify U-turns on junctions.

A route does not need to be closed. This means that its starting point does not need to be its end point. Several routes can be specified on the same road element and a route can be taken in both directions if allowed by the driving directions specified for the road's lanes.

If a road element or a junction includes the shapes of the Trajectory type, you can select the trajectory as path. This path is used for the vehicle instead of the default path.

A route's consistency is checked automatically. For example, if a road element is deleted after the route has been defined, the route becomes inconsistent and must be restored. A route is also inconsistent if an invalid trajectory is selected.

The following illustration shows the **Routes** pane with specified routes.



Related topics

Basics

Trajectories..... 64

HowTos

How to Specify Routes on Road Networks..... 123

References

Routes Pane..... 189

Creating a Road

Introduction

The following instructions show you how to create a road using the **Road Generator**.

Where to go from here

Information in this section

Workflow for Creating a Road without Junctions.....70
Gives an overview on how to create a road using the Road Generator.

Workflow for Creating a Simple Roadwork Scenario Using Several Lane Sections.....71
Gives an overview of how to create a simple roadwork scenario on a road element. This use case shows how to reduce the number of lanes for a roadwork scenario on the road the ASM vehicle drives on. The workflow bases on using several lane sections.

How to Start the Road Generator.....74
To create or edit a road, you must start the Road Generator.

How to Specify the Horizontal Profile of a Road Element.....76
The horizontal profile of a road defines its longitudinal profile. You should specify the horizontal profile before specifying other profiles.

How to Specify the Height Profile of a Road Element.....77
After specifying the longitudinal profile, you can specify the road's height profile.

How to Specify the Lateral Slope Profile of a Road Element.....80
After specifying the horizontal profile, you can specify the road's lateral slope profile.

How to Specify Lane Sections and Lanes on Road Elements.....81
Lane sections determine the number of lanes. Lanes determine the widths of the road elements and the road markings.

How to Specify Additional Height Profiles.....84
You can specify road areas with additional height profiles.

How to Specify Areas with Specific Surface Conditions or Textures.....86
You can specify different characteristics for the surface condition of the whole road and also of road and junction areas.

How to Specify Scenery Sections.....88
Scenery sections determine the margin of a road.

How to Add Static Traffic Objects.....90
You can place traffic objects (e.g., traffic signs) on road elements or junctions.

How to Modify Positions and Orientations of Static Traffic Objects.....92
You can modify the positions, orientations, and other properties of traffic objects.

How to Specify Position Markers..... 94
Position markers for the behavior of vehicles on the road must be specified in the Road Generator.

How to Specify Shapes..... 96
You can specify shapes (e.g., lines, repeating traffic objects, and barriers) for road elements and junctions.

Example for Creating a Guard Rail as Shape..... 100
This example shows how you can create a Guard Rail shape on the basis of a guard rail specified with Highway scenery.

How to Configure User Signals for a Road..... 100
You can specify user signals to provide information on a road to the simulation model.

Workflow for Creating a Road without Junctions

Introduction

This topic gives an overview on how to create a road without junctions using the **Road Generator**.

Workflow

The following steps are the typical way to create a road, but it is not necessary to follow the order strictly.

1. Start the **Road Generator** and specify the global properties. You can modify an existing road or create a new one. For instructions, refer to How to Start the Road Generator on page 74.
2. The horizontal profile specifies the road in the x-y plane. A horizontal profile consists of several segments that are connected. The **Road Generator** provides four different segment types for creating any desired horizontal profile. You can specify open or closed roads. For instructions on building the horizontal profile, refer to How to Specify the Horizontal Profile of a Road Element on page 76.

   The reference line of the road is specified together with the horizontal profile. The reference line forms the coordinate system of the road that is used to specify the other profiles and sections.
3. The height and lateral slope profiles can be specified independently of the segments used for the horizontal profile. However, you should finish the reference line first before specifying the height and lateral slope profiles.

   To specify the height profile, you create several height points along the reference line. The road's height between these points is interpolated. For instructions on creating a height profile, refer to How to Specify the Height Profile of a Road Element on page 77.

To specify the lateral slope profile, you create several lateral slope points along the reference line. The lateral slope is defined by an angle that is constant in lateral direction. The road's lateral slope angles between the lateral slope points are interpolated. For instructions on creating a lateral slope profile, refer to How to Specify the Lateral Slope Profile of a Road Element on page 80.

4. A road can have one or more lane sections. A lane section contains one or more lanes. Each lane can have several characteristics, for example, width or road markings. You can also specify the direction of travel for each lane. For instructions on specifying lane sections and lanes, refer to How to Specify Lane Sections and Lanes on Road Elements on page 81.
5. When you create a road, you specify its global surface conditions (friction and tire parameter set that is used). In addition, you can specify areas on the road where the surface condition is different to the global road settings. The areas can use different tire parameter sets or different friction coefficients. The area's friction coefficient can be constant or you can specify a table containing friction coefficients distributed across the area.

   You can also specify rough or bumpy areas by adding additional height profiles to the height profile of the reference line. You can model the uneven surface with predefined forms (sinus half waves or trapezes) or in a table that can contain any form.

   You can also specify texture maps to be used on the surface of road elements. The **Road Generator** provides arrows, signs, and several other pictures.

   For instructions on specifying friction areas and additional height profiles, refer to How to Specify Areas with Specific Surface Conditions or Textures on page 86 and How to Specify Additional Height Profiles on page 84.
6. A road can have one or more scenery sections. You can specify each scenery section individually. For instructions on specifying a scenery, refer to How to Specify Scenery Sections on page 88.

Related topics

Basics

Overview of Roads.....35
Workflow for Creating a Simple Roadwork Scenario Using Several Lane Sections.....71

Workflow for Creating a Simple Roadwork Scenario Using Several Lane Sections

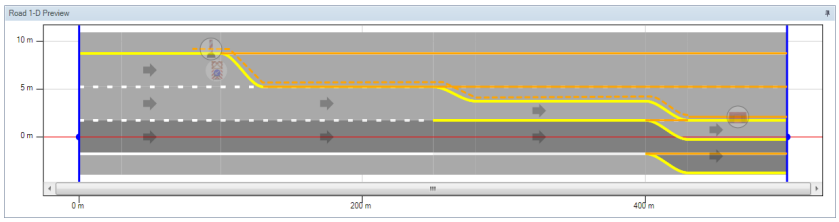
Introduction

This topic gives an overview of how to create a simple roadwork scenario. This use case shows you how to reduce the number of lanes for a roadwork scenario on the road the ASM vehicle drives on. The workflow bases on using several lane sections.

The same use case can be realized by using trajectories, refer to Workflow for Creating a Simple Roadwork Scenario Using a Driving Trajectory on page 104.

Description

In the Road Generator, such a use case can be modeled using one road element that has multiple lane sections. The following illustration displays a preview of a road element prepared for a roadwork scenario.



Road segment For specifying a simple roadwork scenario, one road element is sufficient. In this example, the road segment is a straight segment with a length of 500 m.

Lanes of the roadwork scenario In this example, the road element has 4 lane sections:

1. 0 … 100 m: The first lane section has the default configuration. In this example, it has 3 lanes with a width of 3.5 m each, and both borders have a width of 2 m.
2. 100 … 150 m: In the second lane section, the number of lanes is reduced to 2 lanes. The lanes have a width of 3.5 m. The right border has a width of 2 m. To compensate the elimination of the third lane, the left border has a width of 5.5 m (2 m + 3.5 m).
3. 150 … 300 m: In the third lane section, the width of the left lane is reduced to 2 m. To compensate the reduction, the left border has a width of 7 m (2 m + 3.5 m + 1.5 m).
4. 300 … 500 m: In the fourth lane section, the emergency lane is used as the right lane. The width of the right border is therefore reduced to 0 m. The width of the left border is increased to 9 m. An offset of -2 m to the reference line must be specified. Otherwise, both lanes would still be straight and would not use the space of the emergency lane.

Lines The road markings in a roadwork scenario consist of the white lines that come from the original lanes and the yellow lines that are added to indicate the temporary lanes. To insert the lines, the line settings of the lane sections and shapes of the Line type are used.

1. 0 … 100 m: The first lane section has the default configuration. The lanes are separated by dashed lines. The lanes and the borders are separated by solid lines.
2. 100 … 150 m: In the second lane section, both lanes have the same line settings as in the previous lane section. As the third lane is eliminated, its line is replaced by a shape of the Line type. This line is a white solid line. To separate the left lane from the border, a shape of the Line type is added, which is a yellow solid line. This line must cover the white line of the lane section.

3. 150 … 300 m: In the third lane section, the left lane has a yellow line because the width of the lane is smaller than normal and a temporary road marking must be used. To insert the normal white, dashed line, a shape is added.
4. 300 … 500 m: In the fourth lane section, the yellow solid lines of the temporary lanes are specified with the lane section. The lines that would normally be in this section are realized as shapes.

Traffic objects To guide the vehicles, some objects are added to the road element.

- A shape of the Repeating type is used to separate the left lane from the road works. For this shape, a delineator post object is selected. The course of the shape follows the border of the left lane from the start of the second to the end of the third lane section.
- A shape of the Continuous type is used to separate the left lane from the road works starting in the fourth lane section. The shape's geometry is a red-and-white barrier.
- A warning trailer is added to the left lane in the first lane section. This warning trailer advises oncoming vehicle to change the lanes when the left lane closes. A traffic object is used for this.

Workflow

The following steps are the typical way to create a simple roadwork scenario.

1. Create a road element. Refer to Workflow for Creating a Road without Junctions on page 70.

   When creating a roadwork scenario, specifying height and lateral slope profiles is optional. The profiles can be specified independently of the segments used for the horizontal profile. However, you should finish the reference line first before specifying the height and lateral slope profiles.
2. To create a roadwork scenario, you must specify several lane sections. Only then is it possible to specify different lane numbers and widths. For the simple roadwork scenario shown in the example above, 4 lane sections are specified. The lane sections are used to reduce the number of lanes and to reduce the width of a lane. To avoid the width of the complete road from being reduced, the borders of the lane sections are increased.

   Because the lines are also specified in the lane sections, the type and color of the lines can be modified so that you can specify the white lines for the normal lanes and the yellow lines for the temporary lanes. Refer to How to Specify Lane Sections and Lanes on Road Elements on page 81.
3. After you specified the lane sections, only the lines belonging to the lanes are specified. These are the temporary yellow lines. The lines of the original lanes are missing. You can specify these missing lines by using shapes of the Line type. You can specify any course for a Line shape. Refer to How to Specify Shapes on page 96.
4. To guide the vehicles through a roadwork scenario, you can add 3-D objects such as pylons, delineator posts, and traffic signs. You can do this by adding static traffic objects to the roadwork scenario. Before a 3-D object can be used as a traffic object, you must create it. Refer to ModelDesk Traffic Object Management 🕮.

You can add single traffic objects or a series of traffic objects to the roadwork scenario. To add a series of traffic objects, you can use a shape of the Repeating type. To use this type, select one traffic object and specify a course where this object is to be placed. You can use this, for example, to place delineator posts along a lane. Another kind of object is a shape of the Continuous type. This creates one object along the specified course, for example, barriers. Refer to How to Specify Shapes on page 96 and How to Add Static Traffic Objects on page 90.

5. You can also specify texture maps or surface conditions to be used for road elements. The **Road Generator** provides arrows, signs, and several other symbols. Refer to How to Specify Areas with Specific Surface Conditions or Textures on page 86
6. A road can have one or more scenery sections. You can specify each scenery section individually. In this example, a highway scenery is used. Refer to How to Specify Scenery Sections on page 88.

Related topics

Basics

Overview of Roads.....35
Workflow for Creating a Road without Junctions.....70

How to Start the Road Generator

Objective

To create or edit a new road, you must start the **Road Generator** in ModelDesk.

Preconditions

ModelDesk must be running and a project must be open.

Possible methods

- To create a new road, refer to Method 1 on page 74.
- To edit an existing road, refer to Method 2 on page 75.

Method 1

To start the Road Generator to create a new road

1 You can use one of the following options:
- On the **Environment** ribbon, click **Road** – **New**.
- On the context menu of the **Road** node in the **Project Navigator**, select **New**.

The **Road Generator** is started in the **Road Network** view and a new road is created.

2 If the **Properties** pane is closed, go to the **View** ribbon and click **Controlbar - Switch Controlbars** – **Properties**.

3 In the Properties pane, specify the Road Network Global properties. For a description of the properties, refer to Road Network Global Properties on page 261.

Method 2

To start the Road Generator to edit a road

1 Activate a road and then use one of the following methods:
   - On the Environment ribbon, click Road – Open.
   - On the context menu of the Road node in the Project Navigator, select Open.
   - Double-click the Experiment node in the Project Navigator to open the Configuration page.

     On the page, click Open.
   - Double-click the Road node in the Project Navigator to open the Road configuration page.

     On the page, click Open.

   If you want to edit a road from the Pool, do the following:
   - On the Environment ribbon, click Road – Open from Pool.
   - On the context menu of the Road node in the Project Navigator, select Open from Pool.

   A standard file selection dialog opens. Select a road in the dialog.

   The Road Generator is started in the Road Network view and the road is loaded.
2 If the Properties pane is closed, go to the View ribbon and click Controlbar – Switch Controlbars – Properties.
3 In the Properties pane, you can modify the Road Network Global properties. For a description of the properties, refer to Road Network Global Properties on page 261.

Result

The Road Generator was started to create or edit a road.

Related topics

Basics

Graphical User Interface of the Road Network View 25

HowTos

How to Customize the Screen Arrangement (ModelDesk Basics 🕮)

References

New 168
Open 169
Open from Pool 169

How to Specify the Horizontal Profile of a Road Element

Objective

The horizontal profile of the road elements defines the road's longitudinal profile.

Basics

Several segments are connected to build the horizontal profile of a road element. The **Road Generator** provides four different segment types for building any desired horizontal profile. The possible segment types are listed in the context menu of the **Append Segment/Insert Segment** option of the **Segments** pane.

New segments can be inserted after a currently selected segment or appended at the end of all segments.

You can specify a type for each segment you insert or append. You can change the type in the **Segments** pane afterwards.

The horizontal profile is independent of other profiles, for example, the lateral slope and height profile. However, you should specify the horizontal profile first because it defines the road coordinate system that is the basis for the other profiles.

For basic information on a horizontal profile, refer to Horizontal Profile of a Road Element on page 40.

Close Road without junctions

The Road Generator lets you create a closed road. If you have specified all segments except a small gap between the first and last segments (a minimum of two segments is required), the Road Generator can fill the gap with an appropriate segment. It appends a Close Road segment which has a cubic spline type, closes the road, and sets the **Road Closed** property of the **Road Network Element** properties. The Close Road segment's dimensions are calculated only during creation. If you modify one of the other segments afterwards, the Close Road segment is not automatically updated and the road is open again. To close the road again, delete the old Close Road segment and append a new Close Road segment.

Basic operations

To manage the segments in the pane, you can use the following commands from the context menu of a selected segment:

Command	Purpose
Copy	To copy all the settings of a segment to the Clipboard.
Cut	To cut the selected segment and copy its settings to the Clipboard.
Paste	To insert a new segment with the settings from the Clipboard after a selected segment.
Delete	To delete a selected segment.

Method

To specify the horizontal profile of a road element

1. In the Road Element view, open the Segments, Road 1-D Preview, Road 2-D Preview and Properties panes.
2. You can insert a segment after a selected segment or append a segment to the end of the segment list in the Segment pane:
   - To insert a segment, select an existing segment, open the context menu and select Insert Segment – <segment type>.
   - To append a segment, open the context menu and select Append Segment – <segment type>.

   A segment is added to the segment list. The Road 1-D Preview and Road 2-D Preview are updated.
3. Select the new segment and specify the properties in the Properties pane. The available properties depend on the segment type. The properties of some segment types interact with each other. For details on the properties, refer to Road Segment Properties on page 264.
4. Repeat the previous steps until all the segments have been added and specified.
5. To close the road, select Close Road on the context menu.

   The Road Generator inserts a cubic spline and sets the Road closed property.

Result

The horizontal profile is specified.

Related topics

References

Circular 202
Close Road 203
Clothoid 204
Spline 237
Straight 238

How to Specify the Height Profile of a Road Element

Objective

After specifying the horizontal profile, you can specify the height profile of a road element.

Height profile

The height profile is specified by several sampling points, called height points. The height points are specified along the reference line. They are independent of the segment transitions. The height points are inserted or deleted in the Height Profile pane. You can specify their properties (s, Height, Transition length,

Angle or Gradient) in the Properties pane. To modify the height values of several height points, you can use the Table Editor.

If you have specified a closed road by setting the Close Road property of the Road category, the Road Generator sets the height of the last segment's end equal to the height of the first segment's starting point.

You can specify an offset value that is added to all the height points of the road.

For basic information on the height profile, refer to Height Profile of a Road Element on page 45.

Import and export

The height points can be exported to or imported from a MAT file. You can use this feature to reuse another road's height profile or to import an external height profile.

Precondition

The reference line must have been specified.

Method

To specify the height profile of a road element

1. Open the Road network view.

   The Properties pane displays the Road Network Global properties.

2. In the Height profile interpolation property, select an interpolation method. For a description, refer to Road Network Global Properties on page 261.

   The selected interpolation method is used for the height profile of the whole road network.

3. Switch to the Road element view of the road element you want to parameterize.

   Open the Height Profile and Road 2-D Preview panes.

4. To insert height points, perform one of the following steps on the Height Profile pane:

   - To insert one height point, open the context menu at the position within the road where you want to add the height point and select Insert Height Point.

     The new height point is inserted at the selected position and then highlighted.

   - To insert height points at segment transitions, open the context menu and select Insert Points at Segment Transitions.

     Height points are inserted at each segment transition and displayed in the height profile.

   - To import height points from a MAT file, open the context menu and select Import.

An **Import** dialog opens for you to select a MAT file to import. When the file is loaded, the height points are inserted in the height profile. Note that all height points are imported even if they are outside of the road's length. For information on how ModelDesk deals with height points outside the road's length, refer to Height Profile of a Road Element on page 45.

After inserting height points, you can specify their properties.

5 Select a height point on the **Height Profile** pane.

Its properties are displayed on the **Properties** pane.

6 Enter or modify the property values in the **Properties** pane. For details of the properties, refer to Height Properties on page 250.

Note that if you modify the **Angle** or **Gradient** properties, the **Height** value of the following height point is adapted.

Tip

- The position and height of a height point can be changed by modifying the values in the **Properties** pane or by dragging the height point on the **Height Profile** pane.
- The height of several height points can be changed by modifying the values in the **Table Editor**. To open the **Table Editor**, select **Edit Table** from the context menu.

7 To export the height points, open the context menu on the **Height Profile** pane and select **Export**.

An **Export** dialog opens for you to select a MAT file to export.

8 To specify an offset for all the height points, do the following:

- Open the context menu and select **Apply Offset**.

  The **Apply Offset** dialog opens.
- Enter the offset value.
- Click **OK**.

Result

The height profile of the road element is shaped as you specified.

Related topics

HowTos

How to Specify Additional Height Profiles 84

References

Apply Offset 202
Delete Height Point 211
Export 215
Import 217

How to Specify the Lateral Slope Profile of a Road Element

Objective

After specifying the horizontal profile, you can specify the road's lateral slope profile. As only road elements can have lateral slope, this cannot be done for junctions.

Lateral slope profile

The lateral slope is specified by an angle or gradient in lateral direction. The lateral slope profile is specified by several sampling points (lateral slope points) along the reference line. The positions of the lateral slope points are independent of the road's segment transitions. The lateral slope between the lateral slope points are interpolated linearly.

For basic information on the lateral slope profile, refer to Lateral Slope Profile of a Road Element on page 47.

Import and export

The lateral slope points can be exported to or imported from a MAT file. You can use this feature to reuse another road's lateral slope profile or to import an external lateral slope profile.

Preconditions

The reference line must have been specified.

Method

To specify the lateral slope profile

1. In the Road Element view, open the Lateral Slope Profile, Road 2-D Preview, and Properties panes.
2. To locate a road segment, click it in the Segments or Road 2-D Preview pane.

   The selected road segment is highlighted on the Lateral Slope Profile, Segments, and Road 2-D Preview panes.
3. To insert lateral slope points, perform one of the following steps on the Lateral Slope Profile pane:
   - To insert one lateral slope point, open the context menu at the position within the road where you want to add the height point and select Insert Lateral Slope Point.

     The new lateral slope point is inserted at the selected position and then highlighted.
   - To insert lateral slope points at all the segment transitions, open the context menu and select Insert Points at Segment Transitions.

     Lateral slope points are inserted at each segment transition and displayed in the lateral slope profile.
   - To import lateral slope points from a MAT file, open the context menu and select Import.

An **Import** dialog opens for you to select a MAT file to import. When the file is loaded, the lateral slope points are inserted in the lateral slope profile.

When lateral slope points have been inserted, you can specify their properties.

4 Select a lateral slope point on the **Lateral Slope Profile** pane.

Its properties are displayed on the **Properties** pane.

5 Enter or modify the values of the properties in the **Properties** pane. For details of the properties, refer to Lateral Slope Properties on page 253.

Tip

- The position and angle of a lateral slope point can be changed by modifying the values in the **Properties** pane or by dragging the lateral slope point on the **Lateral Slope Profile** pane.
- The height of several lateral slope points can be changed by modifying the values in the **Table Editor**. To open the **Table Editor**, select **Edit Table** from the context menu.

6 To export the lateral slope points, open the context menu on the **Lateral Slope Profile** pane and select **Export**.

An **Export** dialog for you to select a MAT file to export.

Result

You have created lateral slopes and positioned them by specifying their properties.

Related topics

Basics

Lateral Slope Profile of a Road Element 47

References

Delete Lateral Slope Point 211
Export 215
Import 217

How to Specify Lane Sections and Lanes on Road Elements

Objective

Lane sections determine the number of lanes. Lanes determine the width of the road element and the road markings.

This topic shows how to specify the properties for the following elements:

- Lane sections
- Lane section

- Lanes
- Lines

Basics

A lane section is a section of a road where you can specify the number of lanes and their appearance. A lane section can be specified independently by the road's segments. If the number of lanes or the appearance (such as lines) of the lanes varies, you must specify several lane sections.

A lane is a part of a road which is normally used by one vehicle in longitudinal direction. Lanes are included in lane sections. Their characteristics are the lane width and road markings. The central lane has two line markings. The other lanes have only one line marking at the outer side.

For basic information on lanes, refer to Lanes of a Road Element on page 48.

Basic operations

To manage the lane sections and lanes in the pane, you can use the following commands from the context menu of a selected lane section or lane:

Command	Purpose
Copy	To copy all the settings of an element to the Clipboard.
Cut	To cut a selected element and copy its settings to the Clipboard.
Paste	To insert a new element with the settings from the Clipboard after a selected element.
Delete	To delete a selected element.

Precondition

The reference line must have been specified.

Method

To specify lane sections and lanes

1. Open the Road network view.

   The Properties pane shows the Road Network Global properties.

2. In the Lane width definition mode property, select a mode for defining the lane width. For a description, refer to Road Network Global Properties on page 261.

   The selected mode is used for all lanes.

3. Switch to the Road element view of the element you want to modify.

   Open the Lanes, Road 1-D Preview, Road 2-D Preview, and Properties panes.

4. To specify lanes, you must create lane sections.

   To insert a lane section, perform one of the following steps on the Lanes pane:

   - To insert a lane section after a lane section, click the existing lane section, open the context menu and select Insert Lane Section.

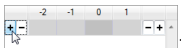
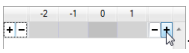
- To insert a lane section at the end of the table, open the context menu and select **Append Lane Section**.

A lane section is added to the table. The new lane section is highlighted in the **Road 1-D Preview** and **Road 2-D Preview** panes.

5 In the **Properties** pane, specify the lane section properties. For details of the properties, refer to Lane Section Properties on page 252.

6 A lane section has one central lane by default. You can add further lanes to a lane section.

To add a lane, select a lane section and perform one of the following steps in the **Lanes** pane:

- To add a lane to the left side of the central lane, click  .
- To add a lane to the right side of the central lane, click  .

A lane is added to the lane section. You can specify its properties.

7 In the **Lanes** pane, click the lane to be specified.

The selected lane is highlighted in the **Road 1-D Preview** pane. The **Properties** pane displays its properties.

8 In the **Properties** pane, specify the lane and line properties:

1. Specify the properties of the **Lanes** category.
2. The center lane has a left line and right line, other lanes have only one line at the outer side as a road marking. Each road marking can be a single or double line. You can specify all the lines with a predefined set of values.

   In the **Preset** property of the **Lanes** category, select a value. Depending on the selected value, a single or double line can be specified.
3. Specify the lines. Select the line type first because it determines the available properties. Refer to Lanes Properties on page 251.

When you modify the property values, the **Road 1-D Preview** is updated.

Result

You have added and specified lane sections and lanes to the selected road.

Related topics

Basics

Lanes of a Road Element 48

References

Append Lane Section 201
Insert Lane Section 221
Lanes Properties 251

How to Specify Additional Height Profiles

Objective

You can specify areas with additional height profiles on road elements and junctions.

Additional height profiles

Additional height profiles are added to the height profile of the reference line. These profiles let you model rough or bumpy roads. The **Road Generator** provides two predefined waveforms that you can use (sinusoidal or trapezoidal). If these dot not meet your requirements, you can use maps to create any uneven surface.

For more information on modeling additional height profiles, refer to Additional Height Profiles on page 55.

Filter

The table on the **Surface** pane shows all the specified areas. If you have specified several areas, you can use filters to retrieve a specific one. For a detailed description of the **Filter Editor** and its handling, refer to How to Specify and Use a Filter (ModelDesk Basics 🕮) and Edit Filter (ModelDesk Basics 🕮).

Import and export

The settings of the maps can be exported to or imported from a MAT file. You can use this feature to reuse maps from another road model or create maps outside the **Road Generator**. Refer to MAT File Format of Maps for Road Elements on page 293 or MAT File Format of Maps for Junctions Elements on page 294.

Basic operations

To manage the elements in the pane, you can use the following commands from the context menu of a selected element:

Command	Purpose
Copy	To copy all the settings of an element to the Clipboard.
Cut	To cut a selected element and copy all its settings to the Clipboard.
Paste	To insert a new element with the settings from the Clipboard after a selected element.
Delete	To delete a selected element.

Preconditions

The reference line must have been specified.

Method

To specify additional height profiles

1 For an additional height profile on a road element, open the **Surface**, **Road 1-D Preview**, **Road 2-D Preview**, and **Properties** panes.

For an additional height profile on a junction, open the **Surfaces**, **Junction 2-D Preview** and **Properties** panes.

2 On the **Surface** pane, open the context menu and select one of the following commands to add an area to the surface.

Note that trapezoidal and sinusoidal height profiles are not possible for junctions.

Command	Inserted Section
New Surface - Additional Height Profile - Trapezoidal	Area with additional height profiles in trapezoidal form
New Surface - Additional Height Profile - Sinusoidal	Area with additional height profiles in sinusoidal form
New Surface - Additional Height Profile - Custom height map	Area with an additional height profile that is specified by a table
New Surface - Import from File	Maps that were previously exported to a MAT file

The new area is created and listed in the **Surface** pane. You can now specify its properties.

3 Select an area.

The preview panes display the position of the selected area. The **Properties** pane displays its properties.

4 In the **Properties** pane, specify the properties. For details of the properties, refer to Surface Properties on page 277.

Tip

You can use the mouse to change the position of the area:

1. In the **Road 1-D Preview** or **Junction 2-D Preview** pane, drag the area to another position.

5 To export the settings of the areas, open the context menu on the **Surface** pane and select **Export**.

An **Export** dialog opens for you to select a MAT file to export.

Result

You have specified areas that have additional height profiles.

Related topics

HowTos

How to Specify the Height Profile of a Road Element 77

References

Custom Height Map 207
Export 215
Import from File 218

Sinusoidal 240
Trapezoidal 243

How to Specify Areas with Specific Surface Conditions or Textures

Objective

You can specify different characteristics for the surface condition of the whole road and also of road and junction areas.

Surface condition

The surface condition is determined by the tire parameter set used for the simulated vehicle and the friction coefficient of the road surface. You can specify a global surface condition for the whole road element or junction and different surface conditions for specific areas.

For more information on modeling the surface of a road, refer to Surface Condition on page 54.

Textures

Areas with textures let you draw signs (e.g., arrows) or other pictures on the road. The **Road Generator** provides several textures that you can place on a road element or junction. Textures do not influence the simulation with the road.

Filter

The table on the **Surface** pane shows all specified areas. If you have specified several areas, you can use filters to retrieve a specific one. For a detailed description of the **Filter Editor** and its handling, refer to How to Specify and Use a Filter (ModelDesk Basics 🕮) and Edit Filter (ModelDesk Basics 🕮).

Import and export

The settings of custom friction maps can be exported to or imported from a MAT file. You can use this feature to reuse the custom friction maps of another road.

For road elements, you can also import surface conditions of OpenCRG files. Such definitions are imported as additional height profiles of the custom height map type.

Basic operations

To manage the elements in the pane, you can use the following commands from the context menu of a selected element:

Command	Purpose
Copy	To copy all the settings of an element to the Clipboard.
Cut	To cut a selected element and copy its settings to the Clipboard.

Command	Purpose
Paste	To insert a new element with the settings from the Clipboard after the selected element.
Delete	To delete a selected element.

Preconditions

The reference line must have been specified.

Possible methods

The surface condition can be specified using the following methods:

- To specify the surface for a whole road element or junction, refer to Method 1 on page 87.
- To specify surface conditions or a texture for an area on a road network element, refer to Method 2 on page 87.

Method 1

To specify surface conditions for the whole road element or junction

1. Open the Properties pane and the Road Network pane.
2. On the Road Network pane, select the road network element whose surface condition you want to specify.

   The Properties pane displays the properties of the selected element.
3. In the Friction coefficient property, enter a friction coefficient.
4. Select a Tire parameter set.

Method 2

To specify surface conditions for an area on a road element or junction

1. To specify surface areas for a road element, open the Surface, Road 1-D Preview, Road 2-D Preview, and Properties panes.

   To specify surface areas for a junction element, open the Surface, Junction 2-D Preview, and Properties panes.
2. In the Surface pane, open the context menu and select one of the following commands to add a section to the surface.

Command	Inserted Area
New Surface – Friction - Custom Friction Map	Area with friction coefficients different to the remaining road
New Surface – Friction - Surface Condition	Area with a tire parameter set different to the remaining road
New Surface – Texture Map	Area with a texture.
New Surface – Import from File	Areas that were previously exported to a MAT file or areas that are defined in an OpenCRG file (for road elements only)

   The new area is created and listed in the Surface pane. You can now specify its properties.

3 In the Surfaces, Road 1-D Preview, or Junction 2-D Preview pane, select a surface area.

The Road 1-D Preview and Road 2-D Preview or Junction 2-D Preview displays the position of the selected area. The Properties pane displays its properties.

4 In the Properties pane, specify the properties. For details of the properties, refer to Surface Properties on page 277.

Tip

You can use the mouse to change the position of the area:

1. In the Road 1-D Preview or Junction 2-D Preview pane, drag the surface area to another position.

5 To export the settings of the areas, open the context menu on the Surface pane and select Export.

An Export dialog opens for you to a MAT file for export.

Result

You have specified the surface.

Related topics

Basics

Additional Height Profiles..... 55

References

Export..... 215
Import from File..... 218
Surface Condition..... 239

How to Specify Scenery Sections

Objective

Scenery sections determine the margin of a road.

Basics

For basic information on the scenery, refer to Scenery on page 56.

Basic operations

To manage the sections in the pane, you can use the following commands from the context menu of a selected section:

Command	Purpose
Copy	To copy all the settings of a section to the Clipboard.

Command	Purpose
Cut	To cut a selected section and copy its settings to the Clipboard.
Paste	To insert a new section with the settings from the Clipboard after the selected section.
Delete	To delete a selected section.

Precondition

The reference line must have been specified.

Possible methods

As road elements and junctions have different possible scenery types, there are two different methods:

- For road element scenery, see Method 1 on page 89.
- For junction scenery, see Method 2 on page 89.

Method 1

To specify the scenery of a road element

1. In the Road Element view, open the Scenery, Road 1-D Preview, Road 2-D Preview, and Properties panes.
2. To insert a scenery section, perform one of the following steps on the Scenery pane:
   - To insert a scenery section after a scenery lane section, click an existing scenery section, open the context menu and select Insert Scenery Section.
   - To insert a scenery section at the end of the table, open the context menu and select Append Scenery Section.

   A scenery section is added to the table and is highlighted in the Road 1-D Preview and Road 2-D Preview panes.
3. On the Scenery pane in the table, select the type of the scenery section.
4. On the Properties pane, specify the scenery section properties. For details of the properties, refer to Scenery Section Properties on page 269.

Method 2

To specify the scenery of a junction

1. In the Junction view, open the Borders, Junction 2-D Preview and Properties panes.
2. On the Borders pane, select the scenery type.
3. You can specify the Scenery properties in the Properties pane.

Result

You have added and specified a scenery to the selected element.

Related topics

Basics

Scenery 56

How to Add Static Traffic Objects

Objective

You can place traffic objects (e.g., traffic signs) on road elements or junctions.

Basics

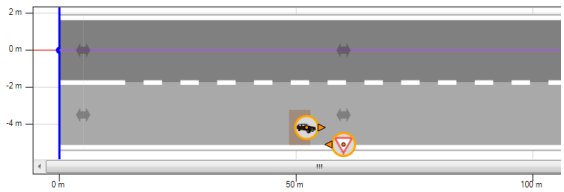
You can place any traffic object on a road element or junction which is stored in the Pool. When the scene is generated in MotionDesk, MotionDesk place the 3-D object at the specified position which corresponds to the traffic object.

For information on creating traffic objects, refer to ModelDesk Traffic Object Management 🕮.

Symbol

Traffic objects are represented as symbols in the **Road 1-D Preview** and **Junction 2-D Preview** panes. The symbols are small previews of the traffic objects in a circle. A triangle marks the front-side. A shadow under the symbol represents the size.

The following illustration shows an example of two traffic objects.



The following illustration shows the scene with the traffic objects in MotionDesk after scene generation.

Preconditions

You must have created and specified a road network and traffic objects.

Possible methods

You can use different methods to add traffic objects. The methods can be used for road elements or junctions.

- To add traffic objects via drag & drop, refer to Method 1 on page 91.
- To add traffic objects via menu command, refer to Method 2 on page 91.

Method 1

To add static traffic objects to road network elements

1 Open the panes of the road network element where you want to add the traffic objects:
   - In the Road view, open the Objects, Road 1-D Preview, and Road 2-D Preview panes.
   - In the Junctions view, open the Objects, and Junction 2-D Preview panes.
2 Open the Traffic Object Browser.
3 Drag the traffic object from the Traffic Object Browser to the Road 1-D Preview or Junction 2-D Preview.

   The traffic object is inserted at the position where you drop it. The rotation of the traffic object is oriented towards the next lane, for example, so that a traffic sign automatically faces the driver.
4 Select the traffic object and modify its properties in the Properties pane if required.

Method 2

To add static traffic objects via the Objects pane

1 Open the panes of the element where you want to add the traffic objects:
   - In the Road view, open the Objects, Road 1-D Preview, and Road 2-D Preview panes.

- In the **Junctions** view, open the **Objects**, and **Junction 2-D Preview** panes.

2. Right-click the **Objects** pane and select **New** on the context menu.

   The **Traffic Object Browser** opens and lists all the traffic objects stored in the Pool.

3. Select a traffic object and click **OK**.

   A new traffic object is added to the list. The traffic object can also be seen in the preview panes, where it is indicated by its symbol. New traffic objects are always added to a junction's reference point or a road element's starting point.

4. Select the traffic object and modify its properties in the **Properties** pane if required.

Result

You have added traffic objects to a road network.

Next steps

You can modify the positions, orientations, and other properties of traffic objects. Refer to How to Modify Positions and Orientations of Static Traffic Objects on page 92.

Related topics

Basics

Basics of Synchronizing the Scene in MotionDesk (ModelDesk Scene Synchronization 🕮)

HowTos

How to Create a Traffic Object (ModelDesk Traffic Object Management 🕮)

References

New (Traffic Object)..... 224
Object Properties..... 255

How to Modify Positions and Orientations of Static Traffic Objects

Objective

You can modify the positions, orientations, and other properties of traffic objects.

Preconditions

You must have added traffic objects.

Possible methods

You can use different methods to modify the properties of traffic objects. The methods can be used for traffic objects on road elements or junctions.

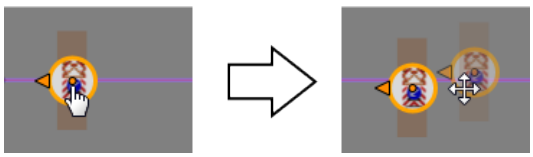
- The positions and orientations of the traffic objects are visualized by the corresponding symbols in the Road 1-D Preview and Junction 2-D Preview panes. You can drag the symbols on the panes to modify their positions and orientations. Refer to Method 1 on page 93.
- You can modify all the properties of traffic objects by specifying the their values. This way, you can also specify their positions and orientations. Refer to Method 2 on page 94.

Method 1

To modify position and orientation of a traffic object using the mouse

1 Open the panes of the road network element where the traffic objects are placed:
   - In the Road view, open the Road 1-D Preview pane.
   - In the Junctions view, open the Junction 2-D Preview pane.

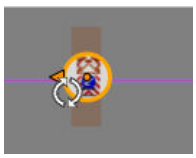
2 To move a traffic object, perform the following steps:
   - Move the mouse pointer to the symbol in the Junction 2-D Preview or Road 1-D Preview pane until the mouse pointer changes to the form of a hand.



   - Drag the symbol to another position.

   The position is modified but the orientation is not modified.

3 To rotate a traffic object, perform the following steps:
   - Move the mouse pointer to the triangle of the symbol in the Junction 2-D Preview or Road 1-D Preview pane until the mouse pointer changes to the shape of two arrows.



   Drag the mouse pointer.

   The position of the triangle changes and with it, the orientation of the traffic object is modified. The position of the traffic object is not modified.

4 Drag the traffic object from the Traffic Object Browser to the Road 1-D Preview or Junction 2-D Preview.

   The traffic object is inserted at the position where you drop it. The traffic object is rotated towards the next lane, for example, so that a traffic sign automatically faces the driver.

5 Select the traffic object and modify its properties in the Properties pane if required.

Method 2

To modify properties of a traffic object

1. Open the panes of the road network element to which you want to add the traffic objects:
   - In the **Road** view, open the **Objects** and **Properties** panes.
   - In the **Junctions** view, open the **Objects** and **Properties** panes.
2. Select the traffic object that you want to modify. You can select the traffic object in the **Objects** pane or click its symbol in the preview.
3. To modify the position, specify the relative position by parameterizing the position values in the **Objects** or the **Properties** pane.

   If you modify the properties of the relative position, ModelDesk automatically updates the values of the absolute position and moves the symbol to the new position.
4. To modify the orientation, specify the **z-rotation** property in the **Properties** pane.

   If you modify the relative z-rotation, ModelDesk automatically updates the value of the absolute z-rotation and moves the triangle to a new position.

Result

You specified new positions or orientations of traffic objects.

Related topics

Basics

Basics of Synchronizing the Scene in MotionDesk (ModelDesk Scene Synchronization 🕮)

HowTos

How to Add Static Traffic Objects..... 90
How to Create a Traffic Object (ModelDesk Traffic Object Management 🕮)

References

Object Properties..... 255

How to Specify Position Markers

Objective

You can specify position markers on a road.

Basics

Position markers can be used to define the behavior of a vehicle on the road network. They must be specified in the **Road Generator** so that they can be

used in the Scenario Editor. Position markers can be specified on road elements and junctions.

For more information on position markers, refer to Position Markers on page 61.

Preconditions

You must have created and specified a road network.

Possible methods

You can define position markers on road elements or junctions:

- To define position markers on road elements, refer to Method 1 on page 95.
- To define position markers on junctions, refer to Method 2 on page 95.
- To modify existing position markers on a road network, refer to Method 3 on page 96.

Method 1

To specify position markers on road elements

1. In the Road view, open the Marker, Road 1-D Preview, Road 2-D Preview and Properties panes.
2. Right-click the Marker pane and select New on the context menu.

   A new position marker is added to the list. The position marker can also be seen in the Road 1-D Preview and Road 2-D Preview panes, where it is indicated by this icon: ✖
3. New position markers are always added to a road element's starting point.

   To move a position marker on a road element, you can:
   - Drag its symbol in the Road 1-D Preview pane
   - Specify its relative position (s and d values) in the Marker or the Properties pane.

Method 2

To specify position markers on junctions

1. In the Junctions view, open the Marker, Junction 2-D Preview and Properties panes.
2. Right-click the Marker pane and select New on the context menu.

   A new position marker is added to the list. The position marker can also be seen in the Junction 2-D Preview pane, where it is indicated by this icon: ✖
3. New position markers are always added to a junction's reference point.

   To move a position marker on a junction, you can:
   - Drag its symbol in the Junction 2-D Preview pane.
   - Specify its absolute position (x and y values) in the Markers or the Properties pane.
   - Specify its relative position (x and y values) in the Properties pane.

Method 3

To modify existing position markers on a road network

1. In the Road Network view, open the Marker, Road Network 2-D Preview and Properties panes.
2. The Marker pane lists all the position markers on your road network.
   Click a position marker in the list and modify its position in the Properties pane.

Result

You have specified position markers on a road network.

Related topics

Basics

Position Markers..... 61

References

Position Marker Properties..... 257

How to Specify Shapes

Objective

You can specify shapes (e.g., lines, repeating traffic objects, and barriers) for road elements and junctions.

Specifying several shapes

You can specify several shapes for a road element or junction.

When you specify several line shapes, you can specify their levels to determine which line is displayed when they overlap. The level also considers the lines specified for lane sections.

When you specify repeating or continuous shapes, you should consider the positions and dimensions of the geometries. The objects can overlap if the courses of different shapes cross or the distance between neighboring objects is smaller then their dimensions. ModelDesk does not check whether objects overlap.

Preconditions

- A road network element must exist.
- If you want to specify a shape of the repeating type, the traffic object must exist. Refer to How to Create a Traffic Object (ModelDesk Traffic Object Management 🕮).

Method

To specify shapes

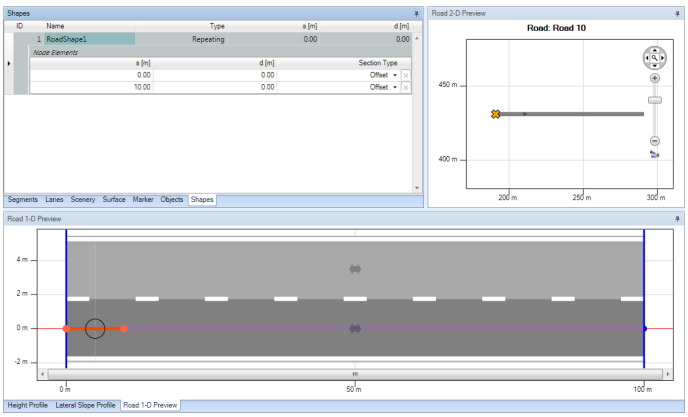
1 Open the panes of the road network element where you want to add the shapes:
   - In the Road view, open the Shapes, Road 1-D Preview, Road 2-D Preview and Properties panes.
   - In the Junctions view, open the Shapes, Junction 2-D Preview and Properties panes.

2 In the Shapes pane, open the context menu and select New – <shape type> to create a new shape in the list.

   Or

   In the Road 1-D Preview or Junction 2-D Preview pane, open the context menu and select New shape – <shape type> to create a new shape at the position of the mouse pointer.

   The Road Generator creates a new shape of the specified type on the road network element. The shape is displayed in the preview and is listed on the Shapes pane. By default, the new shape has two nodes that are listed in the Node Elements list. You can add further nodes to the shape to form the course of the shape.



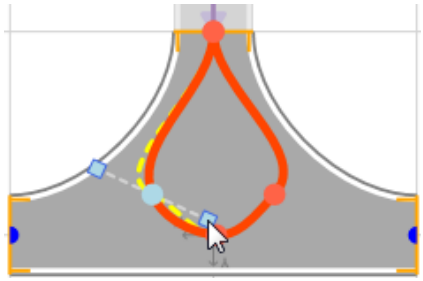
3 In the Node Elements list, open the context menu and select Insert After.

   The Road Generator adds a new node to the shape.

4 To move a node, perform one of the following actions:
   - Drag its symbol to the Junction 2-D Preview or Road 1-D Preview pane.
   - Specify its position by editing the position values in the Shapes or the Properties pane.

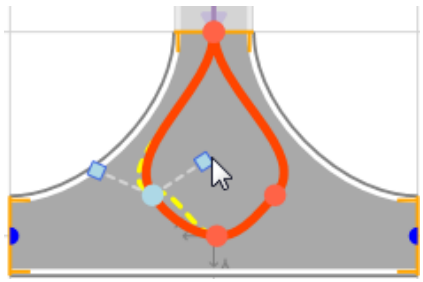
5 You can modify the position or orientation of a node in different ways:
   - Click the node and specify its properties in the Shapes or the Properties pane.
   - To move the node, drag its symbol.
   - If the section type is a spline, you can modify the start and end angles:

     To modify the start angle of a node together with the end angle of the previous node, click a node and drag one of the small rectangles. Refer to the following illustration.



To modify the start angle of a node, press **`Ctrl`**, select a node, and drag the small rectangles.

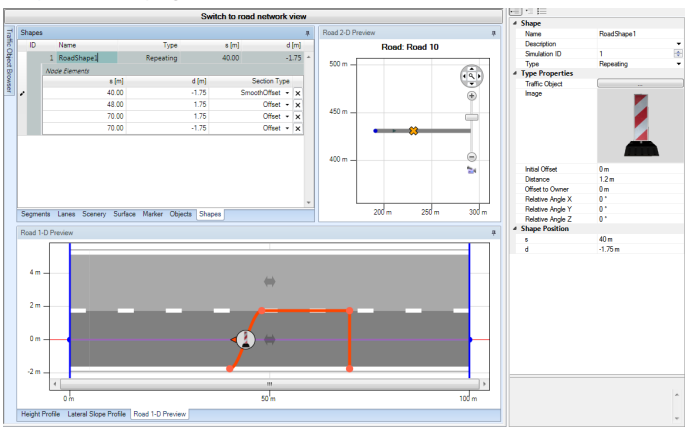
This also modifies the end angle of the previous node. Refer to the following illustration.



6 Specify the section type of the node. The section type determines the course of the shape section between the selected node and the next node. Refer to Shape Properties on page 272.

7 Repeat the previous steps to add more nodes to the shape until the shape has the required course.

8 Specify the properties of the shape. The available properties depend on the shape type. It is also possible to select a different type. Refer to Shape Properties on page 272.



9 To move the whole shape object, perform one of the following actions:

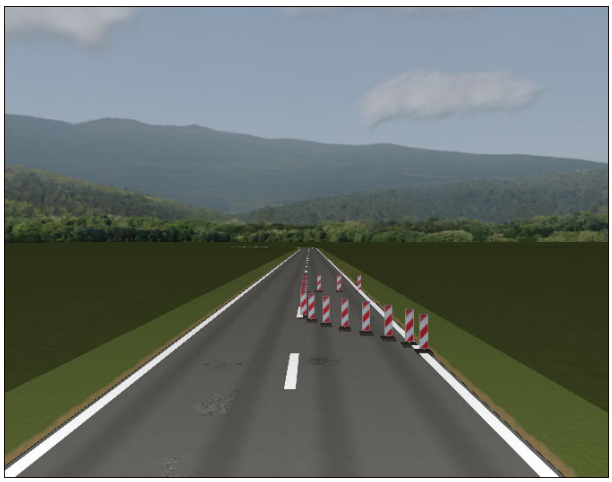
- Drag its symbol to the **Junction 2-D Preview** or **Road 1-D Preview** pane.
- Specify its relative position by editing the position values in the **Shapes** or the **Properties** pane.

10 On the **Environment** ribbon, click **Road** – **Save** to save your settings.

Result

You specified a shape.

The following illustration shows an example of a shape in MotionDesk:



The following illustration shows an example of a shape together with a city scenery and traffic objects used as traffic signs in MotionDesk:

Related topics

Basics

Shapes.....62

References

Insert after.....219

Example for Creating a Guard Rail as Shape

Introduction

This example shows how you can create a Guard Rail shape on the basis of a guard rail specified with Highway scenery.

Basics

Guard rails are elements of the Highway scenery. Elements of sceneries are not relevant for the simulation, they are used only in the animation in MotionDesk. If you want to consider guard rails in the simulation, you must create shapes with a guard rail geometry. It is not necessary to create these shapes manually. ModelDesk can convert the guard rails of the Highway scenery to shapes.

Creating a guard rail

To create a guard rail, perform the following steps.

1. Create the road network. It is recommended to have a finished course of road elements whose guard rails you want to convert to shapes. Otherwise, the course of the guard rails might differ from the course of the road element.
2. Open the road element where the guard rails should be placed. Refer to How to Specify Scenery Sections on page 88.
3. Open the **Scenery** pane. Specify a scenery section for the road element. Select the Highway scenery type and specify the properties of the guard rail in the **Properties** pane. Refer to How to Specify Scenery Sections on page 88.
4. In the **Properties** pane, click **Generate Shapes**.

   ModelDesk creates guard rail shapes which have the same settings as the guard rail of the scenery. In addition, ModelDesk disables the guard rail in the scenery so that they not appear twice in the animation.
5. Open the **Shapes** pane. The pane displays the created continuous shape with a guard rail geometry. The new shape is independent of the Highway scenery. You can modify the properties of the guard rail without any effect to the highway scenery, or you can modify the highway scenery without any effect to the guard rail shape.

Related topics

References

Scenery Section Properties..... 269

How to Configure User Signals for a Road

Objective

You can configure user signals to provide information on a road to the simulation model.

User signals

You can configure user signals for each road. The user signals provide information to the simulation model, for example, to set offsets for the GPS position.

User signals are road global properties. They are specified on the Properties pane. You can reuse the user signals of another road by importing their settings.

Method

To configure user signals for a road

1. Open the Road Network view.
   The Properties pane shows the Road Network Global properties.
2. To reuse the user signals of another road, perform the following steps:
   - Click the Browse button of the Import User signals property.
     A standard open dialog opens.
   - Select the road network file containing the user signals.
   - Click Open.
     The settings of the user signals are imported to the current road.
3. In the Properties pane, configure the user signals.

Result

The user signals are configured. They are available in the simulation model after downloading the road.

Related topics

References

Road Network Global Properties..... 261

Creating a Road Network

Introduction

A road network consists of road elements and junctions. They are used when traffic scenarios are simulated.

Where to go from here

Information in this section

Workflow for Creating a Road Network..... 103
Gives an overview on how to create a road network using the Road Generator.

Workflow for Creating a Simple Roadwork Scenario Using a Driving Trajectory..... 104
Gives an overview of how to create a simple roadwork scenario on a road element. This use case shows how to reduce the number of lanes for a roadwork scenario on the road the ASM vehicle drives on.

Workflow for Creating a Complex Roadwork Scenario..... 107
Gives an overview of how to create a complex roadwork scenario on a highway. This use case shows how to create a roadwork scenario where a lane of the direction direction is led to the road element of the oncoming direction.

How to Specify the Profile of a Junction..... 111
The profile of a junction defines its shape and orientation.

How to Specify Lanes on Junctions..... 113
Lanes can be specified for each connection point of a junction.

How to Specify a Road Network..... 114
To create a road network you must connect road elements and junctions.

How to Specify the Direction of Travel on a Road Element..... 117
The direction of travel can be defined for each lane.

How to Restore the Consistency of a Road Network..... 119
If a road network is inconsistent, its consistency must be recovered.

How to Specify Trajectories..... 121
You can specify shapes of the Trajectory type for road elements and junctions. This shape defines a path that can be followed by the ASM vehicle if a route is specified.

How to Specify Routes on Road Networks..... 123
Routes for vehicles can be defined on road networks.

Information in other sections

Creating a Road..... 69
The instructions show you how to create a road using the Road Generator.

Workflow for Creating a Road Network

Introduction

This topic gives an overview on how to create a road network using the **Road Generator**.

Workflow

The following steps illustrate the typical way to create a road network, but it is not necessary to follow the order strictly.

1. Start the **Road Generator**. You can create a new road network or modify an existing one, refer to How to Start the Road Generator on page 74.
2. Add road elements and junctions to your road model and connect them. Add connection points to a junction to connect more road elements to it. The position of each element in the road network must be specified. You can create closed road networks by filling gaps with automatically adapted elements. You must also specify the traffic type of the road network. For instructions on the creation of road elements and junctions and the connection of elements, refer to How to Specify a Road Network on page 114.
3. You can modify the shapes of road elements and junctions. You do this by specifying segments for road elements, and borders and connection points for junctions. For instructions, refer to How to Specify the Horizontal Profile of a Road Element on page 76 and How to Specify the Profile of a Junction on page 111.
4. You can specify lanes on the elements of your road network. For instructions, refer to How to Specify Lane Sections and Lanes on Road Elements on page 81 and How to Specify Lanes on Junctions on page 113. The driving direction can be specified for lanes on road elements.

   Road elements can also have a lateral slope and height profile. For instructions, refer to How to Specify the Lateral Slope Profile of a Road Element on page 80 and How to Specify the Height Profile of a Road Element on page 77.
5. After specifying all these properties, you should check the consistency of your road network. If elements have different properties in connection points, the road network is inconsistent. For instructions on checking and restoring consistency, refer to How to Restore the Consistency of a Road Network on page 119.
6. Your road network can have different surface conditions. These are defined for each element individually. You can also specify areas with differing surface conditions within elements.

   You can also specify which texture maps to use on the surface of road elements or junctions. The Road Generator provides arrows, signs, and several other pictures.

   Note that junctions and road elements differ in the surface parameters to be modified. For instructions on specifying surface conditions, refer to How to Specify Areas with Specific Surface Conditions or Textures on page 86.

7. You can specify scenery for the road network. When you specify a scenery type for a road element, objects like trees or street lights are added along it. In this way you can create scenery that can be extended later by other objects in MotionDesk. Refer to How to Specify Scenery Sections on page 88.
8. Position markers can be used to define the behavior of ASM and fellow vehicles on road networks. They allow you to add additional end conditions in maneuvers and traffic scenarios. For instructions on defining position markers, refer to How to Specify Position Markers on page 94.
9. In some cases the ASM vehicle or the fellow vehicles should not follow the default path which is preset by the road network elements. In these cases, you can specify trajectories, which can be used as alternative paths. For more information, refer to How to Specify Trajectories on page 121.
10. Routes for the ASM and fellow vehicles can be defined on a road network. For instructions refer to How to Specify Routes on Road Networks on page 123.

Related topics

Basics

Workflow for Creating a Complex Roadwork Scenario..... 107
Workflow for Creating a Simple Roadwork Scenario Using Several Lane Sections..... 71

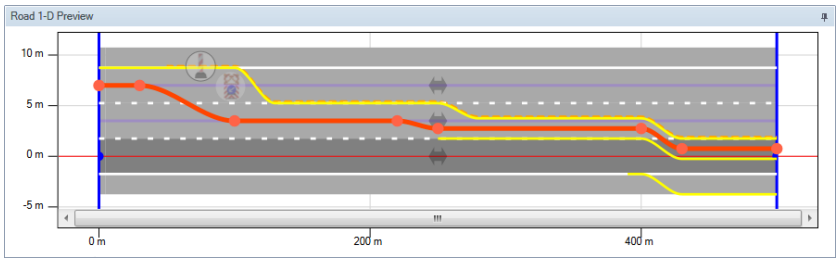
Workflow for Creating a Simple Roadwork Scenario Using a Driving Trajectory

Introduction

This topic gives an overview of how to create a simple roadwork scenario. This use case shows you how to reduce the number of lanes for a roadwork scenario on the road the ASM vehicle drives on.

Description

In the Road Generator, such a use case can be modeled using one road element that has one lane section. This example uses a trajectory to specify the path for the ASM vehicle. The following illustration displays a preview of a road element prepared for a roadwork scenario.



Road segment For specifying a simple roadwork scenario, one road element is sufficient. In this example, the road segment is a straight segment with a length of 500 m.

Lanes of the roadwork scenario In this example, the road element has one lane section. It has 3 lanes with a width of 3.5 m each, both borders have a width of 2 m, and the length is 500 m.

Lines The road markings in a roadwork scenario consist of the white lines that come from the original lanes and the yellow lines that are added to indicate the temporary lanes. To insert the original lines, the line settings of the lane section is used. To insert the yellow lines, shapes of the Line type are used.

The lane section has the default configuration. The lanes are separated by dashed lines. The lanes and the borders are separated by solid lines.

The shapes are added to get the yellow lines. The shapes have the following properties:

- Type: Line
- z-order: Level 3
- Color: Yellow
- All the other properties have the default value.

The following table displays the coordinate values (s and d) of the node elements.

Line Shape	s	d
RoadShape 1	0.00 m	8.75 m
	100.00 m	8.75 m
	130.00 m	5.25 m
	250.00 m	5.25 m
	280.00 m	3.75 m
	400.00 m	3.75 m
	430.00 m	1.75 m
	500.00 m	1.75 m
RoadShape 2	250.00 m	1.75 m
	400.00 m	1.75 m
	430.00 m	-0.25 m
	500.00 m	-0.25 m
RoadShape 3	390.00 m	-1.75 m
	400.00 m	-1.75 m
	430.00 m	-3.75 m
	500.00 m	-3.75 m

Trajectory The driving trajectory specifies the path that is used by the ASM vehicle. The following table displays the coordinate values (s and d) of the node elements.

Trajectory Shape	s	d
RoadShape 4	0.00 m	7.00 m
	30.00 m	7.00 m
	100.00 m	3.50 m
	220.00 m	3.50 m
	250.00 m	2.75 m

Trajectory Shape	s	d
	400.00 m 430.00 m 500.00 m	2.75 m 0.75 m 0.75 m

Traffic objects To guide the vehicles, some objects are added to the road element.

- A shape of the Repeating type is used to separate the left lane from the road works. For this shape, a delineator post object is selected. The course of the shape follows the border of the left lane.
- A warning trailer is added to the left lane in the lane section. This warning trailer advises oncoming vehicle to change the lanes when the left lane closes. A traffic object is used for this.

Workflow

The following steps are the typical way to create a simple roadwork scenario.

1. Create a road element. Refer to Workflow for Creating a Road without Junctions on page 70.

   When creating a roadwork scenario, specifying height and lateral slope profiles is optional. The profiles can be specified independently of the segments used for the horizontal profile. However, you should finish the reference line first before specifying the height and lateral slope profiles.
2. To create a roadwork scenario, you must specify one lane section. For the simple roadwork scenario shown in the example above, a lane section with 3 lanes are specified. The lanes and lines are specified as described above. Refer to How to Specify Lane Sections and Lanes on Road Elements on page 81
3. After you specified the lane sections, the temporary lines are specified. You can use shapes of the Line type for these lines. Refer to How to Specify Shapes on page 96.
4. How to Specify Trajectories on page 121
5. To guide the vehicles through a roadwork scenario, you can add 3-D objects such as pylons, delineator posts, and traffic signs. You can do this by adding static traffic objects to the roadwork scenario. Before a 3-D object can be used as a traffic object, you must create it. Refer to ModelDesk Traffic Object Management 🕮.

   You can add single traffic objects or a series of traffic objects to the roadwork scenario. To add a series of traffic objects, you can use a shape of the Repeating type. To use this type, select one traffic object and specify a course where this object is to be placed. You can use this, for example, to place delineator posts along a lane. Refer to How to Specify Shapes on page 96 and How to Add Static Traffic Objects on page 90.

   Tip

   If you want to specify shapes that have similar properties, you can copy & paste the settings and modify the properties afterwards. It is also possible to modify the shape type.

6. You can also specify texture maps or surface conditions to be used for road elements. The **Road Generator** provides arrows, signs, and several other symbols. Refer to How to Specify Areas with Specific Surface Conditions or Textures on page 86.
7. A road can have one or more scenery sections. You can specify each scenery section individually. In this example, a highway scenery is used. Refer to How to Specify Scenery Sections on page 88.

Related topics

Basics

Overview of Roads.....35
Workflow for Creating a Complex Roadwork Scenario.....107
Workflow for Creating a Simple Roadwork Scenario Using Several Lane Sections.....71

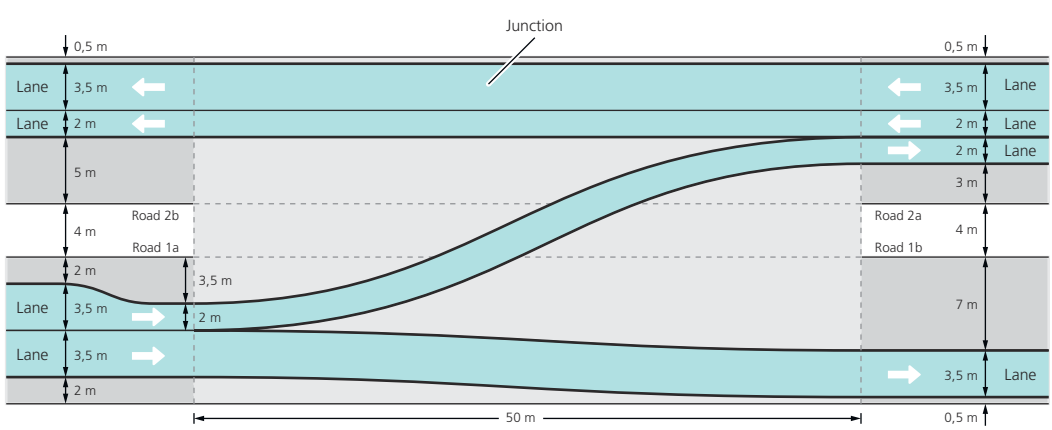
Workflow for Creating a Complex Roadwork Scenario

Introduction

This topic gives an overview of how to create a complex roadwork scenario on a highway. On a highway, the direct and oncoming lanes are usually separated. This use case shows how to create a roadwork scenario where the lanes of the direct direction must be separated and one lane is led to the road element of the oncoming lanes.

Description

In the **Road Generator**, such a use case can be modeled by using four road elements that are connected to one junction. When you have an existing model of a highway, you must separate the road elements of the two directions and insert the junction. Refer to the following example of a road network:



Road network elements For specifying a complex roadwork scenario, 4 road elements and one junction are required.

- The *Road 1a* has 2 lanes. To reduce the width of the left lane, two lane sections are used. The complete width of the road is 11 m for the first lane section (right border: 2 m, right lane: 3.5 m, left lane: 3.5 m, left border: 2 m). Because the overall width should be constant for the road in both lane sections, the width of the left border is increased to 3.5 m in the second lane section when the width of the left lane is reduced.
- The *Road 1b* has 1 lane. The right border has a width of 0.5 m and the lane has a width of 3.5 m. To get a complete width of 11 m, the left border has a width of 7 m. The reference line of road 1b should have no offset to the reference line of road 1a, so an offset of 1.5 m is specified for the lane of road 1b (**Offset to reference line** property of the lane section).
- The *Road 2a* has 3 lanes. Two lanes are specified for the oncoming direction and one lane is specified for the direct direction. The complete width of the road is 11 m (right border: 0.5 m, right lane: 3.5 m, left lane: 2 m, temporary lane: 2 m, left border: 3 m).
- The *Road 2b* has 2 lanes. The complete width of the road is 11 m (right border: 0.5 m, right lane: 3.5 m, left lane: 2 m, left border: 5 m).
- The *junction* has 4 connection points to connect the road elements listed above. The absolute positions, tangent angles, and the properties of the connection points are adapted to the connected road elements. The borders between the connection points are straight.

Lines The lines in a roadwork scenario consist of the white lines that come from the original lanes and the yellow lines that are added to indicate the temporary lanes. To insert the lines, the line settings of the lane sections and shapes of the Line type are used. Because junctions have no lane sections where lines can be specified, the lines are always specified by using shapes.

Traffic objects To guide the vehicles, some objects are added to the road element.

- Delineator post objects are placed on roads and junctions to indicate lanes. A simple method to do this, is using a shape of the Repeating type with a delineator post. After you specified the shape, the delineator post objects are automatically positioned along the course of the shape.
- Barriers are placed on the roads and junction. Shapes of the Continuous type are placed on roads and junction. The selected barrier is generated along the course of the shape.
- Further traffic signs are added to the roadwork scenario by using traffic objects.

Workflow

The following steps are the typical way to create a complex roadwork scenario.

1. Create a road network with 4 road elements and a junction. For a description, refer to Workflow for Creating a Road Network on page 103.

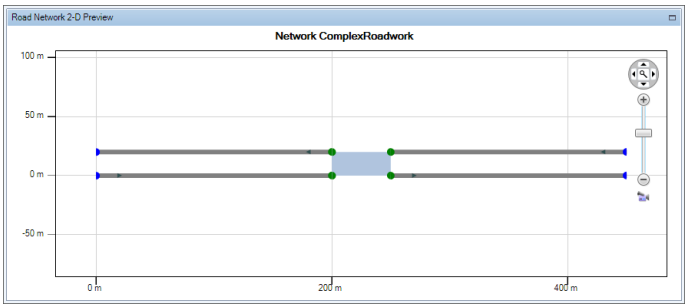
   When you create the road network, consider the following:

   - Start with the creation of the elements and specify their horizontal profiles. One straight segment for each road element is sufficient, but you can also

use several segments if required. In addition, specify their lane sections, especially the number of lanes and the width of lanes and borders. When you connect the junction to the road elements later, you can easily transfer these settings to the connection points of the junction.

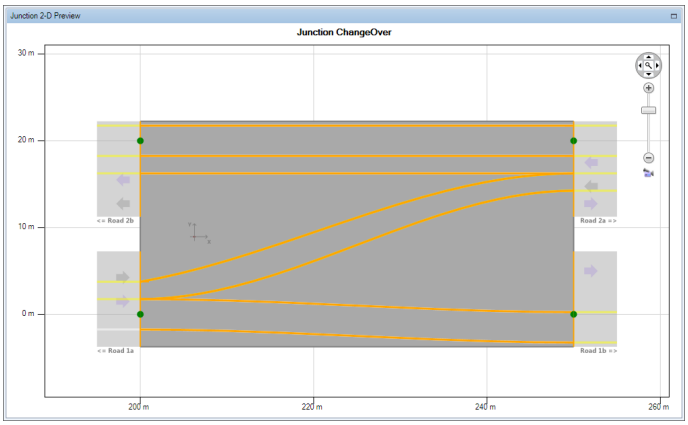
- Place the road elements so that Road 1a and Road 2b are parallel (as well as Road 1b and Road 2a) and there is a gap between Road 1a and Road 1b (as well as Road 2a and Road 2b). The gap must be large enough to insert a smooth lane change.
- Create a new junction with 4 connection points in the area between the road elements. Use the **Connect (Modify)** command at each connection point of the junction and connect it to a road element. The junction is automatically formed to fill the area between the road elements.
- Use the **Adapt Properties** command at each connection point of the junction to get consistent connection points, i.e., the number of lanes, widths of lanes and borders of the junction are equal to the ones of the road elements.
- Specify the Straight type for all the borders of the junction.
- If the **Outline consistency** property of the junction is 'Not ok', move the reference point anywhere inside the junction by using the **Move Reference Point to Here** command.

The following illustration shows the road network in the **Road Network 2-D Preview**:



2. Specify the lines on the road elements and the junction. On the road elements, you can specify lines in the lane sections. In most cases, this can be used to specify the yellow, temporary lines. To specify additional lines on road elements and the junction, use shapes of the Line type. You can use this to specify further yellow lines or white lines that originated from previous road markings. Refer to How to Specify Lanes on Junctions on page 113 and How to Specify Shapes on page 96.

The following illustration shows the junction with the specified yellow lines:



3. To guide the vehicles through a roadwork scenario, you can add 3-D objects such as pylons, delineator posts, and traffic signs. You can do this by adding static traffic objects to the roadwork scenario. Before a 3-D object can be used as traffic object, you must create it. Refer to ModelDesk Traffic Object Management 🕮.
4. You can add a series of traffic objects to the road elements and the junction. To add a series of traffic objects, use a shape of the Repeating type. Using this type, you select a traffic object and specify a course along which this object is placed. You can use this, for example, to place delineator posts along a lane. Another kind of object is a shape of the Continuous type. This creates one object along the specified course. You can use this, for example, to separate lanes with barriers. Refer to How to Specify Shapes on page 96.
5. You can add single traffic objects to the road elements and the junction. This feature can be used to add traffic signs, for example. Refer to How to Add Static Traffic Objects on page 90.
6. You can also specify texture maps or specific surface conditions for road elements or the junction. The Road Generator provides arrows, signs, and several other symbols that can be used as texture maps. Refer to How to Specify Areas with Specific Surface Conditions or Textures on page 86
7. A road element can have one or more scenery sections. You can specify each scenery section individually. In this example, a highway scenery can be used. Refer to How to Specify Scenery Sections on page 88.

Related topics

References

Adapt Properties..... 199
Connect (Modify)..... 205
Move Reference Point to Here..... 223

How to Specify the Profile of a Junction

Objective

The profile of a junction defines its shape and orientation.

Basics

A junction has at least two connection points to connect it with other road elements. When you create a new junction, you can choose between two, three and four connection points as an initial configuration. More connection points can be added later.

The overall position and orientation of a junction can be specified by absolute coordinates and by a tangent angle.

The profile of a junction is defined by the number and positions of its connection points and by the types of borders.

You can specify the properties of every connection point and border. If the junction's shape is invalid, this is indicated in the Junction 2-D Preview and Properties panes.

Method

To specify the profile of a junction

1 In the Road Network 2-D Preview, open the context menu and select New Junction – <n> connections to create a new junction.

> **Tip**
>
> The new junction is created at the position of the mouse pointer. If the mouse pointer is hovering over a connection point of a road element, the new junction is automatically connected to this road element.

2 In the Road Network view of the junction, open the context menu and select Edit.

   The Connection Points and Junction 2-D Preview panes open.

3 To modify the properties of the whole junction, click in the Junction 2-D Preview pane.

   The Properties pane displays the junction parameters.

4 Depending on the option you chose when creating the junction, it has two, three or four connection points. You can add, move and delete connection points.

   There are several ways, to add connection points:

   - Right-click the Connection Points pane and select New Connection Point on the context menu. A new connection point is added to the junction.
   - Right-click the Junction 2-D Preview pane and select New Connection Point on the context menu. A new connection point is created around where you right-clicked the pane.

- Use Copy and Paste on the context menu in the Junction 2-D Preview pane. A copy of an existing connection point is added to the junction around where you right-clicked the pane.

5 To move a connection point, perform one of these steps:
- Use Cut and Paste on the context menu in the Junction 2-D Preview pane. The connection point is moved to a position around where you right-clicked the pane.
- Select a connection point in the Junction 2-D Preview or Connection Points pane and modify its properties in the Connection Points or Properties pane.
- Drag a connection point to the position you want it to be.

6 To modify the orientation of a connection point, select it in the Junction 2-D Preview or Connection Points pane and modify its tangent angle value in the Connection Points or Properties pane.

7 Repeat these steps to add and modify more connection points.

8 To delete a connection point, right-click it in the Connection Points or Junction 2-D Preview pane and select Delete on the context menu.

9 Modifying the connection points might make the junction inconsistent. Inconsistencies are marked red in the Junction 2-D Preview pane. To solve these inconsistencies, you can move its reference point automatically or manually.
- Automatically: Open the context menu of the Junction 2-D Preview and select Find valid reference point.

  The reference point is moved to a valid position.
- Manually: Move the mouse inside the junction, open the context menu and select Move reference point to here.

  The reference point is moved to the position of the mouse pointer.

  Repeat this step until all red points disappear and the Junction consistency property is 'OK'.

10 To get a steady connection between junctions and road elements, the properties of both connection points must match. You can adapt the properties of the junction's connection point manually or automatically:
- Manually: In the Properties pane, click Junction – Adapt Properties.
- Automatically: In the Properties pane, select Junction – Automatic Adaption.

The properties of the connection points and the reference point are adapted.

11 Optional: In the Properties pane, specify the properties of the reference point. As the positions and orientations of the junction's connection points must match the road element's connection points, you can use these properties to influence the junction's height profile.

12 You can define the type of border. Select a border in the Junction 2-D Preview or Borders pane and modify it in the Borders or Properties pane.

Result

You have specified the profile of a junction.

Related topics

References

Connection Point Properties..... 248
Find Valid Reference Point..... 216
Move Reference Point to Here..... 223
New Junction - <n> Connections..... 226
Road Network Element Properties..... 258

How to Specify Lanes on Junctions

Objective

Lanes can be specified for each connection point on a junction.

Basics

Each connection point of a junction can have a different number of lanes. There are no lanes on the rest of the junction.

You can specify the number and widths of lanes on junctions.

Tip

When the connection points of a junction are connected to connection points of road elements, you can transfer the settings of the lanes. Refer to Adapt Properties on page 199.

Preconditions

You have created a junction and specified its position.

Possible methods

You can specify the lane properties automatically or manually.

- The easiest way to specify the lane properties is to adapt the values to the connected road elements automatically. Then the settings are always consistent. Refer to Method 1 on page 113.
- You can specify the lane properties manually. Refer to Method 2 on page 114.

Method 1

To specify lanes on junctions automatically

1. In the Junctions view, open the Properties pane.
2. Click on the junction to display its properties in the Properties pane.
3. In the Connections property of the Properties pane, click Adapt properties.
4. To adapt the properties automatically, enable Automatic Adaption. When you modify a lane of a connected road afterward, the property is automatically adapted on the junction.

Result

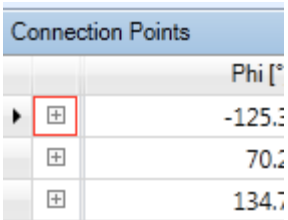
The properties of all the connections are adapted to the properties of the connected roads.

Method 2

To specify lanes on junctions manually

1 In the Junctions view, open the Connection Points, Junction 2-D Preview and Properties panes.

2 Select the connection point you want to modify in the Connection Points pane. Open the Lane connections dialog via the + sign.



3 To add a lane on the right or left side, use the + sign on the side.

4 To delete a lane from the right or left side, use the - sign on the side.

5 To modify the width of a lane, select it in the Connection Points pane and specify the value in the Properties pane.

Result

You have specified lanes on a junction.

Related topics

Basics

Lanes of a Road Element 48

HowTos

How to Specify Lane Sections and Lanes on Road Elements 81

References

Connection Points Pane 175

How to Specify a Road Network

Objective

To create a road network, you must connect road elements and junctions.

Basics

A road network is built from road elements and junctions. These are connected in connection points. You can add elements to your network and delete them from it.

As the properties of each element are specified individually, you must make sure that they are connected without causing inconsistencies.

If there are any inconsistencies in the road network, the Road Generator provides a function to correct these by adapting the properties of connected elements.

You should complete the road network, before modifying properties like the surface condition and scenery.

Copy & paste

You can copy & paste road elements or junctions to reuse specified elements within a road network. This is possible for a single element and several elements at once. However, if you copy several elements that are connected, the pasted elements are no longer connected.

Closed road network

If you have built a road network which has gaps, you do not need to close these manually. The Road Generator will fill each gap with an appropriate element by calculating its properties automatically. Note that, if you modify a closed road network, the inserted element will not be adapted and the network might be open again. In this case, you must close your road network again.

Preconditions

In the Road Generator, you must have either started a new road or opened an existing one.

Method

To specify a road network

1. In the Road Network view, open the Road Network 2-D Preview, Properties, and Road Network panes.
2. It does not matter whether you begin with a road element or a junction.

   To add a road element, perform one of these steps:
   - Right-click the Road Network 2-D Preview pane and select New Road on the context menu.
   - Right-click the Road Network pane and select New – Road on the context menu.

   Specify the global properties of the road element in the Properties pane (see Road Network Element Properties on page 258).
3. To add a junction, perform one of these steps:
   - Right-click the Road Network 2-D Preview pane and select New Junction – <junction type> on the context menu.

- Right-click the **Road Network** pane and select **New – Junction – <junction type>** on the context menu.

Specify the global junction properties in the **Properties** pane (see Road Network Element Properties on page 258).

4 You should specify the road network's traffic type, as the traffic type influences the direction of travel on the lanes. From the main menu, select **Road Generator – Properties**.

The **Properties** pane displays the global properties of the road network.

5 Select the traffic type (right-hand traffic or left-hand traffic).

6 Whichever element you added first, continue by specifying its horizontal profile.

For a road element, refer to How to Specify the Horizontal Profile of a Road Element on page 76.

For a junction, refer to How to Specify the Profile of a Junction on page 111.

7 Specify the road element's height profile. Refer to How to Specify the Height Profile of a Road Element on page 77. Note that the height profile of a junction results from the settings of the connected road element's connection points and the settings of the junction's reference point.

8 For a road element, specify the lateral slope profile. Refer to How to Specify the Lateral Slope Profile of a Road Element on page 80. Note that junctions do not have lateral slope.

9 Create lanes on the road element or junction. You must define the direction of travel for each lane. Refer to How to Specify Lane Sections and Lanes on Road Elements on page 81 and How to Specify Lanes on Junctions on page 113.

10 Add more elements to the road network. There are three possible ways to do this:

- Right-click the connection point you want to add an element to. On the context menu, select **New Road** or **New Junction - <junction type>**. The element is added to the road network and connected to the connection point selected.
- Create a new element (see 2 and 3) and connect it to another element. To do so, right-click the connection point of the element you want to connect in the **Road Network 2-D Preview** pane and select one of these commands on the context menu:
  - **Connect (Move)**: Moves the connection point to the element you want to connect it to.

- **Connect (Modify)**: Modifies the element to connect it to the element you want to connect it to.
- Create a new element (see 2 and 3) and connect it to another element by dragging it to the position you want it to be. Release the mouse button when the connection points turn orange to connect it to another element.

After connection, the x and y coordinates and orientation of the connection points are identical. You can also close your road network in this way. You can insert closing elements in the road network's gaps via **Connect (Modify)**.

Note

If you modify the position of an element, the connection to other elements might break and must be restored manually.

11 Specify the profile of every element you added to the road network, as you did with the first element by repeating steps 6 till 9.

12 When you connect one element to another, you can adapt the elements' properties, i.e., the number of lanes or height. This will also restore the consistency of the connection, refer to How to Restore the Consistency of a Road Network on page 119.

Right-click the element's connection point in the **Road Network 2-D Preview** pane and select **Adapt Properties** on the context menu.

Note

As every connection point has two parts, make sure to select the right part, because the properties of the selected part will be adapted.

After adapting the properties, you can still specify the element's properties as described above.

Result

You have created a road network and specified its profile.

Related topics

References

Adapt Properties 199
Connect (Modify) 205
Connect (Move) 206

How to Specify the Direction of Travel on a Road Element

Objective

You can specify the direction of travel on lanes of road elements.

Directions of travel

Each lane can have a different direction of travel, which is indicated by arrow icons in the Lanes pane.

A one-directional arrow indicates a direct or oncoming direction of travel, depending on the traffic type selected for the road: or

A bidirectional arrow indicates that the lane can be used in both directions:

Direction of travels can only be defined for the whole lane. This means that a lane which is part of several lane sections will always have the same direction of travel.

Which direction of travel is possible for a lane is influenced by the traffic type on the road network. Unspecified lanes between other lanes are always bidirectional.

Preconditions

You have created lanes on a road element and specified the traffic type of the road network.

Possible methods

There are two methods to define the direction of travel:

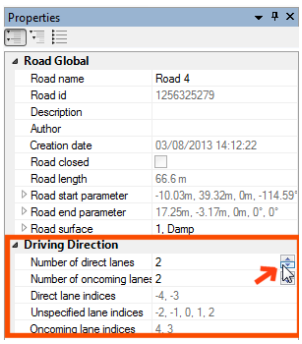
- To specify the direction of travel in the Properties pane. Refer to Method 1.
- To specify the direction of travel in the Lanes pane. Refer to Method 2.

Method 1

To specify the direction of travel on a road element in the Properties pane

1 In the Road Element view, open the Lanes and Properties panes. The Properties pane must display the Road Global and Driving Direction properties.

2 In the Properties pane, click the arrows in the Number of oncoming lanes or Number of direct lanes box. See the following illustration:



This changes the number of lanes in the specified direction on a road element.

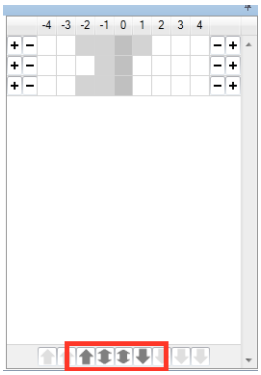
Depending on this and the traffic type specified for the road network, the Road Generator automatically decides which lanes are oncoming or direct. The indices of the oncoming and direct lanes can be seen in the **Properties** pane or in the **Lanes** pane, where the direction of travel is indicated by arrow icons.

Method 2

To specify the direction of travel on a road element on the Lanes pane

1 In the **Road Element** view, open the **Lanes**, **Road 1-D Preview** and **Properties** panes.

2 In the **Lanes** pane, click the arrow icons. In this way, you can switch the direction of travel on the lane. See the following illustration:



The alignment of the arrows in the **Lanes** and **Road 1-D Preview** panes changes.

Result

You have specified the direction of travel on the lanes.

Related topics

Basics

Overview of Roads..... 35

References

Road Network Element Properties..... 258

How to Restore the Consistency of a Road Network

Objective

The elements in a road network must be consistent with each other.

Basics

When you connect elements, it can happen that they are inconsistent, for example, they can have different number of lanes or different driving directions.

The connection between elements in a road network is provided by connection points. They can have different states indicated by color. If a connection point is red, the elements it connects are inconsistent.

As a connection point is a connection between of two elements, it has two parts.

Preconditions

You have created a road network. There are red connection points in the Road Network 2-D Preview or Junction 2-D Preview pane.

Method

To recover the consistency of a road network

1. Open the Properties pane.
2. Click a red connection point to see which properties are inconsistent in the Properties pane.
3. To solve the inconsistency, you can adapt the properties of an element to those of one element.

   Right-click the connection point and select Adapt Properties on the context menu. The properties are adapted and the connection point turns green.

   Note

   As every connection point has two parts, make sure to select the right part, because the properties of the selected part will be adapted.
   Also note that these adaptations might affect other connection points, which might become inconsistent. For example, if a road element has only one lane section, parameters changed for the lane settings at the beginning of a road element are also changed at the end of a road element.

Result

The properties of the connection points have been adapted to recover the road network's consistency.

Related topics

References

Adapt Properties..... 199

How to Specify Trajectories

Objective

You can specify shapes of the Trajectory type for road network elements. This shape defines a curved path that can be followed by the ASM vehicle if a route is defined.

Basics of trajectories

Refer to Trajectories on page 64.

Preconditions

The road network element where the trajectory should be placed, must exist.

Method

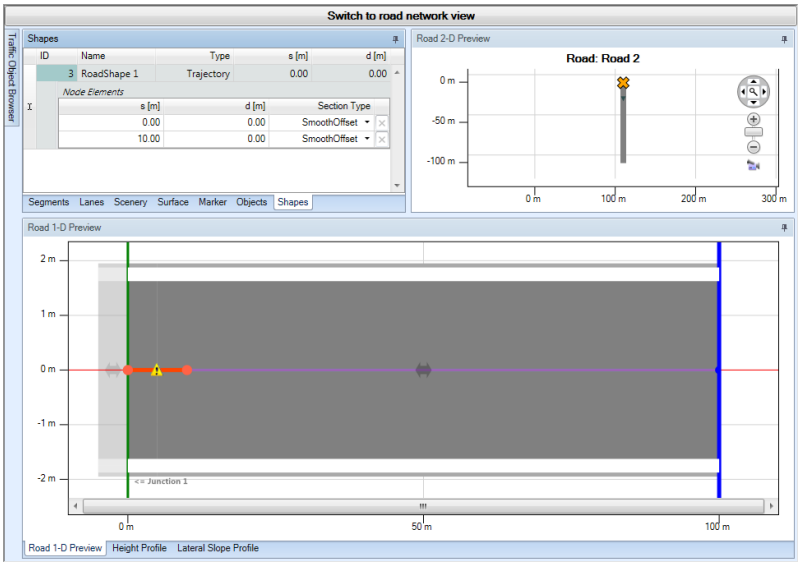
To specify trajectories

1. Open the road network element to which you want to add the trajectories for editing.
2. Open the following panes:
   - In the Road view, open the Shapes, Road 1-D Preview, Road 2-D Preview, and Properties panes.
   - In the Junctions view, open the Shapes, Junction 2-D Preview, and Properties panes.
3. In the Shapes pane, open the context menu and select New – Trajectory to create a new trajectory in the list.

   Or

   In the Road 1-D Preview or Junction 2-D Preview pane, open the context menu and select New shape – Trajectory to create a new trajectory at the position of the mouse pointer.

   The Road Generator creates a new trajectory on the road network element. The trajectory is displayed in the preview and is listed on the Shapes pane. By default, the new trajectory has two nodes that are listed in the Node Elements list.



You can add more nodes to the trajectory to shape the course of the trajectory.

4 In the **Node Elements** list, open the context menu and select **Insert After**.

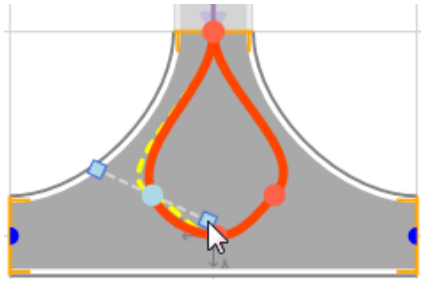
The Road Generator adds a new node to the trajectory after the selected node.

5 Specify the section type of the node. The section type determines the shape of the section between the selected node and the next node. Refer to Shape Properties on page 272.

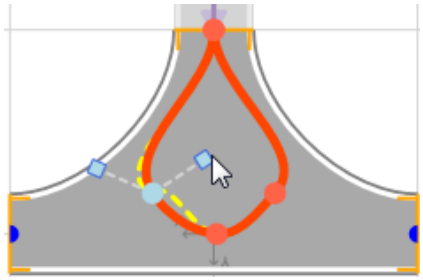
6 You can modify the position or orientation of a node in different ways:

- Click the node and specify its properties in the **Shapes** or the **Properties** pane.
- To move the node, drag its symbol.
- If the section type is a spline, you can modify the start and end angles:

  To modify the start angle of a node together with the end angle of the previous node, click a node and drag one of the little rectangles. Refer to the following illustration.



To modify the start angle of a node and the end angle of the previous node, press `Ctrl`, select a node, and drag the small rectangles. Refer to the following illustration.



7 Repeat the previous steps to add more nodes to the trajectory until it has the correct shape.

A trajectory must start and end at connection points. If this is not the case, the trajectory is invalid and a warning symbol displays on the symbol of the trajectory. If a invalid trajectory is used in a route, the route is also invalid and cannot be used for simulation.

8 On the **Environment** ribbon, click **Road** – **Save** to save your settings.

Result

You specified trajectories. You can select the trajectories in routes. Refer to How to Specify Routes on Road Networks on page 123.

Related topics

Basics

CreateGeoOptTrajectory.py (ASM User Guide 🕮)
Shapes 62

References

Insert after 219

How to Specify Routes on Road Networks

Objective

You can define routes on a road network.

Basics

A route consists of road elements. A route element corresponds to a road element in a road network.

There can be several routes on a road network.

A route does not need to be closed. This means that its starting point does not need to be its end point.

It is possible to specify U-turns on junctions.

Trajectories

The path for traveling is normally specified by the course of the road network elements. For example, the path for traveling is the preferred lane of a road element. It is also possible to use alternative paths. Alternative paths can be specified as trajectories on road network elements. So it is possible to model driving around barriers or cornering by using a greater radius than a curve. Refer to How to Specify Trajectories on page 121.

Preconditions

You have created and specified a road network.

Method

To specify routes on road networks

1. In the Road Network view, open the Routes, Road network 2-D Preview and Properties panes.
2. Right-click the Routes pane and select New Route on the context menu.

   A new route is added to the Routes pane. This route does not contain any route elements yet.
3. To add elements to the route, right-click it and select Edit Route on the context menu.

   The connection points are highlighted in the Road Network 2-D Preview pane.
4. Select one connection point to assign it as the route's starting point.

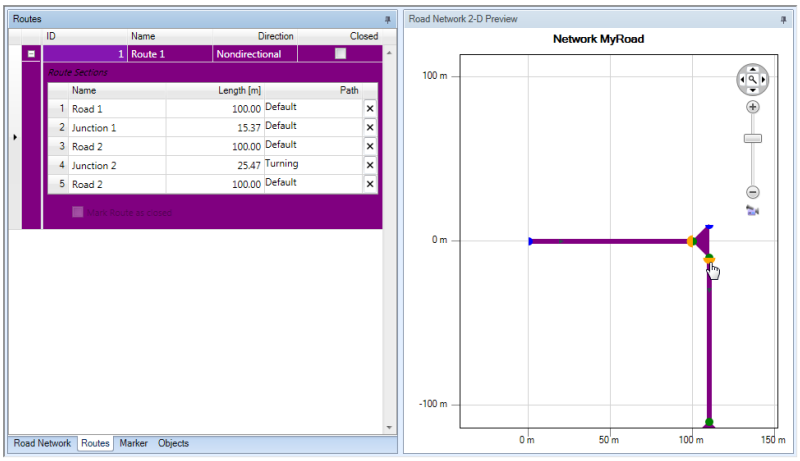
   The road element related to the connection point is used as the starting point of the route. The Road Generator highlights all the other connection points that can be added to the route.
5. Select more elements in the Road Network 2-D Preview pane to add them to the route.

   An element can be added to the route only if the connection point is highlighted.

   All road elements and junctions selected for the route are listed in the Route Sections list.

   By default, the Default path of the road network element is used as path for driving. You can select another path if you have specified trajectories.
6. In the Route Sections list, click the road network elements and select a path.

The following illustration shows an example.



7 Click the route's name in the **Routes** pane to see which elements are part of the route.

The route elements are highlighted in the **Road Network 2-D Preview** pane.

8 To delete an element from the route, activate the **Edit Route** mode in the **Routes** pane and click **X** next to the element you want to delete.

9 If the start and end points of the route match, you can close the route. Select **Mark route as closed** in the **Routes** pane.

Result

You have defined routes on a road network.

Related topics

Basics

Routes on a Road Network.....66
Trajectories.....64

HowTos

How to Specify Trajectories.....121

References

Edit Route.....213
Route Properties.....267
Routes Pane.....189

Working with Roads

Introduction

You can manage the roads you have built, work with them in the **Road Generator**, and visualize them in MotionDesk.

Where to go from here

Information in this section

Managing Roads..... 126
You can manage the roads you have built with the Road Generator and link them to an experiment as required.

How to Import Road RD Files..... 128
You can import road RD files to the current project.

Working with Roads in ModelDesk..... 129
You can use roads in the current project together with a maneuver or in other parameterization projects.

Using Roads for Simulation and Visualization..... 130
A road can be used in a model for simulation and in MotionDesk for visualization.

How to Examine the Road Network in MotionDesk..... 131
You can move an observer in MotionDesk to specific positions using the Road Generator. This can be used to examine the scene after performing the configuration.

How to Download a Road..... 132
You can download a road to the simulation model.

Modifying Properties of a Road via Alias Variables..... 133
When a road is created, you can modify properties using alias variables in ModelDesk testing and automation scripts.

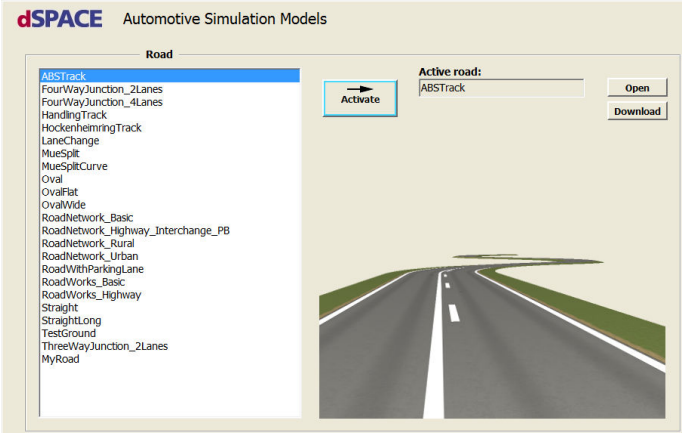
Managing Roads

Introduction

Managing roads means handling and modifying them, and linking them to your experiment as required.

Road Configuration page

ModelDesk's Configuration page gives you easy and intuitive access to the archived roads. The Configuration page also includes various commands for managing and modifying roads. Refer to Road Configuration Page on page 171.



Activating roads All the available roads are listed for you to choose one and activate it. Activating means that the road is linked to the current experiment automatically.

Opening roads You can open the current active road by using the Road Generator.

Downloading roads If you want to use a road in a simulation, you must download it to the model. For further information on downloading, refer to Working with Roads in ModelDesk on page 129.

Tip

You can also manage your roads via the Experiment Configuration page. This global page also gives you access to the roads and provides the same commands for managing and modifying them.

Alternative handling with the Project Navigator

For you to handle roads, the Project Navigator provides a context menu with commands for opening, linking and removing roads.

Opening the active road You can open the active road with Open. This command is only active when a road is linked to the experiment.

Importing a road You can import a road into the Pool of your project. Refer to How to Import Road RD Files on page 128.

Opening roads from the Pool If you want to modify an existing road, you can open it from the Pool. Refer to Open from Pool on page 169.

Linking roads to an experiment From the Pool, you can link each road to an active experiment you want to work with. ModelDesk links the selected road to the experiment, and removes another if there is one. Refer to Activate from Pool on page 165.

Removing roads from an experiment You can work only with one road in your experiment. If you want to work with another, you can remove the linked road. Refer to Remove (from Project) (ModelDesk Project and Experiment Management 🕮).

Related topics

Basics

Creating a Road Network..... 102

References

Configuration Page (ModelDesk Parameterizing 🕮)

How to Import Road RD Files

Objective

You can import road RD files into the Pool to use them in the current project.

Parameter file import dialog

ModelDesk imports the road RD files to the Pool in the Environment/Road section. If you import files to the Pool for the first time, ModelDesk opens the Parameter file import dialog for you to choose how to handle the import. For a description of the dialog, refer to Import (ModelDesk Basics 🕮).

Method

To import road RD files

1. In the Project Navigator, right-click Pool and select Import from the context menu.

   The Open dialog opens.
2. Select the ZIP file containing the road RD file.
3. Click Open.

   ModelDesk checks the selected file:
   - If the road file was created with a previous version of ModelDesk, you can cancel the import or let ModelDesk migrate the road file.
   - If the file name already exists in the Pool, you can cancel the import or replace the existing road.

Result

The road is imported to the Pool of the project. You can use it in your experiment.

Related topics

Basics

Basics of Importing Road Models in OpenDRIVE Format..... 148
Configuration File for Importing OpenDRIVE Files (ODIC File)..... 151

References

Import (ModelDesk Basics 🕮)

Working with Roads in ModelDesk

Introduction

You can use roads together with a maneuver in the current project or in other parameterization projects.

Using roads in maneuvers

You can use a road in a maneuver to let the vehicle's movements follow the course of the road. For further information on coupling a road and maneuver, refer to How to Start Scenario Creation (ModelDesk Scenario Creation 🕮).

Using roads in other projects

All roads are stored in the Pool, from where you can export them and then import them to the Pool of another project.

Export You can export road files into a ZIP archive in a similar way to exporting parameter files. Refer to How to Export Parameter Files (ModelDesk Parameterizing 🕮) and Export (ModelDesk Basics 🕮).

Import You can import road files to your project in a similar way to importing parameter files. Refer to How to Import Parameter Files (ModelDesk Parameterizing 🕮) and Import (ModelDesk Basics 🕮). The road files you have imported are saved to the road folder of the Pool automatically. You can link them to your experiment from there.

Changing parameters outside ModelDesk

You can export a current linked road to a MAT file and use its parameters in the ROAD block of the simulation model. For detailed information on road parameters, refer to Road (ASM Environment Reference 🕮).

Generate road ini You must export the road ini file to the `Simulation.current\IniFiles\Road` folder of the ASM to use the road together with the model and to run the simulation with. The road is exported as a MAT file. For detailed information, refer to Generate Road Ini on page 167.

Related topics

Basics

Workflow for Maneuver Creation (ModelDesk Scenario Creation 🕮)
Workflow for Traffic Creation (ModelDesk Scenario Creation 🕮)

HowTos

How to Download a Road..... 132
How to Follow a Road Automatically (ModelDesk Scenario Creation 🕮)

Using Roads for Simulation and Visualization

Introduction

A road can be used in a model for simulation and in MotionDesk for visualization.

Downloading roads in the simulation model

When you have created a road, you must download it to use the specified road parameters together with the simulation model. The road which is linked to the current experiment can be downloaded to the real-time hardware, Simulink, or VEOS with ModelDesk.

Using a road in MotionDesk

To visualize the road in MotionDesk, the **Road Generator** can copy the required data to a running MotionDesk session. If you update the MotionDesk scene, a static object named ASM_Road is created in the scene. The ASM_Road object is a 3-dimensional COLLADA object of the road that you specified with the **Road Generator**.

For details, refer to Basics of Synchronizing the Scene in MotionDesk (ModelDesk Scene Synchronization 🕮).

Related topics

Basics

Working with Roads in ModelDesk..... 129

HowTos

How to Download a Road..... 132

How to Examine the Road Network in MotionDesk

Objective

You can move an observer in MotionDesk to specific positions by using the **Road Generator**. This can be used to examine the scene after performing the configuration.

Basics of the ModelDesk observer

MotionDesk has a special ModelDesk Observer that can be moved by the **Road Generator**. This is helpful when you create a road network and want to observe the scene at a specific location after scene generation.

Preconditions

- MotionDesk must be running.
- The active road network must be open in the **Road Generator**.
- The scene must be synchronized in ModelDesk and MotionDesk. Refer to How to Synchronize When MotionDesk and ModelDesk Run on the Same PC (ModelDesk Scene Synchronization 🕮).

Possible methods

You have two options to move the ModelDesk Observer:

- You can specify the position and orientation of the ModelDesk Observer in the scene. Refer to Method 1 on page 131.
- You can move the ModelDesk Observer in the scene to the position that corresponds to the current mouse pointer position. Refer to Method 2 on page 132.

Method 1

To examine the road network in MotionDesk by specifying position and orientation of an observer

1. Open a road network, road element, or junction.

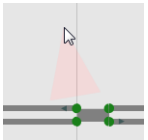
   The preview panes display the element. The 2-D preview panes also display a camera symbol.

2. Click the camera symbol in the preview.

   The area of the 2-D preview pane becomes gray.

3. Drag the mouse pointer from the point to be examined to the point where you want to position the ModelDesk Observer.

While you are dragging the mouse pointer, a red triangle is displayed that visualizes the visible area of the observer.



When you release the mouse button, the observer is moved to the current mouse pointer position in MotionDesk in the direction of the start mouse pointer position.

Method 2

To examine the road network in MotionDesk from a bird's eye view

1. Open a road network, road element, or junction.
   The preview panes displays the opened element.
2. Move the mouse pointer to the position that you want to examine.
3. Open the context menu of the preview and choose Show in MotionDesk.

Result

In MotionDesk, the ModelDesk Observer is set to the specified position.

Related topics

References

Show in MotionDesk 232

How to Download a Road

Objective

You can download a road to the simulation model.

Precondition

The road you want to download must be linked to an experiment. Refer to Managing Roads on page 126.

Method

To download a road

1. In the Project Navigator, right-click the road you want to download.
2. From the context menu, select Download.

Result

You downloaded the road.

Tip

To visualize the road in MotionDesk, you must update the scene. Refer to Basics of Synchronizing the Scene in MotionDesk (ModelDesk Scene Synchronization 🕮).
The update can be automated by selecting an option. Refer to Customize (ModelDesk Scene Synchronization 🕮).

Related topics

References

Download / Download Road..... 166

Modifying Properties of a Road via Alias Variables

Introduction

When a road is created, you can modify properties using alias variables in ModelDesk testing and automation scripts.

Alias variables

Using alias variables is an easy method to modify properties of the active road. The method allows you to modify one or more properties using one alias variable.

You create alias variables in the **Road Generator** for each property that you want to modify. When you create an alias variable, it gets a property reference that points to the property that you want to modify. Then, you can assign several property references to the same alias variable. When you modify the value of the alias variable, you also modify the values of all assigned property references. The modification is done via tool automation.

Related topics

Basics

Basics of the Alias Support (ModelDesk Testing 🕮)
Setting Values of Properties Using Alias Variables (ModelDesk Automation 🕮)

HowTos

How to Create Alias Variables (ModelDesk Testing 🕮)

Working with Roads in OpenDRIVE Format

Introduction

Provides information on importing and exporting road files in the OpenDRIVE® format.

For more information on OpenDRIVE, refer to http://www.opendrive.org/docs/OpenDRIVEStyleGuideRevC.pdf.

Where to go from here

Information in this section

Basics of Using OpenDRIVE Files in ModelDesk 134

Importing OpenDRIVE Files 147

Exporting OpenDRIVE Files 157

Basics of Using OpenDRIVE Files in ModelDesk

Where to go from here

Information in this section

Junctions Specified in OpenDRIVE Format and ModelDesk's Road Model 135
The definition of junctions in OpenDRIVE files is different to the definition of junctions in ModelDesk. When you import OpenDRIVE junctions, some additional steps may be required.

Reference Line Specified in OpenDRIVE Format and ModelDesk's Road Model 137
The reference line defined in the OpenDRIVE file specifies the road start position in ModelDesk.

Connections Specified in OpenDRIVE Format and ModelDesk's Road Model 138
To get a road network in ModelDesk, the road elements must be connected.

Signals and Objects Specified in OpenDRIVE Format and ModelDesk's Road Model 139
ModelDesk has a different method for placing signals and objects in a road network as it is defined in an OpenDRIVE file.

Lane Sections Specified in OpenDRIVE Format and ModelDesk's Road Model 140
ModelDesk has bound several lane parameters to the lane sections to allow an easy definition and configuration of those parameters

Routes Specified in ModelDesk's Road Model 141
ModelDesk uses routes to define ways through a road network.

Mapping of Elements of OpenDRIVE Files to ModelDesk's Road Models 141
When you import OpenDRIVE Files to ModelDesk, their elements are mapped to elements of the ModelDesk road model. Some elements of the OpenDRIVE file cannot be mapped to ModelDesk's road model. They are therefore not evaluated.

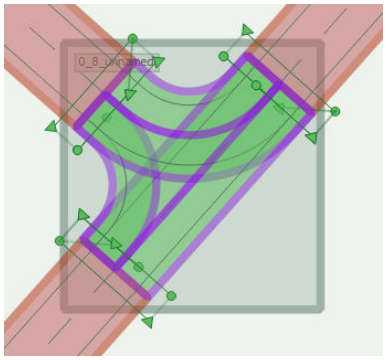
Junctions Specified in OpenDRIVE Format and ModelDesk's Road Model

Introduction

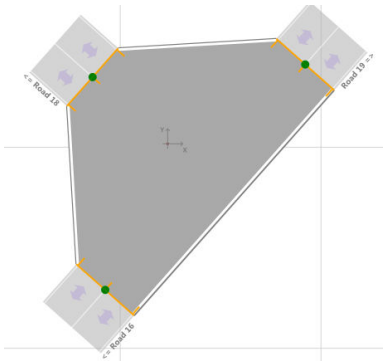
The definition of junctions in OpenDRIVE files is different to the definition of junctions in ModelDesk. When you import OpenDRIVE junctions, some additional steps may be required.

Modeling junctions

Junctions in OpenDRIVE Files OpenDRIVE junctions consist of several roads, which are marked as junction roads by setting the junction attribute to the ID of the junction.



Junctions in ModelDesk ModelDesk defines a junction by connection points that other roads can be attached to as well as additional properties, such as borders.



Connections

You have to connect OpenDRIVE junction roads (junction ID is not -1) to OpenDRIVE standard roads (junction ID is -1) properly to create the ModelDesk junction, see the following example.

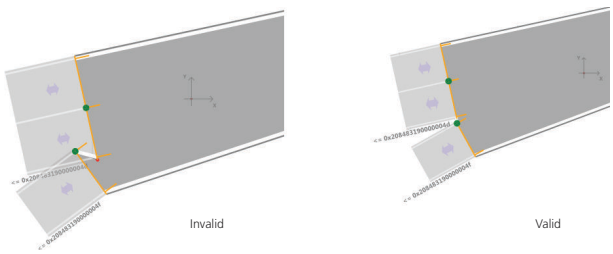
```
<road name="" length="2.4788652606677413e+001" id="22" junction="26">
    <link>
        <predecessor elementType="road" elementId="19" contactPoint="start" />
        <sucessor elementType="road" elementId="18" contactPoint="start" />
    </link>
```

When an OpenDRIVE file is imported, all properties of the junction connection point (position, orientation, width, etc.) are extracted from the successor/predecessor of the junction road to make sure the road-junction connection is valid. Junction road properties other than link are not evaluated.

Validity

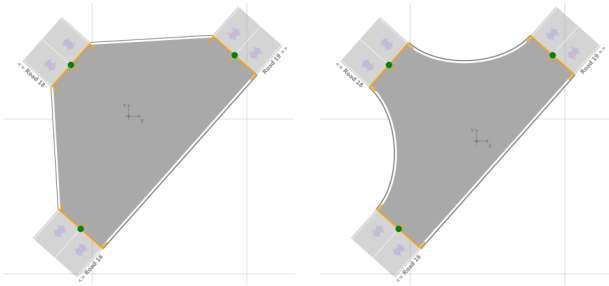
Junctions in ModelDesk are defined in polar coordinates. Every point on the border of the junction must be defined by a unique **φ** angle relative to the reference point of the junction.

When junction connection points overlap, the junction is marked as invalid. Place the connection points at a greater distance to each other to create a valid junction, see the following illustration.



The reference point of the junction is set to the arithmetic mean of all the connection points during the conversion from an OpenDRIVE junction to a ModelDesk junction. The border type is set to "Straight" because the "Spline" border type can cause an invalid junction outline. You can optimize the border

type and junction reference point properties by using the ModelDesk automation interface after completing the import, see the following illustration.



Related topics

Basics

Importing OpenDRIVE Files..... 147

Reference Line Specified in OpenDRIVE Format and ModelDesk's Road Model

Introduction

The reference line defined in the OpenDRIVE file specifies the road start position in ModelDesk.

Reference line

The end and start positions of consecutive OpenDRIVE road geometries are assumed to be nearly identical. Normally, ModelDesk sets the start position of a road segment to the end position of the previous road segment to get a continuous road. However, when you import a file in OpenDRIVE format, the start positions (attributes `x`, `y` and `hdg` of the geometry nodes) specified in the file, are evaluated.

The attributes of the first geometry are used as the road start position.

```
<geometry s="2.0319104264108240e+001" x="6.694491476053077e-001" y="
2.0411353342285011e+002" hdg="2.5405420398725767e+000" length="3.0000
000000000000e+000>
    <spiral curvStart=-8.3333333333333329e-002
curvEnd="-0.0000000000000000e+000" />
</geometry>
```

Reference line offset

The OpenDRIVE `laneOffset` property is similar to the Offset to reference line property in ModelDesk. The main difference is that the OpenDRIVE `laneOffset` property can be defined independently of the OpenDRIVE `laneSection` property, whereas in ModelDesk the Offset to reference line property is a property of the lane section.

ModelDesk creates therefore lane sections for each OpenDRIVE `laneOffset` and `laneSection` areas if these areas do not match.

Tip

If possible, use equal areas for the OpenDRIVE `laneOffset` and `laneSection` elements. This reduces the number of lane sections that are created for the road in ModelDesk.

In ModelDesk the offset to reference line is constant, only the constant part a of the last OpenDRIVE `laneOffset` in a lane section is therefore evaluated.

Related topics

Basics

Horizontal Profile of a Road Element..... 40

Connections Specified in OpenDRIVE Format and ModelDesk's Road Model

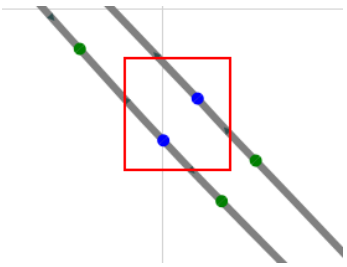
Introduction

To get a road network in ModelDesk, the road elements must be connected.

Connections

ModelDesk establishes connections between multiple roads or roads and junctions only if the position and orientation parameters of both connection points are identical at least up to the third decimal place. If the position and orientation differ for a greater value, the connections points of the roads or road and junction are not connected and the simulation is not able to pass those connection points.

Unconnected connection points are blue, see the following illustration.



Related topics

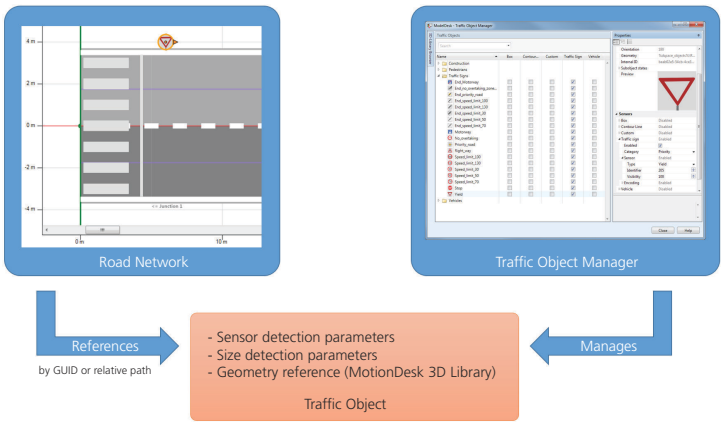
Basics

Basics of Using OpenDRIVE Files in ModelDesk..... 134

Signals and Objects Specified in OpenDRIVE Format and ModelDesk's Road Model

Introduction

ModelDesk has a different method for placing signals and objects in a road network as it is defined in an OpenDRIVE file.



Model differences

There are the following main differences between the description of signals and objects in ModelDesk and in the OpenDRIVE format.

- There is no differentiation between signals and objects in ModelDesk. The referenced traffic object defines the signal's or object's role.
- The referenced traffic object defines which sensor is able to detect the signal or object.
- In ModelDesk, the network contains only references to traffic objects that are managed by the Traffic Object Manager.

  The reference consists of a unique ID and/or the relative path of the traffic object in the project's Pool.

Importing OpenDRIVE signals and objects

OpenDRIVE signals and objects must be mapped to traffic objects in ModelDesk. For this purpose, you can create a configuration file (ODIC file) in ModelDesk. The ODIC file lets ModelDesk automatically map the OpenDRIVE signals and objects when the OpenDRIVE file is imported. Refer to Configuration File for Importing OpenDRIVE Files (ODIC File) on page 151.

ModelDesk converts OpenDRIVE signals and objects on junction roads to ModelDesk traffic object references on the corresponding junctions. The absolute positions of the converted signals and objects remain unchanged.

Related topics

Basics

Basics of Using OpenDRIVE Files in ModelDesk..... 134

Lane Sections Specified in OpenDRIVE Format and ModelDesk's Road Model

Lane sections in ModelDesk

ModelDesk has bound several lane parameters to the lane sections to allow an easy definition and configuration of those parameters:

- Lane count
- Lane width
- Lane offset
- Road markings
- Borders

In contrast to OpenDRIVE, these parameters are constant for each lane section in ModelDesk.

Lane count and type

ModelDesk and ASM currently support up to 100 driving lanes. The ODIC file lets you choose the lane types to be imported. Roads with a structural separation of driving directions like highways must be defined with separate roads, see the following example.

Lane width

If multiple lane widths are defined in an OpenDRIVE lane section, ModelDesk creates multiple lane sections during the import because the lane width is constant within a ModelDesk lane section.

Road markings

ModelDesk converts the OpenDRIVE road marking types to ModelDesk line presets, see the following table:

OpenDRIVE Road Marking Type	ModelDesk Line Preset
none	None
solid	Solid
broken	Dash
solid solid	DoubleSolid
solid broken	SolidDash
broken solid	DashSolid
broken broken	DoubleDash
botts dots	None
grass	None
curb	Race

When multiple roadMark nodes are defined or a custom OpenDRIVE type node is used, ModelDesk converts them to shapes of the Line type.

Related topics

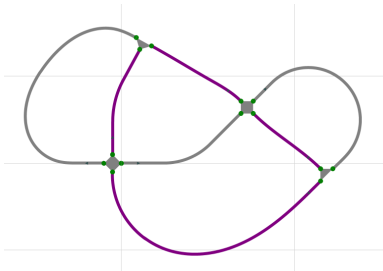
Basics

Shapes..... 62

Routes Specified in ModelDesk's Road Model

Introduction

ModelDesk uses routes to define ways through a road network. Those routes are necessary for vehicle movement in the road network.



Creating routes

Because OpenDRIVE has no equivalent for the ModelDesk route system, ModelDesk creates one route on the first imported OpenDRIVE road. If you want to define more complex routes, you can do this after the import either in the graphical user interface or by using the ModelDesk automation interface.

Related topics

HowTos

How to Specify Routes on Road Networks..... 123

Mapping of Elements of OpenDRIVE Files to ModelDesk's Road Models

Introduction

When you import OpenDRIVE Files to ModelDesk, their elements are mapped to elements of the ModelDesk road model. Some elements of the OpenDRIVE file cannot be mapped to ModelDesk's road model. They are therefore not evaluated.

Mapped elements

The following table shows the elements of an OpenDRIVE file and the mapping to the elements of the road model in ModelDesk. Some elements and attributes that are defined in OpenDRIVE files cannot be evaluated in the road models of ModelDesk.

OpenDRIVE Elements	Effect on ModelDesk's Road Model
`<header>`	ModelDesk supports OpenDRIVE version 1.4H.
`<geoReference>`	ModelDesk supports the definition of the road reference point in the world geodetic system 84 (WGS 84). The `latitude_of_origin` and `central_meridian` entries are expected.
`<userData>`	This element is used to define an import configuration XML file. Attributes: ▪ `code` is evaluated. The evaluated code is `ModelDeskImportConfigurationFilePath`. ▪ `value` is evaluated. It contains the absolute path to the import configuration file. Refer to How to Use an ODIC File on page 155.
`<road>`	Only roads which `junction` attribute is -1 (roads that are not part of a junction) are evaluated in detail. For junction roads (`junction` attribute is not -1), only the `<link>` element is evaluated. Attributes: ▪ `name` is evaluated. ▪ `length` is not evaluated. ModelDesk calculates the complete length of the road using the segment lengths. ▪ `id` is evaluated. It is written to ModelDesk's road description. ▪ `junction` is evaluated. ModelDesk creates junctions from parameters of OpenDRIVE roads with the same junction ID.
`<link>`	The element is evaluated.
`<predecessor>`	The element is evaluated. All attributes are required to generate the connections of all the road network elements.
`<successor>`	The element is evaluated. All attributes are required to generate the connections of all the road network elements.
`<neighbor>`	The element is not evaluated.
`<type>`	The element is not evaluated.
`<planView>`	The element is evaluated.
`<geometry>`	The element is evaluated. Attributes: ▪ `s` is not evaluated. ▪ `x`, `y`, `hdg` are partially evaluated. The start position of the first OpenDRIVE geometry is used as the start position of the ModelDesk road. The start position of the second geometry is calculated internally by ModelDesk and is therefore not mandatory in the OpenDRIVE file. ▪ `length` is evaluated.
`<line>`	The element is evaluated.

OpenDRIVE Elements	Effect on ModelDesk's Road Model
`<spiral>`	The element and its attributes are evaluated.
`<arc>`	The element and its attributes are evaluated.
`<poly3>`	It is converted to a spline segment that has an identical end vector. **Note** The segment's end position and orientation is identical to the values specified with <poly3> but the course differs. All attributes are evaluated. They are used to calculate the segment's end vector.
`<paramPoly3>`	The element is evaluated. Attributes: ▪ `aU`, `bU`, `cU`, `dU`, `aV`, `bV`, `cV`, and `dV` are evaluated. ▪ `pRange` is evaluated but only `normalized` scope is supported. `arcLength` is converted to ModelDesk spline with identical end vector but different course.
`<elevationProfile>`	In ModelDesk, the height points of the road are assumed to be linearly connected.
`<elevation>`	Each instance is translated into at least one height point in ModelDesk. All attributes are evaluated. Two height points at `s` and at the start of the next elevation are created. If `b`, `c`, or `d` are defined, ModelDesk calculates additional height points with a distance of 1 meter.
`<lateralProfile>`	The element is evaluated. In ModelDesk, the lateral slope points of the road are assumed to be linearly connected.
`<superelevation>`	Each instance is translated into at least one lateral slope point in ModelDesk. All attributes are evaluated. Two lateral slope points at `s` and at the start of the next elevation are created. If `b`, `c`, or `d` are defined, ModelDesk calculates additional lateral slope points with a distance of 1 meter.
`<crossfall>`	The element is converted into a custom height map in ModelDesk. Attributes: ▪ `side`, `s`, `a` are evaluated. Only linear crossfalls from the center to border of the road are supported. ▪ `b`, `c`, `d` are not evaluated.
`<shape>`	The element is not evaluated.
`<lanes>`	The element is evaluated.
`<laneOffset>`	The element is evaluated. A defined OpenDRIVE lane offset at position `s` is mapped to the reference line offset of the lane section at the same position in ModelDesk. Attributes: ▪ `s`, `a` are evaluated.

OpenDRIVE Elements	Effect on ModelDesk's Road Model
	▪ `b`, `c`, `d` are not evaluated.
`<laneSection>`	The OpenDRIVE laneSection instances are mapped to ModelDesk lane sections with constant width, starting at `s` along the road's reference line. The transition length of the ModelDesk lane section is set to the complete lane transition length. Attributes: ▪ `s` is evaluated. ▪ `singleSide` is not evaluated.
`<left>`, `<center>`, `<right>`	ModelDesk lane 0 has a width in contrast to the OpenDRIVE lane 0. The openDRIVE lane with index 1 or -1 (if no left lanes are defined) is therefore used as ModelDesk lane 0.
`<lane>`	The element is evaluated. Attributes: ▪ `id` is evaluated but in most cases, the OpenDRIVE lane ID does not match the ModelDesk lane ID. This is caused by the different handling of lane 0 and the unsupported OpenDRIVE lane types. ▪ `type` is evaluated when it is the `none` and `driving` type. Other lane types are omitted. ▪ `level` is not evaluated.
`<link>`	The element is evaluated.
`<width>`	The element and all attributes are evaluated.
`<border>`	The element is not evaluated.
`<roadMark>`	OpenDRIVE road markings reduce the visible area of driving lanes because the road markings are placed on top of the lanes. ModelDesk imports OpenDRIVE roads with the line width definition model **Line included**. **Note** ModelDesk evaluates the first `roadMark` element as ModelDesk line presets. For multiple `roadMark` elements, further elements are evaluated as shape. Refer to Lane Sections Specified in OpenDRIVE Format and ModelDesk's Road Model on page 140. Attributes: ▪ `sOffset` is evaluated. ▪ `type` is evaluated. OpenDRIVE botts dots, grass and all custom types are not supported. ▪ `weight` is not evaluated. ▪ `color` is evaluated. ▪ `material` is not evaluated. ▪ `width` is evaluated. It is assumed that the width is the width of the complete line configuration (e.g., 2 lines and 1 gap for the solid broken type). Each element of the line configuration covers 1/3 of the defined complete width. If

OpenDRIVE Elements	Effect on ModelDesk's Road Model
	the type is defined without a width, the default ModelDesk values are used. ▪ `laneChange` is not evaluated. ▪ `height` is not evaluated.
`<type>`	The element is evaluated. Refer to Lane Sections Specified in OpenDRIVE Format and ModelDesk's Road Model on page 140.
`<material>`	The element is not evaluated.
`<visibility>`	The element is not evaluated.
`<speed>`	The element is not evaluated.
`<access>`	The element is not evaluated.
`<height>`	The element is not evaluated.
`<rule>`	The element is not evaluated.
`<objects>`	The element is evaluated.
`<object>`	The element is evaluated. For details, refer to Basics of Importing Road Models in OpenDRIVE Format on page 148 Attributes: ▪ `type` is evaluated. It is mapped to a ModelDesk traffic object if you have provide an import configuration file. For details, refer to Configuration File for Importing OpenDRIVE Files (ODIC File) on page 151 ▪ `name` is evaluated. ▪ `id` is evaluated. The value is available in the description of the converted object. ▪ `s` is evaluated. ▪ `t` is evaluated. ▪ `zOffset` is evaluated. ▪ `validLength` is not evaluated. ▪ `orientation` is evaluated. ▪ `length` is not evaluated. ▪ `width` is not evaluated. ▪ `radius` is not evaluated. ▪ `height` is not evaluated. ▪ `hdg` is evaluated. The value is interpreted as an offset angle to the orientation. ▪ `pitch` is evaluated. ▪ `roll` is evaluated.
`<repeat>`	The element is not evaluated.
`<outline>`	The element is not evaluated.
`<material>`	The element is not evaluated.
`<validity>`	The element is not evaluated.
`<parkingSpace>`	The element is not evaluated.
`<objectReference>`	The element is not evaluated.
`<tunnel>`	The element is not evaluated.
`<bridge>`	The element is not evaluated.
`<signals>`	The element is evaluated.
`<signal>`	The element is evaluated. For details, refer to Basics of Importing Road Models in OpenDRIVE Format on page 148

OpenDRIVE Elements	Effect on ModelDesk's Road Model
	Attributes: ▪ `s` is evaluated. ▪ `t` is evaluated. ▪ `id` is evaluated. The value is available in the description of the converted object. ▪ `name` is evaluated. ▪ `dynamic` is not evaluated. ▪ `orientation` is evaluated. ▪ `zOffset` is evaluated. ▪ `country` is evaluated. ▪ `type` is evaluated. ▪ `subtype` is evaluated. ▪ `value` is evaluated. ▪ `unit` is not evaluated. ▪ `height` is not evaluated. ▪ `width` is not evaluated. ▪ `text` is evaluated. ▪ `hOffset` is evaluated. The value is interpreted as an offset angle to the orientation. ▪ `pitch` is evaluated. ▪ `roll` is evaluated.
`<validity>`	The element is not evaluated.
`<dependency>`	The element is not evaluated.
`<signalReference>`	The element is not evaluated.
`<surface>`	The element is not evaluated.
`<railroad>`	The element is not evaluated.
`<controller>`	The element is not evaluated.
`<junction>`	A ModelDesk junction connection point is created only if at least on junction road is connected. A ModelDesk junction is created only if at least two junction connection points are available. **Note** The standard roads that are connected to the junction must not overlap at the connection points. Otherwise the junction is invalid.
`<connection>`	The connection information of the OpenDRIVE road successor and predecessor is used.
`<priority>`	The element is not evaluated.
`<controller>`	The element is not evaluated.
`<junctionGroup>`	The element is not evaluated.
`<station>`	The element is not evaluated.

Related topics

Basics

Basics of Importing Road Models in OpenDRIVE Format..... 148

HowTos

How to Import Road RD Files..... 128

Importing OpenDRIVE Files

Where to go from here

Information in this section

Basics of Importing Road Models in OpenDRIVE Format..... 148
Provides basic information on importing road files in the OpenDRIVE format to the current project.

Configuration File for Importing OpenDRIVE Files (ODIC File)..... 151
You have to provide additional information and import behavior definitions for the ModelDesk OpenDRIVE import in an external configuration XML file.

Structure of the ODIC File..... 152
When you manually create OpenDRIVE Import Configuration files, you have to know their structure. This is not required if you use the Road Generator for creating an ODIC file.

How to Create an ODIC File..... 154
In ModelDesk, you can create an OpenDRIVE Import Configuration file (ODIC file). This file is used to automatically assign ModelDesk traffic objects to OpenDRIVE signals and objects when the OpenDRIVE file is imported.

How to Use an ODIC File..... 155
When you import a road in OpenDRIVE format in ModelDesk, you can use an OpenDRIVE Import Configuration file to automatically assign traffic objects of ModelDesk to signals and objects specified in the OpenDRIVE file.

How to Import a Road Model in OpenDRIVE Format..... 156
You can import road files in the OpenDRIVE format to the current project.

Basics of Importing Road Models in OpenDRIVE Format

Introduction

You can import road files to the current project in the OpenDRIVE® format (XODR files). This topic provides basic information on importing such road models.

General information on importing road models

Supported OpenDrive version The Road Generator supports OpenDRIVE files of version 1.4H.

Elements You can only import road elements, junctions, and road objects.

Road elements

The Road Generator can import an arbitrary number of road elements. For each road element, the following characteristics can be imported:

- Reference line
  - The reference line can have an arbitrary number of segments.
  - The fully supported segment types are line, spiral, and arc.
  - The Road Generator will only establish connections between roads and roads or roads and junctions if the position and orientation parameters of both connections points are identical at least up to the third decimal place.
  - A *Cubic Polynomial Record (poly3)* can be imported with the following restriction: The relative end vector of the ModelDesk spline segment is set to the length of the spline from the OpenDRIVE file. The length is therefore identical but the course differs. As the Road Generator sets only the x coordinate (y coordinate and angle remain on the default value of 0), the ModelDesk spline segment looks like a straight segment.
  - A *normalized Parametric Cubic Curve Record* can be imported without restriction. The ModelDesk spline element is identical to the imported spline from the OpenDRIVE file.
  - A *length-based (arcLength) Parametric Cubic Curve Record* can be imported with the following restriction: The relative end vector is calculated and imported. The predefined spline parameters are not imported. The end point of the ModelDesk spline segment is therefore identical but the course may differ.
- Lane sections
  - The lane width is imported.

    The Road Generator evaluates only the final lane width of the OpenDRIVE laneSection and sets the length of the transition area to the complete lane section. This leads to a smooth road appearance.

When the OpenDRIVE laneSection has more than one *width* node, the **Road Generator** creates a lane section for each width.

  - The **Road Generator** maps each laneOffset and laneSection instance to the ModelDesk offset to reference line of a lane section. Only the constant part a of the last OpenDRIVE laneOffset or laneSection is evaluated in a lane section. It is recommended to synchronize the OpenDRIVE laneOffset and laneSection areas because the **Road Generator** can then use one lane section for both elements. Otherwise, the **Road Generator** creates lane sections for each area.
  - Road markings are imported if they are one of the following types: none (none), broken (dashed), curb (race), solid, solid solid (double solid), solid broken (solid/dashed), or broken solid (dashed/solid)
  - Only lanes with a width greater than 0.1 m and that have the type *none* or *driving* are imported by default. You can modify the default values in the ODIC file.
  - Speed limits, access, link, material, visibility, and level are not imported.
- Height profile
  - Where the height profile of an OpenDRIVE road is constant or linear, the **Road Generator** sets the height points at the same position.
  - Where the height profile of the OpenDRIVE road has a third-order polynomial form, the **Road Generator** interpolates the height profile by using height points with a distance of 1 m.
- Lateral slope profile
  - Where the lateral slope profile of the OpenDRIVE road is constant or linear, the **Road Generator** sets the lateral slope points at the same position.
  - Where the lateral slope profile of the OpenDRIVE road has a third-order polynomial form, the **Road Generator** interpolates the lateral slope profile by using lateral slope points with a distance of 1 m.
  - Crossfalls define the road's banking along the reference line and are imported as custom height maps.
- The following characteristics are not supported and cannot be imported:
  - Road type
  - Neighbor settings are not considered

For a list of all elements of an OpenDRIVE file and their elevation in ModelDesk, refer to Mapping of Elements of OpenDRIVE Files to ModelDesk's Road Models on page 141.

Junctions

The **Road Generator** can import an arbitrary number of junctions.

In OpenDRIVE, a junction consists of several fictitious roads which specify all the possibilities of driving across the junction. The fictitious roads form the geometry of the junction. Because the courses of the fictitious roads are not necessary to specify the connection points, this information is not migrated.

The **Road Generator** sets the connection points of a junction according to the roads connected to it. In the OpenDRIVE file, the junction must be set as predecessor or successor for each road connected to it.

The height profile of the ModelDesk junction is adapted to the properties of the connected roads.

Road objects and traffic objects

An OpenDRIVE file can contain road objects. The road objects can be imported to ModelDesk as traffic objects. To be able to map road objects to traffic objects, the internal IDs of the traffic objects must be assigned to the road objects to be imported.

Preparing traffic objects The traffic object must exist in the Pool and a traffic sign sensor must be specified for it. For instructions, refer to How to Create a Traffic Object (ModelDesk Traffic Object Management 🕮).

When a traffic object is created, the **Road Generator** automatically creates an internal ID. This internal ID is used to map a traffic object of ModelDesk to a road object specified in an OpenDRIVE file.

You can use one traffic object for several road objects.

Creating road objects When road objects are specified in the OpenDRIVE file, they are mapped to traffic objects using a configuration file. Refer to Configuration File for Importing OpenDRIVE Files (ODIC File) on page 151.

Additionally, specify the position of the road object. The `zOffset` must be the distance of the geometry reference point to the road surface. If parameters are missing, their values is assumed to be 0 when the road object is imported.

Only the position of a road object is imported, further parameters are not evaluated by the **Road Generator**.

Mapping using a configuration file If you use a configuration file for the OpenDRIVE import (ODIC file), the **Road Generator** can automatically map the road objects of the OpenDRIVE file to traffic objects in ModelDesk. Refer to Configuration File for Importing OpenDRIVE Files (ODIC File) on page 151.

Automatic mapping of OpenDrive signal objects The **Road Generator** can automatically map the OpenDRIVE *signal* objects to ModelDesk traffic objects if no ODIC file is specified or the ODIC file does not contain an assignment of a *signal* object.

To assign the objects, the properties country, type, subtype, and value must be identical. If more than one object with the properties is specified, the first object is assigned.

OpenDRIVE repeat objects The **Road Generator** imports repeat objects as shapes of the repeating type.

Related topics

Basics

Configuration File for Importing OpenDRIVE Files (ODIC File)..... 151

Mapping of Elements of OpenDRIVE Files to ModelDesk's Road Models..... 141
Structure of the ODIC File..... 152

HowTos

How to Create a Traffic Object (ModelDesk Traffic Object Management 🕮)

Configuration File for Importing OpenDRIVE Files (ODIC File)

Introduction

You have to provide additional information and import behavior definitions for the ModelDesk OpenDRIVE import in an external configuration XML file (file name extension: ODIC).

Basics of the ODIC file

The OpenDRIVE Import Configuration (ODIC) file is an XML file used for configuring the import of OpenDRIVE files.

An OpenDRIVE file can specify signals and objects that are added to a road or junction. In the road model of ModelDesk, traffic objects are used for these elements. When an OpenDRIVE file is imported, the signals and objects must be mapped to traffic objects that are specified in ModelDesk. This mapping can be done using ODIC files. It describes the mapping of signals and objects specified in an OpenDRIVE file to traffic objects specified in ModelDesk.

If the OpenDRIVE file contains no signals and objects or you want to map the traffic objects after the import, it is not necessary to use an ODIC file.

Creating an ODIC file

You can specify the configuration for the ODIC file in ModelDesk or create the ODIC file manually.

When you use ModelDesk, you can map the traffic objects to signals and objects by specifying their attributes. Refer to How to Create an ODIC File on page 154.

If you want to create the ODIC file manually, you need to know the structure of such files. Refer to Structure of the ODIC File on page 152.

Using the ODIC file

To use an ODIC file for an import of an OpendDRIVE file, a reference to it must be inserted in the OpenDRIVE file. You must insert the absolute file path in the header of the file. Refer to How to Use an ODIC File on page 155.

Related topics

Basics

Basics of Importing Road Models in OpenDRIVE Format..... 148
Structure of the ODIC File..... 152

HowTos

How to Create an ODIC File..... 154
How to Use an ODIC File..... 155

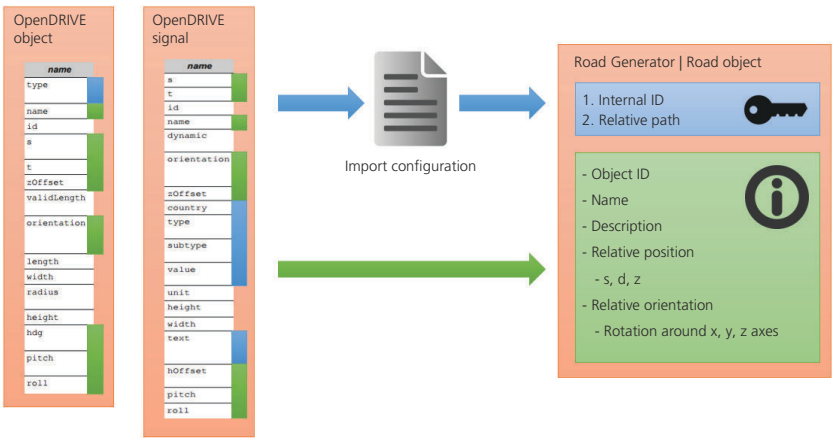
Structure of the ODIC File

Introduction

When you manually create an OpenDRIVE Import Configuration (ODIC) file, you have to know its structure. This is not required if you use the **Road Generator** for creating an ODIC file.

Mapping in the configuration file

ModelDesk requires additional information on how to map the OpenDRIVE signal and object instances to ModelDesk traffic object references. OpenDRIVE signals are defined by a combination of the `type`, `subtype`, `country`, `value`, and `text` attributes. OpenDRIVE objects only provide the `type` attribute.



The file mapping of the import configuration mapping part is divided into signal mappings and object mappings. Both mapping types must contain a definition of the source (<from>) and target (<to>). For objects, you must specify the type. For signals you must specify only the country. Missing entries, such as <value> in the following example, do not affect the mapping. Existing entries in the OpenDRIVE file are ignored.

The order of the entries in the import configuration XML file is relevant if multiple mapping entries match. In this case, the first matching mapping entry is

used for the mapping. This lets you define a fall back mapping for signals where only the country attribute is defined, for example.

```
<mapping>
    <signal-mappings>
        <signal-mapping>
            <from>
                <country>DEU</country>
                <type>222</type>
                <subtype>20</subtype>
            </from>
            <to>
                <guid>a840e369-c8bf-4258-962a-598c9cbe6791</guid>
            </to>
        </signal-mapping>
    </signal-mappings>
    <object-mappings>
        <object-mapping>
            <from>
                <type>guidepost</type>
            </from>
            <to>
                <relativePath>Objects\Misc\Upright.tro</relativePath>
            </to>
        </object-mapping>
    </object-mappings>
</mapping>
```

The target definition can contain both the GUID and a relative path or only one entry. The internal GUID of a ModelDesk traffic object is set when the traffic object is created and cannot be changed afterwards. This GUID is also not changed during ModelDesk Pool export/import or project migration.

You are recommended to create one mapping configuration for all relevant signals and objects that have to be supported during the ModelDesk OpenDRIVE import. This mapping configuration is valid for all the ModelDesk projects if you added the traffic objects to the project Pool by using the ModelDesk import feature.

It is not recommended to create identical traffic objects (traffic objects that have the same MotionDesk geometry and properties) in different installations because their internal GUIDs would differ.

Schema XSD file

ModelDesk provides the schema XSD file (name: `ImportConfigurationOpenDrive.xsd`) in the installation to let you create a valid import configuration XML file. The schema file is part of the RCP & HIL installation and installed in the `<RCP_HIL_InstallationPath>\ModelDesk\RoadGenerator` folder.

The ODIC file contains requirments for the import that are not displayed in the user interface. If you want to use the requirements that are defined in the schema XSD file, you must edit the ODIC file manually.

Related topics

Basics

Basics of Importing Road Models in OpenDRIVE Format..... 148

HowTos

How to Use an ODIC File..... 155

How to Create an ODIC File

Objective

In ModelDesk, you can create an OpenDRIVE Import Configuration file (ODIC file). This file is used to automatically assign ModelDesk traffic objects to OpenDRIVE signals and objects when the OpenDRIVE file is imported.

OpenDRIVE Import Configuration file

An OpenDRIVE Import Configuration file is used to assign traffic objects of a ModelDesk project to signals and objects specified in the OpenDRIVE files. Refer to Configuration File for Importing OpenDRIVE Files (ODIC File) on page 151.

Preconditions

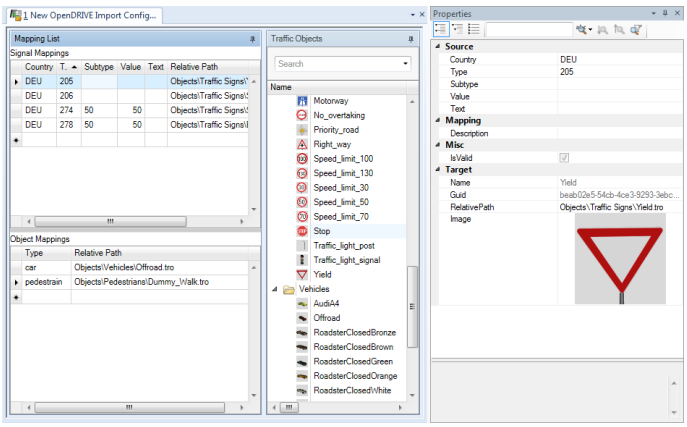
Traffic objects must be specified in the ModelDesk project. Refer to How to Create a Traffic Object (ModelDesk Traffic Object Management 🕮).

Method

To create an ODIC file

1 Open the project and experiment to which you want to import the OpenDRIVE file.

2 On the Environment ribbon, click Road – ODIC File – New.



3 Drag a traffic object from the Traffic Objects list to the empty line of the Signal Mappings or Object Mappings list.

4 Specify the properties of the signal or object in the **Signal Mappings** or **Object Mappings** list or in the **Properties** pane. When the OpenDRIVE file is imported, only the signals or objects whose attributes have the specified values are assigned to the selected traffic object. For details of the properties, refer to Mapping List Properties on page 299.

5 Repeat the previous steps for other signals and objects. You can assign the same traffic object to different signals or objects.

6 On the **Environment** ribbon, click **Road – ODIC File – Save As**.

Result

The configuration file for the OpenDRIVE import is created.

The ODIC files are not contained in ModelDesk's projects and experiments.

Related topics

References

Mapping List Properties 299
ODIC File - New 296
ODIC File - Save 297
ODIC File - Save As 298

How to Use an ODIC File

Objective

When you import a road in OpenDRIVE format in ModelDesk, you can use an OpenDRIVE Import Configuration file to automatically assign traffic objects of ModelDesk to signals and objects specified in the OpenDRIVE file.

Referencing an ODIC file

To use an ODIC file a reference to it must be inserted in the OpenDRIVE file.

You must add a `<userData>` element in the header section of the OpenDRIVE file, see the following example.

```
<header revMajor="1" revMinor="4">
    <geoReference><![CDATA[+proj=tmerc +a=6378137 +b=6378137 +lon_0=8.8995026301666247 +x_0=-0
    +y_0=-5423575.9170007547 +k=1.0 +units=m +nadgrids=@null +wktext +no_defs]]></geoReference>
    <userData code="ModelDeskImportConfigurationFilePath" value="E:\Configuration.odic"/>
</header>
```

The `<userData>` element must have two attributes:

`code`: The `code` attribute must have the value `"ModelDeskImportConfigurationFilePath"`

`value`: The `value` attribute must have the full path to the ODIC file, for example, `"E:\Configuration.odic"`

If no `userData` element with the `"ModelDeskImportConfigurationFilePath"` code exists, ModelDesk performs the import with default behavior.

Preconditions

An ODIC file must exist. Refer to Configuration File for Importing OpenDRIVE Files (ODIC File) on page 151.

Method

To use an ODIC file

1 Open the OpenDRIVE file in an ASCII editor.

2 Insert the following line in the header section of the file.

```
<userData code="ModelDeskImportConfigurationFilePath"
value="FilePath" />
```

`FilePath` is the absolute path and name of the ODIC file.

3 Save the OpenDRIVE file.

Result

The OpenDRIVE file can be imported using the referenced ODIC file.

Related topics

Basics

Basics of Importing Road Models in OpenDRIVE Format..... 148

HowTos

How to Create an ODIC File..... 154

How to Import a Road Model in OpenDRIVE Format

Objective

You can import road files to the current project in the OpenDRIVE® format.

Basics

For basic information on importing road models in OpenDRIVE format, refer to Basics of Importing Road Models in OpenDRIVE Format on page 148.

Preconditions

If the OpenDRIVE file contains road objects to be imported, their ID must match the internal ID of ModelDesk's traffic objects. Refer to Basics of Importing Road Models in OpenDRIVE Format on page 148.

Method

To import a road model in OpenDRIVE format

1. In the **Project Navigator**, right-click **Pool** and select **Import** from the context menu.

   The **Open** dialog opens.
2. Select the XODR file containing the road model in OpenDRIVE format.
3. Click **Open**.

   ModelDesk migrates the road and stores it in the Pool. If the file name already exists in the Pool, you can cancel the import or replace the existing road.

   After the import, check the road for inconsistencies.
4. In the **Project Navigator**, right-click **Road** and select **Open from Pool** from the context menu.

   The **Specify File Name** dialog opens.
5. Select the imported road file and click **Open**.

   ModelDesk opens the road in the **Road Generator**.
6. Check the road for inconsistencies. Refer to How to Restore the Consistency of a Road Network on page 119.

Result

You imported the road to the Pool of the project. You can use it in your experiment.

Related topics

References

Import (ModelDesk Basics 🕮)
Open from Pool..... 169

Exporting OpenDRIVE Files

Where to go from here

Information in this section

Exporting Road Models in OpenDRIVE Format..... 158
Provides basic information on exporting road files in the OpenDRIVE format.

How to Export a Road Model in OpenDRIVE Format..... 160
You can export road files in the OpenDRIVE format.

Exporting Road Models in OpenDRIVE Format

Introduction

You can export road files in the OpenDRIVE® format (XODR files). This topic provides basic information on exporting such road models.

General information on exporting road models

OpenDRIVE version The Road Generator creates OpenDRIVE files of version 1.4H.

Elements You can export only road elements, junctions, their connections, and traffic objects.

Tip

When road networks are exported in the OpenDRIVE format, you can import this file to another ModelDesk project. However, export and import via the OpenDRIVE format is not suitable to exchange road models between ModelDesk projects, because some characteristics cannot be considered. For exchanging road models between ModelDesk projects, use the export and import features of the Pool. Refer to Export (ModelDesk Basics 🕮) and Import (ModelDesk Basics 🕮).

Road elements

When the road network is exported to an OpenDRIVE file, not all characteristics of road elements that can be specified in ModelDesk can be exported.

Exported road characteristics ModelDesk exports the following characteristics:

- Reference lines specified by the road segments
- Lanes including their width and transition areas
- Road marks
- Speed limits specified in scenery sections

Not exported road characteristics ModelDesk cannot export the following characteristics:

- Surface conditions
- Preferred lanes
- Sceneries except speed limits
- Surfaces
- Position markers
- Shapes
- Road Closed flags
- Driving direction
- Textures and colors of line spacings
- Traffic objects (objects whose traffic signal sensor is not enabled)
- Border widths of lane sections

Junctions

When the road network is exported to an OpenDRIVE file, not all characteristics of junctions that can be specified in ModelDesk can be exported.

Exported junction characteristics ModelDesk exports the following characteristics:

- Positions of connection points
- Orientations of connection points

Not exported junction characteristics ModelDesk cannot export the following characteristics:

- Surface conditions
- Surfaces
- Position markers
- Shapes
- Textures and colors of line spacings
- Borders
- Traffic objects (objects whose traffic signal sensor is not enabled)

Limitation The height profile of a junction is only exported as linear profile. This can lead to a sharp bend at the connection point of the junction and the road.

Network

When the road network is exported to an OpenDRIVE file, not all characteristics of the road network that can be specified in ModelDesk can be exported.

Not exported road network characteristics ModelDesk cannot export the following characteristics:

- Height profile interpolation (smooth and cubic)
- Line length calculation (reference line)
- Lane width definition (line excluded)
- Traffic types
- User signals
- Routes

Traffic objects

The Road Generator exports all traffic objects that have an enabled traffic sign sensor. The traffic objects are exported as OpenDRIVE *signal* objects. The following properties of the traffic objects are exported:

- Country
- Type
- SubType
- Value
- Text

Properties for export

You can specify some properties exclusively for the export to an OpenDRIVE file. When you export the road model, the property values are written to the OpenDRIVE file in the description of the associated road element.

- Road Type
- Speed Unit
- Lane Type (only for roads)
- Country (only in the `UserData` elements)
- User data (only in the `UserData` elements)

Note

If you import an OpenDRIVE file, the settings of these properties are lost. You have to specify the properties again when you want to export the model in the OpenDRIVE file.

Related topics

HowTos

How to Export a Road Model in OpenDRIVE Format..... 160

How to Export a Road Model in OpenDRIVE Format

Objective

You can export road files in the OpenDRIVE® format.

Basics

For basic information on exporting road models in the OpenDRIVE format, refer to Exporting Road Models in OpenDRIVE Format on page 158.

Specific properties

Some properties are specified exclusively for the OpenDRIVE export. Refer to Properties for export on page 160.

Preconditions

The road model to be exported must be active. Refer to Managing Roads on page 126.

Method

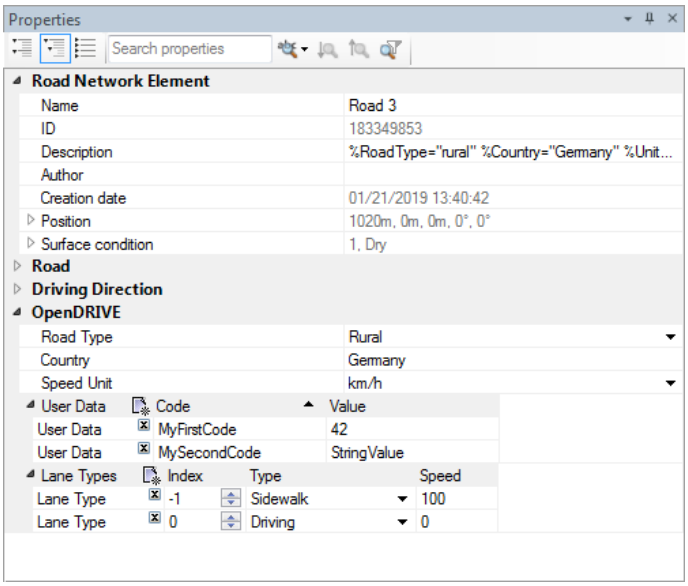
To export a road model in OpenDRIVE format

1 To specify the properties that are exclusive for OpenDRIVE export, select a road network element (road element or junction).

The Properties pane displays its properties.

2 In the OpenDRIVE category, specify the values. For a description, refer to Road Network Element Properties on page 258.

When you specify the properties, the values are also written to the Description property of the road network element and vice versa.



3 Repeat the specification for further road network elements.

Tip

If the specification of other road network elements is identical or similar, you can copy the value of the Description property.

4 On the Environment ribbon, click Road – Export.

The Save As dialog opens.

5 Specify a folder and the file name of the XODR file.

6 Click Save.

Result

ModelDesk creates an XODR file containing the road model in OpenDRIVE format.

Related topics

References

Export 167
Road Network Element Properties 258

Reference Information

Where to go from here

Information in this section

Road Management Commands..... 164
To manage roads.

Road Generator Panes..... 173
To describe the panes of the Road Generator.

Road Generator Creation Commands..... 196
To create roads.

Road Properties..... 245
To specify properties for a road model.

Road MAT File Formats..... 282
To specify elements using MAT files.

OpenDRIVE Format Import - Commands and Dialogs..... 296
To import roads in the OpenDRIVE format.

Road Management Commands

Overview

ModelDesk provides various commands to manage the roads.

Where to go from here

Information in this section

Activate from Pool 165
To activate a loaded or created road by linking it to the current experiment.

Activate 165
To use the currently open road in your experiment.

Download / Download Road 166
To download the active road to the simulation platform.

Export 167
To export the active road in a defined format.

Generate Road Ini 167
To export a currently linked road to change parameters outside ModelDesk.

New 168
To create a new road.

Open 169
To open the road which is active in the current experiment.

Open from Pool 169
To open a road from the Pool to edit it.

Save 170
To save the road.

Save As 171
To save the road under a new name.

Road Configuration Page 171
To activate, open, and download a road linked to the current active experiment.

Settings 172
To specify settings for the Road Generator.

Activate from Pool

Access

You can access this command via:

Ribbon	None
Context menu of	**Project Navigator** – Road
Shortcut key	None
Icon	None

Purpose

To activate a road by linking it to the current experiment.

Result

ModelDesk opens the **Specify File Name** dialog for you to select the road file from the Pool and link it to the current experiment.

Description

The active road can be opened for viewing or via the **Open** command.

Related topics

References

Open..... 169

Activate

Access

You can access this command via:

Ribbon	**Environment** – **Road**
Context menu of	**Project Navigator** – Road
Shortcut key	None
Icon	
Tool button	▪ Configuration page (road) ▪ Road configuration page

Purpose

To use the currently open road in your experiment.

Result

ModelDesk activates the road in your experiment.

Related topics

HowTos

How to Start the Road Generator..... 74

Download / Download Road

Access

You can access this command via:

Ribbon	▪ Home – Experiment – split button ▪ Environment – Road
Context menu of	Project Navigator – Road
Shortcut key	None
Icon	
Tool button	▪ Configuration page (road) ▪ Road configuration page

Purpose

To download the active road to the simulation platform.

Result

The currently active road is downloaded.

Description

In the real-time mode, ModelDesk generates a parameter file which can be loaded to the real-time hardware. In the Simulink mode, the road parameters are downloaded to Simulink for further use.

Related topics

HowTos

How to Download a Road..... 132

Export

Access

You can access this command via:

Ribbon	Environment – Road
Context menu of	None
Shortcut key	None
Icon	

Purpose

To export the active road in a defined format.

Result

The road is exported in the selected file format.

Description

This version of ModelDesk supports the OpenDRIVE® file format.

Related topics

Basics

Exporting Road Models in OpenDRIVE Format..... 158

HowTos

How to Export a Road Model in OpenDRIVE Format..... 160

Generate Road Ini

Access

You can access this command via:

Ribbon	None
Context menu of	Project Navigator – Road
Shortcut key	None
Icon	None

Purpose

To export a currently linked road to change parameters outside ModelDesk.

Result

The road is exported to the specified folder and named as a MAT file.

Description

The road INI file must be exported to `\Simulation.current\IniFiles\Road` of the ASM model to use the road together with the model and to run the simulation with it.

ModelDesk opens the **Save As** dialog for you to select the path and folder.

Save As dialog

Save in Lets you select the path and folder to export the file to.

File name Lets you specify the name of the file. You can also select a name from the files listed under the chosen path and folder.

Save as type Lets you save the file as a MAT file.

If you select a file from those listed under the chosen path and folder, you are prompted to confirm before it is overwritten.

Related topics

Basics

Working with Roads in ModelDesk..... 129

New

Access

You can access this command via:

Ribbon	**Environment** – **Road**
Context menu of	**Project Navigator** – Road
Shortcut key	None
Icon	

Purpose

To create a new road.

Result

ModelDesk starts the **Road Generator** for creating a new road.

Related topics

HowTos

How to Start the Road Generator..... 74

Open

Access

You can access this command via:

Ribbon	Environment – Road
Context menu of	Project Navigator – Road
Shortcut key	None
Icon	
Tool button	▪ Configuration page (road) ▪ Road configuration page

Purpose

To open the road which is active in the current experiment.

Result

ModelDesk opens the active road in the Road Generator.

Description

If no road is active in the current experiment, the command is unavailable.

Related topics

HowTos

How to Start the Road Generator 74

Open from Pool

Access

You can access this command via:

Ribbon	Environment – Road
Context menu of	▪ Project Navigator – Road ▪ Road configuration page
Shortcut key	None
Icon	
Tool button	None

Purpose

To open a road model from the Pool to edit it.

Result

ModelDesk opens the standard **Specify File Name** dialog for you to select the path, folder, file type, and name of the road to be opened from the ModelDesk Pool.

Description

The road can be edited, but it is not linked to the current experiment. If you want to link it, refer to Activate from Pool on page 165.

Related topics

HowTos

How to Start the Road Generator 74

Save

Access

You can access this command via:

Ribbon	**Environment – Road**
Context menu of	None
Shortcut key	None
Icon	

Purpose

To save the road which is edited in the **Road Generator**.

Result

The currently open road is saved in the Pool.

Related topics

Basics

Managing Roads 126

HowTos

How to Start the Road Generator 74

Save As

Access

You can access this command via:

Ribbon	None
Context menu of	Project Navigator – Road
Shortcut key	None
Icon	None

Purpose

To save the road which is edited in the Road Generator under a new name.

Description

A standard dialog is opened where you can specify a name for the road model.

Result

The currently open road is saved in the Pool under the specified name.

Road Configuration Page

Access

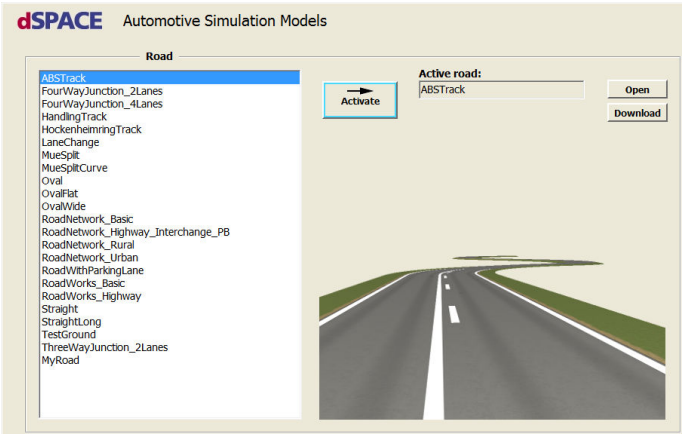
The Road Configuration page opens automatically when you select the Road node in the Project Navigator.

Purpose

To activate, open, and download a road linked to the current active experiment.

Description

The following illustration shows the Road Configuration page.



Dialog settings

Road Lists all the available roads saved in the Pool for you to choose one.

Activate Lets you activate the selected road. Only one road can be active in a ModelDesk project at a time. All the others are inactive. To work with a road, it must be active.

Active road: Displays the active road.

Open Opens the Road Generator to let you edit the active road.

Download Downloads the road. In the real-time mode, ModelDesk generates a parameter file which can be loaded to the real-time hardware. In the Simulink mode, the road parameters are downloaded to Simulink for further use.

Related topics

Basics

Managing Roads..... 126

Settings

Access

You can access this command via:

Ribbon	Environment – Road
Context menu of	None
Shortcut key	None
Icon	

Purpose

To specify settings for the Road Generator.

Download page

Minimum vector size (Simulink) Lets you specify a minimum size for the vectors in Simulink. If you specify a road smaller than the specified minimum, the remaining elements of the vector are filled with 0. Roads which are larger than the specified minimum are downloaded to Simulink in the actual size. This implementation supports the Accelerator mode in MATLAB/Simulink.

Related topics

HowTos

How to Download a Road..... 132

Road Generator Panes

Introduction

ModelDesk's Road Generator has several panes for specifying roads.

Where to go from here

Information in this section

Borders Pane 174
To specify the borders of a junction element.

Connection Points Pane 175
To specify the connection points of a junction element.

Height Profile Pane 176
To specify the height profile of a road element.

Junction 2-D Preview Pane 176
To display and specify a junction element in a 2-D preview.

Lanes Pane 178
To specify lane sections and lanes of a road element.

Lateral Slope Profile Pane 179
To specify the lateral slope profile of a road element.

Marker Pane (Road Element) 180
To specify position markers of a road element.

Marker Pane (Junction Element) 181
To specify position markers of a junction element.

Marker Pane (Road Network) 181
To specify position markers of a road network.

Objects Pane (Road Network) 182
To specify traffic objects of a road network.

Objects Pane (Junction Element) 183
To specify traffic objects of a junction element.

Objects Pane (Road Element) 184
To specify traffic objects of a road element.

Road 1-D Preview Pane 184
To display and specify the road element in a 1-D preview.

Road 2-D Preview Pane 186
To display a road element in a 2-D preview.

Road Network Pane 187
To specify road and junction elements.

Road Network 2-D Preview Pane 188
To display the road network in a 2-D preview.

Routes Pane..... 189
To specify routes.

Scenery Pane..... 190
To specify the scenery of a road.

Segments Pane..... 191
To specify the segments of a road.

Shapes Pane..... 192
To specify shape objects of a road element or junction.

Surface Pane (Junction Element)..... 193
To specify the additional height profiles and friction patterns of a junction element.

Surface Pane (Road Element)..... 194
To specify the additional height profiles and friction patterns of a road element.

Borders Pane

Purpose

To specify the borders of a junction element.

Description

The pane displays a table containing the borders of a junction element and their properties:

- Geometry of the border line (spline or straight)
- Line type (dash, solid, dash-solid, solid-dash, race, double solid, double dash)
- Scenery type (batter or bridge)

When you select a border, it is highlighted in the Junction 2-D Preview pane.

Commands

The pane has no context menu.

Properties

For information on the properties used in the pane, refer to Border Line Properties on page 246.

Related topics

References

Connection Points Pane..... 175
Marker Pane (Junction Element)..... 181

Objects Pane (Junction Element)..... 183
Shapes Pane..... 192

Connection Points Pane

Purpose

To specify the connection points of a junction element.

Description

The pane displays a table containing the connection points of a junction element and their properties:

- Phi, radius (polar coordinates related to the origin of the junction)
- x, y coordinates (absolute coordinates)
- Angle (tangent angle for the connection to a road element)
- Lane connection (number of lanes at the connection point)

Commands

The pane has a context menu with the following commands:

- Copy on page 206
- Cut on page 209
- Delete on page 210
- New Connection Point on page 225
- Paste on page 230

Properties

For information on the properties used in the pane, refer to Connection Point Properties on page 248.

Related topics

HowTos

How to Specify Lanes on Junctions..... 113

References

Borders Pane..... 174
Marker Pane (Junction Element)..... 181
Objects Pane (Junction Element)..... 183
Shapes Pane..... 192
Surface Pane (Junction Element)..... 193

Height Profile Pane

Purpose

To specify the height profile of a road element.

Description

The pane displays the height profile of a road element. The height profile is determined by height points that you can specify via the context menu.

Commands

The pane has a context menu with the following commands:

- Apply Offset on page 202
- Delete Height Point on page 211
- Edit Table on page 214
- Export on page 215
- Import on page 217
- Insert Height Point on page 219
- Insert Points at Segment Transitions on page 222

Properties

For information on the properties used in the pane, refer to Height Properties on page 250.

Related topics

References

Lateral Slope Profile Pane..... 179
Road 1-D Preview Pane..... 184

Junction 2-D Preview Pane

Purpose

To display and specify a junction element in a 2-D preview.

Description

The pane displays the junction element in a 2-D preview with:

- Connection points of the junction element
- Connected road elements
- Surface areas
- Shapes

You can move connection points, surface areas, and shapes (the whole shape and single nodes) by dragging them with the mouse.

The states of the connection points are symbolized by colors, see the following table.

Color	State
(light blue)	Not connected, selected
(blue)	Not connected, not selected
(light green)	Consistent, selected
(green)	Consistent, not selected
(light red)	Inconsistent, selected
(red)	Inconsistent, not selected

The names of the connected road elements are displayed next to the connected connection points. To open a road element, double-click its name.

ModelDesk can set the position and angle of view of the ModelDesk Observer in MotionDesk:

1. Click the button.
2. Drag the mouse pointer from the point that you want to observe to the required position of the ModelDesk Observer.

   The ModelDesk Observer is moved to the new position.

Commands

The pane has a context menu with the following commands:

- For connected connection points: Adapt Properties on page 199
- For connection points and surface areas: Copy on page 206
- For connection points and surface areas: Cut on page 209
- Custom Height Map on page 207
- Custom Friction Map on page 208
- For connection points and surface areas: Delete on page 210
- For connected connection points: Disconnect on page 212
- For surface areas: Export on page 215
- Find Valid Reference Point on page 216
- New – <Shape Type> on page 227
- Import from File on page 218
- Move Reference Point to Here on page 223
- New Connection Point on page 225
- New Traffic Object (refer to New (Traffic Object) on page 224)
- For connection points and surface areas: Paste on page 230
- For shapes: Rotate on page 230
- Show in MotionDesk on page 232
- For surface areas: Surface Condition on page 239
- For surface areas: Texture Map on page 242

Properties

For information on the properties used in the pane, refer to Connection Point Properties on page 248 and Road Network Element Properties on page 258.

Related topics

References

Road Network 2-D Preview Pane..... 188

Lanes Pane

Purpose

To specify lane sections and lanes of a road element.

Description

The pane displays a table containing the lane sections on the left side and their properties:

- Name
- Road width
- Start value (s coordinate related to the road element)
- Length

The total length of the selected lane sections is displayed at the bottom of the pane.

The table on the right displays the lanes. The lanes which are enabled for a lane section are colored gray. The column header shows the lane index. The lane with lane index 0 is always enabled for a lane section. You can add or remove lanes using the plus or minus sign on both sides of lane 0.

The direction of travel is displayed via arrow buttons below the lanes table. You can click the arrow buttons to modify the direction of travel. The settings are valid for all lane sections of the road element.

Commands

The pane has a context menu with the following commands:

- Append Lane Section on page 201
- Copy on page 206
- Cut on page 209
- Delete on page 210
- Insert Lane Section on page 221
- Paste on page 230

Properties

For information on the properties used in the pane, refer to Lane Section Properties on page 252 and Lanes Properties on page 251.

Related topics

References

Marker Pane (Road Network)..... 181
Objects Pane (Road Element)..... 184
Scenery Pane..... 190
Segments Pane..... 191
Shapes Pane..... 192
Surface Pane (Road Element)..... 194

Lateral Slope Profile Pane

Purpose

To specify the lateral slope profile of a road element.

Description

The pane displays the lateral slope profile of a road element. The lateral slope profile is determined by points (angle or gradient) that you can specify via the context menu.

Commands

The pane has a context menu with the following commands:

- Apply Offset on page 202
- Delete Lateral Slope Point on page 211
- Edit Table on page 214
- Export on page 215
- Import on page 217
- Insert Lateral Slope Point on page 222
- Insert Points at Segment Transitions on page 222

Properties

For information on the properties used in the pane, refer to Lateral Slope Properties on page 253.

Related topics

Basics

Lateral Slope Profile of a Road Element.....47

HowTos

How to Specify the Lateral Slope Profile of a Road Element.....80

References

Height Profile Pane.....176
Road 1-D Preview Pane.....184

Marker Pane (Road Element)

Purpose

To specify position markers of a road element.

Description

The pane displays a table containing the position markers of a road element and their properties:

- ID
- Name
- Position (relative in s and d coordinates)

Commands

The pane has a context menu with the following commands:

- **Delete** on page 210
- **New** (refer to New (Position Marker) on page 224)

Properties

For information on the properties used in the pane, refer to Position Marker Properties on page 257.

Related topics

References

Lanes Pane.....178
Objects Pane (Road Element).....184
Scenery Pane.....190
Segments Pane.....191
Shapes Pane.....192
Surface Pane (Road Element).....194

Marker Pane (Junction Element)

Purpose

To specify position markers of a junction element.

Description

The pane displays a table containing the position markers of a junction element and their properties:

- ID
- Name
- Position (absolute in x and y coordinates)

Commands

The pane has a context menu with the following commands:

- **Delete** on page 210
- **New** (refer to New (Position Marker) on page 224)

Properties

For information on the properties used in the pane, refer to Position Marker Properties on page 257.

Related topics

References

Borders Pane..... 174
Connection Points Pane..... 175
Marker Pane (Road Element)..... 180
Marker Pane (Road Network)..... 181
Objects Pane (Junction Element)..... 183
Shapes Pane..... 192
Surface Pane (Junction Element)..... 193

Marker Pane (Road Network)

Purpose

To specify position markers of a road network.

Description

The pane displays a table containing all the position markers of the road and junction elements and the properties of the position markers:

- ID
- Name
- Position (absolute in x and y coordinates)

Commands

The pane has a context menu with the following commands:

- **Delete** on page 210

Properties

For information on the properties used in the pane, refer to Position Marker Properties on page 257.

Related topics

References

Marker Pane (Junction Element)..... 181
Marker Pane (Road Element)..... 180
Objects Pane (Road Element)..... 184
Road Network Pane..... 187
Routes Pane..... 189

Objects Pane (Road Network)

Purpose

To specify traffic objects of a road network.

Description

The pane displays a table containing all the traffic objects of the road and junction elements and the properties of the traffic objects:

- ID
- Name
- Position (absolute in x, y, and z coordinates)

Commands

The pane has a context menu with the following commands:

- **Delete** on page 210

Properties

For information on the properties used in the pane, refer to Object Properties on page 255.

Related topics

References

Objects Pane (Junction Element)..... 183
Objects Pane (Road Element)..... 184

Objects Pane (Junction Element)

Purpose

To specify traffic objects of a junction element.

Description

The pane displays a table containing the traffic objects of a junction element and their properties:

- ID
- Name
- Position (relative in x and y coordinates)

Commands

The pane has a context menu with the following commands:

- Copy on page 206
- Cut on page 209
- Delete on page 210
- New (refer to New (Traffic Object) on page 224)
- Paste on page 230

Properties

For information on the properties used in the pane, refer to Object Properties on page 255.

Related topics

References

Borders Pane..... 174
Connection Points Pane..... 175
Marker Pane (Junction Element)..... 181
Objects Pane (Road Element)..... 184
Objects Pane (Road Network)..... 182
Shapes Pane..... 192
Surface Pane (Junction Element)..... 193

Objects Pane (Road Element)

Purpose

To specify traffic objects of a road element.

Description

The pane displays a table containing all the traffic objects of the road element and the properties of the traffic objects:

- ID
- Name
- Position (relative in s and d coordinates)

Commands

The pane has a context menu with the following commands:

- Copy on page 206
- Cut on page 209
- Delete on page 210
- New (refer to New (Traffic Object) on page 224)
- Paste on page 230

Properties

For information on the properties used in the pane, refer to Object Properties on page 255.

Related topics

References

Lanes Pane..... 178
Marker Pane (Road Element)..... 180
Scenery Pane..... 190
Segments Pane..... 191
Shapes Pane..... 192
Surface Pane (Road Element)..... 194

Road 1-D Preview Pane

Purpose

To display and specify the road element in a 1-D preview.

Description

The pane displays the road element in a 1-D preview without any curves but with:

- Lane sections and lanes
- Driving directions

- Special surface conditions
- Additional height
- Preferred lanes
- Traffic objects
- Shapes

You can move areas with special surface conditions of additional heights, traffic objects, and shapes by dragging with the mouse.

The name of the connected junction is displayed next to the connected connection point. To open the junction in the **Road Generator**, double-click its name.

Commands

The pane has a context menu with the following commands:

- For surface areas: Copy on page 206
- Custom Friction Map on page 208
- Custom Height Map on page 207
- For surface areas: Cut on page 209
- For surface areas: Delete on page 210
- For surface areas: Export on page 215
- For surface areas: Paste on page 230
- For shapes: Rotate on page 230
- Sinusoidal on page 240
- Surface Condition on page 239
- Show in MotionDesk on page 232
- Show Preferred Lane – Direct Lane on page 233
- Show Preferred Lane – Oncoming Lane on page 233
- Show Reference Line on page 234
- Show Shapes on page 236
- Show Surfaces – Friction Surfaces on page 236
- Show Surfaces – Height Surfaces on page 237
- Texture Map on page 242
- Trapezoidal on page 243

Properties

-

Related topics

References

Height Profile Pane..... 176
Junction 2-D Preview Pane..... 176
Lateral Slope Profile Pane..... 179
Road 2-D Preview Pane..... 186
Road Network 2-D Preview Pane..... 188

Road 2-D Preview Pane

Purpose

To display a road element in a 2-D preview.

Description

The pane displays the road element in a 2-D preview with:

- Course of the road element (in x-y plane)
- Segment transitions
- Scenery transitions
- Lane section transitions

ModelDesk can set the position and angle of view of the ModelDesk Observer in MotionDesk:

1. Click the button.
2. Drag the mouse pointer from the point that you want to observe to the required position of the ModelDesk Observer.

   The ModelDesk Observer is moved to the new position.

Commands

The pane has a context menu with the following commands:

- Custom Height Map on page 207
- Custom Friction Map on page 208
- For surface areas: Export on page 215
- Highlight on page 216
- Import from File on page 218
- New Traffic Object (refer to New (Traffic Object) on page 224)
- Show Scenery Transitions on page 235
- Show Segment Transitions on page 235
- Show Lane Section Transitions on page 232
- Show in MotionDesk on page 232
- Sinusoidal on page 240
- Texture Map on page 242
- Trapezoidal on page 243
- Trim Road - Trim from <End/Start> on page 242

Properties

-

Related topics

References

Junction 2-D Preview Pane..... 176
Road 1-D Preview Pane..... 184
Road Network 2-D Preview Pane..... 188

Road Network Pane

Purpose

To specify road and junction elements.

Description

The pane displays a table containing the junction and road elements and some of their properties:

- Name
- x, y coordinates of the element's origin
- Tangent angle of the origin

If the settings of a element are inconsistent, its row is highlighted in the table and the first column shows the ⊗ symbol.

Commands

The pane has a context menu with the following commands:

- Copy on page 206
- Cut on page 209
- Delete on page 210
- Edit (refer to Edit on page 213)
- New Junction - <n> Connections on page 226
- New Road on page 228
- Paste on page 230

Properties

For information on the properties used in the pane, refer to Road Network Global Properties on page 261 and Road Network Element Properties on page 258.

Related topics

References

Marker Pane (Road Network)..... 181
Objects Pane (Road Element)..... 184
Routes Pane..... 189

Road Network 2-D Preview Pane

Purpose

To display the road network in a 2-D preview.

Description

The pane displays the road network in a 2-D preview. You can:

- View all the road and junction elements of the road network
- Create new road or junction elements
- Edit road or junction elements
- Move elements to connect them to other elements
- Modify elements to connect them to other elements
  - Road elements: Append new spline segments at the connection points of the road elements
  - Junction elements: Modify the positions of the connection points
- Let the Road Generator automatically adapt the properties at connection points
- Disconnect elements.
- Trim and separate road elements

The states of the connection points are symbolized by colors, see the following table.

Color	State
(light blue)	Not connected, selected
(blue)	Not connected, not selected
(light green)	Consistent, selected
(green)	Consistent, not selected
(light red)	Inconsistent, selected
(red)	Inconsistent, not selected

ModelDesk can set the position and angle of view of the ModelDesk Observer in MotionDesk:

1. Click the button.
2. Drag the mouse pointer from the point that you want to observe to the required position of the ModelDesk Observer.

   The ModelDesk Observer is moved to the new position.

Commands

The pane has a context menu with the following commands:

- For connected connection points: Adapt Properties on page 199
- For disconnected connection points: Connect (Modify) on page 205
- For disconnected connection points: Connect (Move) on page 206
- For connected connection points: Disconnect on page 212
- New Junction - <n> Connections on page 226

- New Road on page 228
- Show in MotionDesk on page 232
- For road elements: Trim from <End/Start> (refer to Trim Road - Trim from <End/Start> on page 242)
- For road elements: Separate Road on page 231

Properties

For information on the properties used in the pane, refer to Road Network Global Properties on page 261.

Related topics

References

Junction 2-D Preview Pane..... 176
Road 1-D Preview Pane..... 184
Road 2-D Preview Pane..... 186
Road Network Pane..... 187

Routes Pane

Purpose

To specify routes.

Description

The pane displays a table containing the routes that are specified for the road network and their properties:

- ID
- Name
- Direction
- Close state

To get more information on a route, click the plus sign. This displays the road elements that are used for the route in the specified order.

If a route is invalid, its header is colored red and the first column shows the ⊗ symbol. A tooltip provides details. For example, the route can be invalid if a road was deleted after the route was specified.

Commands

The pane has a context menu with the following commands:

- Copy on page 206
- Cut on page 209
- Delete on page 210
- Edit Route on page 213

- New Route on page 229
- Paste on page 230

Properties

For information on the properties used in the pane, refer to Route Properties on page 267.

Related topics

References

Marker Pane (Road Network)..... 181
Objects Pane (Road Element)..... 184
Road Network Pane..... 187

Scenery Pane

Purpose

To specify the scenery of a road.

Description

The pane displays a table containing the scenery sections of a road element and their properties:

- Name
- Type (batter, bridge, country road, city, alley, highway)
- Start value (s coordinate related to the road element)
- Length

The total length of the selected sections is displayed at the bottom of the pane.

Commands

The pane has a context menu with the following commands:

- Append Scenery Section - <Type> on page 200
- Copy on page 206
- Cut on page 209
- Delete on page 210
- Insert Scenery Section - <Type> on page 220
- Paste on page 230

Properties

For information on the properties used in the pane, refer to Scenery Section Properties on page 269.

Related topics

References

Lanes Pane 178
Marker Pane (Road Network) 181
Objects Pane (Road Element) 184
Segments Pane 191
Shapes Pane 192
Surface Pane (Road Element) 194

Segments Pane

Purpose

To specify the segments of a road.

Description

The pane displays a table containing the segments of a road element and their properties:

- Name
- Type (straight, circular, clothoid, or spline)
- Start value (in s coordinate related to the road element)
- Length

The total length of the selected segments is displayed at the bottom of the pane.

Commands

The pane has a context menu with the following commands:

- Circular on page 202
- Copy on page 206
- Close Road on page 203
- Clothoid on page 204
- Cut on page 209
- Delete on page 210
- Paste on page 230
- Spline on page 237
- Straight on page 238

Properties

For information on the properties used in the pane, refer to Road Segment Properties on page 264.

Related topics

References

Lanes Pane 178
Marker Pane (Road Network) 181
Objects Pane (Road Element) 184
Scenery Pane 190
Shapes Pane 192
Surface Pane (Road Element) 194

Shapes Pane

Purpose

To specify shape objects of a road element or junction.

Description

The pane displays a table containing the shapes and their properties:

- ID (simulation ID)
- Name
- Type
- Coordinates of the shape's first node
  - For shapes on road elements: s and d coordinates
  - For shapes on junctions: x and y coordinates

When you select a shape entry, the table displays its node elements and their properties:

- Coordinates of the nodes
  - For shapes on road elements: s and d coordinates
  - For shapes on junctions: x and y coordinates
- Section type

To specify the properties, you can modify the values in the table or in the **Properties** pane.

Commands

The pane has a context menu with the following commands for shapes:

- **Copy** on page 206
- **Cut** on page 209
- **Delete** on page 210
- **New – Line/Repeating Object/Continuous Object** (refer to New – <Shape Type> on page 227)
- **Paste** on page 230
- **Rotate** on page 230

The pane has a context menu with the following commands for node elements:

- Insert after on page 219
- Delete on page 210

Properties

For more information, refer to Shape Properties on page 272.

Related topics

References

Lanes Pane..... 178
Objects Pane (Junction Element)..... 183
Objects Pane (Road Element)..... 184
Scenery Pane..... 190
Segments Pane..... 191

Surface Pane (Junction Element)

Purpose

To specify the additional height profiles and friction patterns of a junction element.

Description

The pane displays a table containing the additional height profiles and friction patterns of a junction element and their properties:

- Name
- Type
- Position (x and y coordinates of a junction element's coordinate system)

Additional height profiles of sinusoidal and trapezoidal types are not supported for a junction element.

Commands

The pane has a context menu with the following commands:

- Copy on page 206
- Custom Height Map on page 207
- Custom Friction Map on page 208
- Cut on page 209
- Delete on page 210
- Export on page 215
- Import from File on page 218
- Paste on page 230
- Surface Condition on page 239
- Texture Map on page 242

Properties

For information on the properties used in the pane, refer to Surface Properties on page 277.

Related topics

References

Connection Points Pane..... 175
Marker Pane (Junction Element)..... 181
Objects Pane (Junction Element)..... 183
Shapes Pane..... 192

Surface Pane (Road Element)

Purpose

To specify the additional height profiles and friction patterns of a road element.

Description

The pane displays a table containing the additional height profiles and friction patterns of a road element and their properties:

- Name
- Type
- Position (s and d coordinates of a road element's coordinate system)

The table entries can be filtered using the buttons at the bottom of the pane, see the following table.

Command	Description
StartsWith([Name], 'su') (Disable Filter)	Lets you enable the filter settings.
(Edit Filter)	Lets you open the Filter Editor to specify the filter settings.
(Clear Filter)	Lets you clear the filter settings.

For details on how to work with filters, refer to How to Specify and Use a Filter (ModelDesk Basics 🕮).

Commands

The pane has a context menu with the following commands:

- Copy on page 206
- Custom Friction Map on page 208
- Custom Height Map on page 207
- Cut on page 209
- Delete on page 210
- Export on page 215

- Import from File on page 218
- Paste on page 230
- Sinusoidal on page 240
- Surface Condition on page 239
- Texture Map on page 242
- Trapezoidal on page 243

Properties

For information on the properties used in the pane, refer to Surface Properties on page 277.

Related topics

References

Lanes Pane..... 178
Marker Pane (Road Network)..... 181
Objects Pane (Road Element)..... 184
Scenery Pane..... 190
Segments Pane..... 191
Shapes Pane..... 192

Road Generator Creation Commands

Overview

ModelDesk's Road Generator provides various commands, which are accessible via context menus in the panes of the Road Generator.

Where to go from here

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Adapt Properties.....199
To adapt the properties of an inconsistent connection point.

Append Scenery Section - <Type>.....200
To add a scenery section to the end of the scenery sections list.

Append Lane Section.....201
To append a lane section.

Apply Offset.....202
To specify an offset value for a profile.

Circular.....202
To add a circular segment to the segment list, either after a selected segment or at the end of the list.

Close Road.....203
To insert a segment that closes a road element. The command is available only if a road element has at least two segments.

Clothoid.....204
To add a clothoid segment to the segment list, either after a selected segment or at the end of the list.

Connect (Modify).....205
To modify and connect a road or junction element.

Connect (Move).....206
To move and connect a road or junction element.

Copy.....206
To copy selected elements.

Custom Height Map.....207
To add a section with an additional height profile that is specified by a table.

Custom Friction Map.....208
To add a section with friction coefficients different to the remaining road element or junction.

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To move the selected elements from the selected table to the Clipboard.

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To delete the selected elements.

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To delete the selected height point.

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To delete the selected lateral slope point.

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To disconnect two connection points.

Edit....213
To open the selected junction or road element for editing.

Edit Route....213
To edit a route.

Edit Table....214
To modify height or lateral slope points in the Table Editor.

Export....215
To export a profile to a file.

Find Valid Reference Point....216
To move the reference point of a junction automatically to a valid position.

Highlight....216
To highlight elements.

Import....217
To import a file containing a specified profile.

Import from File....218
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To insert a node element in a shape.

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To insert a height point.

Insert Scenery Section - <Type>....220
To insert a scenery section in the list after a currently selected section.

Insert Lane Section....221
To insert a lane section in the lanes table after the selected lane section.

Insert Lateral Slope Point....222
To insert a lateral slope point.

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To insert points for height or lateral slope profiles at segment transitions.

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To move the reference point of a junction to a new position.

New (Position Marker)....224
To create a new position marker on a road or junction element.

New (Traffic Object)....224
To create a new traffic object on a road or junction element.

New Connection Point....225
To add a connection point to a junction element.

New Junction - <n> Connections....226
To create a new junction element with <n> connection points (<n> is 2, 3, or 4).

New – <Shape Type>....227
To create a new shape of one of the following types: Line, Repeating, or Continuous

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To create a new road element.

New Route....229
To create a route.

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To paste the data of elements from the Clipboard to the selected table.

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To rotate a shape object.

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To separate the road element at the mouse pointer position.

Show in MotionDesk....232
To move an observer in MotionDesk to the current mouse position.

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To show the transitions of lane sections in the Road 2-D Preview.

Show Preferred Lane – Direct Lane....233
To show the preferred lane for the direct direction in the Road 1-D Preview.

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To show the reference line on the Road 1-D Preview.

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To show the transitions between scenery sections on the Road 2-D Preview.

Show Segment Transitions....235
To show the transitions between segments on the Road 2-D Preview.

Show Shapes....236
To show the shapes in the Road 1-D Preview.

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To hide or show friction surfaces on the Road 1-D Preview pane.

Show Surfaces – Height Surfaces....237
To hide or show the additional height surfaces on the Road 1-D Preview.

Spline....237
To add a spline segment to the segment list, either after a selected segment or at the end of the list.

Straight....238
To add a straight segment to the segment list, either after a selected segment or at the end of the list.

Surface Condition....239
To add an area with a tire parameter set different to the remaining road element or junction.

Sinusoidal....240
To add a section with additional height profiles to the surface in sinusoidal form.

Switch to road network view....241
To return to the road network view.

Trim Road - Trim from <End/Start>....242
To trim the road element at the mouse pointer position.

Texture Map....242
To add a texture map to the surface.

Trapezoidal....243
To add a section with additional height profiles to the surface in trapezoidal form.

Adapt Properties

Access

You can access this command via:

Ribbon	None
Context menu of	Connection point on the **Road Network 2-D Preview** or **Junction 2-D Preview** pane
Shortcut key	None
Icon	None

Purpose

To adapt the properties of an inconsistent connection point.

Result

The connection point is consistent with the connected connection point.

Description

When two connection points are connected, the settings of several properties must match. You can use the **Adapt Properties** command to automatically make the settings consistent. The Road Generator adapts the property values of the selected connection point according to the settings of the connected connection point.

Related topics

HowTos

How to Restore the Consistency of a Road Network..... 119

Append Scenery Section - <Type>

Access

You can access this command via:

Ribbon	None
Context menu of	**Scenery** pane
Shortcut key	None
Icon	None

Purpose

To add a scenery section of the <Type> type to the end of the scenery sections list.

Description

You can select one of the following scenery types:

- **Alley**: The scenery section has 3-D objects of a typical tree-lined road, i.e., reflector posts and trees at intervals.
- **Batter**: The texture of the margin is filled from the road's height to the ground plate.
- **Bridge**: The texture of the margin is filled from the road's height down to the specified Height value. This can be used to model a road bridge.
- **City**: The scenery section has 3-D objects of a city, i.e., buildings and street lights.
- **Country Road**: The scenery section has 3-D objects of a country road, i.e., reflector posts and occasional trees.
- **Highway**: The scenery section has 3-D objects of a highway, i.e., reflector posts, noise barriers, and guard rails.

Result

A section of the selected type is appended to the list of scenery sections. You can specify the properties of the section in the **Properties** pane. Refer to Scenery Section Properties on page 269.

Related topics

HowTos

How to Specify Scenery Sections 88

References

Insert Scenery Section - <Type> 220

Append Lane Section

Access

You can access this command via:

Ribbon	None
Context menu of	**Lanes** pane
Shortcut key	None
Icon	None

Purpose

To append a lane section.

Result

A lane section is appended. Click the new lane section to specify its properties in the **Properties** pane (see Lane Section Properties on page 252).

Related topics

HowTos

How to Specify Lane Sections and Lanes on Road Elements 81

References

Insert Lane Section 221

Apply Offset

Access

You can access this command via:

Ribbon	None
Context menu of	▪ **Height Profile** pane ▪ **Lateral Slope Profile** pane
Shortcut key	None
Icon	None

Purpose

To specify an offset value for a profile.

Dialog settings

Offset Lets you specify an offset in meters (for a height profile) or in degrees (for a lateral slope profile). The specified value is added to all the height or lateral slope points of the profile.

Related topics

Basics

Lateral Slope Profile of a Road Element.....47

HowTos

How to Specify the Height Profile of a Road Element.....77
How to Specify the Lateral Slope Profile of a Road Element.....80

References

Height Profile Pane.....176
Lateral Slope Profile Pane.....179

Circular

Access

You can access this command via:

Ribbon	None
Context menu of	▪ **Segments** pane – **Append** ▪ **Segments** pane – **Insert**
Shortcut key	None
Icon	None

Purpose

To add a circular segment to the segment list, either after a selected segment or at the end of the list.

Result

A circular segment type is added. Click the row of the segment to specify its properties in the **Properties** pane. Refer to Road Segment Properties on page 264.

Description

A road is built up of segments. A circular segment represents a circular section of the road.

Related topics

Basics

Horizontal Profile of a Road Element.....40

HowTos

How to Specify the Horizontal Profile of a Road Element.....76

Close Road

Access

You can access this command via:

Ribbon	None
Context menu of	**Segments** pane
Shortcut key	None
Icon	None

Purpose

To insert a segment that closes a road element. The command is available only if a road element has at least two segments.

Result

A cubic spline segment that closes the road is added to the end of the segment list. The **Road closed** property of the **Road Global** properties is set.

Description

Use the command only after adding all other segments to the road element. The Road Generator calculates the dimensions of the cubic spline segment that closes the road only when the command is executed. If you add a segment afterwards, the road is open again.

To close a road in a road network in the same way, you can use the **Connect (Modify)** command.

Related topics

HowTos

How to Specify the Horizontal Profile of a Road Element.....76

References

Connect (Modify).....205

Clothoid

Access

You can access this command via:

Ribbon	None
Context menu of	▪ **Segments** pane – **Append** ▪ **Segments** pane – **Insert**
Shortcut key	None
Icon	None

Purpose

To add a clothoid segment to the segment list, either after a selected segment or at the end of the list.

Result

A clothoid segment type is added. Click the row of the segment to specify its properties in the **Properties** pane. Refer to Road Segment Properties on page 264.

Description

A road element is built up of segments. A clothoid segment is a curve which narrows into a specified radius.

Related topics

Basics

Horizontal Profile of a Road Element.....40

HowTos

How to Specify the Horizontal Profile of a Road Element.....76

Connect (Modify)

Access

You can access this command via:

Ribbon	None
Context menu of	Connection point on the **Road Network 2-D Preview**
Shortcut key	None
Icon	None

Purpose

To modify and connect a road or junction element.

Result

The selected element is modified and then connected to another element.

Description

You can use the **Connect (Modify)** command to connect the selected connection point of a road or junction element to an unconnected connection point. The position of the selected element is unchanged but the element is modified.

When you select the command at a connection point, the Road Generator highlights all connectable connection points with an orange semicircle. When you select one of these points, the element is modified and then both connection points are connected. For a road element, the Road Generator appends a cubic spline segment that connects both connection points. For a junction element, the Road Generator moves the connection point of the selected junction element to the other connection point.

Related topics

HowTos

How to Specify a Road Network 114

References

Connect (Move) 206

Connect (Move)

Access

You can access this command via:

Ribbon	None
Context menu of	Connection point on the **Road Network 2-D Preview**
Shortcut key	None
Icon	None

Purpose

To move and connect a road or junction element.

Result

The selected element is moved and then connected to another element.

Description

You can use the **Connect (Move)** command to connect the selected connection point of a road or junction element to an unconnected connection point. The selected element is moved so that the connection points are connected. The geometry of the selected element remains unchanged. If the element was connected before, it is disconnected.

When you select the command at a connection point, the Road Generator highlights all connectable connection points with an orange semicircle. When you select one of these points, the element is moved so that both connection points are connected.

Related topics

HowTos

How to Specify a Road Network 114

References

Connect (Modify) 205

Copy

Access

You can access this command via:

Ribbon	None
Context menu of	▪ **Connection Points** pane

	▪ Junctions pane ▪ Junction 2-D Preview pane ▪ Lanes pane ▪ Objects pane ▪ Road 1-D Preview pane ▪ Roads pane ▪ Scenery pane ▪ Segments pane ▪ Shapes pane ▪ Surface pane
Shortcut key	None
Icon	None

Purpose

To copy selected elements.

Result

Data of the selected elements is copied to the Clipboard.

Description

The Road Generator copies data to the Clipboard. You can insert new elements of the same type by pasting it into the table.

Related topics

References

Paste..... 230

Custom Height Map

Access

You can access this command via:

Ribbon	None
Context menu of	▪ Surface pane – New Surface – Additional Height Profile ▪ Road 1-D Preview pane – New Surface – Additional Height Profile ▪ Junction 2-D Preview pane – New Surface – Additional Height Profile
Shortcut key	None
Icon	None

Purpose

To add a section with an additional height profile that is specified by a table.

Result

An additional height profile is added to the Surface table. Click the new entry to specify its properties in the **Properties** pane. Refer to Surface Properties on page 277.

Description

The table contains height values in the coordinate system of the road element (s and d coordinates) or the junction element (x and y coordinates). These values are added to the road's or junction's height. You can use tables to specify any profile you want.

Related topics

Basics

Additional Height Profiles 55

HowTos

How to Specify Areas with Specific Surface Conditions or Textures 86

References

Sinusoidal 240
Trapezoidal 243

Custom Friction Map

Access

You can access this command via:

Ribbon	None
Context menu of	▪ **Surface** pane – **New Surface** – **Friction** ▪ **Road 1-D Preview** pane – **New Surface** – **Friction** ▪ **Junction 2-D Preview** pane – **New Surface** – **Friction**
Shortcut key	None
Icon	None

Purpose

To add a section with friction coefficients different to the remaining road element or junction.

Result

A friction map is added to the Surface table. Click the new entry to specify its properties in the **Properties** pane. Refer to Surface Properties on page 277.

Description

A friction map can be used to specify an area of the road that is covered by leaves, oil, a puddle, etc. You can specify one or more friction coefficients for the section:

- You can specify one constant friction coefficient for the entire area. You must also specify the friction coefficient and the dimensions length and width of the area.
- You can specify a table that contains different friction coefficients to be distributed across the area. The maximum values of the x-axis and y-axis give the length and width of the area.

Related topics

HowTos

How to Specify Areas with Specific Surface Conditions or Textures..... 86

References

Surface Condition..... 239

Cut

Access

You can access this command via:

Ribbon	None
Context menu of	▪ Connection Points pane ▪ Junction 2-D Preview pane ▪ Junctions pane ▪ Lanes pane ▪ Objects pane ▪ Road 1-D Preview pane ▪ Roads pane ▪ Scenery pane ▪ Segments pane ▪ Shapes pane ▪ Surface pane
Shortcut key	None
Icon	None

Purpose

To move the selected elements from the selected table to the Clipboard.

Result

The elements are deleted from the selected table and copied to the Clipboard. You can paste them to another position in the table.

Related topics

References

Paste 230

Delete

Access

You can access this command via:

Ribbon	None
Context menu of	▪ Connection Points pane ▪ Junction 2-D Preview pane ▪ Junctions pane ▪ Lanes pane ▪ Objects pane ▪ Road 1-D Preview pane ▪ Roads pane ▪ Scenery pane ▪ Segments pane ▪ Shapes pane ▪ Surface pane
Shortcut key	None
Icon	None

Purpose

To delete the selected elements.

Result

The selected elements are removed from the table completely.

Description

Unlike the Cut command, the elements are not placed in the Clipboard for further use.

Related topics

References

Cut 209

Delete Height Point

Access

You can access this command via:

Ribbon	None
Context menu of	**Height** pane
Shortcut key	None
Icon	None

Purpose

To delete the selected height point.

Result

The selected height point is removed.

Related topics

Basics

Height Profile of a Road Element 45

HowTos

How to Specify the Height Profile of a Road Element 77

Delete Lateral Slope Point

Access

You can access this command via:

Ribbon	None
Context menu of	**Lateral Slope** pane
Shortcut key	None
Icon	None

Purpose

To delete the selected lateral slope point.

Result

The selected lateral slope point is removed.

Related topics

Basics

Lateral Slope Profile of a Road Element.....47

HowTos

How to Specify the Lateral Slope Profile of a Road Element.....80

Disconnect

Access

You can access this command via:

Ribbon	None
Context menu of	Connection point on the **Road Network 2-D Preview**
Shortcut key	None
Icon	None

Purpose

To disconnect two connection points.

Result

The connection points are disconnected.

Related topics

References

Road Network 2-D Preview Pane.....188

Edit

Access

You can access this command via:

Ribbon	None
Context menu of	Junction or road element on the Road Network pane
Shortcut key	None
Icon	None

Purpose

To open the selected junction or road element for editing.

Result

The user interface is prepared for editing the selected junction or road element.

Description

When the element is a junction, it is displayed in the Junction 2-D Preview and you have access to the Connection Points, Borders, Surfaces, and Marker panes to specify the settings.

When the element is a road element, it is displayed on the Road 2-D Preview and Road 1-D Preview and you have access to the Segments, Lanes, Surface, Scenery, Height Profile, and Lateral Slope Profile panes to specify its settings.

To return to the Road Network pane, click Switch to road network view.

Related topics

References

Switch to road network view..... 241

Edit Route

Access

You can access this command via:

Ribbon	None
Context menu of	Route in the Route pane
Shortcut key	None
Icon	None

Purpose

To edit a route.

Result

You can edit the route.

Description

To add a road element to the route, click an orange connection point in the **Road Network 2-D Preview**. If connection points are connectable, they are symbolized as orange semicircles. The selected road element is added to the end of the route. The direction of the route is automatically set.

To remove road elements from the route, select the first road element in the **Routes** pane and click ×. The selected road element and the succeeding road elements are removed from the route.

Related topics

HowTos

How to Specify Routes on Road Networks 123

References

Routes Pane 189

Edit Table

Access

You can access this command via:

Ribbon	None
Context menu of	▪ **Height Profile** pane ▪ **Lateral Slope Profile** pane
Shortcut key	None
Icon	None

Purpose

To modify height or lateral slope points in the Table Editor.

Result

The Table Editor is opened with the height or lateral slope points which are specified.

Description

The Table Editor is a convenient way to modify one or more points in the profile.

Related topics

References

Table Editor (ModelDesk Parameterizing 🕮)
Table Editor Shortcut Keys (ModelDesk Parameterizing 🕮)

Export

Access

You can access this command via:

Ribbon	None
Context menu of	▪ Height Profile pane ▪ Junction 2-D Preview pane ▪ Lateral Slope Profile pane ▪ Road 1-D Preview pane ▪ Surface pane ▪ Surfaces pane
Shortcut key	None
Icon	None

Purpose

To export a profile to a file.

Result

A MAT file containing the profile is written.

Description

The profile in the pane (Surface, Surfaces, Height Profile, or Lateral Slope Profile pane) is exported into a MAT file. You can reuse the profile in another road model by importing the MAT file.

Related topics

References

Import 217
Import from File 218
MAT File Format of Height Profiles 292
MAT File Format of Lateral Slope Profiles 293
MAT File Format of Maps for Junctions Elements 294
MAT File Format of Maps for Road Elements 293

Find Valid Reference Point

Access

You can access this command via:

Ribbon	None
Context menu of	Junction 2-D Preview
Shortcut key	None
Icon	None

Purpose

To move the reference point of a junction automatically to a valid position.

Result

The reference point has a valid position.

Description

The Road Generator moves the reference point to a valid position. The junction is not moved. This is helpful if a junction is inconsistent and you do not want to move the reference point manually.

Related topics

HowTos

How to Specify the Profile of a Junction..... 111

References

Move Reference Point to Here..... 223

Highlight

Access

You can access this command via:

Ribbon	None
Context menu of	Road 2-D Preview
Shortcut key	None
Icon	None

Purpose

To highlight elements.

Result

The selected elements are highlighted.

Description

If the option is enabled, the selected element is highlighted in the panes. This can lower your PC's performance, especially if you are specifying a long road. In this case, you can disable the highlighting.

Import

Access

You can access this command via:

Ribbon	None
Context menu of	▪ **Height Profile** pane ▪ **Lateral Slope Profile** pane
Shortcut key	None
Icon	None

Purpose

To import a file containing a specified profile.

Result

A MAT file can be selected and imported.

Description

The profile in a **Height Profile** or **Lateral Slope Profile** pane can be exported into a MAT file. You can reuse the settings in another road model by importing the MAT file.

Related topics

References

Export 215
MAT File Format of Height Profiles 292
MAT File Format of Lateral Slope Profiles 293

Import from File

Access

You can access this command via:

Ribbon	None
Context menu of	▪ Surface – New Surface ▪ Road 1-D Preview – New Surface ▪ Surfaces – New Surface ▪ Junction 2-D Preview – New Surface
Shortcut key	None
Icon	None

Purpose

To import a file containing specified surface conditions.

Result

A file can be selected and imported.

Description

ModelDesk can import MATLAB files or OpenCRG files.

MATLAB file You can import the definitions of surface conditions from a MAT file. MAT files are created when you save surface conditions specified in ModelDesk to a file. The **Import from File** command reads the file and imports the definitions to the **Surface** table of a road element or the **Surfaces** table of a junction element.

OpenCRG ModelDesk can import surface conditions in OpenCRG format (CRG files) for road elements. CRG files are imported as additional height profiles of the custom height map type. Only the height information are imported. The reference line is not imported. OpenCRG files cannot be imported for junctions.

Related topics

HowTos

How to Specify Areas with Specific Surface Conditions or Textures..... 86

References

Export..... 215
MAT File Format of Maps for Junctions Elements..... 294
MAT File Format of Maps for Road Elements..... 293

Insert after

Access

You can access this command via:

Ribbon	None
Context menu of	**Shapes** pane (when the table of node elements is displayed)
Shortcut key	None
Icon	None

Purpose

To insert a node element in a shape.

Result

A node element is inserted.

Related topics

References

Shapes Pane..... 192

Insert Height Point

Access

You can access this command via:

Ribbon	None
Context menu of	**Height** pane
Shortcut key	None
Icon	None

Purpose

To insert a height point.

Result

A height point is added to the height profile.

Description

After adding a height point, you can modify its properties:

- You can select it and modify its properties on the **Properties** pane. Refer to Height Properties on page 250.

- You can modify its position or height by dragging it within the **Height Profile** pane.

Tip

You can add height points at each segment transition using the **Insert Points at Segment Transitions** command.

Related topics

References

Insert Points at Segment Transitions..... 222

Insert Scenery Section - <Type>

Access

You can access this command via:

Ribbon	None
Context menu of	**Scenery** pane
Shortcut key	None
Icon	None

Purpose

To insert a scenery section of the <Type> type in the list after a currently selected section.

Description

You can select one of the following scenery types:

- **Alley**: The scenery section has 3-D objects of a typical tree-lined road, i.e., reflector posts and trees at intervals.
- **Batter**: The texture of the margin is filled from the road's height to the ground plate.
- **Bridge**: The texture of the margin is filled from the road's height down to the specified Height value. This can be used to model a road bridge.
- **City**: The scenery section has 3-D objects of a city, i.e., buildings and street lights.
- **Country Road**: The scenery section has 3-D objects of a country road, i.e., reflector posts and occasional trees.
- **Highway**: The scenery section has 3-D objects of a highway, i.e., reflector posts, noise barriers, and guard rails.

Result

A section of the selected type is inserted into the list of scenery sections. You can specify the properties of the section in the **Properties** pane. Refer to Scenery Section Properties on page 269.

Related topics

HowTos

How to Specify Scenery Sections 88

References

Append Scenery Section - <Type> 200

Insert Lane Section

Access

You can access this command via:

Ribbon	None
Context menu of	**Lanes** pane
Shortcut key	None
Icon	None

Purpose

To insert a lane section in the lanes table after the selected lane section.

Result

A lane section is added to the lanes table. Click the new lane section to specify its properties in the **Properties** pane. Refer to Lane Section Properties on page 252.

Related topics

HowTos

How to Specify Lane Sections and Lanes on Road Elements 81

References

Append Lane Section 201

Insert Lateral Slope Point

Access

You can access this command via:

Ribbon	None
Context menu of	**Lateral Slope** pane
Shortcut key	None
Icon	None

Purpose

To insert a lateral slope point.

Result

A lateral slope point is added to the lateral slope profile.

Description

After adding a lateral slope point, you can modify its properties:

- You can modify its properties on the **Properties** pane. Refer to Lateral Slope Properties on page 253.
- You can modify its position or angle by dragging it within the **Lateral Slope Profile** pane.

Tip

You can add lateral slope points at each segment transition using the **Insert Points at Segment Transitions** command.

Related topics

References

Insert Points at Segment Transitions..... 222

Insert Points at Segment Transitions

Access

You can access this command via:

Ribbon	None
Context menu of	▪ **Height Profile** pane ▪ **Lateral Slope Profile** pane
Shortcut key	None
Icon	None

Purpose

To insert points for height or lateral slope profiles at segment transitions.

Result

The Road Generator inserts points at each segment transition.

Description

When the command is executed, points are automatically inserted at each segment transition. You can modify or delete the points afterwards.

Related topics

HowTos

How to Specify the Height Profile of a Road Element..... 77
How to Specify the Lateral Slope Profile of a Road Element..... 80

References

Height Profile Pane..... 176
Lateral Slope Profile Pane..... 179

Move Reference Point to Here

Access

You can access this command via:

Ribbon	None
Context menu of	Junction 2-D Preview
Shortcut key	None
Icon	None

Purpose

To move the reference point of a junction to a new position.

Result

The reference point has a new position.

Description

The Road Generator moves the reference point at the position of the mouse pointer. The junction is not moved. This is helpful if a junction is inconsistent.

Related topics

HowTos

How to Specify the Profile of a Junction 111

References

Find Valid Reference Point 216

New (Position Marker)

Access

You can access this command via:

Ribbon	None
Context menu of	**Position Marker** pane
Shortcut key	None
Icon	None

Purpose

To create a new position marker on a road or junction element.

Result

A new position marker is added to the road or junction element.

Description

You can modify the position marker's properties on the **Properties** pane. For details of the properties, refer to Position Marker Properties on page 257.

Related topics

HowTos

How to Specify Position Markers 94

New (Traffic Object)

Access

You can access this command via:

Ribbon	None
Context menu of	▪ **Traffic Object** pane

	▪ Road 1-D Preview ▪ Junction 2-D Preview
Shortcut key	None
Icon	None

Purpose

To create a new traffic object on a road or junction element.

Result

A new traffic object is added to the road or junction element.

Description

The Traffic Object Browser dialog opens for you to select the object. You can modify the traffic object's properties on the Properties pane.

Related topics

Basics

Basics of Traffic Objects (ModelDesk Traffic Object Management 🕮)

HowTos

How to Add Static Traffic Objects..... 90

References

Object Properties..... 255

New Connection Point

Access

You can access this command via:

Ribbon	None
Context menu of	▪ Junction 2-D Preview ▪ Connection Points pane
Shortcut key	None
Icon	None

Purpose

To add a connection point to a junction element.

Result

A connection point is added to a junction element. You can specify the properties of the junction point in the **Properties** pane.

Description

When you add a connection point via the context menu of the **Junction 2-D Preview**, the Road Generator adds the connection point at the position of the mouse pointer.

Related topics

HowTos

How to Specify the Profile of a Junction..... 111

References

Connection Point Properties..... 248

New Junction - <n> Connections

Access

You can access this command via:

Ribbon	None
Context menu of	▪ **Road Network 2-D Preview** ▪ **Road Network** pane
Shortcut key	None
Icon	None

Purpose

To create a new junction element with <n> connection points (<n> is 2, 3, or 4).

Result

A junction element with <n> connection points is added to the road network. You can specify the properties of the junction element in the **Properties** pane.

Description

When you add a junction element via the context menu of the **Road Network 2-D Preview**, the **Road Generator** adds the junction element at the position of the mouse pointer. When a connection point of a road element is selected, the junction element is created and also connected to the connection point.

If the junction element is to have more than 4 junction points, you can add junction points afterwards using the **New Connection Point** command.

To edit the junction element, select it in the **Road Network** pane and select **Edit**.

Related topics

HowTos

How to Specify the Profile of a Junction 111

References

Edit 213
New Connection Point 225
Road Network Element Properties 258

New – <Shape Type>

Access

You can access this command via:

Ribbon	None
Context menu of	**Shapes** pane
Shortcut key	None
Icon	None

Purpose

To create a new shape of one of the following types:

- Line
- Repeating
- Continuous

Result

A shape of the selected type is added to the road or junction element.

Description

You can change the type afterwards. You can specify this and other properties of the shape on the **Shapes** pane or the **Properties** pane.

Related topics

HowTos

How to Specify Shapes 96

References

Shape Properties 272
Shapes Pane 192

New Road

Access

You can access this command via:

Ribbon	None
Context menu of	▪ Road Network 2-D Preview ▪ Road Network pane
Shortcut key	None
Icon	None

Purpose

To create a new road element.

Result

A road element is added to the road network. You can specify the properties of the road element in the Properties pane.

Description

When you add a road element via the context menu of the Road Network 2-D Preview, the Road Generator adds the road element at the position of the mouse pointer. When a connection point of a junction or road element is selected, the road element is created and also connected to the connection point.

To edit the road element, select it in the Road Network pane and select Edit.

Related topics

HowTos

How to Specify a Road Network..... 114

References

Edit..... 213
Road Network Element Properties..... 258

New Route

Access

You can access this command via:

Ribbon	None
Context menu of	**Routes** pane
Shortcut key	None
Icon	None

Purpose

To create a route.

Result

A new route is created.

Description

A route consists of a list of road elements that the ASM vehicle can drive over in sequence. When you specify a route, you must select all the road elements in the desired order. You can select the same road element several times. To use a route for an endless loop, you can mark it as closed.

You can specify the properties of the route in the **Properties** pane.

Related topics

HowTos

How to Specify Routes on Road Networks..... 123

References

Route Properties..... 267

Paste

Access

You can access this command via:

Ribbon	None
Context menu of	▪ Connection Points pane ▪ Junction 2-D Preview pane ▪ Junctions pane ▪ Lanes pane ▪ Road 1-D Preview pane ▪ Roads pane ▪ Scenery pane ▪ Segments pane ▪ Shapes pane ▪ Surface pane
Shortcut key	None
Icon	None

Purpose

To paste the data of elements from the Clipboard to the selected table.

Result

New elements are added to the table. They have the same data as the element which was copied to the Clipboard.

Description

To copy data of similar elements, you can use the Copy command.

Related topics

References

Copy 206

Rotate

Access

You can access this command via:

Ribbon	None
Context menu of	▪ Road 1-D Preview ▪ Junction 2-D Preview
Shortcut key	None
Icon	None

Purpose

To rotate a shape object.

Result

The whole shape is rotated around the first node.

Description

When you call the command, a dialog opens for you to specify the angle for rotation.

Related topics

HowTos

How to Specify Shapes 96

Separate Road

Access

You can access this command via:

Ribbon	None
Context menu of	Road 2-D Preview
Shortcut key	None
Icon	None

Purpose

To separate the road element at the mouse pointer position.

Result

The road element is separated.

Description

You can use the Separate Road and Trim Road commands if you want to insert a junction into an existing road network.

Related topics

References

Trim Road - Trim from <End/Start> 242

Show in MotionDesk

Access

You can access this command via:

Ribbon	None
Context menu of	▪ Road Network 2-D Preview ▪ Road 1-D Preview ▪ Road 2-D Preview ▪ Junction 2-D Preview
Shortcut key	None
Icon	None

Purpose

To move an observer in MotionDesk to the current position of the mouse pointer.

Result

The ModelDesk Observer is moved to the current mouse pointer position and shows the bird's eye view of the scene.

Description

MotionDesk has a special ModelDesk Observer that can be moved by the Road Generator. When you call the **Show in MotionDesk** command, the ModelDesk Observer is moved in the scene to the position that corresponds to the current mouse pointer position. This is helpful when you create a road network and want to observe the scene after scene generation. Note that the scene is not automatically synchronized when you use this command.

Related topics

HowTos

How to Examine the Road Network in MotionDesk..... 131

Show Lane Section Transitions

Access

You can access this command via:

Ribbon	None
Context menu of	Road 2-D Preview
Shortcut key	None
Icon	None

Purpose

To show the transitions of lane sections in the Road 2-D Preview.

Result

If the option is enabled, the lane section transitions are marked with red triangles in the Road 2-D Preview.

Related topics

References

Road 2-D Preview Pane..... 186

Show Preferred Lane – Direct Lane

Access

You can access this command via:

Ribbon	None
Context menu of	Road 1-D Preview
Shortcut key	None
Icon	None

Purpose

To show the preferred lane for the direct direction in the Road 1-D Preview.

Result

If the option is enabled, the preferred lane for the direct direction is shown.

Related topics

References

Road 1-D Preview Pane..... 184

Show Preferred Lane – Oncoming Lane

Access

You can access this command via:

Ribbon	None
Context menu of	Road 1-D Preview

Shortcut key	None
Icon	None

Purpose

To show the preferred lane for the oncoming direction in the Road 1-D Preview.

Result

If the option is enabled, the preferred lane for the oncoming direction is shown.

Related topics

References

Road 1-D Preview Pane..... 184

Show Reference Line

Access

You can access this command via:

Ribbon	None
Context menu of	Road 1-D Preview
Shortcut key	None
Icon	None

Purpose

To show the reference line on the Road 1-D Preview.

Result

If the option is enabled, the reference line is displayed on the Road 1-D Preview.

Related topics

References

Road 1-D Preview Pane..... 184

Show Scenery Transitions

Access

You can access this command via:

Ribbon	None
Context menu of	Road 2-D Preview
Shortcut key	None
Icon	None

Purpose

To show the transitions between scenery sections on the Road 2-D Preview.

Result

If the option is enabled, the scenery transitions are marked with green rectangles in the Road 2-D Preview.

Related topics

References

Road 2-D Preview Pane..... 186

Show Segment Transitions

Access

You can access this command via:

Ribbon	None
Context menu of	Road 2-D Preview
Shortcut key	None
Icon	None

Purpose

To show the transitions between segments on the Road 2-D Preview.

Result

If the option is enabled, the segment transitions are marked with blue circles in the Road 2-D Preview.

Related topics

References

Road 2-D Preview Pane..... 186

Show Shapes

Access

You can access this command via:

Ribbon	None
Context menu of	Road 1-D Preview
Shortcut key	None
Icon	None

Purpose

To show the shapes in the Road 1-D Preview.

Result

If the option is enabled, the shapes are displayed on the Road 1-D Preview.

Related topics

References

Road 1-D Preview Pane..... 184

Show Surfaces – Friction Surfaces

Access

You can access this command via:

Ribbon	None
Context menu of	Road 1-D Preview – Show Surfaces
Shortcut key	None
Icon	None

Purpose

To hide or show friction surfaces on the Road 1-D Preview.

Result

If the option is enabled, the friction surfaces are displayed on the **Road 1-D Preview**.

Related topics

References

Road 1-D Preview Pane..... 184

Show Surfaces – Height Surfaces

Access

You can access this command via:

Ribbon	None
Context menu of	**Road 1-D Preview – Show Surfaces**
Shortcut key	None
Icon	None

Purpose

To hide or show the additional height surfaces on the **Road 1-D Preview**.

Result

If the option is enabled, the additional height surfaces are displayed on the **Road 1-D Preview**.

Related topics

References

Road 1-D Preview Pane..... 184

Spline

Access

You can access this command via:

Ribbon	None
Context menu of	▪ **Segments** pane – **Append** ▪ **Segments** pane – **Insert**
Shortcut key	None
Icon	None

Purpose

To add a spline segment to the segment list, either after a selected segment or at the end of the list.

Result

A spline segment is added. Click the row of the segment to specify its properties in the **Properties** pane.

Description

A cubic spline road segment is an interpolated curve specified by its starting and end points and a tangent angle.

Related topics

Basics

Horizontal Profile of a Road Element..... 40

HowTos

How to Specify the Horizontal Profile of a Road Element..... 76

References

Road Segment Properties..... 264

Straight

Access

You can access this command via:

Ribbon	None
Context menu of	▪ **Segments** pane – **Append** ▪ **Segments** pane – **Insert**
Shortcut key	None
Icon	None

Purpose

To add a straight segment to the segment list, either after a selected segment or at the end of the list.

Result

A straight segment type is added. Click the row of the segment to specify its properties in the **Properties** pane.

Description

A straight road segment is specified by its starting point and length.

Related topics

Basics

Horizontal Profile of a Road Element.....40

HowTos

How to Specify the Horizontal Profile of a Road Element.....76

References

Road Segment Properties.....264

Surface Condition

Access

You can access this command via:

Ribbon	None
Context menu of	▪ Surface pane – New Surface – Friction ▪ Road 1-D Preview pane – New Surface – Friction ▪ Junction 2-D Preview pane – New Surface – Friction
Shortcut key	None
Icon	None

Purpose

To add an area with a tire parameter set different to the remaining road element or junction.

Result

An area that has a specific tire parameter set is added to the Surface table. Click the new entry to select the tire parameter set and specify further properties in the Properties pane.

Description

The tire parameter set for the ASM vehicle is selected in the Road Network Element Properties. In the area specified by the surface condition, another tire parameter set is used. This lets you model uneven road surface conditions, such as a dry road with a small icy area.

Related topics

HowTos

How to Specify Areas with Specific Surface Conditions or Textures..... 86

References

Custom Friction Map..... 208
Road Network Element Properties..... 258
Surface Properties..... 277

Sinusoidal

Access

You can access this command via:

Ribbon	None
Context menu of	▪ Surface pane – New Surface – Additional Height Profile ▪ Road 1-D Preview pane – New Surface – Additional Height Profile
Shortcut key	None
Icon	None

Purpose

To add a section with additional height profiles to the surface in sinusoidal form.

Result

An additional height profile is added to the Surface table.

Description

The sinusoidal height profile is added to the road's height profile. Click the new entry to specify its properties in the Properties pane.

Related topics

Basics

Additional Height Profiles..... 55

HowTos

How to Specify Areas with Specific Surface Conditions or Textures..... 86

References

Custom Height Map..... 207
Surface Properties..... 277
Trapezoidal..... 243

Switch to road network view

Access

You can access this command via:

Ribbon	None
Context menu of	None
Shortcut key	None
Icon	None
Tool button	Working area

Purpose

To return to the road network view.

Result

The Road Generator shows the view for the road network with the following panes:

- Roads pane
- Junctions pane
- Routes pane
- Marker pane
- Road Network 2-D Preview

Related topics

References

Road Network Pane..... 187

Trim Road - Trim from <End/Start>

Access

You can access this command via:

Ribbon	None
Context menu of	Road 2-D Preview
Shortcut key	None
Icon	None

Purpose

To trim the road element at the mouse pointer position.

Result

The road element is trimmed from the end or from the start.

Description

The command lets you shorten the road element. The section of the road element from the mouse pointer to the end or start is deleted. All the road segments that are completely inside this section are deleted. The road segment that is only partially inside this section is trimmed.

Trim from start Deletes the section of the road element from the start to the mouse pointer.

Trim from end Deletes the section of the road element from the mouse pointer to the end.

Tip

Use the Trim Road and Separate Road commands if you want to insert a junction into an existing road network.

Related topics

References

Separate Road 231

Texture Map

Access

You can access this command via:

Ribbon	None
Context menu of	▪ Surface pane – New Surface

	▪ Road 1-D Preview pane – New Surface ▪ Junction 2-D Preview pane – New Surface
Shortcut key	None
Icon	None

Purpose

To add a texture map to the surface.

Result

A texture map is added to the Surface table.

Description

The texture map is added to the road element or junction. Click the new entry to specify its properties in the Properties pane.

Related topics

HowTos

How to Specify Areas with Specific Surface Conditions or Textures..... 86

References

Surface Properties..... 277

Trapezoidal

Access

You can access this command via:

Ribbon	None
Context menu of	▪ Surface pane – New Surface – Additional Height Profile ▪ Road 1-D Preview pane – New Surface – Additional Height Profile
Shortcut key	None
Icon	None

Purpose

To add a section with additional height profiles to the surface in trapezoidal form.

Result

An additional height profile is added to the Surface table.

Description

The trapezoidal height profile is added to the road's height profile. Click the new entry to specify its properties in the **Properties** pane. Refer to Surface Properties on page 277.

Related topics

Basics

Additional Height Profiles..... 55

HowTos

How to Specify Areas with Specific Surface Conditions or Textures..... 86

References

Custom Height Map..... 207
Sinusoidal..... 240

Road Properties

Overview

ModelDesk's Road Generator provides a **Properties** pane to specify the properties of a road model. The **Properties** pane shows the properties of the active pane.

Where to go from here

Information in this section

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To specify the borders of a junction element.

Connection Point Properties....248
To specify the properties of a connection point.

Height Properties....250
To specify the properties of a height point.

Lanes Properties....251
To specify the properties of a lane.

Lane Section Properties....252
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To specify a road element or junction.

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To specify the properties of a road element's scenery section.

Shape Properties.....272
To specify shapes for road elements or junctions.

Surface Properties.....277
To specify the properties of a surface area.

Border Line Properties

Purpose

To specify the borders of a junction element.

Description

A border can have a straight or spline shape. It has one outer line, whose line type and properties you can set.

Tip

Because the properties that are specified depend on the line type, you should select the line type before specifying the properties.

Border line properties

Type (Border Line) Lets you select the geometry of the border line (straight or spline).

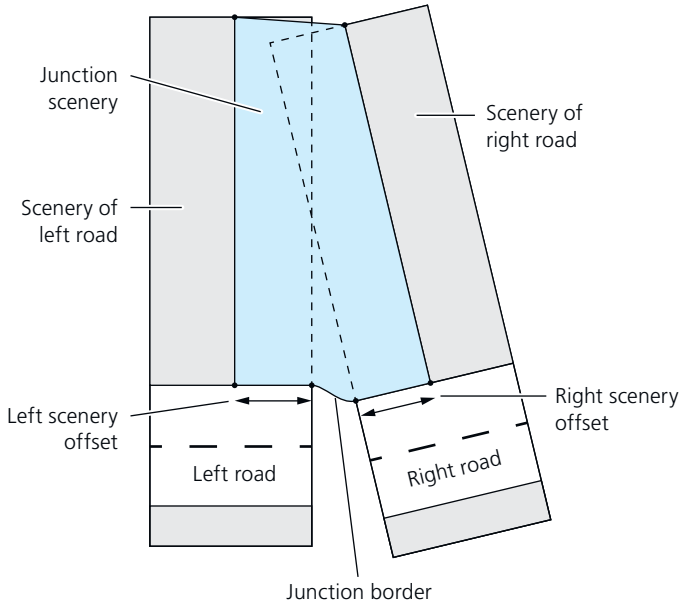
Outer line properties

Lets you specify the lines of a border. Refer to Lines Properties on page 254.

Scenery properties

Height Lets you specify the height of the margin, which is visualized as solid if the scenery type is a bridge. Only this margin is filled with a texture. The remaining height of the junction is without texture.

Offset <road name> (Only for the Adapt type) Lets you specify an offset value for the scenery of <road name> which is connected to the border line. In this area, the scenery of the road is replaced by the junction scenery to avoid an overlapping of the sceneries of the connected roads, see the following illustration.



Margin Lets you specify the width of the margin in meters.

Show type information Displays information on the selected scenery type.

Type (Scenery) Displays the selected scenery type. The type determines how the margin of a road is visualized. You can specify the type on the **Borders** pane.

Scenery Type	Description
Batter	The texture of the margin is filled from the road's height to the ground plate.
Bridge	The texture of the margin is filled from the junction's height down to the specified height value of the connected road elements. Use this type if the junction is on a bridge.
Adapt	The texture and margins of the junction is adapted to the connected road elements.

Related topics

Basics

Profile of a Junction.....43

HowTos

How to Specify the Profile of a Junction.....111

Connection Point Properties

Purpose

To specify the properties of a connection point.

Description

You can specify the position of a junction point in absolute or relative values. The absolute values are related to the origin of the virtual world. The relative values are related to the origin of the junction's coordinate system. The location and orientation of the junction's coordinate system is specified with the junction properties, refer to Road Network Element Properties on page 258. If you specify the absolute values, the relative values are calculated and vice versa.

When you select a connection point, the **Properties** pane displays the properties listed below and the properties of the lanes that are connected to the connection point. For a description of the lane properties, refer to Lane Section Properties on page 252.

Properties

Absolute position Lets you specify the absolute position of the connection point in Cartesian coordinates.

Parameter	Description
x	x coordinate in meters
y	y coordinate in meters
z	z coordinate in meters
Tangent angle	Tangent angle in degrees

Consistency Displays the results of the consistency check. The Road Generator checks whether the properties of a connection point match the properties of the connected connection point. To adapt the properties automatically, you can use the **Adapt Properties** command.

Consistency Check	Reason
Arrangement of lanes	The arrangement of lanes is different. Check the offset of the lanes and the lane width at both connection points.
Border width	The widths of the borders are different. Check the border width at both connection points.
No adjacent junctions	Two junctions are connected. The route must not contain two adjacent junctions.
Connection height	The height of the road element differs at the connection point. The height must be equal.
Connection lateral slope	The lateral slope is different. In a road/junction connection, specify a lateral slope of 0° for the road element at the connection point because a lateral slope cannot be specified for a junction element. In a road/road

Consistency Check	Reason
	connection, specify the same value for the angle of the lateral slope at both connection points.
Number of lanes	The number of lanes must be equal. Check the number of lanes specified with the lane section at the connection point.

Lane properties Lets you specify the properties of the lanes

Parameter	Description
Border width (Left)	Width of the border on the left side
Border width (Right)	Width of the border on the right side
Offset	Offset value in tangential direction
Width	Width of a lane

Relative position – Cartesian Lets you specify the relative position of the connection point in Cartesian coordinates.

Parameter	Description
x	x coordinate in meters
y	y coordinate in meters
z	z coordinate in meters
Tangent angle	Tangent angle in degrees

Relative position – Polar Lets you specify the relative position of the connection point in Polar coordinates.

Parameter	Description
Radius	Radius in meters
Phi	Angle in degrees

Slope Lets you specify the slope at the connection point in degrees.

Parameter	Description
Lateral slope	Lets you specify the slope in the lateral direction.
Height slope	Lets you specify the slope in the longitudinal direction.

Related topics

References

Adapt Properties..... 199
Road Network Element Properties..... 258

Height Properties

Purpose

To specify the properties of a height point.

Description

The height profile of a road element is described by height points. A height point specifies the height of the road's reference line anywhere on a road element. It is not necessary to place a height point at a segment edge.

The slope of the road from one height point to the next is described by an angle or a gradient. If you specify the angle, the gradient is calculated and vice versa, and the height of the next height point is adjusted.

Tip

You can specify the **Height** and **s** properties in the **Properties** dialog or by dragging height points in the **Height Profile** pane.

Properties

Actual transition length Displays the transition length that is actually reached in meters. The actual transition length can be smaller than the specified Transition length if the distance between neighboring height points is too small.

Gradient Lets you specify the gradient of the road slope between the selected height point and the following height point in per cent.

Height Lets you specify the z coordinate at the height point of the road's reference line in meters.

s Lets you specify the s coordinate of the height point within the road element in meters.

Slope Lets you specify the angle of the road slope between the selected height point and the following height point in degrees.

Transition length Lets you specify a range in meters where the height is smoothly interpolated if smooth interpolation is selected.

The height of the reference line between the height points is interpolated. You can specify only one kind of interpolation for the road by the **Height profile interpolation** property in the **Road Global** properties. Refer to Road Network Global Properties on page 261). If height profile interpolation is smooth, you can adjust the **Transition length**, a range before and after the height point where the height is smooth. Outside this range, the height is interpolated linearly.

Related topics

Basics

Height Profile of a Road Element 45

HowTos

How to Specify the Height Profile of a Road Element 77

References

Insert Height Point 219
Insert Points at Segment Transitions 222

Lanes Properties

Purpose

To specify the properties of a lane.

Description

A lane section has one or more lanes. The central lane has two lines (left line and right line). The other lanes have only one line. Each line can be set individually by specifying the line type and its properties.

You can select a predefined set of line types or the custom type, which lets you specify the lines individually.

Tip

- Because the parameters that are specified depend on the line type, you should select the line type before specifying the parameters.
- When you specify a lane and its lines, the Road 1-D Preview pane gives you a preview of the results. This is helpful if you are unsure about which line you are specifying.

Lane properties

Is drivable Lets you specify whether the lane can be used for driving.

Is preferred (Direct) Lets you specify the lane normally used in driving direction.

Is preferred (Oncoming) Lets you specify the lane normally used by the oncoming traffic.

Lane index Displays the index of the lane. The central lane has the index 0. The lanes to the left of the central lane have positive indices. The lanes to the right of the central lane have negative indices.

Width Lets you specify the width of the lane in meters.

Line properties

Lets you specify the lines of a lane. For the center lane (lane index 0), you can specify a right line and a left line. For all the other lanes, you can specify the outer lines. Refer to Lines Properties on page 254.

Related topics

Basics

Lanes of a Road Element.....48

HowTos

How to Specify Lane Sections and Lanes on Road Elements.....81

Lane Section Properties

Purpose

To specify the properties of a lane section.

Lane Sections properties

Border width (Left) Lets you specify the width of the left border in meters.

Border width (Right) Lets you specify the width of the right border in meters.

Central lane Displays the properties of the central lane. For details of the properties, refer to Lanes Properties on page 251.

Lane list Displays the properties of the outer lanes. For details of the properties, refer to Lanes Properties on page 251.

Lane section index Displays the index of the lane section.

Lane section name Lets you specify a name for the lane section.

Length Lets you specify the length of the lane section in meters.

Offset to reference line Lets you specify an offset to the reference line in meters.

s Displays the start value in meters. It is an s value in the coordinate system related to the road element. The value for the first section is 0. The start value of the other sections is the sum of the lengths of all previous sections.

Transition length Lets you specify the length of the smooth width transition between the current lane section and the previous lane section in meters. The transition length must be shorter than the lane section length.

Preferred Lanes

Preferred direct lane Lets you select the index of the lane that is preferred for the direct direction.

Preferred oncoming lane Lets you select the index of the lane that is preferred for the oncoming direction.

Related topics

HowTos

How to Specify Lane Sections and Lanes on Road Elements.....81

Lateral Slope Properties

Purpose

To specify the properties of a lateral slope point.

Description

The lateral slope is specified for the whole road element length independently of the road element's segments. It is specified by several points at the road element's length. A lateral slope point can be specified by an angle or by a gradient. If you specify a lateral slope point by the angle, the gradient is automatically calculated and vice versa.

Properties

Gradient Lets you specify the lateral slope point by a gradient in percent.

Lateral slope Lets you specify the lateral slope point by an angle in degrees.

s Lets you specify the position (s coordinate) of the lateral slope point in meters.

Show information Displays general information on lateral slopes.

Related topics

HowTos

How to Specify the Lateral Slope Profile of a Road Element.....80

References

Insert Lateral Slope Point.....222
Insert Points at Segment Transitions.....222

Lines Properties

Purpose

To specify the properties a line.

Lines properties

Lets you specify the lines of a lane, border line of a junction, and shape line. For the center lane (lane index 0), you can specify a right lane and a left lane. For all the other lanes, you can specify the outer lines.

Preset Lets you select a preset for the line. You can select a preset to get an initial values for a custom line. If you modify the number of lanes or the type of a line, the preset is automatically set to "Custom".

The following preset types are available:

Type	Description
None	No line
Dash	The line is a dashed line.
Solid	The line is a solid line.
DashSolid	The line is a double line consisting of a dashed and a solid line.
SolidDash	The line is a double line consisting of a solid and a dashed line.
Race	The line is a race line.
DoubleSolid	The line is a double line consisting of solid lines.
DoubleDash	The line is a double line consisting of dashed lines.
Custom	The line is customized.

Number of lines Lets you specify the number of lines (1 or 2).

Complete width Displays the complete width of the lines in meters. If you specify two lines, the complete width consists of the widths of the lines and the gap between them.

Line properties

Lets you specify the properties of a line. It depends on the line type which properties are available.

Color (Only for solid and dashed lines) Lets you specify the color of the line.

Color 1 (Only for a bi-colored line) Lets you specify color of the line in the first color.

Color 2 (Only for a bi-colored line) Lets you specify color of the line in the second color.

Gap length (Only for a dashed line) Lets you specify the length of the gap in meters.

Initial offset Lets you specify the initial offset in meters.

Line 1 length (Only for a bi-colored line) Lets you specify the length of the line in the first color in meters.

Line 2 length (Only for a bi-colored line) Lets you specify the length of the line in the second color in meters.

Line length (Only for a dashed line) Lets you specify the length of the line in meters.

Show incomplete line part (Only for a dashed line or bi-colored line) Lets you specify whether the last line part is shown when it is not complete.

Type Lets you specify the line type (solid, dashed, or bi-colored).

Width Lets you specify the width of a line in meters.

Spacing properties

If you select two lines, the space between them can be specified.

Color Lets you specify the color of the gap.

Distance Lets you specify the distance between the lines in meters.

Margin Lets you specify the width of the margin in meters.

Texture Lets you select a texture which is used between the lines.

Related topics

Basics

Lines.....51

HowTos

How to Specify Lane Sections and Lanes on Road Elements.....81

Object Properties

Purpose

To specify the position and orientation of traffic objects on a road or junction element.

Description

For a traffic object on a road element, you can specify the position of a traffic object in s and d coordinates in the road element's coordinate system or in absolute values.

For a traffic object on a junction element, you can specify the position of a traffic object in x and y coordinates relative to the junction's coordinate system or in absolute values.

Object properties

Description Lets you specify the description of the traffic object.

Dynamic Displays whether the traffic object is dynamic. Dynamic traffic objects can change their states. For example, traffic lights can show different lights and gantry signs can display a different sign.

If a traffic object is dynamic, the Stream ID property is enabled. You can use the ID to modify the state during simulation.

Image Displays a preview image of the traffic object.

Lane mapping (Only if Use lane mapping is enabled) Lets you select the index of the lane to which the traffic object is assigned.

Object ID Lets you select the identifier of the traffic object used in the simulation.

Orientation Displays the orientation angle specified for the geometry of the traffic object in degrees. This is the front side of the geometry. In the preview, the front side is indicated by a triangle.

Name Lets you specify the name of the traffic object.

Relative path Displays the relative path to the geometry file that is used for the traffic object.

Stream ID (Only if the traffic object is dynamic) Lets you specify an ID to modify the state of the traffic object in the simulation model. Refer to Traffic Sign Sensor Dynamic Calculation (ASM Traffic Reference 🕮).

Traffic Object Lets you specify the traffic object. ModelDesk opens the Traffic Object Manager, which lets you select a traffic object.

Use lane mapping Lets you specify to use lane mapping. If this option is enabled, you can assign the traffic object to a lane by using the Lane mapping property.

Absolute position properties

Displays or lets you specify the absolute position and orientation of a traffic object in Cartesian coordinates related to the origin of the virtual world. The values of traffic objects on road elements are displayed only.

x Displays or lets you specify the x coordinate of the traffic object in meters.

y Displays or lets you specify the y coordinate of the traffic object in meters.

z Displays the z coordinate of the traffic object in meters.

x-Rotation Displays or lets you specify the rotation around its x-axis within the range -180° to 180° in degrees.

y-Rotation Displays or lets you specify the rotation around its y-axis within the range -180° to 180° in degrees.

z-Rotation Displays or lets you specify the rotation around its z-axis within the range -180° to 180° in degrees.

Relative position properties

Lets you specify the relative position and orientation of a traffic object in the road element's coordinate system for a road element or in Cartesian coordinates for a junction.

s Lets you specify the s coordinate of the traffic object in meters.

d Lets you specify the d coordinate of the traffic object in meters.

x Lets you specify the x coordinate of the traffic object in meters.

y Lets you specify the y coordinate of the traffic object in meters.

z Lets you specify the z coordinate of the traffic object in meters.

x-rotation Lets you specify the rotation around its x-axis within the range -180° to 180° in degrees.

y-rotation Lets you specify the rotation around its y-axis within the range -180° to 180° in degrees.

z-rotation Lets you specify the rotation around its z-axis within the range -180° to 180° in degrees.

Related topics

HowTos

How to Add Static Traffic Objects.....90
How to Create and Specify a Fellow (ModelDesk Scenario Creation 🕮)
How to Modify Positions and Orientations of Static Traffic Objects.....92

References

Manage Traffic Objects (ModelDesk Traffic Object Management 🕮)
Traffic Sign Sensor Dynamic Calculation (ASM Traffic Reference 🕮)

Position Marker Properties

Purpose

To specify position markers of a road or junction element.

Description

For a road element, you can specify the position of a marker in s and d coordinates in the road element's coordinate system.

For a junction element, you can specify the position of a marker in x and y coordinates relative to the junction's coordinate system or in absolute values.

Position Marker properties	**Description** Lets you specify the description of the position marker. **ID** Lets you select the identifier of the position marker. **Name** Lets you specify the name of the position marker.
Absolute position properties	(Junction only) Lets you specify the absolute position of the position marker in Cartesian coordinates related to the origin of the virtual world. **x** Lets you specify the x coordinate in meters. **y** Lets you specify the y coordinate in meters.
Relative position properties	Lets you specify the relative position in the road element's coordinate system or Cartesian coordinate system related to the junction's origin. **s** Lets you specify the s coordinate of the traffic object on a road in meters. **d** Lets you specify the d coordinate of the traffic object on a road in meters. **x** Lets you specify the x coordinate of the traffic object on a junction in meters. **y** Lets you specify the y coordinate of the traffic object on a junction in meters.
Related topics	HowTos How to Specify Position Markers.....94

Road Network Element Properties

Purpose	To specify a road element or junction.
Description	The position of the road network element is specified in the Cartesian coordinate system related to the road network. For a road element, the position is the start position of its first segment. For a junction, the position is the origin of the its coordinate system.

Road Network Element

Author Lets you specify the authors responsible for the road network element.

Creation date Displays the creation date.

Description Lets you specify code-value pairs for the export in the OpenDRIVE format. You can specify these code-value pairs also using properties. Refer to OpenDRIVE on page 260.

Friction coefficient Lets you specify the surface condition of the junction element.

Lets you specify a friction in addition to the tire parameter set.

Specify a friction coefficient to produce a specific surface condition.

ID Displays the identifier of the road network element.

Lateral slope angle (Road element only) Displays the lateral slope angle in degrees.

Name Lets you specify a name for the road element.

Position Displays the coordinates of the position.

Surface condition Displays the surface conditions.

Tangent angle Lets you specify the tangent angle of the element's position in degrees.

Tire parameter set Lets you select a parameter set for the tires. A tire parameter set corresponds to a road surface condition under a specific weather condition, such as a wet or icy road surface. This parameter defines a tire parameter set from the Simulink model to be used for the junction element.

x Lets you specify the x coordinate of the element's position in meters.

y Lets you specify the y coordinate of the element's position in meters.

z Displays or lets you specify the z coordinate of the element's position in meters.

Junction

Displays properties that are specific for a junction.

Automatic adaption Lets you enable automatic adaption so that there is a smooth transition between the junction and the connected road elements.

Connections Lets you adapt the properties of the connection points to the connected road elements to get a smooth transition. When you click the button, the values of the following properties are copied from the road elements: height, slope, and lanes.

Outline consistency Displays the result of a consistency check for the junction. A junction is consistent when each point of the junction's border has a unique angle related to the junction's origin.

Reference point Displays the position of the junction's reference point.

x-rotation Lets you specify the x angle of the junction reference point.

y-rotation Lets you specify the y angle of the junction reference point.

z Lets you specify the height of the junction without changing the absolute height of the attached connection points.

Road

Lets you specify properties that are specific for a road element.

Road closed Displays whether the road is closed. The Road Generator sets the option when you add a Close Road segment using the Close Road command. Refer to Close Road on page 203.

Road length Displays the length of the road element in meters.

Driving Direction

Lets you specify properties for the directions of travel.

Direct lane indices Displays the indices of the lanes that are selected for the direct direction of travel.

Number of direct lanes Lets you select the number of lanes for the direct direction of travel.

Number of oncoming lanes Lets you select the number of lanes for the oncoming direction of travel.

Oncoming lane indices Displays the indices of the lanes that are selected for the oncoming direction of travel.

Unspecified lane indices Displays the indices of the lanes that are not selected for any direction of travel.

OpenDRIVE

Lets you specify the properties for the OpenDRIVE file. The values are set when road elements are exported in the OpenDRIVE format. The code-value pairs are also written to the Description property. Refer to Description on page 259.

Country Lets you specify the country for the OpenDRIVE format. This value is written as user data with the code `"dS_Country"` in the OpenDRIVE file. Refer to the following example:

```
<userData code="dS_Country" value="Germany" />
```

Road Type Lets you select the road type defined for the OpenDRIVE format.

Lane Types Lets you select the type of lanes according to the OpenDRIVE specification.

Parameter	Description
Index	Lets you select the index of the lane in ModelDesk whose type you want to specify. This is not the lane index that is exported for the OpenDRIVE file. The values of the indices are different, for example, the index of lane 0 in ModelDesk is exported as lane -1 in the OpenDRIVE file.
Type	Lets you select the type according to the OpenDRIVE specification.
Speed	Lets you specify the maximum allowed speed of the lane.

Speed Unit Lets you select the unit of the speed.

User Data Lets you specify user data as code-value pairs for the OpenDRIVE file.

For example, if you specify the code `"MyCode"` and the value `"MyValue"`, the following line is written to the OpenDRIVE file:

```
<userData code="MyCode" value="MyValue" />
```

Related topics

Basics

Coordinate System Used by the Road Generator 37

HowTos

How to Specify the Direction of Travel on a Road Element 117
How to Start the Road Generator 74

Road Network Global Properties

Purpose

To specify the global properties of the road network.

Road Network Global properties

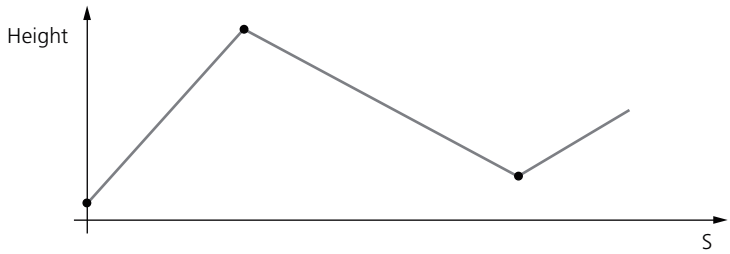
Author Lets you specify the authors responsible for the road network.

Creation date Displays the creation date.

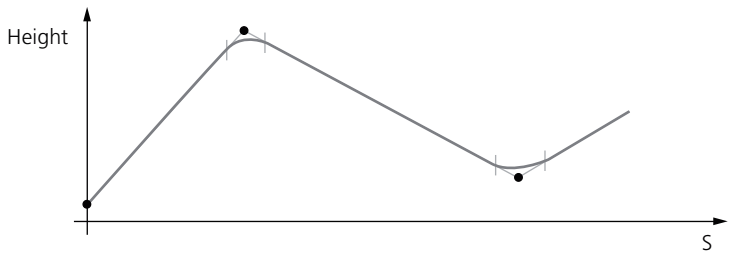
Description Lets you enter a description of the road network.

Height profile interpolation Lets you specify the type of height interpolation for the road. You can select one of the following options:

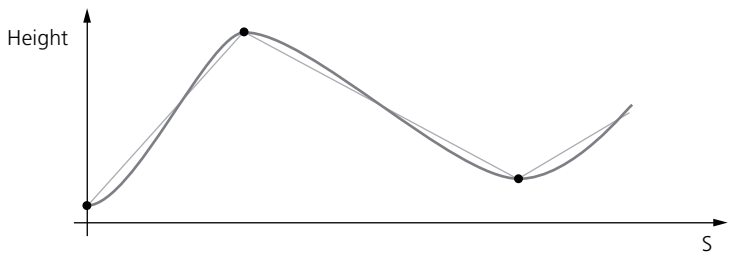
Linear: The height profile is linear between height points.



Smooth: The height profile is smooth within specified ranges (transition length) before and after height points. Outside the ranges, the height profile is linear.



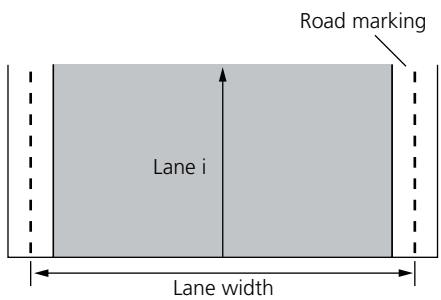
Cubic: The height profile between height points is a cubic spline.

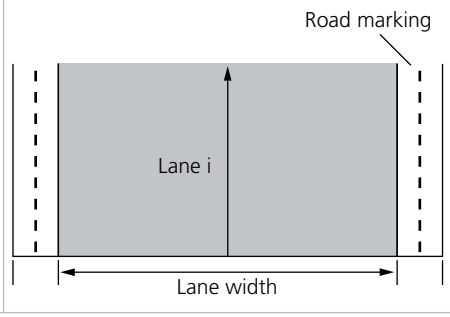


Note that MotionDesk 3.0 does not support cubic splines for height interpolation. Cubic splines are calculated in the simulation model but are not visualized in MotionDesk.

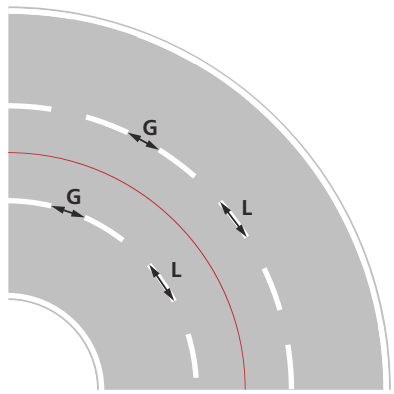
Import user signals Lets you import user signals from another road.

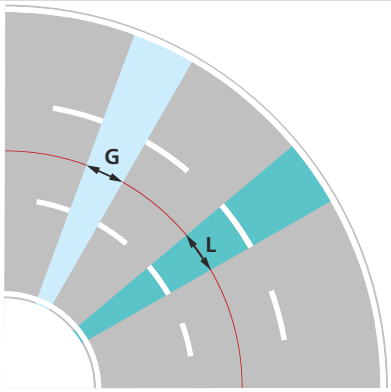
Lane width definition mode Lets you specify how to measure the lane width. The lines can be included in or excluded from the lane width.

Value	Description
Line included	The lane width is measured between the middle of the right and left border lines. 

Value	Description
Line excluded	The lane width is measured between the right and left line edges. 

Line length calculation Lets you specify how the line length is calculated.

Value	Description
Absolute	The actual length of lines and gaps is equal to the specified values. 
Referenced line	The actual length of lines and gaps differs from the specified values depending on the distance to the reference line. The specified values are the lengths on the reference line.

Value	Description
	

Name Displays the road network name.

OpenDRIVE export configuration Lets you specify the absolute path of the configuration file that is used by the OpenDRIVE export. Refer to Configuration File for Importing OpenDRIVE Files (ODIC File) on page 151.

Traffic type Lets you select the traffic type (right-hand traffic or left-hand traffic).

User signals Lets you specify up to 10 user signals. User signals can be used to provide information on the road network to the simulation model, for example, GPS offsets. You can specify an alias name and a value for each user signal.

Related topics

HowTos

How to Configure User Signals for a Road..... 100
How to Specify a Road Network..... 114

Road Segment Properties

Purpose

To specify the properties of a road segment.

Description

When a segment is selected in the **Segments** pane, the **Properties** pane shows its properties. The Road Generator supports four segment types.

General properties

The following properties are used in several segment definitions.

Absolute start position Displays the start point of the segment relative to the origin of the Cartesian coordinate system.

Property	Description
x	Absolute x coordinate in meters
y	Absolute y coordinate in meters
Tangent	Tangent angle in degrees

Absolute end position Displays the end point of the segment relative to the origin of the Cartesian coordinate system.

Property	Description
x	Absolute x coordinate in meters
y	Absolute y coordinate in meters
Tangent	Tangent angle in degrees

Length Lets you specify the length of the segment in meters. The segment length is defined by the length of the reference line.

Index Displays the index of the segment. The **Road Generator** automatically assigns the indices sequentially in ascending order starting with 1. The indices correspond to the order of the road's segments.

Name Lets you specify a name for the segment.

s Displays the start value in meters. It is an s value in the coordinate system related to the road element. The value for the first segment is 0. The start value of the other segments is the sum of the lengths of all previous segments.

Type Displays the segment type.

Circular segment properties

Lets you specify the properties of a circular segment by defining two of three properties (length, radius, and angle).

Angle Lets you specify the angle of the circular segment in degrees. If you specify the angle, the **Road Generator** calculates the length automatically.

Radius Lets you specify the radius of the circular segment in meters. If you specify the length, the **Road Generator** calculates the angle automatically.

Clothoid segment properties

Lets you specify the properties of a clothoid segment by defining the length and the radius at the segment's end. The radius at the segment's start is specified by the previous segment.

Is infinite Lets you specify the radius of the clothoid segment's end as infinite. If this property is selected, the curvature at the segment's end is 0. If it is not selected, you must specify the radius of the segment's end.

Radius Lets you specify the radius of the clothoid segment's end. You cannot specify the radius if the **Is infinite** option is selected.

Cubic spline segment properties

Lets you specify the properties of a cubic spline segment by defining the end point of the segment in absolute or relative values. If you specify absolute values, the relative values are calculated and vice versa.

Absolute end values Lets you specify the end point of the segment relative to the origin of the Cartesian coordinate system.

Property	Description
x	Absolute x coordinate in meters
y	Absolute y coordinate in meters
Tangent	Tangent angle in degrees

Relative end values Lets you specify the end point of the segment relative to the end of the previous segment.

Property	Description
x	Relative x coordinate in meters
y	Relative y coordinate in meters
Tangent	Tangent angle in degrees

Advanced spline settings

Lets you specify a spline segment by specifying the parameters for spline interpolation.

Use advanced settings Lets you enable the advanced settings.

Spline definition Lets you specify how the spline is calculated.

Value	Description
End vector	The spline is calculated based on the end vector, which is specified relatively or absolutely.
Parameter based	The spline is calculated based on the parameter specified for the x and y directions (x and y properties).

x Displays or lets you specify the coefficients for spline interpolation in the x direction. The coefficients are used in the following polynomial function to calculate the spline for $0 \leq t \leq 1$:

$$x(t) = a + b \cdot t + c \cdot t^2 + d \cdot t^3$$

y Displays or lets you specify the coefficients for spline interpolation in the y direction. The coefficients are used in the following polynomial function to calculate the spline for $0 \leq t \leq 1$:

$$y(t) = a + b \cdot t + c \cdot t^2 + d \cdot t^3$$

Related topics

Basics

Coordinate System Used by the Road Generator.....37

Horizontal Profile of a Road Element.....40

HowTos

How to Specify the Horizontal Profile of a Road Element.....76

Route Properties

Purpose

To specify the properties of a route.

Properties

Description Lets you enter a description of the route.

ID Lets you specify the identifier of the route.

Name Lets you specify the name of the route.

Route closed Displays whether the route is closed. The **Road Generator** sets the option when you select the **Mark route as closed** option on the **Routes** pane when you edit the route.

Route consistency Displays the result of a consistency check. A route can be inconsistent for several reasons, refer to the following table.

Consistency Check	Reason
Connection	Not all elements of the route are connected.
Route section consistency	A route section in the route is inconsistent. Refer to Route Section Properties on page 268.
Route sections direction	The direction of the route changes between two adjacent route sections.
Route sections offset	There is a lateral offset between two adjacent route sections.
Number of roads	The route contains no road.

Valid direction Displays whether the route can be used in one direction (direct) or in the reverse direction of travel (non-directional).

Related topics

Basics

Routes on a Road Network.....66

HowTos

How to Specify Routes on Road Networks.....123

Route Section Properties

Purpose

To specify the properties of a route section.

Properties

Length Displays the length of the route section. The length of the route section depends on the length of the road network element and the selected path.

Name Displays the name of the road network element.

Path Displays the name of the path that is selected for the road network element.

Route section consistency Displays the result of a consistency check. A route section can be inconsistent for several reasons, refer to the following table.

Consistency Check	Reason
Element removed	Road elements or junctions that are selected in a route are removed from the road network.
Shape type changed	A trajectory shape that is used in a route has a shape type that differs from the trajectory.
Connection valid	A connection of the route section is invalid.
Trajectory removed	A trajectory shape that is used in a route is removed from the road element or junction.
Outer trajectory node on connection point	The first or the last node of a trajectory is not placed on a connection point.
Outer trajectory node inside of borders	The first and the last node of a trajectory is not placed inside the road element or junction borders.
Trajectory direction	The trajectory shape runs in the wrong direction, i.e., the first node is not placed at the road start and the last node is not placed at the road end.
Driving direction	The direction of travel that is specified for the road element does not fit the direction of travel of the route.
Junction shape	A junction in the route has an invalid shape.
Junction trajectory direction	The direction of adjacent trajectory sections changes by more than 15 degrees on junctions.

Related topics

Basics

Routes on a Road Network..... 66

HowTos

How to Specify Routes on Road Networks..... 123

Scenery Section Properties

Purpose

To specify the properties of a road element's scenery section.

Description

As the type selected for the scenery section determines the available properties, you should select the type first.

Scenery Section properties

Length Lets you specify the length of the scenery section in meters.

Margin Lets you specify the width of the margin in meters.

s Displays the start value in meters. It is an s value in the coordinate system related to the road. The value for the first section is 0. The start value of the other sections is the sum of the lengths of all previous sections.

Scenery section index Displays the index of the scenery section.

Scenery section name Lets you specify the name of the scenery section.

Show type information Displays information on the selected scenery type.

Side Lets you specify whether the scenery is generated on the left, right, or both sides.

Speed limit Lets you specify a speed limit for the scenery section.

Type Displays the selected scenery type. The type determines how the road is visualized in MotionDesk.

You can select one of the following scenery types:

- Alley: The scenery section has 3-D objects of a typical tree-lined road, i.e., reflector posts and trees at intervals.
- Batter: The texture of the margin is filled from the road's height to the ground plate.
- Bridge: The texture of the margin is filled from the road's height down to the specified Height value. This can be used to model a road bridge.
- City: The scenery section has 3-D objects of a city, i.e., buildings and street lights.
- Country Road: The scenery section has 3-D objects of a country road, i.e., reflector posts and occasional trees.
- Highway: The scenery section has 3-D objects of a highway, i.e., reflector posts, noise barriers, and guard rails.

Bridge properties

Height Lets you specify the height of the margin which is visualized as solid if the scenery type is a bridge. Only this margin is filled with texture. The remaining height of the road is without texture.

Buildings properties	**Distance to road** Lets you specify the distance of the buildings to the road in meters. **Enabled** Lets you enable the generation of buildings in the scenery section. **Initial offset** Lets you specify the distance of the first building to the beginning of the scenery section in meters. **Interval** Lets you specify the distance between the buildings in meters. **Type** Lets you specify the type of buildings.
Curbstone	**Height** Lets you specify the height of the curbstones in meters. **Width** Lets you specify the width of the curbstones in meters.
Embankment properties	**Width** Lets you specify the width of the embankment in meters.
Guard rail	**Distance to road** Lets you specify the distance between the guard rail and road in meters. **Enabled** Lets you enable the generation of guard rails. **End terminal** Lets you specify the length of the end terminal in meters. **Height** Lets you specify the height of the guard rail in meters. **Initial offset** Lets you specify the initial offset of the guard rail. **Interval** Lets you specify the interval of the guard rail posts. **Start terminal** Lets you specify the length of the start terminal in meters. **Use in simulation** Lets you use the guard rail in the simulation. If you click the button, ModelDesk creates one or two shapes of the continuous type with the guard rail geometry. The properties of the shapes are copied from the properties of the scenery's guard rail. Shapes can be detected in the simulation. To avoid double guard rails, ModelDesk automatically disables the guard rail in the highway scenery. For an example, refer to Example for Creating a Guard Rail as Shape on page 100.

Noise barrier	**Distance to road** Lets you specify the distance between the noise barrier and the road in meters. **Enabled** Lets you enable the generation of a noise barrier. **End terminal** Lets you specify the length of the end terminal in meters. **Height** Lets you specify the height of the noise barrier. **Initial offset** Lets you specify the initial offset of the noise barrier. **Interval** Lets you specify the interval of the noise barrier posts. **Start terminal** Lets you specify the length of the start terminal in meters. **Wall style** Lets you select the type of the noise barrier.
Reflector Post properties	**Distance to road** Lets you specify the distance of the reflector posts to the road in meters. **Enabled** Lets you enable the generation of reflector posts in the scenery section. **Initial offset** Lets you specify the distance of the first reflector post to the beginning of the scenery section in meters. **Interval** Lets you specify the distance between the reflector posts in meters.
Sidewalk properties	**Distance to curbstone** Lets you specify the distance between the sidewalk and the curbstones in meters. **Sidewalk texture** Lets you select a texture for the sidewalk. **Width** Lets you specify the width of the sidewalk in meters.
Street lights properties	**Distance to road** Lets you specify the distance of the street lights to the road in meters. **Enabled** Lets you enable the generation of street lights in the scenery section. **Initial offset** Lets you specify the distance of the first street light to the beginning of the scenery section in meters. **Interval** Lets you specify the distance between the street lights in meters.
Tree Line properties	**Distance to road** Lets you specify the distance of the trees to the road in meters. **Enabled** Lets you enable the generation of tree lines in the scenery section.

Initial offset Lets you specify the distance of the first tree to the beginning of the scenery section in meters.

Interval Lets you specify the distance between the trees in meters.

Trees properties (City type)

Enabled Lets you enable the generation of trees in the scenery section.

Trees properties (CountryRoad type)

Enabled Lets you enable the generation of trees in the scenery section.

Density Lets you specify the density of the forest.

Width Lets you specify the width of the forest in meters.

Related topics

HowTos

How to Specify Scenery Sections..... 88

Shape Properties

Purpose

To specify shapes for road elements or junctions.

Description

You can use a shape to add an additional line, a chain of several traffic objects of the same type or a barrier to a road. Refer to Shapes on page 62.

Shape properties

The following properties specify the general settings of the shape.

Description Lets you specify a description for the shape.

Name Lets you specify a name for the shape.

Simulation ID Lets you specify a simulation ID for the shape.

Type Lets you specify the shape type.

Shape Type	Description
Line	A line is drawn along the specified shape course. This shape type can be used, for example, to add further road markings to the ones specified in the lane section of the road.
Repeating	Several traffic objects of the same type are placed along the specified shape course. This shape type can be used, for example, to place a row of pylons or reflector posts when modeling a roadwork scenario.

Shape Type	Description
Continuous	A geometry is placed along the specified shape course. This shape type can be used, for example, to place a barrier between two lanes when modeling a roadwork scenario with interim lanes.
Trajectory	A path that is specified on a road network element. The path can be used as alternative to the default path if you select a road network element for a route.

Z-Order (Only for a Line type) Lets you specify the level on which the line is generated. This value determines which line is visible when a Line shape overlaps another Line shape or the line of the lane section.

Type properties (Line type)

Refer to Lines Properties on page 254.

Type properties (Repeating type)

The following properties specify the shape of the Repeating type.

Distance Lets you specify the distance between the center points of the repeated traffic objects in meters. When you specify the distance while the traffic object is selected, the gap length is calculated automatically.

Gap length Lets you specify the distance between the repeated traffic objects in meters. This property considers the dimension of the traffic object. When you specify the gap length while the traffic object is selected, the distance is calculated automatically.

Height Lets you specify the height, including the offset to the road element or junction, in meters. When you specify the height while the traffic object is selected, the offset to the road element or junction is calculated automatically.

Image Displays the preview of the traffic object.

Initial offset Lets you specify the initial offset in meters.

Offset to owner Lets you specify a height offset to the road element or junction in meters. When you specify the offset while the traffic object is selected, the height is calculated automatically.

Relative angle x Lets you specify the rotation around the x-axis for all the traffic objects of the shape.

Relative angle y Lets you specify the rotation around the y-axis for all the traffic objects of the shape.

Relative angle z Lets you specify the rotation around the z-axis for all the traffic objects of the shape.

Relative path Displays the relative path to the geometry file that is used for the traffic object.

Traffic object Lets you specify the traffic object that is placed along the shape course.

Type properties (Continuous type)

The following properties specify the shape of a Continuous type.

End terminal (Only for a GuardRail 3-D object) Lets you specify the length of the end terminal in meters.

Color ID (Only for a custom 3-D object) Lets you specify the color ID of the continous shape with a custom 3-D object.

Flip orientation (Only for a GuardRail geometry) Lets you specify to flip the orientation of the geometry.

3D Object Lets you specify the 3-D object that is used as geometry. The following geometries are available:

ConcreteBarrier	
RedAndWhiteBarrier	
YellowBarrier	
GuardRail	
Custom	Specified by the Color ID and Type ID properties

Tip

If you require a guard rail, ModelDesk can convert a guard rail of a highway scenery to a shape. Refer to Example for Creating a Guard Rail as Shape on page 100.

Height Displays or lets you specify the height of the selected geometry in meters. Specifying is possible only for a GuardRail or custom 3-D object.

Initial offset Lets you specify the initial offset in meters.

Interval (Only for a GuardRail 3-D object) Lets you specify the distance between the posts of a guard rail in meters.

Start terminal (Only for a GuardRail 3-D object) Lets you specify the length of the start terminal in meters.

Type ID (Only for a custom 3-D object) Lets you specify the type ID of the continous shape with a custom 3-D object.

Width Displays or lets you specify the width of the selected geometry in meters. Specifying is possible only for a custom 3-D object.

Type properties (Trajectory)

Trajectory consistency Displays the result of the consistency check. A route that contains an inconsistent trajectory is not downloaded for simulation. A trajectory can be inconsistent caused by different reason. Refer to the following table.

Consistent Property	Description
Trajectory direction	The direction of the trajectory is reversed. The first node of the trajectory must start at the beginning of a road element.
Outer trajectory node on connection point	An outer node of the trajectory is not at the connection point line of the road network element. A trajectory must always start at a connection point line so that a route can be specified without a gap. The connection point line is a line in the lateral direction from the connection point.
Outer trajectory node inside borders	The outer node of a trajectory is outside of the lanes of the road network element or outside of the junction borders.
Junction trajectory direction	The difference between the start angle of a node and the end angle of the previous node is more than 15 degrees.

Shape position properties

(Only for shapes on road elements) The following properties specify the starting position of a shape. If a value is specified, all the node elements of the shape are moved to new positions.

d Lets you specify the d coordinate in meters. This is the position of the first node orthogonal to the reference line.

s Lets you specify the s coordinate in meters. This is the node position along the reference line.

Node properties

The following properties specify the position of a shape's node. If a value is specified, the node is moved to the new position.

d (Only for shapes on road elements) Lets you specify the d coordinate in meters.

End angle (Only for nodes of spline type) Lets you specify the angle at the end node of a spline section in degrees.

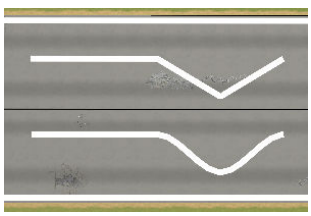
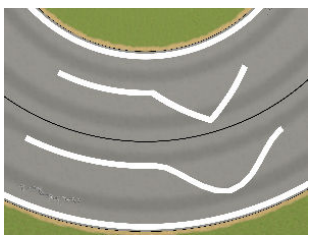
s (Only for shapes on road elements) Lets you specify the s coordinate in meters.

Start angle (Only for nodes of spline type) Lets you specify the angle at the start node of a spline section in degrees.

Section type Displays the course of the shape section between the selected node and the previous one. You can select the section type on the **Shapes** pane.

Value	Description
Offset	(Road element only): The offset to the reference line changes linearly between the nodes.
SmoothOffset	(Road element only): The connection between the nodes is specified by a smooth offset to the reference line. The start and end angles are always 0.
Straight	(Junction only): The nodes are directly connected. The shape section is straight.
Spline	(Junction only): The nodes are smoothly connected. The shape section is a spline curve. To specify the spline, you can specify the start and end angles.

The following table contains some examples of shapes on different road network elements.

Shape Section	Description
	A shape on a straight road segment with an Offset (upper line) and SmoothOffset (lower line) section type.
	A shape on a circular road segment with an Offset (upper line) and SmoothOffset (lower line) section type.
	A shape on a junction with a Straight (upper line) and Spline (lower line) section type.

Absolute position

(Only for shapes on junctions) You can specify the absolute position of a single node of a shape or the start position of the whole shape course. To specify the position of a single node, select this node on the **Shapes** pane. To specify the start position of the whole shape course, select the shape entry on the **Shapes** pane.

x Lets you specify the x coordinate of the selected node or shape in meters.

y Lets you specify the y coordinate of the selected node or shape in meters.

Relative position (only for shapes on junctions)

You can specify the position of a single node of a shape or the start position of the whole shape course relative to the origin of the junction. To specify the position of a single node, select this node on the **Shapes** pane. To specify the start position of the whole shape course, select the shape entry on the **Shapes** pane.

x Lets you specify the x coordinate of the selected node or shape in meters.

y Lets you specify the y coordinate of the selected node or shape in meters.

Related topics

Basics

Coordinate System Used by the Road Generator.....37
Shapes.....62

HowTos

How to Specify Shapes.....96
How to Specify Trajectories.....121

Surface Properties

Purpose

To specify the properties of a surface area.

Description

You can specify areas on the road where the surface condition differ from the rest of the road element or junction. When you select a surface area in the **Surface** pane, the **Properties** pane shows its properties. The **Road Generator** supports several surface types, each with specific properties.

- In a *custom friction map*, you can specify an area that has friction coefficients different to the remaining road network element. You can specify one constant friction coefficient for the entire area or a table containing several friction coefficients for different positions within the area.
- In a *custom height map*, you can specify areas on the road network element where the height differ from the height specified for the road network element.
- In a *sinusoidal map*, you can specify sine half-waves that are used as additional height.
- In a *surface condition map*, you can specify an area where a tire parameter set is used which is different to the tire parameter set specified for the remaining road network element. In the ASMs, different surface conditions are represented by different tire parameter sets (dry, damp, wet, icy).

- In texture maps, you can let MotionDesk paint symbols (e.g., arrows or crosswalks) on the road's surface. The symbols are only visualized, they do not influence the simulation.
- In a trapezoidal map, you can specify trapezoid profiles that are used as additional height.

General properties

Name Lets you specify a name for the surface area.

Absolute position Lets you specify the origin of the surface area in the coordinate system related to the road network. For areas on a road, the position is specified in s and d coordinates in meters. For areas on a junction, the position is specified in x and y coordinates in meters and the tangent angle in degrees.

Edit table Lets you specify the area with the additional height points or friction points. A table editor opens for you to enter the coordinates and their values. The coordinates are relative to the reference point. The maximum value of the s or x coordinate specifies the length of the area. The maximum value of the d or y coordinate specifies the width of the area.

To edit the table, you can do the following actions.

- To enter a value in a cell, enter the value and press the **`Enter`** key.
- To insert a new column or row in the table, select a column or row header and press the **`Ins`** key.
- To delete a column or row of the table, select the column or row header and press the **`Del`** key.
- To import a table stored in the MAT file format, click Import and select the file. Note that existing values are overwritten.
- To export the table to a MAT file, click Export and specify a file name.

Length Displays or lets you specify the length of the surface area in meters. If the area is specified by a table, the width results from the maximum s or x value.

Relative position Lets you specify the origin of the surface area in the coordinate system related to the origin of the road element or junction. For areas on a road element, the position is specified in s and d coordinates in meters. For areas on a junction, the position is specified in x and y coordinates in meters and the tangent angle in degrees.

Type Displays the type of the surface area.

Width Displays the width of the custom height map in meters. If the area is specified by a table, the width results from the maximum d or y value.

Custom Friction Map properties

The following properties are used in several surface condition definitions.

Custom map type Lets you select how the friction coefficient is specified.

Option	Description
Constant	The area has one constant friction coefficient specified by the Friction property.

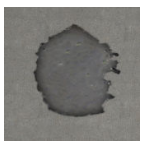
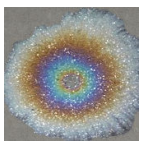
Option	Description
Table	The custom friction map is specified by a table. Click **Edit table** to specify the values.

Edit table Lets you specify the rectangular area with the friction coefficients. For further descriptions, refer to Edit table on page 278.

Friction Lets you specify a constant friction coefficient. The friction coefficient you select determines the surface condition.

Length Displays or lets you specify the length of the surface area in meters. If the area is specified by a table, the width results from the maximum s or x value.

Texture type Lets you select a texture that is displayed for the surface area. The following table shows examples.

Puddle	Oil Patch	Leaves
		

Type Displays the type of the surface area.

Custom Height Map properties

Absolute position Lets you specify the origin of the surface area in the coordinate system related to the road network. For areas on a road, the position is specified in s and d coordinates in meters. For areas on a junction, the position is specified in x and y coordinates in meters and the tangent angle in degrees.

Edit table Lets you specify the area with the additional height points. For further descriptions, refer to Edit table on page 278.

Length Displays the length of the surface area in meters. The width results from the maximum s or x value.

Relative position Lets you specify the origin of the surface area in the coordinate system related to the origin of the road element or junction. For areas on a road element, the position is specified in **s** and **d** coordinates in meters. For areas on a junction, the position is specified in **x** and **y** coordinates in meters and the **tangent angle** in degrees.

Type Displays the type of the surface area.

Width Displays the width of the custom height map in meters. If the area is specified by a table, the width results from the maximum d or y value.

Sinusoidal properties

Distance Lets you specify the distance between two half-waves in meters.

Height Lets you specify the amplitude of half-wave in meters.

Length Lets you specify the length of a half-wave in meters.

Maximal profile count Displays the maximum possible number of half-waves in the area.

Profile count Lets you specify the number of half-waves in the area. The value is limited to the maximum number of possible half-waves, see Maximal profile count.

Profile length Lets you specify the maximum length of the surface area. The actual length is calculated by the length of one half-wave, the distance between two half-waves and the number of half-waves in the area.

Relative position Lets you specify the origin of the surface area in the coordinate system related to the origin of the road element. For areas on a road element, the position is specified in s and d coordinates in meters.

Show information Displays information on sinusoidal additional height profiles.

Type Displays the type of the surface area.

Width Lets you specify the width of the surface area in meters.

Surface Condition properties

The following properties are used in several surface condition definitions.

Length Lets you specify the length of the surface area in meters.

Relative position Lets you specify the origin of the surface area in the coordinate system related to the origin of the road element or junction. For areas on a road element, the position is specified in s and d coordinates in meters. For areas on a junction, the position is specified in x and y coordinates in meters and the tangent angle in degrees.

Tire parameter Lets you select a tire parameter set for the specified area.

Type Displays the type of the surface area.

Width Lets you specify the width of the surface area in meters.

Texture Map properties

Length Displays or lets you specify the length of the surface area in meters.

Orientation Lets you select the orientation of the texture map.

Relative position Lets you specify the origin of the surface area in the coordinate system related to the origin of the road element or junction. For areas on a road element, the position is specified in s and d coordinates in meters. For

areas on a junction, the position is specified in x and y coordinates in meters and the tangent angle in degrees.

Texture Lets you select a texture which is painted on the road element.

Type Displays the type of the surface area.

Width Lets you specify the width of the surface area in meters. If the area is specified by a table, the width results from the maximum d value.

Trapezoid properties

Angle Lets you specify the value of the leading and trailing angles in degrees.

Distance Lets you specify the distance between two profiles.

Height Lets you specify the height of the profile in meters. If the angle is too small, the actual height is smaller. The actual height is displayed in the Height reached property.

Height reached Displays the actual height of the trapezoidal profiles in meters.

Length Lets you specify the length of the area in meters.

Maximal profile count Displays the maximum possible number of profiles in the area.

Profile count Lets you specify the number of profiles in the area. The value is limited to the maximum number of possible profiles, see Maximal profile count.

Profile length Lets you specify the length of the profile in meters.

Relative position Lets you specify the origin of the surface area in the coordinate system related to the origin of the road element. For areas on a road element, the position is specified in s and d coordinates in meters.

Show information Displays information on trapezoidal additional height profiles.

Type Displays the type of the surface area.

Width Lets you specify the width of the surface area in meters.

Related topics

Basics

Surface Condition..... 54

HowTos

How to Specify Areas with Specific Surface Conditions or Textures..... 86

Road MAT File Formats

Introduction

Some elements can be specified with values from a MAT file.

Where to go from here

Information in this section

MAT File Format of Road Elements 282
To specify road elements in a MAT file.

MAT File Format of Height Profiles 292
To specify a height profile in a MAT file.

MAT File Format of Lateral Slope Profiles 293
To specify a lateral slope profile in a MAT file.

MAT File Format of Maps for Road Elements 293
To specify a map with additional height profiles or friction coefficients for road elements in a MAT file.

MAT File Format of Maps for Junctions Elements 294
To specify a map with additional height profiles or friction coefficients for junction elements in a MAT file.

MAT File Format of Road Elements

Purpose

To specify road elements in a MAT file.

Description

You can specify road elements of a road network in a MAT file and import it into ModelDesk's Pool.

You can specify the following properties of a road element:

- The type and parameters of its segments
- One or more lane sections, each with one center lane and further lanes
- The right and left line of a center lane
- The outer line of lanes
- The height profile
- The lateral slope profile

Not all the properties available in the **Road Generator** for road elements can be specified in MAT files. It is also not possible to specify junctions. If any properties and junctions are missing, you can specify them in the Road Generator after you have imported the MAT file.

Overview of the structs

The following illustration displays the hierarchy of all the structs that are used to model a road element.

```
RoadNetwork
    Roads(n)
        Segments(n)
        Heights
        LateralSlopes
        LaneSections(n)
            CenterLane
                LeftLineProperty
                RightLineProperty
            Lanes(n)
                OuterLineProperty    UserSignals(n)
```

CenterLane

To specify the center lane of a lane section. Each lane section has one center lane.

Syntax

```
RoadNetwork.Roads(m).LaneSections(n).CenterLane
```

Fields The following table shows the fields of the struct.

Struct	Field	Data Type	Description
CenterLane	DrivingDirection	String	Direction of travel The string is used as an enumeration. Use one of the following values: ▪ 'Nondirectional': The lane has no preferred direction of travel. ▪ 'Oncoming': The lane is normally used by the oncoming traffic. ▪ 'Direct': The lane is normally used in the direction of travel. ▪ 'Undefined': The direction of travel is not defined.
	IsPreferred	Integer	True if the lane is normally used in the direction of travel
	IsPreferredOncoming	Integer	True if the lane is normally used by the oncoming traffic
	LeftLineProperty	Struct	To specify the properties of the left line. Refer to LeftLineProperty (refer to LineProperty on page 286).
	Name	String	Name of the center lane
	RightLineProperty	Struct	To specify the properties of the right line. Refer to RightLineProperty (refer to LineProperty on page 286).
	Width	Double	Width of the center lane

Example The following listing shows an example.

```
RoadNetwork.Roads(1).LaneSections(1).CenterLane.Name = '';
RoadNetwork.Roads(1).LaneSections(1).CenterLane.DrivingDirection = 'Nondirectional';
RoadNetwork.Roads(1).LaneSections(1).CenterLane.IsPreferred = true;
RoadNetwork.Roads(1).LaneSections(1).CenterLane.IsPreferredOncoming = true;
RoadNetwork.Roads(1).LaneSections(1).CenterLane.Width = 3.5;
```

Heights

To specify the height profile of a road element. A road element has one height profile. The height profile can have one or more height points.

Syntax

```
RoadNetwork.Roads(n).Heights
```

Fields The following table shows the fields of the struct.

Struct	Field	Data Type	Description
`Heights`	`Height`	Double	Vector containing tuples of an s coordinate and a height point, i.e., [s,h(s)]
	`TransitionLength`	Double	Transition length for all the height points

Example The following listing shows an example.

```
RoadNetwork.Roads(1).Heights.Height = [0 0; 20 0.2; 50 0.1];
RoadNetwork.Roads(1).Heights.TransitionLength = 5;
```

Lanes(n)

To specify the outer lanes of a lane section. A lane section can have up to 100 lanes.

Syntax

```
RoadNetwork.Roads(l).LaneSections(m).Lanes(n)
```

Fields The following table shows the fields of the struct.

Struct	Field	Data Type	Description
`Lanes(n)`	`DrivingDirection`	String	Direction of travel The string is used as an enumeration. Use one of the following values: ▪ `'Nondirectional'`: The lane has no preferred direction of travel. ▪ `'Oncoming'`: The lane is normally used by the oncoming traffic. ▪ `'Direct'`: The lane is normally used in the direction of travel.

Struct	Field	Data Type	Description
			▪ `'Undefined'`: The direction of travel is not defined.
	`IsPreferred`	Integer	True if the lane is normally used in the direction of travel
	`IsPreferredOncoming`	Integer	True if the lane is normally used by the oncoming traffic
	`LaneIndex`	Integer	Index of the lane. The lane indices must be specified consecutively, the index 0 is reserved for the center lane.
	`Name`	String	Name of the lane
	`OuterLineProperty`	Struct	To specify the properties of the outer line. Refer to OuterLineProperty (refer to LineProperty on page 286).
	`Width`	Double	Width of the lane

Example The following listing shows an example.

```
RoadNetwork.Roads(1).LaneSections(2).Lanes(1).Name = '';
RoadNetwork.Roads(1).LaneSections(2).Lanes(1).DrivingDirection = 'Nondirectional';
RoadNetwork.Roads(1).LaneSections(2).Lanes(1).IsPreferred = false;
RoadNetwork.Roads(1).LaneSections(2).Lanes(1).IsPreferredOncoming = false;
RoadNetwork.Roads(1).LaneSections(2).Lanes(1).LaneIndex = 1;
RoadNetwork.Roads(1).LaneSections(2).Lanes(1).Width = 3.5;
```

LaneSections(n)

To specify a lane section of a road element. A road element can have one or more lane sections.

Syntax

```
RoadNetwork.Roads(m).LaneSections(n)
```

Fields The following table shows the fields of the struct.

Struct	Field	Data Type	Description
`LaneSections(n)`	`BorderWidth`	Double	Border width
	`CenterLane`	Struct	To specify the center lane. Refer to CenterLane on page 283.
	`Lanes`	Struct	To specify the outer lanes. Refer to Lanes(n) on page 284.
	`Length`	Double	Length of the lane section
	`Name`	String	Name of the lane section
	`OffsetReferenceLine`	Double	Offset to the reference line
	`TransitionLength`	Double	Length of the transition

Example The following listing shows an example.

```
RoadNetwork.Roads(1).LaneSections(1).Name = 'Lane Section 1';
RoadNetwork.Roads(1).LaneSections(1).Length = 25;
RoadNetwork.Roads(1).LaneSections(1).BorderWidth = 0.2;
RoadNetwork.Roads(1).LaneSections(1).OffsetReferenceLine = 0;
RoadNetwork.Roads(1).LaneSections(1).TransitionLength = 5;
```

LateralSlopes

To specify the lateral slopes of a road element. A road has one lateral slope profile. The lateral slope profile can have one or more lateral slope points.

Syntax

```
RoadNetwork.Roads(n).LateralSlopes
```

Fields The following table shows the fields of the struct.

Struct	Field	Data Type	Description
`LateralSlopes`	`LateralSlope`	Double	Vector containing tuples of an s coordinate and a lateral slope point, i.e., [s,q(s)]

Example The following listing shows an example.

```
RoadNetwork.Roads(1).LateralSlopes.LateralSlope = [0,0; 20,0.2; 50,0.1];
```

LineProperty

To specify the properties of a center lane's left line (`LeftLineProperty`), a center lane's right line (`RightLineProperty`), or a lane's outer line (`OuterLineProperty`). A center lane has one left line and one right line, the other lanes of a lane section have one outer line.

Syntax

```
RoadNetwork.Roads(l).LaneSections(m).CenterLane.LeftLineProperty
```

Or

```
RoadNetwork.Roads(l).LaneSections(m).CenterLane.RightLineProperty
```

Or

```
RoadNetwork.Roads(l).LaneSections(m).Lanes(n).OuterLineProperty
```

Fields The following table shows the fields of the struct.

Struct	Field	Data Type	Description
`LeftLineProperty` or `RightLineProperty` or `OuterLineProperty`	`Gap`	Double	(Only for dashed lines) Gap length
	`Length`	Double	(Only for dashed lines) Line length
	`LineColor`	String	Line color The string is used as an enumeration. Use one of the following values: ▪ `'White'`: White color

Struct	Field	Data Type	Description
			▪ `'Yellow'`: Yellow color
	`LineDistanceRatio`	String	Ratio of the line length to the gap length The string is used as an enumeration. Use one of the following values: ▪ `'1:1'`: 1:1 (gap length = line length) ▪ `'1:2'`: 1:2 (gap length = 2 · line length) ▪ `'2:1'`: 2:1 (2 · gap length = line length) ▪ `'1:10'`: 1:10 (gap length = 10 · line length)
	`LineType`	String	Line type The string is used as an enumeration. Use one of the following values: ▪ `'None'`: No line ▪ `'Solid'`: Solid line ▪ `'Dash'`: Dashed line
	`Width`	Double	Line width

Example (center lane) The following listing shows an example of specifying the properties of the right and left line of a center line.

```
RoadNetwork.Roads(1).LaneSections(1).CenterLane.LeftLineProperty.LineType = 'Solid';
RoadNetwork.Roads(1).LaneSections(1).CenterLane.LeftLineProperty.LineColor = 'White';
RoadNetwork.Roads(1).LaneSections(1).CenterLane.LeftLineProperty.Width = 0.25;
RoadNetwork.Roads(1).LaneSections(3).CenterLane.RightLineProperty.LineType = 'Dash';
RoadNetwork.Roads(1).LaneSections(3).CenterLane.RightLineProperty.LineColor = 'White';
RoadNetwork.Roads(1).LaneSections(3).CenterLane.RightLineProperty.Width = 0.25;
RoadNetwork.Roads(1).LaneSections(3).CenterLane.RightLineProperty.Gap = 1;
RoadNetwork.Roads(1).LaneSections(3).CenterLane.RightLineProperty.Length = 1;
RoadNetwork.Roads(1).LaneSections(3).CenterLane.RightLineProperty.LineDistanceRatio = '1:1';
```

Example (outer lane) The following listing shows an example of specifying the properties of the line of an outer lane.

```
RoadNetwork.Roads(1).LaneSections(2).Lanes(1).OuterLineProperty.LineType = 'Dash';
RoadNetwork.Roads(1).LaneSections(2).Lanes(1).OuterLineProperty.LineColor = 'White';
RoadNetwork.Roads(1).LaneSections(2).Lanes(1).OuterLineProperty.Width = 0.25;
RoadNetwork.Roads(1).LaneSections(2).Lanes(1).OuterLineProperty.Gap = 1;
RoadNetwork.Roads(1).LaneSections(2).Lanes(1).OuterLineProperty.Length = 1;
RoadNetwork.Roads(1).LaneSections(2).Lanes(1).OuterLineProperty.LineDistanceRatio = '1:1';
```

RoadNetwork

To specify the global properties of a road network.

Syntax `RoadNetwork`

Fields The following table shows the fields of the struct.

Struct	Field	Data Type	Description
`RoadNetwork`	`Author`	String	Name of the author
	`CreationDate`	String	Date when the road network was created
	`Description`	String	Description of the road network
	`HeightInterpolation`	String	Type of the height profile interpolation The string is used as an enumeration. Use one of the following values: ▪ `'Linear'`: Height profile is linear. ▪ `'Smooth'`: Height profile is smooth within specified ranges before and after height points. ▪ `'Cubic'`: The height profile between height points is a cubic spline.
	`Name`	String	Name of the road network
	`Roads`	Struct	To specify the road elements. Refer to Roads(n) on page 288.
	`UserSignals`	Struct	To specify the user signals. Refer to UserSignals(n) on page 291.
	`Version`	String	Version

Example The following listing shows an example.

```
RoadNetwork.Name = 'MyRoadNetwork';
RoadNetwork.Author = 'MyName';
RoadNetwork.CreationDate = '2016-03-14T08:22:44.0769895+02:00';
RoadNetwork.Description = 'My Description';
RoadNetwork.Version = '1.0';
RoadNetwork.HeightInterpolation = 'Linear';
```

Roads(n)

To specify a road element. A road network can have one or more road elements.

Syntax

```
RoadNetwork.Roads(n)
```

Fields The following table shows the fields of the struct.

Struct	Field	Data Type	Description
`Roads(n)`	`Description`	String	Description of the road
	`DirectLanes`	Double	Number of lanes for the direct direction of travel[1)]
	`Heights`	Struct	To specify the height profile of the road element. Refer to Heights on page 284.
	`LaneSections`	Struct	To specify the lane sections. Refer to LaneSections(n) on page 285.
	`LateralSlopes`	Struct	To specify the lateral profile. Refer to LateralSlopes on page 286.
	`LineInterpretation`	String	Line width definition mode[2)]. The string is used as an enumeration. Use one of the following values: ▪ `'ISO'`: The lane width is measured between the right and left line edges (line excluded). ▪ `'dSPACE'`: The lane width is measured between the middle of the right and left border lines (line included).
	`Name`	String	Name of the road element
	`OncomingLanes`	Double	Number of lanes for the oncoming direction of travel[1)]
	`RoadClosed`	Integer	True if the road is closed
	`Segments`	Struct	To specify the segments. Refer to Segments(n) on page 290.
	`StartParameter`	Doubles	x and y coordinates and the tangent angle of the start position Array with 3 double values (x, y, tangent angle)
	`TrafficType`	String	Traffic type The string is used as an enumeration. Use one of the following values: ▪ `'RightHandTraffic'`: Right-hand traffic ▪ `'LeftHandTraffic'`: Left-hand traffic

1) For details, refer to How to Specify the Direction of Travel on a Road Element on page 117.

2) For details, refer to Road Network Global Properties on page 261

Example The following listing shows an example.

```
RoadNetwork.Roads(1).Name = 'Road 1';
RoadNetwork.Roads(1).Description = '';
RoadNetwork.Roads(1).LineInterpretation = 'dSPACE';
RoadNetwork.Roads(1).RoadClosed = false;
RoadNetwork.Roads(1).DirectLanes = 0;
RoadNetwork.Roads(1).OncomingLanes = 0;
RoadNetwork.Roads(1).TrafficType = 'RightHandTraffic';
RoadNetwork.Roads(1).StartParameter = [10; 5.5; 90];
```

Segments(n)

To specify a segment of a road element. A road element can have one or more segments.

Syntax

```
RoadNetwork.Roads(m).Segments(n)
```

Fields The following table shows the fields of the struct.

Struct	Field	Data Type	Description
`Segments(n)`	`IsInfinite`	Integer	(Only for clothoid segments) True if the radius of the clothoid segment's end is infinite
	`Length`	Double	(Only for straight, circular, and clothoid segments) Length of the segment's reference line
	`Name`	String	Name of the segment
	`Radius`	Double	(Only for circular and clothoid segments) Radius of the segment's end
	`RelativeEndVector`	Doubles	(Only for spline segments) Relative end vector Array with 3 double values (x, y, tangent angle)
	`Type`	String	Segment type The string is used as an enumeration. Use one of the following values: ▪ `'Straight'`: Straight ▪ `'Circular'`: Circular ▪ `'Spline'`: Spline ▪ `'Clothoid'`: Clothoid

Example The following listing shows an example of a straight segment.

```
RoadNetwork.Roads(1).Segments(1).Type = 'Straight';
RoadNetwork.Roads(1).Segments(1).Name = 'Segment 1';
RoadNetwork.Roads(1).Segments(1).Length = 100;
```

The following listing shows an example of a circular segment.

```
RoadNetwork.Roads(1).Segments(2).Type = 'Circular';
RoadNetwork.Roads(1).Segments(2).Name = 'Segment 2';
RoadNetwork.Roads(1).Segments(2).Length = 100;
RoadNetwork.Roads(1).Segments(2).Radius = -75;
```

The following listing shows an example of a clothoid segment.

```
RoadNetwork.Roads(1).Segments(3).Type = 'Clothoid';
RoadNetwork.Roads(1).Segments(3).Name = 'Segment 3';
RoadNetwork.Roads(1).Segments(3).Length = 150;
RoadNetwork.Roads(1).Segments(3).Radius = -25;
RoadNetwork.Roads(1).Segments(3).IsInfinite = false;
```

The following listing shows an example of a spline segment.

```
RoadNetwork.Roads(1).Segments(4).Type = 'Spline';
RoadNetwork.Roads(1).Segments(4).Name = 'Segment 4';
RoadNetwork.Roads(1).Segments(4).RelativeEndVector = [100,25,0];
```

UserSignals(n)

To specify user signals for a road element. You can use user signals to provide information on the road network to the simulation model, for example, GPS offsets. A maximum of 10 user signals is supported.

Syntax

```
RoadNetwork.UserSignals(n)
```

Fields The following table shows the fields of the struct.

Struct	Field	Data Type	Description
`UserSignals(n)`	`Alias`	String	Alias name
	`Comment`	String	Comment
	`Value`	Double	Value

Example The following listing shows an example.

```
RoadNetwork.UserSignals(1).Alias = 'GPS method[0xy|1GPS]';
RoadNetwork.UserSignals(1).Comment = '';
RoadNetwork.UserSignals(1).Value = 1;
RoadNetwork.UserSignals(2).Alias = 'start coordinate latitude[deg]';
RoadNetwork.UserSignals(2).Comment = '';
RoadNetwork.UserSignals(2).Value = 52;
RoadNetwork.UserSignals(3).Alias = 'start coordinate longitude[deg]';
RoadNetwork.UserSignals(3).Comment = '';
RoadNetwork.UserSignals(3).Value = 10;
```

Related topics

References

Import from File..... 218

MAT File Format of Height Profiles

Purpose

To specify the height profile in a MAT file.

Description

The MAT file contains the following structs and substructs:

Struct	Substruct	Dimension	Data Type	Contents
`height`	`s`	1 x N	double	s coordinates of the height points
	`v`	1 x N	double	z coordinates of the height points
	`type`	1 x 1	double	Type of interpolation ▪ 0: Linear ▪ 1: Smooth ▪ 2: Piecewise cubic (spline)
	`ds`	1 x N	double	Range before and after the height point where the height is smooth if the interpolation is smooth (1).
	`Version`	1 x 1	double	Version of MAT file format

The values must comply with the following rules:

- The first s coordinate must be 0 (`height.s(1) = 0`)
- The values of all the `ds` values must be greater than or equal to 0 (`height.ds(i) ≥ 0`)
- The value of the type must be 0, 1 or 2.
- If the type is 1, `height.ds` must be specified.

Related topics

References

Export 215
Import 217

MAT File Format of Lateral Slope Profiles

Purpose

To specify a lateral slope profile in a MAT file.

Description

The MAT file contains the following structs and substructs:

Struct	Substruct	Dimension	Data Type	Contents
`lateral_slope`	`s`	1 x N	double	s coordinates of the lateral slope points
	`v`	1 x N	double	Lateral slope points
	`Version`	1 x 1	double	Version of MAT file format

The values must comply with the following rule:

- The first s coordinate must be 0 (`lateral_slope.s(1) = 0`)

Related topics

References

Export 215
Import 217

MAT File Format of Maps for Road Elements

Purpose

To specify a map with additional height profiles or friction coefficients for road elements in a MAT file.

Description

The MAT file contains the following structs and substructs:

Struct	Substruct	Dimension	Data Type	Contents
`map`	`type`	1 x 1	double	Type of map ▪ 1: Map containing friction coefficients ▪ 2: Map containing additional height profiles
	`s`	1 x N	double	Local s coordinates in the look-up table (N = number of s coordinates)
	`d`	1 x M	double	Local d coordinates in the look-up table (M = number of d coordinates)
	`v`	M x N	double	Friction coefficient or additional height in the look-up table (N =

Struct	Substruct	Dimension	Data Type	Contents
				number of s coordinates, M = number of d coordinates)
	`s0`	1 x 1	double	Optional: s coordinate used as the reference value for the map
	`d0`	1 x 1	double	Optional: d coordinate used as the reference value for the map

The values must comply with the following rules:

- The value of the type must be 1 or 2.
- The number of s coordinates and d coordinates must be 2 or more.
- The dimension of `maps.v` must match the dimension of `map.s` and `map.d`.
- The first local s coordinate must be 0 (`map.s(1) = 0`)
- The d vector must explicitly have an explicit value of 0 or its values must implicitly include the 0, see the following example:

```
-1, 0, 3, 6
-5, -2, 0
0, 12, 15
-5, -2, 3, 4
```

- Either `map.s0` and `map.d0` are both specified or neither of them is specified.

Related topics

References

Export 215
Import from File 218

MAT File Format of Maps for Junctions Elements

Purpose

To specify a map with additional height profiles or friction coefficients for junction elements in a MAT file.

Description

The MAT file contains the following structs and substructs:

Struct	Substruct	Dimension	Data Type	Contents
`map`	`type`	1 x 1	double	Type of map ▪ 1: Map containing friction coefficients

Struct	Substruct	Dimension	Data Type	Contents
				▪ 2: Map containing additional height profiles
	x	1 x N	double	Local x coordinates in the look-up table (N = number of x coordinates)
	y	1 x M	double	Local y coordinates in the look-up table (M = number of y coordinates)
	v	M x N	double	Friction coefficient or additional height in the look-up table (N = number of x coordinates, M = number of y coordinates)
	x0	1 x 1	double	Optional: x coordinate used as the reference value for the map relative to the junction's origin
	y0	1 x 1	double	Optional: y coordinate used as the reference value for the map relative to the junction's origin
	phi0	1 x 1	double	Optional: Tangent angle used as the reference value for the map relative to the junction's origin

The values must comply with the following rules:

- The value of the type must be 1 or 2.
- The number of x coordinates and y coordinates must be 2 or more.
- The dimension of `maps.v` must match the dimension of `map.x` and `map.y`.
- The first local x coordinate must be 0 (`map.x(1) = 0`)
- The y vector must explicitly have an explicit value of 0 or its values must implicitly include the 0, see the following example:

```
-1, 0, 3, 6
-5, -2, 0
0, 12, 15
-5, -2, 3, 4
```

- Either all the `map.x0`, `map.y0`, and `map.phi0` parameters are specified or neither of them is specified.

Related topics

References

Export 215
Import from File 218

OpenDRIVE Format Import - Commands and Dialogs

Introduction

ModelDesk provides commands for importing roads in the OpenDRIVE format.

Where to go from here

Information in this section

ODIC File - New 296
To create a new configuration file for importing an OpenDRIVE file.

ODIC File - Save 297
To save the configuration file for the OpenDRIVE import.

ODIC File - Save As 298
To save the configuration file for the OpenDRIVE import under new name.

Mapping List Properties 299
To specify the settings for mapping signals and objects when OpenDRIVE files are imported.

Information in other sections

Working with Roads in OpenDRIVE Format 134
Provides information on importing and exporting road files in the OpenDRIVE format.

ODIC File - New

Access

You can access this command via:

Ribbon	Environment – Road
Context menu of	None
Shortcut key	None
Icon	

Purpose

To create a new configuration file for importing an OpenDRIVE file.

Description

A configuration file for the OpenDRIVE import is used to assign traffic objects of a ModelDesk project to signals and objects specified in the OpenDRIVE files. Refer to Configuration File for Importing OpenDRIVE Files (ODIC File) on page 151.

Result

A new configuration file is created.

The ODIC files are not contained in ModelDesk's projects and experiments.

Related topics

Basics

Configuration File for Importing OpenDRIVE Files (ODIC File)..... 151

HowTos

How to Create an ODIC File..... 154

References

ODIC File - Save..... 297
ODIC File - Save As..... 298

ODIC File - Save

Access

You can access this command via:

Ribbon	Environment – Road
Context menu of	None
Shortcut key	None
Icon	

Purpose

To save the configuration file for the OpenDRIVE import.

Result

The currently open configuration file is saved.

The ODIC files are not contained in ModelDesk's projects and experiments.

Related topics

Basics

Configuration File for Importing OpenDRIVE Files (ODIC File)..... 151

HowTos

How to Create an ODIC File..... 154

References

ODIC File - New..... 296
ODIC File - Save As..... 298

ODIC File - Save As

Access

You can access this command via:

Ribbon	Environment – Road
Context menu of	None
Shortcut key	None
Icon	

Purpose

To save the configuration file for the OpenDRIVE import under a new name.

Result

The currently open configuration file is saved under a new name.

The ODIC files are not contained in ModelDesk's projects and experiments.

Related topics

Basics

Configuration File for Importing OpenDRIVE Files (ODIC File)..... 151

HowTos

How to Create an ODIC File..... 154

References

ODIC File - New..... 296
ODIC File - Save..... 297

Mapping List Properties

Purpose

To specify the settings for mapping signals and objects when OpenDRIVE files are imported.

Source

Country Lets you specify the country code of the signal that is used in the OpenDRIVE file. The country code is a three-letter string according to ISO 3166 ALPHA-3. The following table shows some examples:

Country Code	Country
CHN	China
DEU	Germany
FRA	France
GBR	United Kingdom
JPN	Japan
USA	United States of America

Type Lets you specify the numerical main type of the signal or object is used in the OpenDRIVE file.

Subtype Lets you specify the numerical sub type of the signal is used in the OpenDRIVE file.

Value Lets you specify the value of the signal is used in the OpenDRIVE file. The meaning of the value depends on the type of the traffic sign, for example, if it specifies a speed limit or mass.

Text Lets you specify the text associated with the signal is used in the OpenDRIVE file.

Mapping

Description Lets you specify a description for the mapping.

Misc

IsValid Displays whether the settings of the mapping are valid.

Target

Name Displays the name of the traffic object in ModelDesk.

Guid Displays the identifier of the traffic object in ModelDesk.

RelativePath Displays the relative path of the traffic object in ModelDesk.

Image Displays a preview image of the traffic object in ModelDesk.

Related topics

Basics

Configuration File for Importing OpenDRIVE Files (ODIC File)..... 151

HowTos

How to Create an ODIC File..... 154

Automation

Where to go from here

Information in this section

Programming ModelDesk Automation.....302

Interfaces for Working with Roads.....315
Provides information on all interfaces for selecting roads for automation.

Programming ModelDesk Automation

Where to go from here

Information in this section

Modifying a Road in Python.....302
You can access a road network for the experiment for driving.

Example of Creating a Road Network and Accessing its Elements in Python.....305
You can access a road network for the experiment for driving.

Example of Specifying a Road Element in Python.....307
The example shows how you can specify the segments of a road element in a Python script.

Example of Creating Lane Sections in Python.....309
The example shows how you can specify lane sections of a road element in a Python script.

Example of Creating a Junction in Python.....310
The example shows how you can specify a junction in a Python script.

Overview of the Classes for Road Creation.....311
The object model overview of the Road Generator gives a quick overview of the classes and their dependencies.

Modifying a Road in Python

Introduction

You can select a road network for the experiment for driving in a Python script. The road network must be created beforehand. It is not possible to create a road network using the ModelDesk automation interface.

Features

ModelDesk's tool automation provides the following features:

- Creating and accessing a road network
- Accessing road elements and junctions
- Modifying surface conditions (friction, textures, additional height profiles) of road elements
- Modifying surface conditions (friction, textures, additional height profiles) of junctions
- Managing road and junction connections
- Creating and modifying traffic objects
- Creating routes
- Accessing user signals

- Updating the scene in MotionDesk and downloading to road network to the simulation

Reference information

The following listings show only short examples of the tool automation.

For an overview of the interface classes, refer to Overview of the Classes for Road Creation on page 311.

For a full description of the interfaces, refer to Interfaces for Working with Roads on page 315.

Accessing the experiment

The following example shows how you can open a project and activate an experiment. Replace the project name and path by your own project in the script below.

```
from win32com.client import Dispatch
# Start ModelDesk, load project and activate experiment
Application = Dispatch("ModelDesk.Application")
Application.Visible = True
MyProject = Application.OpenProject(r"C:\ExamplePath\Example_001\Example_001.CDP")
MyExperiments = MyProject.Experiments
MyExperiment = MyExperiments.Item(0)
MyActiveExperiment = MyExperiment.Activate(False)
```

A project is opened and an experiment is accessed in this part. For a description, refer to Handling Projects and Experiments in Python (ModelDesk Project and Experiment Management 🕮).

Accessing a road

The following listing shows how to access a road element and a surface area.

```
MyRoadNetwork = MyActiveExperiment.Road
Road1 = MyRoadNetwork.Roads.Item(0)
# or
Road1 = MyRoadNetwork.Roads.Item('Name of the Road')
print "Length of road1:" Road1.Length
HeightMaps = Road1.Surface.AdditionalHeightProfile
Map = HeightMaps.Item(0)
# or
Map = HeightMaps.Item('Name of the Map')
```

This part shows how to access the objects of a road element. You can select a road or change the surface condition and the friction of a road element or modify the road objects using the ModelDesk automation interface. It is not possible to create a new road element or change the geometry of an existing road element.

Accessing a junction

The following listing shows how to access a junction and a surface area.

```
MyRoadNetwork = MyActiveExperiment.Road
Junction1 = MyRoadNetwork.Junctions.Item(0)
# or
Junction1 = RoadNetwork.Junctions.Item('Name of the Junction')
print "Number of Connection points:", Junction1.ConnectionPoints.Count
```

This part shows how to access the objects of a junction. You can select a junction or change the surface condition and the friction of a junction or modify the junction objects using the ModelDesk automation interface. You can create or delete junctions and change the geometry of an existing junction by moving its connection points.

Accessing traffic objects

The following listing shows how to access traffic objects of a road element and a junction.

```
print "Number of Objects:", Road1.Objects.Count
Road_Object1 = Road1.Objects.Item(0)
print "Object name: ", Road_Object1.Name
print "Number of Objects:", Junction1.Objects.Count
Junction_Object1 = Junction1.Objects.Item(0)
print "Object name: ", Junction_Object1.Name
```

Accessing routes

The following listing shows how to access routes of a road network.

```
print Number of routes", MyRoadNetwork.Routes.Count
Route1 = MyRoadNetwork.Routes.Item(0)
print "Name of route 1", Route1.Name
```

Saving the road and updating the scene

The following listing shows how to save and download the road and update the MotionDesk scene.

```
# Save the road
MyRoadNetwork.Save(1)
# Update the MotionDesk scene
MyRoadNetwork.UpdateScene()
# Download the road
MyRoadNetwork.Download()
```

Related topics

Basics

Handling Projects and Experiments in Python (ModelDesk Project and Experiment Management 🕮)

References

Interfaces for Working with Roads..... 315
Overview of the Classes for Road Creation..... 311

Example of Creating a Road Network and Accessing its Elements in Python

Introduction

You can select a road network for the experiment for driving in a Python script.

Reference information

The following listings show only short examples of the tool automation.

For an overview of the interface classes, refer to Overview of the Classes for Road Creation on page 311.

For a full description of the interfaces, refer to Interfaces for Working with Roads on page 315.

Accessing the experiment

The following example shows how you can open a project and activate an experiment. Replace the project name and path by your own project in the script below.

```
from win32com.client import Dispatch
# Start ModelDesk, load project and activate experiment
Application = Dispatch("ModelDesk.Application")
Application.Visible = True
MyProject = Application.OpenProject(r"C:\ExamplePath\Example_001\Example_001.CDP")
MyExperiments = MyProject.Experiments
MyExperiment = MyExperiments.Item(0)
MyActiveExperiment = MyExperiment.Activate(False)
```

A project is opened and an experiment is accessed in this part. For a description, refer to Handling Projects and Experiments in Python (ModelDesk Project and Experiment Management 🕮).

Creating a new road

The following listing shows how to create a road.

```
import dspace.com
Enums = dspace.com.Enums(Application)
# To create a new road file
MyProject.Pool.CreateFile(Enums.ContentTypes.Road,'MyRoad',True)
# Activate the road network 'MyRoad'
MyProject.ActiveExperiment.ActivateRoad('MyRoad')
```

The road is created in the pool of the project. To work with the road, it is activated.

Accessing a road

The following listing shows how to access a road element and a surface area.

```
MyRoadNetwork = MyActiveExperiment.Road
Road1 = MyRoadNetwork.Roads.Item(0)
# or
Road1 = MyRoadNetwork.Roads.Item('Name of the Road')
print "Length of road1:" Road1.Length
```

```
HeightMaps = Road1.Surface.AdditionalHeightProfile
Map = HeightMaps.Item(0)
# or
Map = HeightMaps.Item('Name of the Map')
```

This part shows how to access the objects of a road element. You can select a road or change the surface condition and the friction of a road element or modify the road objects using the ModelDesk automation interface. It is not possible to create a new road element or change the geometry of an existing road element.

Accessing a junction

The following listing shows how to access a junction and a surface area.

```
MyRoadNetwork = MyActiveExperiment.Road
Junction1 = MyRoadNetwork.Junctions.Item(0)
# or
Junction1 = RoadNetwork.Junctions.Item('Name of the Junction')
print "Number of Connection points:", Junction1.ConnectionPoints.Count
```

This part shows how to access the objects of a junction. You can select a junction or change the surface condition and the friction of a junction or modify the junction objects using the ModelDesk automation interface. You can create or delete junctions and change the geometry of an existing junction by moving its connection points.

Accessing traffic objects

The following listing shows how to access traffic objects of a road element and a junction.

```
print "Number of Objects:", Road1.Objects.Count
Road_Object1 = Road1.Objects.Item(0)
print "Object name: ", Road_Object1.Name
print "Number of Objects:", Junction1.Objects.Count
Junction_Object1 = Junction1.Objects.Item(0)
print "Object name: ", Junction_Object1.Name
```

Accessing routes

The following listing shows how to access routes of a road network.

```
print Number of routes", MyRoadNetwork.Routes.Count
Route1 = MyRoadNetwork.Routes.Item(0)
print "Name of route 1", Route1.Name
```

Saving the road and updating the scene

The following listing shows how to save and download the road and update the MotionDesk scene.

```
# Save the road
MyRoadNetwork.Save(1)
# Update the MotionDesk scene
MyRoadNetwork.UpdateScene()
# Download the road
MyRoadNetwork.Download()
```

Related topics

Basics

Handling Projects and Experiments in Python (ModelDesk Project and Experiment Management 🕮)

References

Interfaces for Working with Roads..... 315
Overview of the Classes for Road Creation..... 311

Example of Specifying a Road Element in Python

Introduction

The example shows how you can specify the segments of a road element in a Python script.

Preconditions

The following script is not complete. To run the script successfully, you must have run the script given in Example of Creating a Road Network and Accessing its Elements in Python on page 305.

Specifying a road

The following listing shows how to modify the first road element

```
import dspace.com
Enums = dspace.com.Enums(Application)

# Access the first road element and specify start parameter
MyRoadNetwork = MyActiveExperiment.Road
Road1 = MyRoadNetwork.Roads.Item(0)
Road1.StartParameter.X = -39.8
Road1.StartParameter.Y = 0.33
Road1.StartParameter.TangentAngle = 23

# Adding a clothoid segment
Road1.Segments.Add(Enums.SegmentTypesInternal.Clothoid)

# Modifying the length of the segments
Road1.Segments.Item(0).ActiveElement.Length = 79
Road1.Segments.Item(1).ActiveElement.Length = 20

# Adding further segments
Road1.Segments.Add(Enums.SegmentTypesInternal.Circular)
Road1.Segments.Add(Enums.SegmentTypesInternal.Clothoid)
Road1.Segments.Add(Enums.SegmentTypesInternal.Straight)

# Specifying the lengths and radiuses of segments
Road1.Segments.Item(2).ActiveElement.Length = 20
Road1.Segments.Item(3).ActiveElement.Length = 20
Road1.Segments.Item(4).ActiveElement.Length = 116
Road1.Segments.Item(1).ActiveElement.Radius = -100
Road1.Segments.Item(2).ActiveElement.Radius = -100
Road1.Segments.Item(3).ActiveElement.IsInfinite = True

Save the project
MyProject.Save()
```

Related topics

Examples

Example of Creating a Road Network and Accessing its Elements in Python..... 305

References

Interfaces for Working with Roads..... 315
Overview of the Classes for Road Creation..... 311

Example of Creating Lane Sections in Python

Introduction

The example shows how you can specify lane sections of a road element in a Python script.

Preconditions

The following script is not complete. To run the script successfully, you must have run the script given in Example of Creating a Road Network and Accessing its Elements in Python on page 305 and Example of Specifying a Road Element in Python on page 307.

Specifying lane sections and lanes

The following listing shows how to create and modify lane sections and lanes.

```
# Specify the first lane section
LaneSection1 = Road1.LaneSections.Item(0)
LaneSection1.Length = 120
LaneSection1.Lanes.Add(Enums.RoadSideTypes.Right)
LaneSection1.Lanes.Add(Enums.RoadSideTypes.Left)
LaneSection1.Lanes.Add(Enums.RoadSideTypes.Left)

# Specify the lanes of the lane section
LaneSection1.Lanes.ItemByLaneIndex(-1).OuterLine.Preset = Enums.LinePresetsInternal.Solid
LaneSection1.Lanes.ItemByLaneIndex(1).OuterLine.Preset = Enums.LinePresetsInternal.Dash
LaneSection1.Lanes.ItemByLaneIndex(2).OuterLine.Preset = Enums.LinePresetsInternal.Solid
LaneSection1.CenterLane.RightLine.Preset = Enums.LinePresetsInternal.Dash
LaneSection1.CenterLane.LeftLine.Preset = Enums.LinePresetsInternal.DoubleSolid

# Add and specify a second lane section
LaneSection2 = Road1.LaneSections.Add()
LaneSection2.Length = 140
LaneSection2.Lanes.Add(Enums.RoadSideTypes.Left)
LaneSection2.CenterLane.LeftLine.Preset = Enums.LinePresetsInternal.DoubleSolid
```

Specifying the scenery

The following listing shows how to select a scenery.

```
# Activate another scenery
Road1.Sceneries.Item(0).Activate(Enums.SceneryTypesInternal.CountryRoad)
Road1.Sceneries.Item(0).ActiveElement.Length = 255
Road1.Sceneries.Item(0).ActiveElement.SideSelection = Enums.ScenerySideSelectionTypesInternal.Both
```

Related topics

Examples

Example of Creating a Road Network and Accessing its Elements in Python..... 305

References

Interfaces for Working with Roads..... 315
Overview of the Classes for Road Creation..... 311

Example of Creating a Junction in Python

Introduction

The example shows how you can specify a junction in a Python script.

Preconditions

The following script is not complete. To run the script successfully, you must have run the script given in Example of Creating a Road Network and Accessing its Elements in Python on page 305 and Example of Specifying a Road Element in Python on page 307.

Specifying a junction

The following listing shows how to create a junction and connect it to a road element. Further road elements are added and connected to the junction.

```
# Create a junction with 3 connections
Junction1 = MyRoadNetwork.Junctions.Add(3)

# Move the junction so that its first connection point is connected
# to the second connection point of Road1
Junction1.ConnectionPoints.Item(0).MoveAndConnect(Road1.ConnectionPoints.Item(1))

# Add a second road element
Road2 = MyRoadNetwork.Roads.Add()
Road2.StartParameter.X = 254
Road2.StartParameter.Y = 154
Road2.StartParameter.TangentAngle = -90
LaneSection = Road2.LaneSections.Item(0)
LaneSection.Lanes.Add(Enums.RoadSideTypes.Left)
LaneSection.CenterLane.LeftLine.Preset = Enums.LinePresetsInternal.Dash

# Connect the second road element to the junction
Junction1.ConnectionPoints.Item(1).ModifyAndConnect(Road2.ConnectionPoints.Item(1))

# Add a third road element
Road3 = MyRoadNetwork.Roads.Add()
Road3.StartParameter.X = 258
Road3.StartParameter.Y = 35
Road3.StartParameter.TangentAngle = -90
LaneSection = Road3.LaneSections.Item(0)
LaneSection.Lanes.Add(Enums.RoadSideTypes.Left)
LaneSection.CenterLane.LeftLine.Preset = Enums.LinePresetsInternal.Dash

# Connect the third road element to the junction
Junction1.ConnectionPoints.Item(2).ModifyAndConnect(Road3.ConnectionPoints.Item(0))

# Move the reference point to a valid position
Junction1.FindValidReferencePoint()

# Adapt the properties of the junction's connection points to the
# connection points of the road elements
Junction1.AdaptProperties()
```

Related topics

Examples

Example of Creating a Road Network and Accessing its Elements in Python..... 305

References

Interfaces for Working with Roads..... 315
Overview of the Classes for Road Creation..... 311

Overview of the Classes for Road Creation

Introduction

The following table gives you a quick overview of the classes for working with roads.

Road Generator

The following table gives an overview of the classes of the object model:

Class	Level
RoadNetwork on page 413	0
UserSignals (Collection) on page 472	1
UserSignal on page 471	2
Roads (Collection) on page 421	1
Road on page 399	2
RoadStartparameter on page 425	3
PositionMarkers (Collection) on page 395	
RoadPositionMarker on page 418	4
HeightProfile on page 340	3
HeightPoint on page 339	4
LateralSlopeProfile on page 386	3
LateralSlopePoint on page 385	4
LaneSections on page 381	3
LaneSection on page 380	4
CenterLane on page 329	5
LineProperty on page 394	6
LaneLinks on page 374	
LaneLink on page 379	7
Lanes on page 370	5

Class	Level
Lane on page 369	6
LineProperty on page 394	7
LaneLinks on page 374	
LaneLink on page 379	8
Segments on page 448	3
Segment on page 446	4
Sceneries on page 440	3
Scenery on page 445	4
Shapes on page 455	3
Shape on page 453	4
SurfaceProperties on page 460	3
Surfaces (Collection) on page 461	
FrictionSurfaces on page 336	4
RoadSurfaceConditionMap on page 425	5
RoadReferencePointBasic on page 420	6
RoadCustomFrictionMap on page 405	5
Table on page 462	6
RoadReferencePointBasic on page 420	7
AdditionalHeightProfileSurfaces on page 323	4
TrapezoidalMap on page 470	5
RoadReferencePointBasic on page 420	6
SinusoidalMap on page 459	5
RoadReferencePointBasic on page 420	6
RoadCustomHeightMap on page 406	5
RoadReferencePointBasic on page 420	6
Table on page 462	
TextureSurfaces on page 465	4
RoadTextureMap on page 426	5
RoadReferencePointBasic on page 420	6
LaneSections on page 381	3
LaneSection on page 380	4
CenterLane on page 329	5
LineProperty on page 394	6
Lines on page 391	7
LineSpacing on page 393	
Lanes on page 370	5

Class	Level
LineProperty on page 394	6
Lines on page 391	7
LineSpacing on page 393	
RoadEnvironmentObjects (Collection) on page 408	3
RoadEnvironmentObject on page 407	4
RoadReferencePointAdvanced on page 419	5
ActiveTrafficObjectType on page 321	
TrafficObjectTypes (Collection) on page 469	6
TrafficObjectType on page 468	7
ConnectionPoints (Collection) on page 334	3
ConnectionPoint on page 330	4
RoadConnectionPoint on page 402	5
RoadReferencePointConnectionPoint on page 420	6
Junctions (Collection) on page 362	1
Junction on page 345	2
JunctionStartparameter on page 366	3
Borders (Collection) on page 327	
Border on page 328	4
JunctionScenery on page 526	5
JunctionSceneryAdapt on page 528	6
JunctionSceneryBatter on page 529	
JunctionSceneryBridge on page 530	
PositionMarkers (Collection) on page 395	3
JunctionPositionMarker on page 360	4
Shapes on page 455	3
Shape on page 453	4
SurfaceProperties on page 460	3
Surfaces (Collection) on page 461	
FrictionSurfaces	4
JunctionSurfaceConditionMap on page 367	5
JunctionReferencePointBasic on page 368	6
JunctionCustomFrictionMap on page 353	5
Table on page 462	6
JunctionReferencePointBasic on page 368	7
AdditionalHeightProfileSurfaces on page 323	4
JunctionCustomHeightMap on page 354	5

Class	Level
TextureSurfaces on page 465	4
JunctionTextureMap on page 368	5
JunctionReferencePointBasic on page 368	6
JunctionEnvironmentObjects (Collection) on page 356	3
JunctionEnvironmentObject on page 355	4
JunctionEnvironmentObjectReferencePoint on page 359	5
ActiveTrafficObjectType on page 321	
TrafficObjectTypes (Collection) on page 469	6
TrafficObjectType on page 468	7
ConnectionPoints (Collection) on page 334	3
ConnectionPoint on page 330	4
JunctionConnectionPoint on page 349	5
JunctionReferencePointConnectionPoint on page 361	6
Routes (Collection) on page 432	1
Route on page 428	2
RouteElements (Collection) on page 436	3
RouteElement on page 435	4
ActiveRouteElementPath on page 320	5
RouteElementPaths on page 439	6
RouteElementPath on page 438	7

Related topics

References

Enumerations for Roads..... 537
Interfaces for Working with Roads..... 315

Interfaces for Working with Roads

Purpose

You can select roads for your simulation via the automation interface.

Where to go from here

Information in this section

RoadNetwork Interfaces.....315
To specify a road network.

LineTypes Interfaces.....474
To get a line type.

ShapeTypes Interfaces.....479
To get a shape type.

SegmentTypes Interfaces.....500
To get a segment type.

SceneryTypes Interfaces.....512
To get a scenery type.

Enumerations for Roads.....537

RoadNetwork Interfaces

Purpose

To specify a road network.

Where to go from here

Information in this section

ActiveRouteElementPath.....320
To get the active path of the route element.

ActiveTrafficObjectType.....321
To get the active traffic object.

AdditionalHeightProfileSurfaces.....323
To access areas which have an additional height profile.

Borders (Collection).....327
To get the borders of a junction.

Border.....328
To access a border of a junction.

CenterLane.....329
To access the center lane of a lane section.

ConnectionPoint.....330
To access a connection point.

ConnectionPoints (Collection).....334
To handle a collection of connection points.

FrictionSurfaces.....336
To get/set the areas which have a special friction.

HeightPoint.....339
To access a height point.

HeightProfile.....340
To get the height profile of a road element.

Junction.....345
To access the parameters of a junction.

JunctionConnectionPoint.....349
To access a connection point on a junction.

JunctionCustomFrictionMap.....353
To specify an area with a special friction.

JunctionCustomHeightMap.....354
To specify an area with an additional height specified by sampling points on a junction.

JunctionEnvironmentObject.....355
To specify a traffic object of a junction.

JunctionEnvironmentObjects (Collection).....356
To handle the collection of traffic objects (JunctionEnvironmentObject).

JunctionEnvironmentObjectReferencePoint.....359
To specify the reference point of a traffic object on a junction.

JunctionPositionMarker.....360
To access a position marker on a junction.

JunctionReferencePointBasic.....361
To get a position on a junction.

JunctionReferencePointConnectionPoint.....361
To get the position of a connection point on a junction.

Junctions (Collection).....362
To handle a collection of junctions.

JunctionStartparameter.....366
To get or set the position of a junction in the road network.

JunctionSurfaceConditionMap.....367
To specify an area where a special tire parameter set is used.

JunctionReferencePointBasic.....368
To specify the reference point of an area on a junction.

JunctionTextureMap.....368
To specify an area with a texture on a junction.

Lane.....369
To access a lane.

Lanes.....370
To access lanes of a lane section.

LaneLinks.....374
To get the lane links that are linked to the center lane or a lane.

LaneLink.....379
To get the properties of a lane link.

LaneSection.....380
To access a specific lane section.

LaneSections.....381
To get the lane sections of the road element.

LateralSlopePoint.....385
To access a lateral slope point.

LateralSlopeProfile.....386
To get the lateral slope profile of a road element.

Lines.....391
To access lines.

LineSpacing.....393
To specify the space between lines.

LineProperty.....394
To specify a line.

PositionMarkers (Collection).....395
To access the position markers.

ReferencePoint.....398
To access the reference point of a junction.

Road.....399
To access the parameters of a road element.

RoadConnectionPoint.....402
To access a connection point on a road element.

RoadCustomFrictionMap.....405
To specify an area with a special friction.

RoadCustomHeightMap.....406
To specify an area with an additional height specified by sampling points on a road element.

RoadEnvironmentObject....407
To specify a traffic object of a road element.

RoadEnvironmentObjects (Collection)....408
To handle the collection of traffic objects (RoadEnvironmentObject).

RoadNetwork....413
To handle the active road network.

RoadNetworkElement....417
To get the road network element (road or junction).

RoadPositionMarker....418
To access a position marker on a road.

RoadReferencePointAdvanced....419
To specify the reference point of a traffic object on a road element.

RoadReferencePointConnectionPoint....420
To get the position of a connection point on a road element.

RoadReferencePointBasic....420
To specify the reference point of a road element's area.

Roads (Collection)....421
To handle a collection of road elements.

RoadStartparameter....425
To get or set the position of the road element in the network.

RoadSurfaceConditionMap....425
To specify an area where a special tire parameter set is used.

RoadTextureMap....426
To specify an area with a texture on a road element.

Route....428
To handle a route.

Routes (Collection)....432
To handle a collection of routes.

RouteElement....435
To access a route element.

RouteElements (Collection)....436
To handle a collection of route elements.

RouteElementPath....438
To get the path of a route element.

RouteElementPaths....439
To get all the paths of a route element.

Sceneries....440
To specify the scenery sections of a road element.

Scenery....445
To specify a scenery section.

Segment....446
To specify a segment of a road element.

Segments....448
To specify segments of a road element.

Shape....453
To specify a shape.

Shapes....455
To access the shapes.

SinusoidalMap....459
To specify an area with sinusoidal height profiles.

SurfaceProperties....460
To get or set friction and tire parameter set used for a whole element.

Surfaces (Collection)....461
To access the areas of the road element or junction where the surface condition (friction, height, or texture) differ from the rest of the road element or junction.

Table....462
To handle values in a table.

TextureSurfaces....465
To access the areas with a texture.

TrafficObjectType....468
To get information on a traffic object type.

TrafficObjectTypes (Collection)....469
To handle a collection of traffic object types.

TrapezoidalMap....470
To specify an area with a trapezoidal height profiles.

UserSignal....471
To access the parameters of a user signal.

UserSignals (Collection)....472
The UserSignals object contains a collection of user signals.

ActiveRouteElementPath

Purpose

To get the active path of the route element.

Where to go from here

Information in this section

Interface Description (ActiveRouteElementPath)..... 320
To describe the interface and its attributes.

Activate..... 321
To activate a path of the route element.

Interface Description (ActiveRouteElementPath)

Syntax

No direct creation

Purpose

To get the active path of the route element.

Attributes

The interface contains the following attributes:

Attributes	Type	Purpose
ActiveElement	RouteElementPath[1)]	To get the active path of the route element.
AvailableElements	RouteElementsPaths[2)]	To get the available paths of the route element.

1) Refer to RouteElementPath on page 438
2) Refer to RouteElementPaths on page 439.

Methods

The interface contains the following methods:

Method	Purpose
Activate	To activate a route element path. Refer to Activate on page 321.

Related topics

Basics

Routes on a Road Network..... 66

Activate

Class

ActiveRouteElementPath

Syntax

```
RouteElementPath = ActiveRouteElementPath.Activate(Item)
```

Purpose

To activate a path of the route element.

Parameters

The method uses the following parameters:

Parameter	Type	Description
Item	Object[1)]	Path to be activated

1) Refer to RouteElementPath on page 438.

Return value

The method returns an object of the following type:

Type	Description
RouteElementPath[1)]	The active path of the route element.

1) Refer to RouteElementPath on page 438.

Related topics

References

Interface Description (ActiveRouteElementPath)..... 320

ActiveTrafficObjectType

Purpose

To get the active traffic object.

Where to go from here

Information in this section

Interface Description (ActiveTrafficObjectType)..... 322
To describe the interface and its attributes.

Activate (ActiveTrafficObjectType) 322
To activate a traffic object.

Interface Description (ActiveTrafficObjectType)

Syntax

No direct creation

Purpose

To get the active traffic object.

Attributes

The interface contains the following attributes:

Attributes	Type	Purpose
ActiveElement	Object	To get the active traffic object.
AvailableElements	TrafficObjectTypes[1)]	To get the available traffic object types.

[1)] Refer to TrafficObjectTypes (Collection) on page 469.

Methods

The interface contains the following methods:

Method	Purpose
Activate	To activate a traffic object. Refer to Activate (ActiveTrafficObjectType) on page 322.

Related topics

Basics

Static Objects 61

Activate (ActiveTrafficObjectType)

Class

ActiveTrafficObjectType

Syntax

```
object = ActiveTrafficObjectType.Activate(Value)
```

Purpose

To activate a traffic object.

Parameters

The method uses the following parameters:

Parameter	Type	Description
Value	String	Relative path to the traffic object to be activated, e.g., '/signs/mySign.tro'

Return value

The method returns an object of the following type:

Type	Description
Object	The activated traffic object.

Related topics

References

Interface Description (ActiveTrafficObjectType)..... 322

AdditionalHeightProfileSurfaces

Purpose

To access areas which have an additional height profile.

Where to go from here

Information in this section

Interface Description (AdditionalHeightProfilesSurfaces)..... 324
To describe the interface and its attributes.

Add..... 324
To add an area which has an additional height profile.

Item..... 325
To access an area which has an additional height profile.

Remove..... 326
To delete an area which has an additional height profile.

Interface Description (AdditionalHeightProfilesSurfaces)

Syntax

No direct creation

Purpose

To access areas which have an additional height profile.

Attributes

The interface contains the following attributes:

Attributes	Type	Purpose
Count	Integer	To get the number of areas with an additional height profile.

Methods

The interface contains the following methods:

Method	Purpose
Add	To add an area with an additional height profile. Refer to Add on page 324.
Item	To access an area with an additional height profile. Refer to Item on page 325.
Remove	To delete an area with an additional height profile. Refer to Remove on page 326.

Related topics

Basics

Additional Height Profiles 55

References

Interface Description (Surfaces (Collection)) 461

Add

Class

AdditionalHeightProfileSurfaces

Syntax

```
RetVal = AdditionalHeightProfileSurfaces.Add(Type)
```

Purpose

To add an area which has an additional height profile.

Parameters

The method uses the following parameters:

Parameter	Type	Description
Type	HeightBasedSurfacesTypes[1)]	Type of the friction area.

[1)] Refer to HeightBasedSurfacesTypes on page 539.

Return value

The method returns an object of the following type:

Type	Description
SinusoidalMap, TrapezoidalMap, RoadCustomHeightMap, or JunctionCustomHeightMap[1)]	Object of the new area of the specified type.

[1)] Refer to SinusoidalMap on page 459, TrapezoidalMap on page 470, RoadCustomHeightMap on page 406, or JunctionCustomHeightMap on page 354.

Related topics

References

Interface Description (AdditionalHeightProfilesSurfaces)..... 324

Item

Class

AdditionalHeightProfileSurfaces

Syntax

```
RetVal = AdditionalHeightProfileSurfaces.Item(Index)
```

Purpose

To access an area which has an additional height profile.

Parameters

The method uses the following parameters:

Parameter	Type	Description
Index	Object	Index of the area to be returned. You can specify the name of the area or a number (counting starts at zero).

Return value

The method returns an object of the following type:

Type	Description
SinusoidalMap, TrapezoidalMap, RoadCustomHeightMap, or JunctionCustomHeightMap[1)]	Object of the new area of the specified type.

1) Refer to SinusoidalMap on page 459, TrapezoidalMap on page 470, RoadCustomHeightMap on page 406, or JunctionCustomHeightMap on page 354.

Related topics

References

Interface Description (AdditionalHeightProfilesSurfaces)..... 324

Remove

Class

AdditionalHeightProfileSurfaces

Syntax

```
RetVal = AdditionalHeightProfileSurfaces.Remove(Index)
```

Purpose

To delete an area which has an additional height profile.

Parameters

The method uses the following parameters:

Parameter	Type	Description
Index	Object	Index of the area to be deleted. You can specify the name of the area or a number (counting starts at zero).

Return value

The method returns an object of the following type:

Type	Description
Boolean	True if successful.

Related topics

References

Interface Description (AdditionalHeightProfilesSurfaces)..... 324

Borders (Collection)

Purpose

To get the borders of a junction.

Where to go from here

Information in this section

Class Description (Borders)..... 327
To describe the class and its attributes.

Item..... 328
To get a specific border.

Class Description (Borders)

Syntax

```
Borders = Junction.Borders
```

Purpose

To get the borders of a junction.

Attributes

The class contains the following attributes:

Attributes	Type	Purpose
Count	Integer	To get the number of borders.

Methods

The class contains the following methods:

Method	Purpose
Item	To access a specific border. Refer to Item on page 328.

Related topics

References

Interface Description (Junction)..... 345

Item

Class

Borders

Syntax

```
Border = Borders.Item(Variable)
```

Purpose

To get a specific border.

Parameters

The method uses the following parameters:

Parameter	Type	Description
Variable	Object	Index of the border.

Return value

The method returns an object of the following type:

Type	Description
Border[1)]	The specified border.

[1)] Refer to Border on page 328.

Related topics

References

Class Description (Borders)..... 327

Border

Purpose

To access a border of a junction.

Class Description (Border)

Syntax

```
Border = Borders.Item(Variable)
```

Purpose

To access a border of a junction.

Attributes

The class contains the following attributes:

Attributes	Type	Purpose
OuterLine	LineProperty[1)]	To get/set the properties of the outer line.
Scenery	JunctionScenery[2)]	To get/set the scenery of the junction at the border.
Type	BorderType[3)]	To get/set the type of a border.

1) Refer to LineProperty on page 394.
2) Refer to JunctionScenery on page 526.
3) Refer to BorderType on page 538.

Methods

–

Related topics

References

Class Description (Borders)..... 327

CenterLane

Purpose

To access the center lane of a lane section.

Class Description (CenterLane)

Syntax

```
CenterLane = LaneSection.CenterLane
```

Purpose

To access the center lane of a lane section.

Attributes

The class contains the following attributes:

Attributes	Type	Purpose
IsDrivable	Boolean	To get/set the flag whether the lane is drivable.

Attributes	Type	Purpose
LaneIndex	Integer	To get the index of the lane.
LeftLine	LineProperty[1)]	To get/set the properties of the left line.
PredecessorLaneLinks	LaneLinks[2)]	To get the predecessor lane links.
RightLine	LineProperty[1)]	To get/set the properties of the right line.
SucessorLaneLinks	LaneLinks[2)]	To get the sucessor lane links
Width	Double	To get/set the width of the lane in meters.

1) Refer to LineProperty on page 394.
2) Refer to LaneLinks on page 374.

Methods

–

Related topics

References

Class Description (LaneSection)..... 380

ConnectionPoint

Purpose

To access a connection point.

Where to go from here

Information in this section

Interface Description (ConnectionPoint)..... 331
To describe the interface and its attributes.

Disconnect..... 332
To disconnect a connection point.

ModifyAndConnect..... 332
To connect a connection point with another one by appending a cubic spline segment to the road element or moving the junction connection point.

MoveAndConnect..... 333
To connect a connection point with another one by moving the road element or junction.

Interface Description (ConnectionPoint)

Syntax

```
ConnectionPoint = ConnectionPoints.Item()
```

Purpose

To access a connection point.

Attributes

The interface contains the following attributes:

Attributes	Type	Purpose
Counterpart	ConnectionPoint[1)]	To get the counterpart of the connection point. It can be used to navigate through the road network.
IsConsistent	Boolean	To get information whether the connection point is consistent.
Owner	RoadNetworkElementTypes[2)]	To get the owner of the connection point (road or junction).

1) Refer to ConnectionPoint on page 330.
2) Refer to RoadNetworkElementTypes on page 541.

Methods

The interface contains the following methods:

Method	Purpose
Disconnect	To disconnect a connection point. Refer to Disconnect on page 332.
ModifyAndConnect	To connect a connection point with another one by appending a cubic spline segment to the road element or moving the junction connection point. Refer to ModifyAndConnect on page 332.
MoveAndConnect	To connect a connection point with another one by moving the road element or junction. Refer to MoveAndConnect on page 333.

Related topics

References

Interface Description (ConnectionPoints)..... 334

Disconnect

Class

ConnectionPoint

Syntax

```
ConnectionPoint.Disconnect()
```

Purpose

To disconnect a connection point.

Parameters

–

Return value

–

Related topics

References

Interface Description (ConnectionPoint)..... 331

ModifyAndConnect

Class

ConnectionPoint

Syntax

```
RetVal = ConnectionPoint.ModifyAndConnect(Object)
```

Purpose

To connect a connection point with another one by appending a cubic spline segment to the road element or moving the junction connection point.

Parameters

The method uses the following parameters:

Parameter	Type	Description
Object	RoadConnectionPoint[1] or JunctionConnectionPoint[2]	Connection point to be connected.

[1] Refer to RoadConnectionPoint on page 402.
[2] Refer to JunctionConnectionPoint on page 349.

Return value

The method returns an object of the following type:

Type	Description
Boolean	True if successful

Related topics

References

Interface Description (ConnectionPoint)..... 331

MoveAndConnect

Class

ConnectionPoint

Syntax

```
RetVal = ConnectionPoint.MoveAndConnect(Object)
```

Purpose

To connect a connection point with another one by moving the road element or junction.

Parameters

The method uses the following parameters:

Parameter	Type	Description
Object	RoadConnectionPoint[1] or JunctionConnectionPoint[2]	Connection point to be connected.

[1] Refer to RoadConnectionPoint on page 402.
[2] Refer to JunctionConnectionPoint on page 349.

Return value

The method returns an object of the following type:

Type	Description
Boolean	True if successful

Related topics

References

Interface Description (ConnectionPoint)..... 331

ConnectionPoints (Collection)

Purpose

To handle a collection of connection points.

Where to go from here

Information in this section

Interface Description (ConnectionPoints)..... 334
To describe the interface and its attributes.

Item..... 335
To get the connection point specified by the given index.

Interface Description (ConnectionPoints)

Syntax

```
CPs = RoadNetwork.Roads[0].ConnectionPoints
```

Purpose

To handle a collection of connection points.

Attributes

The interface contains the following attributes:

Attributes	Type	Purpose
Count	Integer	To get the number of connection points in the collection.

Methods

The interface contains the following methods:

Method	Purpose
Item	To get the connection point specified by the given index. Refer to Item on page 335.

Related topics

References

Interface Description (Roads)..... 421

Item

Class

ConnectionPoints

Syntax

```
ConnectionPoint = ConnectionPoints.Item(Variable)
```

Purpose

To get the connection point specified by the given index.

Parameters

The method uses the following parameters:

Parameter	Type	Description
Variable	Object	Index of the connection point to be returned (counting starts at zero).

Return value

The method returns an object of the following type:

Type	Description
ConnectionPoint[1)]	The specified connection point

1) Refer to ConnectionPoint.

Example

You can specify a connection point by an index, see the following example.

```
ConnectionPoint1 = Road.ConnectionPoints.Item(0)
```

Related topics

References

Interface Description (ConnectionPoints)..... 334

FrictionSurfaces

Purpose

To get/set the areas which have a special friction.

Where to go from here

Information in this section

Interface Description (FrictionSurfaces)..... 336
To describe the interface and its attributes.

Add..... 337
To add an area which has a special friction.

Item..... 338
To access an area which has a special friction.

Remove..... 338
To delete an area which has a special friction.

Interface Description (FrictionSurfaces)

Syntax

No direct creation

Purpose

To get/set the areas which have a special friction.

Attributes

The interface contains the following attributes:

Attributes	Type	Purpose
Count	Integer	To get the number of the areas which have a special friction.

Methods

The interface contains the following methods:

Method	Purpose
Add	To add an area which has a special friction. Refer to Add on page 337.
Item	To access an area which has a special friction. Refer to Item on page 338.
Remove	To delete an area which has a special friction. Refer to Remove on page 338.

Related topics

References

Interface Description (Surfaces (Collection)) 461

Add

Class

FrictionSurfaces

Syntax

```
RetVal = FrictionSurfaces.Add(Type)
```

Purpose

To add an area which has a special friction.

Parameters

The method uses the following parameters:

Parameter	Type	Description
Type	FrictionBasedSurfaceTypes[1)]	Type of the friction area.

[1)] Refer to FrictionBasedSurfaceTypes on page 538.

Return value

The method returns an object of the following type:

Type	Description
RoadSurfaceConditionMap, RoadCustomFrictionMap, JunctionSurfaceConditionMap, or JunctionCustomFrictionMap[1)]	Object of the new friction area of the specified type.

[1)] Refer to RoadSurfaceConditionMap on page 425, RoadCustomFrictionMap on page 405, JunctionSurfaceConditionMap on page 367, or JunctionCustomFrictionMap on page 353

Related topics

References

Interface Description (FrictionSurfaces) 336

Item

Class

FrictionSurfaces

Syntax

```
RetVal = FrictionSurfaces.Item(Index)
```

Purpose

To access an area which has a special friction.

Parameters

The method uses the following parameters:

Parameter	Type	Description
Index	Object	Index of the area to be returned. You can specify the name of the area or a number (counting starts at zero).

Return value

The method returns an object of the following type:

Type	Description
RoadSurfaceConditionMap, RoadCustomFrictionMap, JunctionSurfaceConditionMap, or JunctionCustomFrictionMap[1)]	Object of the specified friction area.

1) Refer to RoadSurfaceConditionMap on page 425, RoadCustomFrictionMap on page 405, JunctionSurfaceConditionMap on page 367, or JunctionCustomFrictionMap on page 353.

Related topics

References

Interface Description (FrictionSurfaces)..... 336

Remove

Class

FrictionSurfaces

Syntax

```
RetVal = FrictionSurfaces.Remove(Index)
```

Purpose

To delete an area which has a special friction.

Parameters

The method uses the following parameters:

Parameter	Type	Description
Index	Object	Index of the area to be deleted. You can specify the name of the area or a number (counting starts at zero).

Return value

The method returns an object of the following type:

Type	Description
Boolean	True if successful.

Related topics

References

Interface Description (FrictionSurfaces) 336

HeightPoint

Purpose

To access a height point.

Class Description (HeightPoint)

Syntax

```
HeightPoint = HeightProfile.Item()
```

Or

```
HeightPoint = HeightProfile.Insert()
```

Purpose

To specify a height point.

Attributes

The class contains the following attributes:

Attributes	Type	Purpose
S	Double	To get/set the s coordinate.
Height	Double	To get/set the height.
TransitionLength	Double	To get/set the transition length.
Slope	Double	To get/set the slope.
Gradient	Double	To get/set the gradient.

Methods

–

Related topics

References

Class Description (HeightProfile)..... 341

HeightProfile

Purpose

To get the height profile of a road element.

Where to go from here

Information in this section

Class Description (HeightProfile)..... 341
To describe the class and its attributes.

ExportProfile..... 341
To write the height profile to a MAT file.

ImportProfile..... 342
To read a MAT file containing the height profile.

Insert..... 343
To insert a height point into the height profile.

Item..... 344
To access a height point.

Remove..... 344
To remove a height point.

Class Description (HeightProfile)

Syntax

```
HeightProfile = Road.HeightProfile
```

Purpose

To get the height profile of a road element.

Attributes

The class contains the following attributes:

Attributes	Type	Purpose
Count	Integer	To get the number of height points.

Methods

The class contains the following methods:

Method	Purpose
ExportProfile	To write the height profile to a MAT file. Refer to ExportProfile on page 341.
ImportProfile	To read a MAT file containing the height profile. Refer to ImportProfile on page 342.
Insert	To insert a height point into the height profile. Refer to Insert on page 343.
Item	To access a height point. Refer to Item on page 344.
Remove	To remove a height point. Refer to Remove on page 344.

Related topics

References

Interface Description (Road)..... 399

ExportProfile

Class

HeightProfile

Syntax

```
ReVal = HeightProfile(FilePath)
```

Purpose

To write the height profile to a MAT file.

Parameters

The method uses the following parameters:

Parameter	Type	Description
FilePath	String	File path of the MAT file.

Return value

The method returns the following parameter:

Type	Description
Boolean	True if successful

Related topics

References

Class Description (HeightProfile)..... 341

ImportProfile

Class

HeightProfile

Syntax

```
RetVal = HeightProfile(FilePath)
```

Purpose

To read a MAT file containing the height profile.

Parameters

The method uses the following parameters:

Parameter	Type	Description
FilePath	String	File path of the MAT file.

Return value

The method returns the following parameter:

Type	Description
Boolean	True if successful

Related topics

References

Class Description (HeightProfile)..... 341

Insert

Class

HeightProfile

Syntax

```
HeightPoint = HeightProfile(S, Height)
```

Purpose

To insert a height point into the height profile.

Parameters

The method uses the following parameters:

Parameter	Type	Description
Height	Double	The height of the height point.
S	Double	The s coordinate where the height point is inserted.

Return value

The method returns the following parameter:

Type	Description
HeightPoint[1)]	The height point.

[1)] Refer to HeightPoint on page 339.

Related topics

References

Class Description (HeightProfile)..... 341

Item

Class

HeightProfile

Syntax

```
HeightPoint = HeightProfile.Item(Variable)
```

Purpose

To access a height point.

Parameters

The method uses the following parameters:

Parameter	Type	Description
Variable	Object	The index of the height point.

Return value

The method returns the following parameter:

Type	Description
HeightPoint[1)]	The specific height point.

[1)] Refer to HeightPoint on page 339.

Related topics

References

Class Description (HeightProfile)..... 341

Remove

Class

HeightProfile

Syntax

```
RetVal = HeightProfile(Value)
```

Purpose

To remove a height point.

Parameters

The method uses the following parameters:

Parameter	Type	Description
Value	Object	Height point to be removed.

Return value

The method returns the following parameter:

Type	Description
Boolean	True if successful

Related topics

References

Class Description (HeightProfile)..... 341

Junction

Purpose

To access the parameters of a junction.

Where to go from here

Information in this section

Interface Description (Junction)..... 345
To describe the interface and its attributes.

AdaptProperties..... 347
To adapt the properties of the junction's connection points to the properties of connection points of the connected road elements.

FindValidReferencePoint..... 348
To find a valid reference point of the junction.

MoveReferencePoint..... 348
To move the reference point of the junction.

Interface Description (Junction)

Syntax

```
Junction = Junctions.Add()
```

Or

```
Junction = Junctions.Item()
```

Purpose

To access the parameters of a junction.

Attributes

The interface contains the following attributes:

Attributes	Type	Purpose
Author	String	To get/set the name of the author.
AutomaticAdaptionEnabled	Boolean	To get/set the automatic adaption of the junction's connection points to the road element's connection points.
Borders	Borders[1)]	To get the borders of the junction.
ConnectionPoints	ConnectionPoints[2)]	To get the connection points specified on the junction.
CreationDate	String	To get the creation date of the junction.
Description	String	To get/set a description for the junction.
IsConsistent	Boolean	To get the information whether the junction is consistent.
JunctionSurface	SurfaceProperties[3)]	To get or set friction and used tire parameter set for a whole junction.
Name	String	To get/set the junction's name.
Objects	JunctionEnvironmentObjects[4)]	To get the traffic objects specified for the junction.
PositionMarker	PositionMarkers[5)]	To get the position markers.
ReferencePoint	ReferencePoint[6)]	To get the reference point.
Shapes	Shapes[7)]	To get the shapes.
StartParameter	JunctionStartparameter[8)]	To get/set the initial values of the junction.
Surface	Surfaces[9)]	To get the friction areas, additional height profiles, or texture maps.
Type	RoadNetworkElementTypes[10)]	To get the road network element type.

1) Refer to Borders (Collection) on page 327.
2) Refer to ConnectionPoints (Collection) on page 334.

Attributes	Type	Purpose

[3] Refer to SurfaceProperties on page 460.
[4] Refer to JunctionEnvironmentObjects (Collection) on page 356.
[5] Refer to PositionMarkers (Collection) on page 395.
[6] Refer to ReferencePoint on page 398.
[7] Refer to Shapes on page 455.
[8] Refer to JunctionStartparameter on page 366.
[9] Refer to Surfaces (Collection) on page 461.
[10] Refer to RoadNetworkElementTypes on page 541.

Methods

The interface contains the following methods:

Method	Purpose
AdaptProperties	To adapt the properties of the junction's connection points and reference point to the properties of the connected connection points. Refer to AdaptProperties on page 347.
FindValidReferencePoint	To find a valid reference point of the junction. Refer to FindValidReferencePoint on page 348.
MoveReferencePoint	To move the reference point of the junction. Refer to MoveReferencePoint on page 348.

Related topics

References

Interface Description (Junctions)..... 363

AdaptProperties

Class

Junction

Syntax

```
Junction.AdaptProperties()
```

Purpose

To adapt the properties of the junction's connection points to the properties of connection points of the connected road elements.

Parameters

–

Return value –

Related topics References

Interface Description (Junction) 345

FindValidReferencePoint

Class Junction

Syntax

```
RetVal = Junction.FindValidReferencePoint()
```

Purpose To find a valid reference point of the junction.

Parameters –

Return value The method returns an object of the following type:

Type	Description
Boolean	True if successful

Related topics References

Interface Description (Junction) 345

MoveReferencePoint

Class Junction

Syntax

```
RetVal = Junction.MoveReferencePoint(x, y)
```

Purpose

To move the reference point of the junction.

Parameters

The method uses the following parameters:

Parameter	Type	Description
x	Double	x coordinate of the absolute position in meters.
y	Double	y coordinate of the absolute position in meters.

Return value

The method returns an object of the following type:

Type	Description
Boolean	True if successful

Related topics

References

Interface Description (Junction)..... 345

JunctionConnectionPoint

Purpose

To access a connection point on a junction.

Where to go from here

Information in this section

Interface Description (JunctionConnectionPoint)..... 350
To describe the interface and its attributes.

Disconnect..... 351
To disconnect a connection point.

ModifyAndConnect..... 351
To connect a connection point with another one by moving the junction connection point relative to the junction position.

MoveAndConnect..... 352
To connect a connection point with another one by moving the road element.

Interface Description (JunctionConnectionPoint)

Syntax

No direct creation

Purpose

To access a connection point.

Attributes

The interface contains the following attributes:

Attributes	Type	Purpose
Counterpart	ConnectionPoint[1)]	To get the counterpart of the connection point. It can be used to navigate through the road network.
IsConsistent	Boolean	To get information whether the connection point is consistent.
Owner	RoadNetworkElement[2)]	To get the owner of the connection point (road or junction).
Position	JunctionConnectionPoint[3)]	To get the position of the connection point.

1) Refer to ConnectionPoint on page 330.
2) Refer to RoadNetworkElement on page 417.
3) Refer to JunctionConnectionPoint on page 349.

Methods

The interface contains the following methods:

Method	Purpose
Disconnect	To disconnect a connection point. Refer to Disconnect on page 351.
ModifyAndConnect	To connect a connection point with another one by moving the junction connection point relative to the junction position. Refer to ModifyAndConnect on page 351.
MoveAndConnect	To connect a connection point with another one by moving the junction. Refer to MoveAndConnect on page 352.

Related topics

References

Interface Description (ConnectionPoint)..... 331

Disconnect

Class

JunctionConnectionPoint

Syntax

```
JunctionConnectionPoint.Disconnect()
```

Purpose

To disconnect a connection point.

Parameters

–

Return value

–

Related topics

References

Interface Description (JunctionConnectionPoint)..... 350

ModifyAndConnect

Class

JunctionConnectionPoint

Syntax

```
RetVal = JunctionConnectionPoint.ModifyAndConnect(Object)
```

Purpose

To connect a connection point with another one by moving the junction connection point relative to the junction position.

Parameters

The method uses the following parameters:

Parameter	Type	Description
object	JunctionConnectionPoint[1)]	Connection point to be connected.

[1)] Refer to JunctionConnectionPoint on page 349.

Return value

The method returns an object of the following type:

Type	Description
Boolean	True if successful

Related topics

References

Interface Description (JunctionConnectionPoint)..... 350

MoveAndConnect

Class

JunctionConnectionPoint

Syntax

```
RetVal = JunctionConnectionPoint.MoveAndConnect(Object)
```

Purpose

To connect a connection point with another one by moving the junction.

Parameters

The method uses the following parameters:

Parameter	Type	Description
Object	JunctionConnectionPoint[1)]	Connection point to be connected.

[1)] Refer to JunctionConnectionPoint on page 349.

Return value

The method returns an object of the following type:

Type	Description
Boolean	True if successful

Related topics

References

Interface Description (JunctionConnectionPoint)..... 350

JunctionCustomFrictionMap

Purpose

To specify an area with a special friction.

Interface Description (JunctionCustomFrictionMap)

Syntax

```
JunctionCustomFrictionMap = FrictionSurfaces.Add()
```

Or

```
JunctionCustomFrictionMap = FrictionSurfaces.Item()
```

Purpose

To specify an area with a special friction.

Attributes

The interface contains the following attributes:

Attributes	Type	Purpose
Length	Double	To get the length of the area in meters.
Name	String	To get/set the name.
Width	Double	To get the width of the area in meters.
Type	FrictionBasedSurfaceTypes[1)]	To get the type of the area.
Texture	FrictionTextureType[2)]	To get/set the texture.
CustomMapType	CustomFrictionMapType[3)]	To get information on the custom map type.
Table	Table[4)]	To get the values of the table.
ReferencePoint	JunctionReferencePointBasic[5)]	To get/set the reference point.

1) Refer to FrictionBasedSurfaceTypes on page 538.
2) Refer to FrictionTextureType on page 539.
3) Refer to CustomFrictionMapType on page 538.
4) Refer to Table on page 462.
5) Refer to JunctionReferencePointBasic on page 368.

Methods

–

Related topics

References

Interface Description (FrictionSurfaces)..... 336

JunctionCustomHeightMap

Purpose

To specify an area with an additional height specified by sampling points on a junction.

Interface Description (JunctionCustomHeightMap)

Syntax

```
JunctionCustomHeightMap = AdditionalHeightProfilesSurfaces.Add()
JunctionCustomHeightMap = AdditionalHeightProfilesSurfaces.Item()
```

Purpose

To specify an area with an additional height specified by sampling points on a junction.

Attributes

The interface contains the following attributes:

Attributes	Type	Purpose
Length	Double	To get the length of the area in meters.
Name	String	To get/set the name.
Width	Double	To get the width of the area in meters.
Table	Table[1)]	To access the table of sample points.
Type	HeightBasedSurfacesTypes[2)]	To get the type of the area.
Texture	HeightTextureType[3)]	To get/set a texture.
ReferencePoint	JunctionReferencePointBasic[4)]	To get/set the reference point.

1) Refer to Table on page 462.
2) Refer to HeightBasedSurfacesTypes on page 539.
3) Refer to HeightTextureType on page 539.
4) Refer to JunctionReferencePointBasic on page 368.

Methods

–

Related topics

Basics

Additional Height Profiles..... 55

References

Interface Description (AdditionalHeightProfilesSurfaces)..... 324

JunctionEnvironmentObject

Purpose

To specify a traffic object of a junction.

Interface Description (JunctionEnvironmentObject)

Syntax

```
JunctionEnvironmentObject = JunctionEnvironmentObjects.Add()
```

Or

```
JunctionEnvironmentObject = JunctionEnvironmentObjects.Item()
```

Purpose

To specify a traffic object of a junction.

Attributes

The interface contains the following attributes:

Attributes	Type	Purpose
Name	String	To get/set the name of the traffic object.
ObjectID	Integer	To get/set the object ID of the traffic object.
Position	JunctionEnvironmentObjectReferencePoint[1)]	To get/set the position of the traffic object.
StreamID	Integer	To get/set the stream ID.
TrafficObjectType	ActiveTrafficObjectType[2)]	To get/set the type of the traffic object.

1) Refer to JunctionEnvironmentObjectReferencePoint on page 359.
2) Refer to ActiveTrafficObjectType on page 321.

Methods

–

Related topics

References

Interface Description (JunctionEnvironmentObjects (Collection)) 356
Object Properties 255

JunctionEnvironmentObjects (Collection)

Purpose

To handle the collection of traffic objects (JunctionEnvironmentObject).

Where to go from here

Information in this section

Interface Description (JunctionEnvironmentObjects (Collection)) 356
To describe the interface and its attributes.

Add 357
To add a traffic object to the junction.

Item 358
To get the JunctionEnvironmentObject specified by the given index.

Remove 358
To remove the specified JunctionEnvironmentObject from the junction.

Interface Description (JunctionEnvironmentObjects (Collection))

Syntax

```
JunctionEnvironmentObjects = Junction.JunctionEnvironmentObjects
```

Purpose

To handle the collection of traffic objects (JunctionEnvironmentObject).

Attributes

The interface contains the following attributes:

Attributes	Type	Purpose
Count	Integer	To get the number of traffic objects (JunctionEnvironmentObject) in the collection.

Methods

The interface contains the following methods:

Method	Purpose
Add	To add a traffic object (JunctionEnvironmentObject) to the junction. Refer to Add on page 357.
Item	To get the traffic object (JunctionEnvironmentObject) specified by the given index. Refer to Item on page 358.
Remove	To remove the specified traffic object (JunctionEnvironmentObject) from the junction. Refer to Remove on page 358.

Related topics

References

Interface Description (Junction)..... 345

Add

Class

JunctionEnvironmentObjects

Syntax

```
Object = JunctionEnvironmentObjects.Add()
```

or

```
Object = JunctionEnvironmentObjects.Add(X, Y)
```

Purpose

To add a traffic object to the junction.

Parameters

The method uses the following parameters:

Parameter	Type	Description
X	Double	x coordinate in meters
Y	Double	y coordinate in meters

Return value

The method returns an object of the following type:

Type	Description
JunctionEnvironmentObject[1)]	The added traffic object.

1) Refer to JunctionEnvironmentObject on page 355.

Related topics

References

Interface Description (JunctionEnvironmentObjects (Collection))..... 356

Item

Class

JunctionEnvironmentObjects

Syntax

```
Object = JunctionEnvironmentObjects.Item(Index)
```

Purpose

To get the JunctionEnvironmentObject specified by the given index.

Parameters

The method uses the following parameters:

Parameter	Type	Description
Index	Integer	Index of the JunctionEnvironmentObject to be returned (counting starts at zero).

Return value

The method returns an object of the following type:

Type	Description
JunctionEnvironmentObject[1)]	The specified JunctionEnvironmentObject element.

1) Refer to JunctionEnvironmentObject on page 355.

Example

You can specify a JunctionEnvironmentObject by an index, see the following example.

```
Object1 = Junction.JunctionEnvironmentObjects.Item(0)
```

Related topics

References

Interface Description (JunctionEnvironmentObjects (Collection)) 356

Remove

Class

JunctionEnvironmentObjects

Syntax

```
RetVal = JunctionEnvironmentObjects.Remove(TrafficObject)
```

Purpose

To remove the specified JunctionEnvironmentObject from the junction.

Parameters

The method uses the following parameters:

Parameter	Type	Description
TrafficObject	JunctionEnvironmentObject[1)]	Traffic object to be removed.

1) Refer to JunctionEnvironmentObject on page 355.

Return value

The method returns an object of the following type:

Type	Description
Boolean	True if the object is successfully removed.

Related topics

References

Interface Description (JunctionEnvironmentObjects (Collection)) 356

JunctionEnvironmentObjectReferencePoint

Purpose

To specify the reference point of a traffic object on a junction.

Interface Description (JunctionEnvironmentObjectReferencePoint)

Syntax

```
JunctionEnvironmentObjectReferencePoint =
JunctionEnvironmentObject.Position
```

Purpose

To specify the reference point of a traffic object on a junction.

Attributes

The interface contains the following attributes:

Attributes	Type	Purpose
AngleX	Double	To get/set the X angle in degrees.
AngleY	Double	To get/set the Y angle in degrees.

Attributes	Type	Purpose
AngleZ	Double	To get/set the Z angle in degrees.
X	Double	To get/set the x coordinate in meters.
Y	Double	To get/set the y coordinate in meters.
Z	Double	To get/set the z coordinate in meters.

Methods

–

Related topics

References

Interface Description (JunctionEnvironmentObject)..... 355

JunctionPositionMarker

Purpose

To access a position marker on a junction.

Class Description (JunctionPositionMarker)

Syntax

```
JunctionPositionMarker = PositionMarker.Item(Variable)
```

Purpose

To access a position marker of a junction.

Attributes

The class contains the following attributes:

Attributes	Type	Purpose
Name	String	To get/set the name of the position marker.
Description	String	To get/set the description of the position marker.
ID	Integer	To get/set the index of the position marker.
Position	JunctionReferencePointBasic[1)]	To get the position of the position marker.

1) Refer to JunctionReferencePointBasic on page 361.

Methods –

Related topics References

Class Description (PositionMarkers)..... 395

JunctionReferencePointBasic

Purpose To get a position on a junction.

Interface Description (JunctionReferencePointBasic)

Syntax No direct creation

Purpose To specify the reference point of a junction.

Attributes The interface contains the following attributes:

Attributes	Type	Purpose
X	Double	To get/set the x coordinate (lateral direction) in meters.
Y	Double	To get/set the y coordinate (longitudinal direction) in meters.

Methods –

JunctionReferencePointConnectionPoint

Purpose To get the position of a connection point on a junction.

Interface Description (JunctionReferencePointConnectionPoint)

Syntax

No direct creation

Purpose

To specify the position of a connection point on a junction.

Attributes

The interface contains the following attributes:

Attributes	Type	Purpose
AngleZ	Double	To get/set the z angle in degrees.
HeightSlope	Double	To get/set the height slope in degrees.
LateralSlope	Double	To get/set the lateral slope in degrees.
X	Double	To get/set the x coordinate in meters.
Y	Double	To get/set the y coordinate in meters.
Z	Double	To get the z coordinate in meters.

Methods

–

Related topics

References

Interface Description (RoadReferencePointConnectionPoint)..... 420

Junctions (Collection)

Purpose

To handle a collection of junctions.

Where to go from here

Information in this section

Interface Description (Junctions)..... 363
To describe the interface and its attributes.

Add..... 363
To add a junction to the collection.

Item..... 364
To get the road element specified by the given index.

Remove..... 365
To remove a junction from the collection.

Interface Description (Junctions)

Syntax

```
Junctions = RoadNetwork.Junctions
```

Purpose

To handle a collection of junctions.

Attributes

The interface contains the following attributes:

Attributes	Type	Purpose
Count	Integer	To get the number of junctions in the collection.

Methods

The interface contains the following methods:

Method	Purpose
Add	To add a junction to the collection. Refer to Add on page 363.
Item	To get the junction specified by the given index. Refer to Item on page 364.
Remove	To remove a junction from the collection. Refer to Remove on page 365.

Related topics

References

Interface Description (RoadNetwork)..... 413

Add

Class

Junctions

Syntax

```
Junction = Junctions.Add(Connections)
```

Purpose

To add a junction to the collection.

Parameters

The method uses the following parameters:

Parameter	Type	Description
Connections	Integer	Number of connection points of the junction. The value must be at least 2.

Return value

The method returns an object of the following type:

Type	Description
Junction[1)]	The specified junction.

[1)] Refer to Junction on page 345.

Related topics

References

Interface Description (Junctions)..... 363

Item

Class

Junctions

Syntax

```
Junction = Junctions.Item(Variable)
```

Purpose

To get the junction specified by the given index.

Parameters

The method uses the following parameters:

Parameter	Type	Description
Variable	Object	Index of the junction to be returned. You can specify the name of the junction or a number (counting starts at zero).

Return value

The method returns an object of the following type:

Type	Description
Junction[1)]	The specified junction.

[1)] Refer to Junction on page 345.

Example

You can specify a junction by an index, see the following example.

```
Junction1 = RoadNetwork.Junctions.Item(0)
```

You can specify a junction by its name, see the following example.

```
Junction1 = RoadNetwork.Junctions.Item("My Junction")
```

Related topics

References

Interface Description (Junctions) 363

Remove

Class

Junctions

Syntax

```
Junction = Junctions.Item(value)
```

Purpose

To remove a junction from the collection.

Parameters

The method uses the following parameters:

Parameter	Type	Description
value	Junction[1)]	Index of the junction to be removed. You can specify the name of the junction or a number (counting starts at zero).

[1)] Refer to Junction on page 345.

Return value

The method returns an object of the following type:

Type	Description
Boolean	True if successful

Related topics

References

Interface Description (Junctions)..... 363

JunctionStartparameter

Purpose

To get or set the position of a junction in the road network.

Interface Description (JunctionStartparameter)

Syntax

```
JunctionStartparameter = Junction.StartParameter
```

Purpose

To get or set the position of a junction in the road network.

Attributes

The interface contains the following attributes:

Attributes	Type	Purpose
AngleZ	Double	To get/set the value of the initial z angle in degrees.
x	Double	To get/set the initial x coordinate in meters.
y	Double	To get/set the initial y coordinate in meters.
z	Double	To get/set the initial z coordinate in meters.

Methods

–

Related topics

References

Interface Description (Junction)..... 345

JunctionSurfaceConditionMap

Purpose

To specify an area where a special tire parameter set is used.

Interface Description (JunctionSurfaceConditionMap)

Syntax

```
JunctionSurfaceConditionMap = FrictionSurfaces.Add()
```

Or

```
JunctionSurfaceConditionMap = FrictionSurfaces.Item()
```

Purpose

To specify an area where a special tire parameter set is used.

Attributes

The interface contains the following attributes:

Attributes	Type	Purpose
Length	Double	To get/set the length of the area in meters.
Name	String	To get/set the name.
Width	Double	To get/set the width of the area in meters.
Type	FrictionBasedSurfaceTypes[1)]	To get the type of the area.
TireParameter	TireParameterTypes[2)]	To get/set the tire parameter set used in the area.
ReferencePoint	JunctionReferencePointBasic[3)]	To get/set the reference point.

1) Refer to FrictionBasedSurfaceTypes on page 538.
2) Refer to TireParameterTypes on page 544.
3) Refer to JunctionReferencePointBasic on page 368.

Methods

–

Related topics

References

Interface Description (FrictionSurfaces)..... 336

JunctionReferencePointBasic

Purpose

To specify the reference point of an area on a junction.

Interface Description (JunctionSurfaceReferencePoint)

Syntax

No direct creation

Purpose

To specify the reference point of a junction's area.

Attributes

The interface contains the following attributes:

Attributes	Type	Purpose
AngleZ	Double	To get/set the z angle in degrees.
X	Double	To get/set the x coordinate in meters.
Y	Double	To get/set the y coordinate in meters.

Methods

–

Related topics

References

Interface Description (JunctionCustomFrictionMap)..... 353
Interface Description (JunctionCustomHeightMap)..... 354
Interface Description (JunctionSurfaceConditionMap)..... 367
Interface Description (JunctionTextureMap)..... 369

JunctionTextureMap

Purpose

To specify an area with a texture on a junction.

Interface Description (JunctionTextureMap)

Syntax

```
JunctionTextureMap = TextureSurfaces.Add()
JunctionTextureMap = TextureSurfaces.Item()
```

Purpose

To specify an area with a texture on a junction.

Attributes

The interface contains the following attributes:

Attributes	Type	Purpose
Length	Double	To get the length of the area in meters.
Name	String	To get/set the name.
Width	Double	To get the width of the area in meters.
Type	TextureBasedSurfaceTypes[1)]	To get the type of the area.
Texture	TextureType[2)]	To get/set the texture.
Orientation	TextureMapOrientationTypes[3)]	To get/set the orientation.
ReferencePoint	JunctionReferencePointBasic[4)]	To get/set the reference point.

1) Refer to TextureBasedSurfaceTypes on page 543.
2) Refer to TextureType on page 543.
3) Refer to TextureMapOrientationTypes on page 543.
4) Refer to JunctionReferencePointBasic on page 368.

Methods

–

Related topics

References

Interface Description (TextureSurfaces)..... 465

Lane

Purpose

To access a lane.

Class Description (Lane)

Syntax

```
Lane = Lanes.Add(Side)
Lane = Lanes.Item(Index)
```

Purpose

To access a lane.

Attributes

The class contains the following attributes:

Attributes	Type	Purpose
IsDrivable	Boolean	To get/set the flag whether the lane is drivable.
LaneIndex	Integer	To get the index of the lane.
Outerline	LineProperty[1)]	To get/set the properties of the lines.
PredecessorLaneLinks	LaneLinks[2)]	To get the predecessor lane links.
SucessorLaneLinks	LaneLinks[2)]	To get the sucessor lane links
Width	Double	To get/set the width of the lane.

1) Refer to LineProperty on page 394.
2) Refer to LaneLinks on page 374.

Methods

–

Related topics

References

Class Description (Lanes)..... 371

Lanes

Purpose

To access lanes of a lane section.

Where to go from here

Information in this section

Class Description (Lanes)..... 371
To describe the class and its attributes.

Add.....372
To append a lane at the specified side.

Item.....372
To access a lane.

ItemByLaneIndex.....373
To access a lane specified by the lane index.

Remove.....374
To remove the outer lane from the specified side.

Class Description (Lanes)

Syntax

```
Lanes = LaneSection.Lanes
```

Purpose

To access lanes of a lane section.

Attributes

The class contains the following attributes:

Attributes	Type	Purpose
Count	Integer	To get the number of lanes. The value includes the lanes of both sides from the center lane, the center lane is not included.

Methods

The class contains the following methods:

Method	Purpose
Add	To append a lane at the specified side. Refer to Add on page 372.
Item	To access a lane. Refer to Item on page 372.
ItemByLaneIndex	To access a lane specified by the lane index. Refer to ItemByLaneIndex on page 373.
Remove	To remove the outer lane from the specified side. Refer to Remove on page 374.

Related topics

References

Class Description (LaneSection).....380

Add

Class

Lanes

Syntax

```
Lane = Lanes.Add(Side)
```

Purpose

To append a lane at the specified side.

Parameters

The method uses the following parameters:

Parameter	Type	Description
Side	RoadSideTypes[1)]	Side where the lane is added.

[1)] Refer to RoadSideTypes on page 541.

Return value

The method returns the following parameter:

Type	Description
Lane[1)]	The added lane

[1)] Refer to Lane on page 369.

Related topics

References

Class Description (Lanes)..... 371

Item

Class

Lanes

Syntax

```
Lane = Lanes.Item(Index)
```

Purpose

To access a lane.

Parameters

The method uses the following parameters:

Parameter	Type	Description
Index	Integer	Index of the lane

Return value

The method returns the following parameter:

Type	Description
Lane[1)]	The specific lane.

[1)] Refer to Lane on page 369.

Related topics

References

Class Description (Lanes)..... 371

ItemByLaneIndex

Class

Lanes

Syntax

```
Lane = Lanes.ItemByLaneIndex(Index)
```

Purpose

To access a lane specified by the lane index.

Parameters

The method uses the following parameters:

Parameter	Type	Description
Index	Integer	Index of the lane.

Return value

The method returns the following parameter:

Type	Description
Lane[1)]	The specific lane.

[1)] Refer to Lane on page 369.

Related topics

References

Class Description (Lanes)..... 371

Remove

Class

Lanes

Syntax

```
RetVal = Lanes.Remove(Side)
```

Purpose

To remove the outer lane from the specified side.

Parameters

The method uses the following parameters:

Parameter	Type	Description
Side	RoadSideTypes[1)]	Side from which the lane is removed.

[1)] Refer to RoadSideTypes on page 541.

Return value

The method returns the following parameter:

Type	Description
Boolean	True if successful

Related topics

References

Class Description (Lanes)..... 371

LaneLinks

Purpose

To get the lane links that are linked to the center lane or a lane.

Where to go from here

Information in this section

Class Description (LaneLinks) 375
To describe the class and its attributes.

Add 376
To add a lane link.

Item 377
To get a specific lane link.

Remove 377
To remove a lane link.

RemoveAll 378
To remove all lane links.

Class Description (LaneLinks)

Syntax

```
LaneLinks = CenterLane.PredecessorLaneLinks
LaneLinks = CenterLane.SuccessorLaneLinks
LaneLinks = Lane.PredecessorLaneLinks
LaneLinks = Lane.SuccessorLaneLinks
```

Purpose

To get the lane links that are linked to the center lane or a lane.

Attributes

The class contains the following attributes:

Attributes	Type	Purpose
Count	Integer	To get the number of lane links.

Methods

The class contains the following methods:

Method	Purpose
Add	To add a lane link. Refer to Add on page 376.
Item	To get a lane link. Refer to Item on page 377.
Remove	To remove a specific lane link. Refer to Remove on page 377.
RemoveAll	To remove all lane links. Refer to RemoveAll on page 378.

Related topics

References

Class Description (CenterLane)..... 329
Class Description (Lane)..... 370

Add

Class

LaneLinks

Syntax

```
LaneLink = LaneLinks.Add(Index, ConnectionPoint, Bidirectional = True)
```

Purpose

To add a lane link.

Parameters

The method uses the following parameters:

Parameter	Type	Description
Index	Integer	Index of the lane.
ConnectionPoint	RoadConnectionPoint[1)]	The road connection point.
Bidirectional	Boolean	True to add lane link bidirectional

[1)] Refer to RoadConnectionPoint on page 402.

Return value

The method returns the following parameter:

Type	Description
LaneLink[1)]	The added lane link.

[1)] Refer to LaneLink on page 379.

Related topics

References

Class Description (LaneLinks)..... 375

Item

Class

LaneLinks

Syntax

```
LaneLink = LaneLinks.Item(Index)
```

Purpose

To get a specific lane link.

Parameters

The method uses the following parameters:

Parameter	Type	Description
Index	Integer	The index of the lane link.

Return value

The method returns the following parameter:

Type	Description
LaneLink[1)]	The lane link.

[1)] Refer to LaneLink on page 379.

Related topics

References

Class Description (LaneLinks) 375

Remove

Class

LaneLinks

Syntax

```
RetVal = LaneLinks.Remove(Value, Bidirectional = True)
```

Purpose

To remove a lane link.

Parameters

The method uses the following parameters:

Parameter	Type	Description
Value	Object	Lane link to be removed.
Bidirectional	Boolean	True to remove the lane link bidirectional.

Return value

The method returns the following parameter:

Type	Description
Boolean	True if successful

Related topics

References

Class Description (LaneLinks)..... 375

RemoveAll

Class

LaneLinks

Syntax

```
RetVal = LaneLinks.RemoveAll(Bidirectional = True)
```

Purpose

To remove all lane links.

Parameters

The method uses the following parameters:

Parameter	Type	Description
Bidirectional	Boolean	True to remove the lane link bidirectional.

Return value

The method returns the following parameter:

Type	Description
Boolean	True if successful

Related topics

References

Class Description (LaneLinks)..... 375

LaneLink

Purpose

To get the properties of a lane link.

Class Description (LaneLink)

Syntax

```
LaneLink = LaneLinks.Item(Index)
LaneLink = LaneLinks.Add(Index, ConnectionPoint, Bidirectional)
```

Purpose

To get the properties of a lane link.

Attributes

The class contains the following attributes:

Attributes	Type	Purpose
AssociatedRoadNetworkElement	RoadNetworkElement[1)]	To get the associated road network element.
Index	Integer	To get the index.

[1)] Refer to RoadNetworkElement on page 417.

Methods

–

Related topics

References

Class Description (LaneLinks)..... 375

LaneSection

Purpose

To access a specific lane section.

Class Description (LaneSection)

Syntax

```
LaneSection = LaneSections.Add()
LaneSection = LaneSections.Item(Index)
```

Purpose

To access a specific lane section.

Attributes

The class contains the following attributes:

Attributes	Type	Purpose
BorderWidthLeft	Double	To get/set the width of the left border in meters.
BorderWidthRight	Double	To get/set the width of the right border in meters.
CenterLane	CenterLane[1)]	To get the center lane.
Index	Integer	To get the index of the lane section.
Lanes	Lanes[2)]	To get the outer lanes.
Length	Double	To get/set the length of the lane section in meters.
Name	String	To get/set the name of the lane section.
OffsetReferenceLine	Double	To get/set the offset of the lane section to the reference line in meters.
PreferredDirectLaneIndex	Integer	To get/set the index of the lane preferred for direct direction.
PreferredOncomingLaneIndex	Integer	To get/set the index of the lane preferred for oncoming direction.
RoadWidth	Double	To get the complete width of the road.
S	Double	To get the S coordinate of the lane section's position in meters.
TransitionLength	Double	To get/set the transition length of the lane section in meters.

1) Refer to CenterLane on page 329.
2) Refer to Lanes on page 370.

Methods –

Related topics

References

Class Description (LaneSections)..... 381

LaneSections

Purpose

To get the lane sections of the road element.

Where to go from here

Information in this section

Class Description (LaneSections)..... 381
To describe the class and its attributes.

Add..... 382
To add a lane section to the road element.

InsertAfter..... 383
To insert a new lane section after a specific lane section.

Item..... 384
To access a specific lane section of the road element.

Remove..... 384
To remove a lane section from the road element.

Class Description (LaneSections)

Syntax

```
LaneSections = Road.LaneSections
```

Purpose

To get the lane sections of the road element.

Attributes

The class contains the following attributes:

Attributes	Type	Purpose
Count	Integer	To get the number of lane sections.

Methods

The class contains the following methods:

Method	Purpose
Add	To add a lane section to the road element. Refer to Add on page 382.
InsertAfter	To insert a new lane section after a specific lane section. Refer to InsertAfter on page 383.
Item	To access a specific lane section of the road element. Refer to Item on page 384.
Remove	To remove a lane section from the road element. Refer to Remove on page 384.

Related topics

References

Interface Description (Road) 399

Add

Class

LaneSections

Syntax

```
MyLaneSection = LaneSections.Add()
```

Purpose

To add a lane section to the road element.

Parameters

–

Return value

The method returns the following parameter:

Type	Description
LaneSection[1)]	The new lane section

1) Refer to LaneSection on page 380.

Related topics

References

Class Description (LaneSections)..... 381

InsertAfter

Class

LaneSections

Syntax

```
LaneSection = LaneSections.InsertAfter(Index)
```

Purpose

To insert a new lane section after a specific lane section.

Parameters

The method uses the following parameters:

Parameter	Type	Description
Index	Integer	Index of the lane section after which the new lane section is inserted.

Return value

The method returns the following parameter:

Type	Description
LaneSection[1)]	The new lane section.

1) Refer to LaneSection on page 380.

Related topics

References

Class Description (LaneSections)..... 381

Item

Class

LaneSections

Syntax

```
LaneSection = LaneSections.Item(Index)
```

Purpose

To access a specific lane section of the road element.

Parameters

The method uses the following parameters:

Parameter	Type	Description
Index	Integer	Index of the specific lane section.

Return value

The method returns the following parameter:

Type	Description
LaneSection[1)]	The specific lane section.

1) Refer to LaneSection on page 380.

Related topics

References

Class Description (LaneSections)..... 381

Remove

Class

LaneSections

Syntax

```
RetVal = LaneSections.Remove(Index)
```

Purpose

To remove a lane section from the road element.

Parameters

The method uses the following parameters:

Parameter	Type	Description
Index	Integer	Index of the lane section to be removed.

Return value

The method returns the following parameter:

Type	Description
Boolean	True if successful

Related topics

References

Class Description (LaneSections)..... 381

LateralSlopePoint

Purpose

To access a lateral slope point.

Class Description (LateralSlopePoint)

Syntax

```
LateralSlopePoint = LateralSlopeProfile.Item()
LateralSlopePoint = LateralSlopeProfile.Insert()
```

Purpose

To specify a lateral slope point.

Attributes

The class contains the following attributes:

Attributes	Type	Purpose
S	Double	To get/set the s coordinate.
LateralSlope	Double	To get/set the lateral slope.
Gradient	Double	To get/set the gradient.

Methods –

Related topics

References

Class Description (LateralSlopeProfile)..... 386

LateralSlopeProfile

Purpose To get the lateral slope profile of a road element.

Where to go from here

Information in this section

Class Description (LateralSlopeProfile)..... 386
To describe the class and its attributes.

ExportProfile..... 387
To write the lateral slope profile to a MAT file.

ImportProfile..... 388
To read a MAT file containing the lateral slope profile.

Insert..... 389
To insert a lateral slope point into the lateral slope profile.

Item..... 389
To access a lateral slope point.

Remove..... 390
To remove a lateral slope point.

Class Description (LateralSlopeProfile)

Syntax

```
LateralSlopeProfile = Road.LateralSlopeProfile
```

Purpose To get the lateral slope profile of a road element.

Attributes

The class contains the following attributes:

Attributes	Type	Purpose
Count	Integer	To get the number of lateral slope points.

Methods

The class contains the following methods:

Method	Purpose
ExportProfile	To write the lateral slope profile to a MAT file. Refer to ExportProfile on page 387.
ImportProfile	To read a MAT file containing the lateral slope profile. Refer to ImportProfile on page 388.
Insert	To insert a height point into the lateral slope profile. Refer to Insert on page 389.
Item	To access a lateral slope point. Refer to Item on page 389.
Remove	To remove a lateral slope point. Refer to Remove on page 390.

Related topics

References

Interface Description (Road)..... 399

ExportProfile

Class

LateralSlopeProfile

Syntax

```
RetVal = LateralSlopProfile(FilePath)
```

Purpose

To write the lateral slope profile to a MAT file.

Parameters

The method uses the following parameters:

Parameter	Type	Description
FilePath	String	File path of the MAT file.

Return value

The method returns the following parameter:

Type	Description
Boolean	True if successful

Related topics

References

Class Description (LateralSlopeProfile)..... 386

ImportProfile

Class

LateralSlopeProfile

Syntax

```
RetVal = LateralSlopeProfile(FilePath)
```

Purpose

To read a MAT file containing the lateral slope profile.

Parameters

The method uses the following parameters:

Parameter	Type	Description
FilePath	String	File path of the MAT file.

Return value

The method returns the following parameter:

Type	Description
Boolean	True if successful

Related topics

References

Class Description (LateralSlopeProfile)..... 386

Insert

Class

LateralSlopeProfile

Syntax

```
LateralSlopePoint = LateralSlopeProfile(S, Height)
```

Purpose

To insert a lateral slope point into the lateral slope profile.

Parameters

The method uses the following parameters:

Parameter	Type	Description
S	Double	The s coordinate where the lateral slope point is inserted.
Slope	Double	The value of the lateral slope point.

Return value

The method returns the following parameter:

Type	Description
LateralSlopePoint[1)]	The lateral slope point.

[1)] Refer to LateralSlopePoint on page 385.

Related topics

References

Class Description (LateralSlopeProfile)..... 386

Item

Class

LateralSlopeProfile

Syntax

```
LateralSlopePoint = LateralSlopeProfile.Item(Variable)
```

Purpose

To access a lateral slope point.

Parameters

The method uses the following parameters:

Parameter	Type	Description
Variable	object	The lateral slope point.

Return value

The method returns the following parameter:

Type	Description
LateralSlopePoint[1)]	The specific lateral slope point.

[1)] Refer to LateralSlopePoint on page 385.

Related topics

References

Class Description (LateralSlopeProfile)..... 386

Remove

Class

LateralSlopeProfile

Syntax

```
RetVal = LateralSlopeProfile(Value)
```

Purpose

To remove a lateral slope point.

Parameters

The method uses the following parameters:

Parameter	Type	Description
Value	object	Lateral slope point to be removed.

Return value

The method returns the following parameter:

Type	Description
Boolean	True if successful

Related topics

References

Class Description (LateralSlopeProfile)..... 386

Lines

Purpose

To access lines.

Where to go from here

Information in this section

Class Description (Lines)..... 391
To describe the class and its attributes.

Item..... 392
To access a line.

Class Description (Lines)

Syntax

```
Lines = LineProperty.Lines
```

Purpose

To access lines.

Attributes

The class contains the following attributes:

Attributes	Type	Purpose
Count	Integer	To get the number of lines.

Methods

The class contains the following methods:

Method	Purpose
Item	To access a line. Refer to Item on page 392.

Related topics

Basics

Lines.....51

References

Class Description (LineProperty).....394
Lines Properties.....254

Item

Class

Lines

Syntax

```
ActiveLine = Lines.Item(Variable)
```

Purpose

To access a line.

Parameters

The method uses the following parameters:

Parameter	Type	Description
Variable	Variant	Index of the active line

Return value

The method returns the following parameter:

Type	Description
ActiveLine	The active line.

Related topics

References

Class Description (Lines).....391

LineSpacing

Purpose

To specify the space between lines.

Class Description (LineSpacing)

Syntax

```
LineSpacing = LineProperty.Spacing
```

Purpose

To specify the space between lines.

Attributes

The class contains the following attributes:

Attributes	Type	Purpose
Color	ColorPicker[1)]	To get the color of the space between the lines.
Distance	Double	To get/set the distance between the lines in meters.
Margin	Double	To get/set the margin in meters.
Texture	LineSpacingTextureTypes[2)]	To get/set the texture of the space.

1) Refer to ColorPicker on page 474.
2) Refer to LineSpacingTextureTypes on page 540.

Methods

–

Related topics

Basics

Lines.....51

References

Class Description (LineProperty).....394
Lines Properties.....254

LineProperty

Purpose

To specify a line.

Class Description (LineProperty)

Syntax

```
LineProperty = CenterLane.LeftLine
LineProperty = CenterLane.RightLine
LineProperty = Lanes.Item().OuterLine
```

Purpose

To specify a line.

Attributes

The class contains the following attributes:

Attributes	Type	Purpose
Preset	LinePresets[1)]	To get/set a preset for the line.
NumberOfLines	Integer	To get/set the number of lines.
CompleteWidth	Double	To get the complete width of the line.
Lines	Lines[2)]	To get a line.
Spacing	LineSpacing[3)]	To get/set the space between the lines.

1) Refer to LinePresets on page 540.
2) Refer to Lines on page 391.
3) Refer to LineSpacing on page 393.

Methods

–

Related topics

References

Class Description (CenterLane)..... 329
Class Description (Lanes)..... 371

PositionMarkers (Collection)

Purpose

To access the position markers.

Where to go from here

Information in this section

Class Description (PositionMarkers)..... 395
To describe the class and its attributes.

Add..... 396
To add a position marker.

Item..... 396
To get a specific position marker.

Remove..... 397
To remove a position marker.

Class Description (PositionMarkers)

Syntax

```
PositionMarkers = Road.PositionMarker
PositionMarkers = Junction.PositionMarker
```

Purpose

To access the position markers.

Attributes

The class contains the following attributes:

Attributes	Type	Purpose
Count	Integer	To get the number of position markers.

Methods

The class contains the following methods:

Method	Purpose
Add	To add a position marker. Refer to Add on page 396.
Item	To get a specific position marker. Refer to Item on page 396.
Remove	To remove a position marker. Refer to Remove on page 397.

Related topics

References

Interface Description (Junction)..... 345
Interface Description (Road)..... 399

Add

Class

PositionMarkers

Syntax

```
RetVal = PositionMarkers.Add()
```

Purpose

To add a position marker.

Parameters

–

Return value

The method returns the following parameter:

Type	Description
Boolean	True if successful

Related topics

References

Class Description (PositionMarkers)..... 395

Item

Class

PositionMarkers

Syntax

```
PositionMarker = PositionMarkers.Item(Variable)
```

Purpose

To get a specific position marker.

Parameters

The method uses the following parameters:

Parameter	Type	Description
Variable	Object	Index of the specific position marker.

Return value

The method returns the following parameter:

Type	Description
RoadPositionMarker or JunctionPositionMarker[1)]	The specific position marker of a road or junction.

[1)] Refer to RoadPositionMarker on page 418 or JunctionPositionMarker on page 360.

Related topics

References

Class Description (PositionMarkers)..... 395

Remove

Class

PositionMarkers

Syntax

```
RetVal = PositionMarkers.Remove(Variable)
```

Purpose

To remove a position marker.

Parameters

The method uses the following parameters:

Parameter	Type	Description
Variable	Object	The position marker to be removed.

Return value

The method returns the following parameter:

Type	Description
Boolean	True if successful

Related topics

References

Class Description (PositionMarkers)..... 395

ReferencePoint

Purpose

To access the reference point of a junction.

Class Description (ReferencePoint)

Syntax

```
ReferencePoint = Junction.ReferencePoint
```

Purpose

To specify the reference point of a junction.

Attributes

The class contains the following attributes:

Attributes	Type	Purpose
AngleX	Double	To get/set the x angle of the junction reference point.
AngleY	Double	To get/set the y angle of the junction reference point.
Z	Double	To get the height of the junction.

Methods

–

Related topics

References

Interface Description (Junction)..... 345
Road Network Element Properties..... 258

Road

Purpose

To access the parameters of a road element.

Where to go from here

Information in this section

Interface Description (Road)..... 399
To describe the interface and its attributes.

CloseRoad..... 401
To close a road that it can be used for endless loops.

Interface Description (Road)

Syntax

```
Road = Roads.Add()
Road = Roads.Item()
```

Purpose

To access the parameters of a road element.

Attributes

The interface contains the following attributes:

Attributes	Type	Purpose
Author	String	To get/set the name of the author.
ConnectionPoints	ConnectionPoints[1)]	To get the connection points specified on the road element.
CreationDate	String	To get the creation date of the road element.
Description	String	To get/set a description for the road element.
HeightProfile	HeightProfile[2)]	To get the height profile.
LaneSections	LaneSections[3)]	To get the lane sections of the road element.
Length	Double	To get the length of the road element.
Name	String	To get/set the road element's name.

Attributes	Type	Purpose
NumberOfDirectLanes	Integer	To get/set the number of direct lanes.
NumberOfOncomingLanes	Integer	To get/set the number of oncoming lanes.
Objects	RoadEnvironmentObjects[4]	To get the traffic objects specified for the road element.
PositionMarker	PositionMarkers[5]	To get the position markers.
RoadClosed	Boolean	To get the information whether the road element is closed.
RoadSurface	SurfaceProperties[6]	To get/set friction and used tire parameter set for a whole road element.
Scenery	Sceneries[7]	To get the scenery sections.
Segments	Segments[8]	To get the segments.
Shapes	Shapes[9]	To get the shapes.
StartParameter	RoadStartparameter[10]	To get/set the initial values of the road element.
Surface	Surfaces[11]	To get the friction areas, additional height profiles, or texture maps.
Type	RoadNetworkElementTypes[12]	To get the road network element type.

[1] Refer to ConnectionPoints (Collection) on page 334.
[2] Refer to HeightProfile on page 340.
[3] Refer to LaneSections on page 381.
[4] Refer to RoadEnvironmentObjects (Collection) on page 408.
[5] Refer to PositionMarkers (Collection) on page 395.
[6] Refer to SurfaceProperties on page 460.
[7] Refer to Sceneries on page 440.
[8] Refer to Segments on page 448.
[9] Refer to Shapes on page 455.
[10] Refer to RoadStartparameter on page 425.
[11] Refer to Surfaces (Collection) on page 461.
[12] Refer to RoadNetworkElementTypes on page 541.

Methods

The interface contains the following methods:

Method	Purpose
CloseRoad	To close the road element. Refer to CloseRoad on page 401.

Related topics

Basics

Modifying a Road in Python..... 302

References

Interface Description (Roads)..... 421

CloseRoad

Class

Road

Syntax

```
RetVal = Road.CloseRoad()
```

Purpose

To close a road that it can be used for endless loops.

Parameters

–

Return value

The method returns an object of the following type:

Type	Description
Boolean	True if the method was successful.

Related topics

References

Interface Description (Road)..... 399

RoadConnectionPoint

Purpose

To access a connection point on a road element.

Where to go from here

Information in this section

Interface Description (RoadConnectionPoint)..... 402
To describe the interface and its attributes.

Disconnect..... 403
To disconnect a connection point.

ModifyAndConnect..... 404
To connect a connection point with another one by appending a cubic spline segment between them.

MoveAndConnect..... 404
To connect a connection point with another one by moving the road element.

Interface Description (RoadConnectionPoint)

Syntax

No direct creation

Purpose

To access a connection point on a road element.

Attributes

The interface contains the following attributes:

Attributes	Type	Purpose
Counterpart	ConnectionPoint[1)]	To get the counterpart of the connection point. It can be used to navigate through the road network.
IsConsistent	Boolean	To get information whether the connection point is consistent.
Owner	RoadNetworkElement[2)]	To get the owner of the connection point (road or junction).
Position	RoadConnectionPoint[3)]	To get the position of the connection point.
Type	RoadConnectionPointType[4)]	To get the type of the connection point (start or end).

1) Refer to ConnectionPoint on page 330.
2) Refer to RoadNetworkElement on page 417.

Attributes	Type	Purpose

[3] Refer to RoadConnectionPoint on page 402.
[4] Refer to RoadConnectionPointType on page 541.

Methods

The interface contains the following methods:

Method	Purpose
Disconnect	To disconnect a connection point. Refer to Disconnect on page 403.
ModifyAndConnect	To connect a connection point with another one by appending a cubic spline segment between them. Refer to ModifyAndConnect on page 404.
MoveAndConnect	To connect a connection point with another one by moving the road element. Refer to MoveAndConnect on page 404.

Related topics

References

Interface Description (ConnectionPoint) 331

Disconnect

Class

RoadConnectionPoint

Syntax

```
RoadConnectionPoint.Disconnect()
```

Purpose

To disconnect a connection point.

Parameters

–

Return value

–

Related topics

References

Interface Description (RoadConnectionPoint) 402

ModifyAndConnect

Class

RoadConnectionPoint

Syntax

```
RetVal = RoadConnectionPoint.ModifyAndConnect(Object)
```

Purpose

To connect a connection point with another one by appending a cubic spline segment between them.

Parameters

The method uses the following parameters:

Parameter	Type	Description
Object	RoadConnectionPoint or JunctionConnectionPoint[1)]	Connection point to be connected.

[1)] Refer to RoadConnectionPoint on page 402 or JunctionConnectionPoint on page 349.

Return value

The method returns an object of the following type:

Type	Description
Boolean	True if successful

Related topics

References

Interface Description (RoadConnectionPoint)..... 402

MoveAndConnect

Class

RoadConnectionPoint

Syntax

```
RetVal = RoadConnectionPoint.MoveAndConnect(Variable)
```

Purpose

To connect a connection point with another one by moving the road element.

Parameters

The method uses the following parameters:

Parameter	Type	Description
Variable	RoadConnectionPoint or JunctionConnectionPoint[1)]	Connection point to be connected.

[1)] Refer to RoadConnectionPoint on page 402 or JunctionConnectionPoint on page 349.

Return value

The method returns an object of the following type:

Type	Description
Boolean	True if successful

Related topics

References

Interface Description (RoadConnectionPoint)..... 402

RoadCustomFrictionMap

Purpose

To specify an area with a special friction.

Interface Description (RoadCustomFrictionMap)

Syntax

```
RoadCustomFrictionMap = FrictionSurfaces.Add()
```

Or

```
RoadCustomFrictionMap = FrictionSurfaces.Item()
```

Purpose

To specify an area with a special friction.

Attributes

The interface contains the following attributes:

Attributes	Type	Purpose
Length	Double	To get the length of the area in meters.
Name	String	To get/set the name.

Attributes	Type	Purpose
Width	Double	To get the width of the area in meters.
Type	FrictionBasedSurfaceTypes[1)]	To get the type of the area.
Texture	FrictionTextureType[2)]	To get/set the texture.
CustomMapType	CustomFrictionMapType[3)]	To get information on the custom map type.
Table	Table[4)]	To get the values of the table.
ReferencePoint	RoadReferencePointBasic[5)]	To get/set the reference point.

1) Refer to FrictionBasedSurfaceTypes on page 538.
2) Refer to FrictionTextureType on page 539.
3) Refer to CustomFrictionMapType on page 538.
4) Refer to Table on page 462.
5) Refer to RoadReferencePointBasic on page 420.

Methods

–

Related topics

References

Interface Description (FrictionSurfaces)..... 336

RoadCustomHeightMap

Purpose

To specify an area with an additional height specified by sampling points on a road element.

Interface Description (RoadCustomHeightMap)

Syntax

```
RoadCustomHeightMap = AdditionalHeightProfilesSurfaces.Add()
RoadCustomHeightMap = AdditionalHeightProfilesSurfaces.Item()
```

Purpose

To specify an area with an additional height specified by sampling points on a road element.

Attributes

The interface contains the following attributes:

Attributes	Type	Purpose
Length	Double	To get the length of the area in meters.
Name	String	To get/set the name.
Width	Double	To get the width of the area in meters.
Table	Table[1)]	To access the table of sample points.
Type	HeightBasedSurfacesTypes[2)]	To get the type of the area.
Texture	HeightTextureType[3)]	To get/set a texture.
ReferencePoint	RoadReferencePointBasic[4)]	To get/set the reference point.

1) Refer to Table on page 462.
2) Refer to HeightBasedSurfacesTypes on page 539.
3) Refer to HeightTextureType on page 539.
4) Refer to RoadReferencePointBasic on page 420.

Methods

–

Related topics

Basics

Additional Height Profiles..... 55

References

Interface Description (AdditionalHeightProfilesSurfaces)..... 324

RoadEnvironmentObject

Purpose

To specify a traffic object of a road element.

Interface Description (RoadEnvironmentObject)

Syntax

```
RoadEnvironmentObject = RoadEnvironmentObjects.Add()
RoadEnvironmentObject = RoadEnvironmentObjects.AddNextToRoad()
RoadEnvironmentObject = RoadEnvironmentObjects.Item()
```

Purpose

To specify a traffic object of a road element.

Attributes

The interface contains the following attributes:

Attributes	Type	Purpose
LaneMapping	Integer[]	To get/set the lanes used for lane mapping.
LaneMappingEnabled	Boolean	To get/set the use of lane mapping.
Name	String	To get/set the name of the traffic object.
ObjectID	Integer	To get/set the object ID of the traffic object.
Position	RoadReferencePointAdvanced[1)]	To get/set the position of the traffic object.
StreamID	Integer	To get/set the stream ID for dynamic objects.
TrafficObjectType	ActiveTrafficObjectType[2)]	To get/set type of the traffic object.

1) Refer to RoadReferencePointAdvanced on page 419.
2) Refer to ActiveTrafficObjectType on page 321.

Methods

–

Related topics

References

Interface Description (RoadEnvironmentObjects (Collection))..... 409

RoadEnvironmentObjects (Collection)

Purpose

To handle the collection of traffic objects (RoadEnvironmentObject).

Where to go from here

Information in this section

Interface Description (RoadEnvironmentObjects (Collection))..... 409
To describe the interface and its attributes.

Add.....410
To add a traffic object to the road.

AddNextToRoad.....410
To add a RoadEnvironmentObject next to the road.

Item.....411
To get the RoadEnvironmentObject specified by the given index.

Remove.....412
To remove the specified RoadEnvironmentObject from to the road.

Interface Description (RoadEnvironmentObjects (Collection))

Syntax

```
RoadEnvironmentObjects = Road.RoadEnvironmentObjects
```

Purpose

To handle the collection of traffic objects (RoadEnvironmentObject).

Attributes

The interface contains the following attributes:

Attributes	Type	Purpose
Count	Integer	To get the number of traffic objects (RoadEnvironmentObject) in the collection.

Methods

The interface contains the following methods:

Method	Purpose
Add	To add a traffic object (RoadEnvironmentObject) to the road. Refer to Add on page 410.
AddNextToRoad	To add a traffic object (RoadEnvironmentObject) next to the road. Refer to AddNextToRoad on page 410.
Item	To get the traffic object (RoadEnvironmentObject) specified by the given index. Refer to Item on page 411.
Remove	To remove the specified traffic object (RoadEnvironmentObject) from to the road. Refer to Remove on page 412.

Related topics

References

Interface Description (Road).....399

Add

Class

RoadEnvironmentObjects

Syntax

```
Object = RoadEnvironmentObjects.Add(S, D)
```

Purpose

To add a traffic object to the road.

Parameters

The method uses the following parameters:

Parameter	Type	Description
S	Double	s coordinate in meters.
D	Double	Distance to the center line in meters.

Return value

The method returns an object of the following type:

Type	Description
RoadEnvironmentObject[1)]	The added traffic object.

[1)] Refer to RoadEnvironmentObject on page 407.

Related topics

References

Interface Description (RoadEnvironmentObjects (Collection)) 409

AddNextToRoad

Class

RoadEnvironmentObjects

Syntax

```
RoadEnvironmentObject = RoadEnvironmentObjects.AddNextToRoad(S, Offset, Side)
```

Purpose

To add a RoadEnvironmentObject next to the road.

Parameters

The method uses the following parameters:

Parameter	Type	Description
S	Double	Specifies the s coordinate where the object is added.
Offset	Double	Specifies the distance of the traffic object to the outer line of the road element. The value is positive when the traffic object is outside of the road, otherwise negative.
Side	EnvironmentObjectSide[1)]	Specifies the side of the road where the traffic object is added.

[1)] Refer to EnvironmentObjectSide on page 538.

Return value

The method returns an object of the following type:

Type	Description
RoadEnvironmentObject[1)]	The added traffic object.

[1)] Refer to RoadEnvironmentObject on page 407.

Related topics

References

Interface Description (RoadEnvironmentObjects (Collection)) 409

Item

Class

RoadEnvironmentObjects

Syntax

```
Object = RoadEnvironmentObjects.Item(Index)
```

Purpose

To get the RoadEnvironmentObject specified by the given index.

Parameters

The method uses the following parameters:

Parameter	Type	Description
Index	Integer	Index of the RoadEnvironmentObject to be returned (counting starts at zero).

Return value

The method returns an object of the following type:

Type	Description
RoadEnvironmentObject[1)]	The specified RoadEnvironmentObject element.

[1)] Refer to RoadEnvironmentObject on page 407.

Example

You can specify a road element by an index, see the following example.

```
Object1 = Road.RoadEnvironmentObjects.Item(0)
```

Related topics

References

Interface Description (RoadEnvironmentObjects (Collection)) 409

Remove

Class

RoadEnvironmentObjects

Syntax

```
RetVal = RoadEnvironmentObjects.Remove(TrafficObject)
```

Purpose

To remove the specified RoadEnvironmentObject from to the road.

Parameters

The method uses the following parameters:

Parameter	Type	Description
TrafficObject	Object	RoadEnvironmentObject to be removed.

Return value

The method returns an object of the following type:

Type	Description
Boolean	True if successful.

Related topics

References

Interface Description (RoadEnvironmentObjects (Collection)) 409

RoadNetwork

Purpose

To handle the active road network.

Where to go from here

Information in this section

Interface Description (RoadNetwork) 413
To describe the interface and its attributes.

Download 414
To download the active road network to the simulation platform.

Export 415
To export the road model in a file.

Save 416
To save the active road network.

UpdateScene 416
To update the road in the scene of MotionDesk.

Interface Description (RoadNetwork)

Syntax

```
RoadNetwork = ActiveExperiment.Road
```

Purpose

To handle the active road network.

Attributes

The interface contains the following attributes:

Attributes	Type	Purpose
Author	String	To get/set the author of the road network.
CreationDate	String	To get the creation date of the road network.
Description	String	To get/set a description for the road network.
HeightProfileInterpolationType	HeightProfileInterpolationType[1)]	To get/set the interpolation type of the height profile.
Junctions	Junctions[2)]	To get the Junctions object.

Attributes	Type	Purpose
LineInterpretationType	LineInterpretationTypes[3]	To get/set the line interpretation type.
Name	String	To get the name of the road network.
Roads	Roads[4]	To get the Roads object.
Routes	Routes[5]	To get the Routes object.
TrafficType	TrafficType[6]	To get/set the traffic type.
UserSignals	UserSignals[7]	To get the UserSignals object.

1) Refer to HeightProfileInterpolationType on page 539.
2) Refer to Junctions (Collection) on page 362.
3) Refer to LineInterpretationTypes on page 540.
4) Refer to Roads (Collection) on page 421.
5) Refer to Routes (Collection) on page 432.
6) Refer to TrafficType on page 544.
7) Refer to UserSignals (Collection) on page 472.

Methods

The interface contains the following methods:

Method	Purpose
Download	To download the active road network to the simulation platform. Refer to Download on page 414.
Export	To export the active road network to a file. Refer to Export on page 415.
Save	To save the active road network with its current name. Refer to Save on page 416.
UpdateScene	To update the road in the scene of MotionDesk. Refer to UpdateScene on page 416.

Related topics

References

ActiveExperiment (ModelDesk Project and Experiment Management 🕮)

Download

Class

RoadNetwork

Syntax

```
RoadNetwork.Download()
```

Purpose

To download the active road network to the simulation platform.

Parameter

–

Return value

The method returns the following parameter:

Type	Description
Boolean	True if the method was successful

Related topics

References

Interface Description (RoadNetwork)..... 413

Export

Class

RoadNetwork

Syntax

```
RetVal = RoadNetwork.Export(Path, Type, OverwriteExisting)
```

Purpose

To export the road model to a file.

Parameters

The method uses the following parameters:

Parameter	Type	Description
Path	String	Path and name of the file to be written
Type	ExportTypes[1)]	File type of the exported road model
OverwriteExisting	Boolean	True if an existing file can be overwritten

[1)] Refer to ExportTypes on page 538

Return value

The method returns the following parameter:

Type	Description
Boolean	True if the method was successful

Related topics

Basics

Exporting Road Models in OpenDRIVE Format..... 158

References

Interface Description (RoadNetwork)..... 413

Save

Class

RoadNetwork

Syntax

```
RoadNetwork.Save()
```

Purpose

To save the active road network.

Parameter

–

Return value

The method returns the following parameter:

Type	Description
Boolean	True if the method was successful

Related topics

References

Interface Description (RoadNetwork)..... 413

UpdateScene

Class

RoadNetwork

Syntax

```
RoadNetwork.UpdateScene()
```

Purpose

To update the road in the scene of MotionDesk.

Parameter

–

Return value

The method returns the following parameter:

Type	Description
Boolean	True if the method was successful

Related topics

References

Interface Description (RoadNetwork)..... 413

RoadNetworkElement

Purpose

To get the road network element (road or junction).

Class Description (RoadNetworkElement)

Syntax

```
RoadNetworkElement = RoadConnectionPoint.Owner
RoadNetworkElement = JunctionConnectionPoint.Owner
```

Purpose

To get the road network element (road or junction).

Attributes

The class contains the following attributes:

Attributes	Type	Purpose
Author	String	To get the name of the author.
ConnectionPoints	ConnectionPoints[1)]	To get the connection points.
CreationDate	String	To get the creation date.
Description	String	To get the description.
Name	String	To get the name.
PositionMarker	PositionMarkers[2)]	To get the position markers.

Attributes	Type	Purpose
Surface	Surfaces[3]	To get the surfaces.
Type	RoadNetworkElementTypes[4]	To get the type of the road element.

[1] Refer to ConnectionPoints (Collection) on page 334.
[2] Refer to PositionMarkers (Collection) on page 395.
[3] Refer to Surfaces (Collection) on page 461.
[4] Refer to RoadNetworkElementTypes on page 541.

Methods

–

Related topics

References

JunctionConnectionPoint..... 349
RoadConnectionPoint..... 402

RoadPositionMarker

Purpose

To access a position marker on a road.

Class Description (RoadPositionMarker)

Syntax

```
RoadPositionMarker = PositionMarker.Item(Variable)
```

Purpose

To access a position marker of a road.

Attributes

The class contains the following attributes:

Attributes	Type	Purpose
Name	String	To get the name of the position marker.
Description	String	To get the description of the position marker.
ID	Integer	To get the index of the position marker.
Position	RoadReferencePointBasic[1]	To get the position of the position marker.

[1] Refer to RoadReferencePointBasic on page 420.

Methods

–

Related topics

References

Class Description (PositionMarkers)..... 395

RoadReferencePointAdvanced

Purpose

To specify the reference point of a traffic object on a road element.

Interface Description (RoadReferencePointAdvanced)

Syntax

```
RoadReferencePointAdvanced = RoadEnvironmentObject.Position
```

Purpose

To specify the reference point of a traffic object on a road element.

Attributes

The interface contains the following attributes:

Attributes	Type	Purpose
AngleX	Double	To get/set the X angle in degrees.
AngleY	Double	To get/set the Y angle in degrees.
AngleZ	Double	To get/set the Z angle in degrees.
D	Double	To get/set the d coordinate (lateral direction) in meters.
S	Double	To get/set the s coordinate (longitudinal direction) in meters.
Z	Double	To get/set the z coordinate (height) in meters.

Methods

–

Related topics

References

Interface Description (RoadEnvironmentObject)..... 407

RoadReferencePointConnectionPoint

Purpose

To get the position of a connection point on a road element.

Interface Description (RoadReferencePointConnectionPoint)

Syntax

No direct creation

Purpose

To get the position of a connection point on a road element.

Attributes

The interface contains the following attributes:

Attributes	Type	Purpose
AngleZ	Double	To get the z angle in degrees.
HeightSlope	Double	To get the height slope in degrees.
LateralSlope	Double	To get the lateral slope in degrees.
X	Double	To get the x coordinate in meters.
Y	Double	To get the y coordinate in meters.
Z	Double	To get the z coordinate in meters.

Methods

–

Related topics

References

Interface Description (JunctionReferencePointConnectionPoint)..... 362

RoadReferencePointBasic

Purpose

To specify the reference point of a road element's area.

Interface Description (RoadReferencePointBasic)

Syntax

No direct creation

Purpose

To specify the reference point of a road element's area.

Attributes

The interface contains the following attributes:

Attributes	Type	Purpose
D	Double	To get/set the d coordinate (lateral direction) in meters.
S	Double	To get/set the s coordinate (longitudinal direction) in meters.

Methods

–

Roads (Collection)

Purpose

To handle a collection of road elements.

Where to go from here

Information in this section

Interface Description (Roads)..... 421
To describe the interface and its attributes.

Add..... 422
To add the road element.

Item..... 423
To get the road element specified by the given index.

Remove..... 424
To remove the road element specified by the given index.

Interface Description (Roads)

Syntax

```
Roads = RoadNetwork.Roads
```

Purpose

To handle a collection of road elements.

Attributes

The interface contains the following attributes:

Attributes	Type	Purpose
Count	Integer	To get the number of road elements in the collection.

Methods

The interface contains the following methods:

Method	Purpose
Add	To add a road element. Refer to Add on page 422.
Item	To get the road element specified by the given index. Refer to Item on page 423.
Remove	To remove the road element specified by the given index. Refer to Remove on page 424.

Related topics

References

Interface Description (RoadNetwork)..... 413

Add

Class

Roads

Syntax

```
RoadElement = Roads.Add()
```

Purpose

To add a road element.

Parameters

–

Return value

The method returns an object of the following type:

Type	Description
Road[1)]	The added road element

[1)] Refer to Road on page 399.

Related topics

References

Interface Description (Roads)..... 421

Item

Class

Roads

Syntax

```
RoadElement = Roads.Item(Variable)
```

Purpose

To get the road element specified by the given index.

Parameters

The method uses the following parameters:

Parameter	Type	Description
Variable	Object	Index of the road element to be returned. You can specify the name of the road element or a number (counting starts at zero).

Return value

The method returns an object of the following type:

Type	Description
Road[1)]	The specified road element

[1)] Refer to Road on page 399.

Example

You can specify a road element by an index, for example,

```
Road1 = RoadNetwork.Roads.Item(0)
```

You can specify a road element by its name, for example,

```
Road1 = RoadNetwork.Roads.Item("Name of Road")
```

Related topics

References

Interface Description (Roads) 421

Remove

Class

Roads

Syntax

```
RetVal = Roads.Remove(Value)
```

Purpose

To remove the road element specified by the given index.

Parameters

The method uses the following parameters:

Parameter	Type	Description
Value	Variant	Index of the road element to be removed. You can specify the name of the road element or a number (counting starts at zero).

Return value

The method returns an object of the following type:

Type	Description
Boolean	True if successful

Example

You can specify the road element to be removed by an index, for example,

```
Road1 = RoadNetwork.Roads.Remove(0)
```

You can specify the road element to be removed by its name, for example,

```
Road1 = RoadNetwork.Roads.Remove("Name of Road")
```

Related topics

References

Interface Description (Roads) 421

RoadStartparameter

Purpose

To get or set the position of the road element in the network.

Interface Description (RoadStartparameter)

Syntax

```
RoadStartParameter = Road.StartParameter
```

Purpose

To get or set the position of the road element in the network.

Attributes

The interface contains the following attributes:

Attributes	Type	Purpose
LateralSlopeAngle	Double	To get the value of the initial lateral slope angle in degrees.
TangentAngle	Double	To get/set the value of the tangent angle in degrees.
x	Double	To get/set the x coordinate in meters.
y	Double	To get/set the y coordinate in meters.
z	Double	To get the z coordinate in meters.

Methods

–

Related topics

Basics

Modifying a Road in Python..... 302

References

Interface Description (Road)..... 399

RoadSurfaceConditionMap

Purpose

To specify an area where a special tire parameter set is used.

Interface Description (RoadSurfaceConditionMap)

Syntax

No direct creation

```
RoadSurfaceConditionMap = FrictionSurfaces.Add()
RoadSurfaceConditionMap = FrictionSurfaces.Item()
```

Purpose

To specify an area where a special tire parameter set is used.

Attributes

The interface contains the following attributes:

Attributes	Type	Purpose
Length	Double	To get/set the length of the area in meters.
Name	String	To get/set the name.
Width	Double	To get/set the width of the area in meters.
Type	FrictionBasedSurfaceTypes[1)]	To get the type of the area.
TireParameter	TireParameterTypes[2)]	To get/set the tire parameter set used in the area.
ReferencePoint	RoadReferencePointBasic[3)]	To get/set the reference point.

1) Refer to FrictionBasedSurfaceTypes on page 538.
2) Refer to TireParameterTypes on page 544.
3) Refer to RoadReferencePointBasic on page 420.

Methods

–

Related topics

References

Interface Description (FrictionSurfaces)..... 336

RoadTextureMap

Purpose

To specify an area with a texture on a road element.

Interface Description (RoadTextureMap)

Syntax

```
RoadTextureMap = TextureSurfaces.Add()
RoadTextureMap = TextureSurfaces.Item()
```

Purpose

To specify an area with a texture on a road element.

Attributes

The interface contains the following attributes:

Attributes	Type	Purpose
Length	Double	To get the length of the area in meters.
Name	String	To get/set the name.
Width	Double	To get the width of the area in meters.
Type	TextureBasedSurfaceTypes[1)]	To get the type of the area.
Texture	TextureType[2)]	To get/set the texture.
Orientation	TextureMapOrientationTypes[3)]	To get/set the orientation.
ReferencePoint	RoadReferencePointBasic[4)]	To get/set the reference point.

1) Refer to TextureBasedSurfaceTypes on page 543.
2) Refer to TextureType on page 543.
3) Refer to TextureMapOrientationTypes on page 543.
4) Refer to RoadReferencePointBasic on page 420.

Methods

–

Related topics

References

Interface Description (TextureSurfaces)..... 465

Route

Purpose

To handle a route.

Where to go from here

Information in this section

Interface Description (Route) 428
To describe the interface and its attributes.

AddElement 429
To add a route element to the route.

CanCloseRoute 430
To check whether the route can be closed.

CloseRoute 430
To close the route.

RemoveLastElement 431
To remove the last element of the route.

Interface Description (Route)

Syntax

```
Route = Routes.Item(index)
```

Purpose

To handle a route.

Attributes

The interface contains the following attributes:

Attributes	Type	Purpose
Direction	RouteDirectionType[1)]	To get/set the route direction.
IsClosed	Boolean	To check whether the route is closed.
IsConsistent	Boolean	To check whether the route is consistent.
Name	String	To get/set the name of the route.
PossibleSuccessors	RouteElements[2)]	To get the possible successors for the route.
Route	RouteElements[2)]	To get the route elements of the route.

1) Refer to RouteDirectionType on page 541.
2) Refer to RouteElements (Collection) on page 436.

Methods

The interface contains the following methods:

Method	Purpose
AddElement	To add a route element to the route. Refer to AddElement on page 429.
CanCloseRoute	To check whether the route can be closed. Refer to CanCloseRoute on page 430.
CloseRoute	To close the route. Refer to CloseRoute on page 430.
RemoveLastElement	To remove the last element of the route. Refer to RemoveLastElement on page 431.

Related topics

References

Interface Description (Routes) 432

AddElement

Class

Route

Syntax

```
RetVal = Route.AddElement(Element)
```

Purpose

To add a route element to the route.

Parameters

The method uses the following parameters:

Parameter	Type	Description
Element	RouteElement[1)]	Route element to be added to the route.

1) Refer to RouteElement on page 435.

Return value

The method returns an object of the following type:

Type	Description
Bool	True if successful

Related topics

References

Interface Description (Route)..... 428

CanCloseRoute

Class

Route

Syntax

```
RetVal = Route.CanCloseRoute()
```

Purpose

To check whether the route can be closed.

Parameters

–

Return value

The method returns an object of the following type:

Type	Description
Boolean	True if the route can be closed

Related topics

References

Interface Description (Route)..... 428

CloseRoute

Class

Route

Syntax

```
RetVal = Route.CloseRoute()
```

Purpose

To close the route.

Parameters

–

Return value

The method returns an object of the following type:

Type	Description
Boolean	True if successful

Related topics

References

Interface Description (Route) 428

RemoveLastElement

Class

Route

Syntax

```
RetVal = Route.RemoveLastElement()
```

Purpose

To remove the last element of the route.

Parameters

–

Return value

The method returns an object of the following type:

Type	Description
Boolean	True if successful

Related topics

References

Interface Description (Route) 428

Routes (Collection)

Purpose

To handle a collection of routes.

Where to go from here

Information in this section

Interface Description (Routes)..... 432
To describe the interface and its attributes.

Add..... 433
To add a route to the Routes collection.

Item..... 434
To get the route specified by the given index.

Remove..... 434
To remove a route from the Routes collection.

Interface Description (Routes)

Syntax

```
Roads = RoadNetwork.Routes
```

Purpose

To handle a collection of routes.

Attributes

The interface contains the following attributes:

Attributes	Type	Purpose
Count	Integer	To get the number of routes in the collection.

Methods

The interface contains the following methods:

Method	Purpose
Add	To add a route to the Routes collection. Refer to Add on page 433.
Item	To get the route specified by the given index. Refer to Item on page 434.
Remove	To remove a route from the Routes collection. Refer to Remove on page 434.

Related topics

References

Interface Description (RoadNetwork)..... 413

Add

Class

Routes

Syntax

```
Route = Routes.Add(Name)
```

Purpose

To add a route to the Routes collection.

Parameters

The method uses the following parameters:

Parameter	Type	Description
Name	String	Name of the route to be added.

Return value

The method returns an object of the following type:

Type	Description
Route[1)]	The added route

1) Refer to Route on page 428.

Related topics

References

Interface Description (Routes)..... 432

Item

Class

Routes

Syntax

```
Route = Routes.Item(Variable)
```

Purpose

To get the route specified by the given index.

Parameters

The method uses the following parameters:

Parameter	Type	Description
Variable	Object	Index of the route to be returned. You can specify the name of the route or a number (counting starts at zero).

Return value

The method returns an object of the following type:

Type	Description
Route[1)]	The specified route

1) Refer to Route on page 428.

Related topics

References

Interface Description (Routes) 432

Remove

Class

Routes

Syntax

```
Route = Routes.Remove(Value)
```

Purpose

To remove a route from the Routes collection.

Parameters

The method uses the following parameters:

Parameter	Type	Description
Value	Object	Route object to be removed.

Return value

The method returns an object of the following type:

Type	Description
Boolean	True if successful

Related topics

References

Interface Description (Routes) 432

RouteElement

Purpose

To access a route element.

Interface Description (RouteElement)

Syntax

```
RouteElement = RouteElements.Item()
```

Purpose

To access a route element.

Description

RouteElement is a road element or a junction that is used for the route.

Attributes

The interface contains the following attributes:

Attributes	Type	Purpose
Name	String	To get the name of the road network element.
Direction	RouteDirectionType[1)]	To get the direction of the route.
Path	ActiveRouteElementPath[2)]	To get the active path of the route element.

[1)] Refer to RouteDirectionType on page 541.

Attributes	Type	Purpose

[2] Refer to ActiveRouteElementPath on page 320.

Methods

–

Related topics

References

Interface Description (RouteElements (Collection)) 436

RouteElements (Collection)

Purpose

To handle a collection of route elements.

Where to go from here

Information in this section

Interface Description (RouteElements (Collection)) 436
To describe the interface and its attributes.

Item 437
To get the route element specified by the given index.

Interface Description (RouteElements (Collection))

Syntax

```
RouteElements = Route.Route
RouteElements = Route.PossibleSuccessors
```

Purpose

To handle a collection of route elements.

Attributes

The interface contains the following attributes:

Attributes	Type	Purpose
Count	Integer	To get the number of route elements in the collection.

Methods

The interface contains the following methods:

Method	Purpose
Item	To get the route element specified by the given index. Refer to Item on page 437.

Related topics

References

Interface Description (Route)..... 428

Item

Class

RouteElements

Syntax

```
RouteElement = RouteElements.Item(Variable)
```

Purpose

To get the route element specified by the given index.

Parameters

The method uses the following parameters:

Parameter	Type	Description
Variable	Object	Index of the route element to be returned. You can specify the name of the route element (name of the road element) or a number (counting starts at zero).

Return value

The method returns an object of the following type:

Type	Description
RouteElement[1)]	The specified route element

[1)] Refer to RouteElement on page 435.

Related topics

References

Interface Description (RouteElements (Collection))..... 436

RouteElementPath

Purpose

To get the path of a route element.

Interface Description (RouteElementPath)

Syntax

```
RouteElementPath = RouteElementPaths.Item()
RouteElementPath = ActiveRouteElementPath.Activate(Item)
RouteElementPath = ActiveRouteElementPath.ActiveElement
```

Purpose

To access the path of a route element.

Attributes

The interface contains the following attributes:

Attributes	Type	Purpose
Name	String	To get the name.
Type	RouteElementPathTypes[1)]	To get the type of the path.
Length	Double	To get the length of the path.

[1)] Refer to RouteElementPathTypes on page 541.

Methods

–

Related topics

References

Interface Description (ActiveRouteElementPath)..... 320
Interface Description (RouteElementPaths)..... 439

RouteElementPaths

Purpose

To get all the paths of a route element.

Where to go from here

Information in this section

Interface Description (RouteElementPaths)..... 439
To describe the interface and its attributes.

Item..... 440
To get a specific path.

Interface Description (RouteElementPaths)

Syntax

```
RouteElementPaths = ActiveRouteElementsPath.AvailableElements
```

Purpose

To get the available paths of a route element.

Attributes

The interface contains the following attributes:

Attributes	Type	Purpose
Count	Integer	The number of specified paths for the route element.

Methods

The interface contains the following methods:

Method	Purpose
Item	To get a specific path. Refer to Item on page 440.

Related topics

References

Interface Description (ActiveRouteElementPath)..... 320

Item

Class

RouteElementPaths

Syntax

```
RouteElementPath = RouteElementPaths.Item(Index)
```

Purpose

To get a specific path.

Parameters

The method uses the following parameters:

Parameter	Type	Description
Index	Integer	Index of the specific path.

Return value

The method returns an object of the following type:

Type	Description
RouteElementPath[1)]	The specified path.

[1)] Refer to RouteElementPath on page 438.

Related topics

References

Interface Description (RouteElementPaths)..... 439

Sceneries

Purpose

To specify the scenery sections of a road element.

Where to go from here

Information in this section

Class Description (Sceneries)..... 441
To describe the class and its attributes.

Add..... 442
To add a scenery section at the end of the sceneries.

InsertAfter..... 442
To add a new scenery section after a specified scenery section.

Item..... 443
To access a specific scenery.

Remove..... 444
To remove a scenery section.

Class Description (Sceneries)

Syntax

```
Sceneries = Road.Scenery
```

Purpose

To specify the scenery sections of a road element.

Attributes

The class contains the following attributes:

Attributes	Type	Purpose
Count	Integer	To get the number of scenery sections.

Methods

The class contains the following methods:

Method	Purpose
Add	To add a scenery section at the end of the scenery sections. Refer to Add on page 442.
InsertAfter	To insert a scenery section after a specified scenery section. Refer to InsertAfter on page 442.
Item	To access a scenery section. Refer to Item on page 443.
Remove	To remove a scenery section. Refer to Remove on page 444.

Related topics

References

Interface Description (Road)..... 399

Add

Class

Sceneries

Syntax

```
Scenery = Sceneries.Add(Type)
```

Purpose

To add a scenery section at the end of the sceneries.

Parameters

The method uses the following parameters:

Parameter	Type	Description
Type	SceneryTypes[1)]	Type of the scenery section to be added.

1) Refer to SceneryTypes on page 542.

Return value

The method returns the following parameter:

Type	Description
Scenery[1)]	The new scenery section.

1) Refer to Scenery on page 445.

Related topics

References

Class Description (Sceneries)..... 441

InsertAfter

Class

Sceneries

Syntax

```
Scenery = Sceneries.InsertAfter(Index, Type)
```

Purpose

To add a new scenery section after a specified scenery section.

Parameters

The method uses the following parameters:

Parameter	Type	Description
Index	Integer	Index of the scenery section after which the new one is inserted.
Type	SceneryTypes[1)]	Type of the scenery section to be inserted.

[1)] Refer to SceneryTypes on page 542.

Return value

The method returns the following parameter:

Type	Description
Scenery[1)]	The new scenery section.

[1)] Refer to Scenery on page 445.

Related topics

References

Class Description (Sceneries)..... 441

Item

Class

Sceneries

Syntax

```
Scenery = Sceneries.Item(Index)
```

Purpose

To access a specific scenery.

Parameters

The method uses the following parameters:

Parameter	Type	Description
Index	Integer	Index of the specific scenery section.

Return value

The method returns the following parameter:

Type	Description
Scenery[1)]	The specific scenery section.

[1)] Refer to Scenery on page 445.

Related topics

References

Class Description (Sceneries)..... 441

Remove

Class

Sceneries

Syntax

```
RetVal = Sceneries.Remove(Value)
```

Purpose

To remove a scenery section.

Parameters

The method uses the following parameters:

Parameter	Type	Description
Value	Scenery[1)]	The scenery section to be removed.

[1)] Refer to Scenery on page 445.

Return value

The method returns the following parameter:

Type	Description
Boolean	True if successful.

Related topics

References

Class Description (Sceneries)..... 441

Scenery

Purpose

To specify a scenery section.

Where to go from here

Information in this section

Class Description (Scenery) 445
To describe the class and its attributes.

Activate 446
To activate a scenery type.

Class Description (Scenery)

Syntax

```
Scenery = Sceneries.Item()
Scenery = Sceneries.Add()
Scenery = Sceneries.InsertAfter()
```

Purpose

To specify a scenery.

Attributes

The class contains the following attributes:

Attributes	Type	Purpose
ActiveElement	Scenery[1)]	To get the active scenery type.

[1)] Refer to Scenery on page 445.

Methods

The class contains the following methods:

Method	Purpose
Activate	To activate a scenery type. Refer to Activate on page 446.

Related topics

References

Class Description (Sceneries) 441

Activate

Class

Scenery

Syntax

```
Scenery = Scenery.Activate(Type)
```

Purpose

To activate a scenery type.

Parameters

The method uses the following parameters:

Parameter	Type	Description
Type	SceneryTypes[1)]	The type to be activated.

1) Refer to SceneryTypes on page 542.

Return value

The method returns the following parameter:

Type	Description
Scenery[1)]	The activated scenery.

1) Refer to Scenery on page 445.

Related topics

References

Class Description (Scenery)..... 445

Segment

Purpose

To specify a segment of a road element.

Where to go from here

Information in this section

Class Description (Segment)..... 447
To describe the class and its attributes.

Activate.....448
To activate a segment.

Class Description (Segment)

Syntax

```
Segment = Segments.Item(Index)
Segment = Segments.Add(Type)
Segment = Segments.InsertAfter(Index, Type)
```

Purpose

To specify a segment.

Attributes

The class contains the following attributes:

Attributes	Type	Purpose
ActiveElement	Circular, Clothoid, Spline, or Straight[1)]	To get the active segment.

1) Refer to Circular on page 501, Clothoid on page 503, Spline on page 505, or Straight on page 510.

Methods

The class contains the following methods:

Method	Purpose
Activate	To activate a segment. Refer to Activate on page 448.

Related topics

References

Class Description (Segments).....449
Segments.....448

Activate

Class

Segment

Syntax

```
Segment = Segment.Activate(Type)
```

Purpose

To activate a segment.

Parameters

The method uses the following parameters:

Parameter	Type	Description
Type	SegmentTypes[1)]	The segment type to be activated.

1) Refer to SegmentTypes on page 542.

Return value

The method returns the following parameter:

Type	Description
Circular, Clothoid, Spline, or Straight[1)]	The activated segment.

1) Refer to Circular on page 501, Clothoid on page 503, Spline on page 505, or Straight on page 510.

Related topics

References

Class Description (Segment)..... 447

Segments

Purpose

To specify segments of a road element.

Where to go from here

Information in this section

Class Description (Segments)..... 449
To describe the class and its attributes.

Add....450
To add a segment at the end of the road element.

InsertAfter....450
To insert a segment after another segment.

Item....451
To access a specific segment.

Remove....452
To remove a specified segment.

Class Description (Segments)

Syntax

```
Segments = Road.Segments
```

Purpose

To specify segments of a road element.

Attributes

The class contains the following attributes:

Attributes	Type	Purpose
Count	Integer	To get the number of segments.

Methods

The class contains the following methods:

Method	Purpose
Add	To add a segment at the end of the road element. Refer to Add on page 450.
InsertAfter	To insert a segment after another segment. Refer to InsertAfter on page 450.
Item	To access a specific segment. Refer to Item on page 451.
Remove	To remove a specified segment. Refer to Remove on page 452.

Related topics

References

Interface Description (Road)....399
Road....399

Add

Class

Segments

Syntax

```
Segment = Segments.add(Type)
```

Purpose

To add a segment at the end of the road element.

Parameters

The method uses the following parameters:

Parameter	Type	Description
Type	SegmentTypes[1)]	The segment type to be inserted.

1) Refer to SegmentTypes on page 542.

Return value

The method returns the following parameter:

Type	Description
Segment[1)]	The added segment.

1) Refer to Segment on page 446.

Related topics

References

Class Description (Segments)..... 449

InsertAfter

Class

Segments

Syntax

```
Segment = Segments.InsertAfter(Index, Type)
```

Purpose

To insert a segment after another segment.

Parameters

The method uses the following parameters:

Parameter	Type	Description
Index	Integer	The index of the segment after which the segment is inserted.
Type	SegmentTypes[1)]	The segment type to be inserted.

[1)] Refer to SegmentTypes on page 542.

Return value

The method returns the following parameter:

Type	Description
Segment[1)]	The inserted segment.

[1)] Refer to Segment on page 446.

Related topics

References

Class Description (Segments)..... 449

Item

Class

Segments

Syntax

```
Segment = Segments.Item(Index)
```

Purpose

To access a specific segment.

Parameters

The method uses the following parameters:

Parameter	Type	Description
Index	Integer	The index of the specific segment.

Return value

The method returns the following parameter:

Type	Description
Segment[1)]	The specified segment.

[1)] Refer to Segment on page 446.

Related topics

References

Class Description (Segments)..... 449

Remove

Class

Segments

Syntax

```
RetVal = Segments.Remove(Value)
```

Purpose

To remove a specified segment.

Parameters

The method uses the following parameters:

Parameter	Type	Description
Value	object	Segment to be removed.

Return value

The method returns the following parameter:

Type	Description
Boolean	True if successful

Related topics

References

Class Description (Segments)..... 449

Shape

Purpose

To specify a shape.

Where to go from here

Information in this section

Class Description (Shape) 453
To describe the class and its attributes.

Activate 454
To activate a shape type.

Export 455
To export a shape.

Class Description (Shape)

Syntax

```
Shape = Shapes.Item(Index)
```

Or

```
Shape = Shapes.Add(Type)
```

Purpose

To specify a shape.

Attributes

The class contains the following attributes:

Attributes	Type	Purpose
ActiveElement	Object	The active shape.

Methods

The class contains the following methods:

Method	Purpose
Activate	To activate a shape type. Refer to Activate on page 454.
Export	To export the shape. Refer to Export on page 455.

Related topics

References

Class Description (Shapes) 456
Shapes 455

Activate

Class

Shape

Syntax

```
Shape = Shape.Activate(Type)
```

Purpose

To activate a shape type.

Parameters

The method uses the following parameters:

Parameter	Type	Description
Type	ShapeTypes[1)]	The type of the shape to be activated.

1) Refer to ShapeTypes on page 542.

Return value

The method returns the following parameter:

Type	Description
Shape[1)]	The shape object.

1) Refer to Shape on page 453.

Related topics

References

Class Description (Shape) 453

Export

Class

Shape

Syntax

```
RetVal = Shape.Export(Path, OverWriteExisting)
```

Purpose

To export a shape.

Parameters

The method uses the following parameters:

Parameter	Type	Description
Path	String	The path and name of the MAT file containing the shape.
OverWriteExisting	Boolean	True if an existing file can be overwritten, otherwise false.

Return value

The method returns the following parameter:

Type	Description
Boolean	True if successful.

Related topics

References

Class Description (Shape)..... 453

Shapes

Purpose

To access the shapes.

Where to go from here

Information in this section

Class Description (Shapes)..... 456
To describe the class and its attributes.

Add..... 457
To add a shape.

Import....457
To import a shape.

Item....458
To access a shape.

Remove....459
To remove a shape.

Class Description (Shapes)

Syntax

```
Shapes = Road.Shapes
Shapes = Junction.Shapes
```

Purpose

To access the shapes.

Attributes

The class contains the following attributes:

Attributes	Type	Purpose
Count	Integer	To get the number of shapes.

Methods

The class contains the following methods:

Method	Purpose
Add	To add a shape. Refer to Add on page 457.
Import	To import a shape. Refer to Import on page 457.
Item	To access a shape. Refer to Item on page 458.
Remove	To remove a shape. Refer to Remove on page 459.

Related topics

References

Interface Description (Junction)....345
Interface Description (Road)....399
Junction....345
Road....399

Add

Class

Shapes

Syntax

```
Shape = Shapes.Add(Type)
```

Purpose

To add a shape.

Parameters

The method uses the following parameters:

Parameter	Type	Description
Type	ShapeTypes[1)]	The type of the shape.

[1)] Refer to ShapeTypes on page 542.

Return value

The method returns the following parameter:

Type	Description
Shape[1)]	The new shape.

[1)] Refer to Shape on page 453.

Related topics

References

Class Description (Shapes) 456

Import

Class

Shapes

Syntax

```
Shape = Shapes.Import(Path)
```

Purpose

To import a shape.

Parameters

The method uses the following parameters:

Parameter	Type	Description
Path	String	The path to the shape file.

Return value

The method returns the following parameter:

Type	Description
Shape[1)]	The imported shape.

[1)] Refer to Shape on page 453.

Related topics

References

Class Description (Shapes) 456

Item

Class

Shapes

Syntax

```
Shape = Shapes.Item(Index)
```

Purpose

To access a shape.

Parameters

The method uses the following parameters:

Parameter	Type	Description
Index	Integer	The index of the shape.

Return value

The method returns the following parameter:

Type	Description
Shape[1)]	The specific shape.

[1)] Refer to Shape on page 453.

Related topics

References

Class Description (Shapes) 456

Remove

Class

Shapes

Syntax

```
RetVal = Shapes.Remove(Value)
```

Purpose

To remove a shape.

Parameters

The method uses the following parameters:

Parameter	Type	Description
Value	Object	The shape to be removed.

Return value

The method returns the following parameter:

Type	Description
Boolean	True if successful

Related topics

References

Class Description (Shapes) 456

SinusoidalMap

Purpose

To specify an area with sinusoidal height profiles.

Interface Description (SinusoidalMap)

Syntax

```
SinusoidalMap = AdditionalHeightProfilesSurfaces.Add()
SinusoidalMap = AdditionalHeightProfilesSurfaces.Item()
```

Purpose

To specify an area with sinusoidal height profiles.

Attributes

The interface contains the following attributes:

Attributes	Type	Purpose
Distance	Double	To get/set the distances between two profiles in meters.
Height	Double	To get/set the height of the profiles.
Length	Double	To get/set the length of the area in meters.
MaxProfileCount	Integer	To get the maximum number of profiles.
Name	String	To get/set the name.
ProfileCount	Integer	To get/set the number of profiles.
ProfileLength	Double	To get/set the length of a profile in meters.
Width	Double	To get/set the width of the area in meters.
Type	HeightBasedSurfacesTypes[1)]	To get the type of the area.
ReferencePoint	RoadReferencePointBasic[2)]	To get/set the reference point.

1) Refer to HeightBasedSurfacesTypes on page 539.
2) Refer to RoadReferencePointBasic on page 420.

Methods

–

Related topics

References

Interface Description (AdditionalHeightProfilesSurfaces)..... 324

SurfaceProperties

Purpose

To get or set friction and tire parameter set used for a whole element.

Interface Description (SurfaceProperties)

Syntax

```
RoadSurface = Road.RoadSurface
JuntionSurface = Junction.JunctionSurface
```

Purpose

To get or set friction and tire parameter set used for a whole element.

Attributes

The interface contains the following attributes:

Attributes	Type	Purpose
Friction	Double	To get/set friction of the whole element.
Tireparameter	TireParameterTypes[1)]	To get/set the tire parameter set used on the whole road element.

[1)] Refer to TireParameterTypes on page 544.

Methods

–

Related topics

References

Interface Description (Junction)..... 345
Interface Description (Road)..... 399

Surfaces (Collection)

Purpose

To access the areas of the road element or junction where the surface condition (friction, height, or texture) differ from the rest of the road element or junction.

Interface Description (Surfaces (Collection))

Syntax

```
Surfaces = Road.Surface
Surfaces = Junction.Surface
```

Purpose

To access the areas of the road element or junction where the surface condition (friction, height, or texture) differ from the rest of the road element or junction.

Attributes

The interface contains the following attributes:

Attributes	Type	Purpose
Friction	FrictionSurfaces[1)]	To get/set the areas which have a special friction.
AdditionalHeightProfile	AdditionalHeightProfileSurfaces[2)]	To get/set the areas which have an additional height profile.
Texture	TextureSurfaces[3)]	To get/set the areas which have a special texture.

1) Refer to FrictionSurfaces on page 336.
2) Refer to AdditionalHeightProfileSurfaces on page 323.
3) Refer to TextureSurfaces on page 465.

Methods

–

Related topics

References

Interface Description (Junction)..... 345
Interface Description (Road)..... 399

Table

Purpose

To handle values in a table.

Where to go from here

Information in this section

Interface Description (Table)..... 463
To describe the interface and its attributes.

SetConstantValue..... 463
To set a constant value.

SetTable..... 464
To set the values in a table.

Interface Description (Table)

Syntax

No direct creation

Purpose

To handle values in a table.

Attributes

The interface contains the following attributes:

Attributes	Type	Purpose
Values	Double[,]	To get the values of the table.
VectorD	Double[]	To get the values of the d axis (lateral direction).
VectorS	Double[]	To get the values of the s axis (longitudinal direction).

Methods

The interface contains the following methods:

Method	Purpose
SetConstantValue	To set a constant value. Refer to SetConstantValue on page 463.
SetTable	To set the values in a table. Refer to SetTable on page 464.

SetConstantValue

Class

Table

Syntax

```
RetVal = Table.SetConstantValue(Value)
```

Purpose

To set a constant value.

Parameters

The method uses the following parameters:

Parameter	Type	Description
Value	Double	Constant value

Return value

The method returns an object of the following type:

Type	Description
Boolean	True if the method was successful.

Related topics

References

Interface Description (Table)..... 463

SetTable

Class

Table

Syntax

```
RetVal = Table.SetTable(VectorS, VectorD, Values)
```

Purpose

To set the values in a table.

Parameters

The method uses the following parameters:

Parameter	Type	Description
VectorS	Double[]	Axis in s direction (longitudinal)
VectorD	Double[]	Axis in d direction (lateral)
Values	Double[,]	Values

Return value

The method returns an object of the following type:

Type	Description
Boolean	True if the method was successful.

Related topics

References

Interface Description (Table)..... 463

TextureSurfaces

Purpose

To access the areas with a texture.

Where to go from here

Information in this section

Interface Description (TextureSurfaces)..... 465
To describe the interface and its attributes.

Add..... 466
To add an area with a texture.

Item..... 466
To access an area with a texture.

Remove..... 467
To delete an area which has a texture.

Interface Description (TextureSurfaces)

Syntax

No direct creation

Purpose

To access the areas with a texture.

Attributes

The interface contains the following attributes:

Attributes	Type	Purpose
Count	Integer	To get the number of areas with a texture.

Methods

The interface contains the following methods:

Method	Purpose
Add	To add an area with a texture. Refer to Add on page 466.
Item	To access a area with a texture. Refer to Item on page 466.
Remove	To delete a area with a texture. Refer to Remove on page 467.

Related topics

References

Interface Description (Surfaces (Collection)) 461

Add

Class

TextureSurfaces

Syntax

```
RetVal = TextureSurfaces.Add()
```

Purpose

To add an area with a texture.

Parameters

–

Return value

The method returns an object of the following type:

Type	Description
RoadTextureMap or JunctionTextureMap[1)]	Object of the new area of the specified type.

[1)] Refer to RoadTextureMap on page 426 or JunctionTextureMap on page 368.

Related topics

References

TextureSurfaces 465

Item

Class

TextureSurfaces

Syntax

```
RetVal = TextureSurfaces.Item(Variable)
```

Purpose

To access an area with a texture.

Parameters

The method uses the following parameters:

Parameter	Type	Description
Variable	Object	Index of the area to be returned. You can specify the name of the area or a number (counting starts at zero).

Return value

The method returns an object of the following type:

Type	Description
RoadTextureMap or JunctionTextureMap[1)]	Object of the new area of the specified type.

[1)] Refer to RoadTextureMap on page 426 or JunctionTextureMap on page 368.

Related topics

References

TextureSurfaces..... 465

Remove

Class

TextureSurfaces

Syntax

```
RetVal = TextureSurfaces.Remove(Index)
```

Purpose

To delete an area which has a texture.

Parameters

The method uses the following parameters:

Parameter	Type	Description
Index	Object	Index of the area to be deleted. You can specify the name of the area or a number (counting starts at zero).

Return value

The method returns an object of the following type:

Type	Description
Boolean	True if the method was successful.

Related topics

References

TextureSurfaces..... 465

TrafficObjectType

Purpose

To get information on a traffic object type.

Interface Description (TrafficObjectType)

Syntax

```
TrafficObjectType = TrafficObjectTypes.Item()
```

Purpose

To get information on a traffic object type.

Attributes

The interface contains the following attributes:

Attributes	Type	Purpose
Comment	String	To get the comment of the traffic object.
Geometry	String	To get the path of the geometry file of the traffic object.
Name	String	To get the name of the traffic object.
Orientation	Double	To get the natural orientation of the traffic object in degree.
RelativePath	String	To get the relative path to the traffic object.
TypeId	String	To get the identifier of the traffic object.

Methods

–

Related topics

References

Interface Description (TrafficObjectTypes)..... 469

TrafficObjectTypes (Collection)

Purpose

To handle a collection of traffic object types.

Where to go from here

Information in this section

Interface Description (TrafficObjectTypes)..... 469
To describe the interface and its attributes.

Item..... 470
To get the traffic object type specified by the given index.

Interface Description (TrafficObjectTypes)

Syntax

No direct creation

Purpose

To handle a collection of traffic object types.

Attributes

The interface contains the following attributes:

Attributes	Type	Purpose
Count	Integer	To get the number of traffic object types in the collection.

Methods

The interface contains the following methods:

Method	Purpose
Item	To get the traffic object type specified by the given index. Refer to Item on page 470.

Item

Class

TrafficObjectTypes

Syntax

```
TrafficObjectType = TrafficObjectTypes.Item(Index)
```

Purpose

To get the traffic object type specified by the given index.

Parameters

The method uses the following parameters:

Parameter	Type	Description
Index	Integer	Index of the traffic object type to be returned.

Return value

The method returns an object of the following type:

Type	Description
String	Name of the traffic object type.

Related topics

References

Interface Description (TrafficObjectTypes) 469

TrapezoidalMap

Purpose

To specify an area with a trapezoidal height profiles.

Interface Description (Trapezoidal)

Syntax

```
Trapezoidal = AdditionalHeightProfilesSurfaces.Add()
Trapezoidal = AdditionalHeightProfilesSurfaces.Item()
```

Purpose

To specify an area with a trapezoidal height profiles.

Attributes

The interface contains the following attributes:

Attributes	Type	Purpose
Angle	Double	To get/set the leading and trailing angles in degrees.
Distance	Double	To get/set the distances between two profiles in meters.
Height	Double	To get/set the height of the profiles in meters.
HeightReached	Double	To get the height of the profiles that are reached in meters.
Length	Double	To get/set the length of the area in meters.
MaxProfileCount	Integer	To get the maximum number of profiles.
Name	String	To get/set the name.
ProfileCount	Integer	To get/set the number of profiles.
ProfileLength	Double	To get/set the length of a profile in meters.
Width	Double	To get/set the width of the area in meters.
Type	HeightBasedSurfacesTypes[1)]	To get the type of the area.
ReferencePoint	RoadReferencePointBasic[2)]	To get/set the reference point.

1) Refer to HeightBasedSurfacesTypes on page 539.
2) Refer to RoadReferencePointBasic on page 420.

Methods

–

Related topics

Basics

Additional Height Profiles.....55

References

Interface Description (AdditionalHeightProfilesSurfaces).....324

UserSignal

Purpose

To access the parameters of a user signal.

Interface Description (UserSignal)

Syntax

```
UserSignal = UserSignals.Item()
```

Purpose

To access the parameters of a user signal.

Attributes

The interface contains the following attributes:

Attributes	Type	Purpose
Alias	String	To get/set an alias name of the user signal.
Comment	String	To get/set a comment for the user signal.
Index	Integer	To get the index of the user signal.
Value	Double	To get/set the value of the user signal.

Methods

–

Related topics

References

Interface Description (UserSignals)..... 473

UserSignals (Collection)

Purpose

The UserSignals object contains a collection of user signals.

Where to go from here

Information in this section

Interface Description (UserSignals)..... 473
To describe the interface and its attributes.

Item..... 473
To get the user signal specified by the given index.

Interface Description (UserSignals)

Syntax

```
UserSignals = RoadNetwork.UserSignals
```

Purpose

To handle a collection of user signals.

Attributes

The interface contains the following attributes:

Attributes	Type	Purpose
Count	Integer	To get the number of user signals in the collection.

Methods

The interface contains the following methods:

Method	Purpose
Item	To get the user signal specified by the given index. Refer to Item on page 473.

Related topics

References

Interface Description (RoadNetwork)..... 413

Item

Interface

UserSignals

Syntax

```
UserSignal = UserSignals.Item(Index)
```

Purpose

To get the user signal specified by the given index.

Parameters

The method uses the following parameters:

Parameter	Type	Description
Index	Integer	Index of the user signal to be returned. Counting starts at zero.

Return value

The method returns an object of the following type:

Type	Description
UserSignal[1)]	The specified user signal

[1)] Refer to UserSignal on page 471.

Related topics

References

Interface Description (UserSignals)..... 473

LineTypes Interfaces

Purpose

To get a line type.

Where to go from here

Information in this section

ColorPicker..... 474
To get a color.

LineTypes..... 475
To get a line type.

BicolorLine..... 476
To specify a bi-colored line.

DashLine..... 477
To specify a dashed line.

SolidLine..... 478
To specify a solid line.

ColorPicker

Purpose

To get a color.

Interface Description (ColorPicker)

Syntax

No direct creation

Purpose

To get a color in RGB values with alpha channel.

Attributes

The interface contains the following attributes:

Attributes	Type	Purpose
Red	Integer	The value of the red color within the range 0 … 255.
Green	Integer	The value of the green color within the range 0 … 255.
Blue	Integer	The value of the blue color within the range 0 … 255.
Alpha	Integer	The value of the alpha channel within the range 0 … 255.
Hex	String	The color in hexadecimal representation.

Methods

–

LineTypes

Purpose

To get a line type.

Interface Description (LineTypes)

Syntax

No direct creation

Purpose

To get the line type.

Attributes

The interface contains the following attributes:

Attributes	Type	Purpose
BicolorLine	BicolorLine[1]	The BicolorLine line type.
DashLine	DashLine[2]	The DashLine line type.
SolidLine	SolidLine[3]	The SolidLine line type.

[1] Refer to BicolorLine on page 476.
[2] Refer to DashLine on page 477.
[3] Refer to SolidLine on page 478.

Methods

–

BicolorLine

Purpose

To specify a bi-colored line.

Interface Description (BicolorLine)

Syntax

No direct creation

Purpose

To specify a bi-colored line.

Attributes

The interface contains the following attributes:

Attributes	Type	Purpose
Type	LineTypes[1]	To get the line type.
InitialOffset	Double	To get/set the initial offset of the line in meters.
Width	Double	To get/set the width of the line in meters.
FirstLineColor	ColorPicker[2]	To get the color of the first line.
FirstLineLength	Double	To get/set the length of the first line in meters.
SecondLineColor	ColorPicker[2]	To get the color of the second line.
SecondLineLength	Double	To get/set the length of the second line in meters.

[1] Refer to LineTypes on page 475.
[2] Refer to ColorPicker on page 474.

Methods

–

Related topics

Basics

Lines.....51

References

Lines Properties.....254

DashLine

Purpose

To specify a dashed line.

Interface Description (DashLine)

Syntax

No direct creation

Purpose

To specify a dashed line.

Attributes

The interface contains the following attributes:

Attributes	Type	Purpose
Type	LineTypes[1)]	To get the line type.
InitialOffset	Double	To get/set the initial offset of the line in meters.
Width	Double	To get/set the width of the line in meters.
LineColor	ColorPicker[2)]	To get the line color.
LineLength	Double	To get/set the length of the line in meters.
GapLength	Double	To get/set the length of the gap in meters.
ShowIncompleteLinePart	Boolean	To get/set the flag whether the last line part is shown when it is incomplete.

1) Refer to LineTypes on page 475.
2) Refer to ColorPicker on page 474.

Methods

–

Related topics

Basics

Lines.....51

References

Lines Properties.....254

SolidLine

Purpose

To specify a solid line.

Interface Description (SolidLine)

Syntax

No direct creation

Purpose

To specify a solid line.

Attributes

The interface contains the following attributes:

Attributes	Type	Purpose
InitialOffset	Double	To get/set the initial offset of the line in meters.
LineColor	ColorPicker[1)]	To get the line color.
Type	LineTypes[2)]	To get the line type.
Width	Double	To get/set the width of the line.

1) Refer to ColorPicker on page 474.
2) Refer to LineTypes on page 475.

Methods

–

Related topics

Basics

Lines.....51

References

Lines Properties.....254

ShapeTypes Interfaces

Purpose

To get a shape type.

Where to go from here

Information in this section

ConcreteBarrier.....480
To specify a concrete barrier.

ContinuousObject.....481
To specify a Continuous Object shape.

GuardRail.....482
To specify a guard rail.

JunctionNode.....483
To specify a node of a shape on a junction.

JunctionShapePosition.....484
To get the position of a shape on a junction.

Line.....484
To specify a Line shape.

Nodes.....486
To get all the nodes of a shape.

RedAndWhiteBarrier.....490
To specify a red-and-white barrier.

RepeatingObject.....491
To specify a RepeatingObject shape.

RoadNode.....492
To specify a node of a shape on a road element.

RoadShapePosition.....493
To get the position of a shape on a road element.

ShapeGeometry.....494
To get the geometry of a continuous object shape.

Trajectory.....495
To specify a Trajectory shape.

YellowBarrier.....499
To specify a yellow barrier.

ConcreteBarrier

Purpose

To specify a concrete barrier.

Class Description (ConcreteBarrier)

Syntax

No direct creation

Purpose

To specify a concrete barrier.

Attributes

The class contains the following attributes:

Attributes	Type	Purpose
Height	Double	To get the height of the concrete barrier.
InitialOffset	Double	To get/set the initial offset for the concrete barrier.
Type	GeometryTypes[1)]	To get the geometry type.
Width	Double	To get the width of the concrete barrier.

[1)] Refer to GeometryTypes on page 539.

Methods

–

Related topics

References

Class Description (ShapeGeometry)..... 494
Shape Properties..... 272

ContinuousObject

Purpose

To specify a Continuous Object shape.

Class Description (ContinuousObject)

Syntax

No direct creation

Purpose

To specify a Continuous Object shape.

Attributes

The class contains the following attributes:

Attributes	Type	Purpose
Description	String	To get/set the description for the shape.
Geometry	ShapeGeometry[1)]	To get the geometry of the shape.
ID	Integer	To get/set the index of the shape.
Name	String	To get/set the name of the shape.
Nodes	Nodes[2)]	To get the nodes of the shape
Offset	Double	To get/set the distance between the start position of the shape and the first object.
Position	RoadShapePosition or JunctionShapePosition[3)]	To get/set the start position of the shape.
Type	ShapeTypes[4)]	To get the shape type.

1) Refer to ShapeGeometry on page 494.
2) Refer to Nodes on page 486.
3) Refer to RoadShapePosition on page 493 or JunctionShapePosition on page 484.
4) Refer to ShapeTypes on page 542.

Methods –

Related topics

Basics

Shapes.....62

References

Shape Properties.....272

GuardRail

Purpose To specify a guard rail.

Class Description (GuardRail)

Syntax No direct creation

Purpose To specify a guard rail.

Attributes The class contains the following attributes:

Attributes	Type	Purpose
EndTerminal	Double	To specify the length of the end terminal.
FlipOrientation	Boolean	To specify to flip the orientation of the geometry.
Height	Double	To get/set the height of the guard rail.
InitialOffset	Double	To get/set the initial offset for the guard rail.
Interval	Double	To specify the interval of the guard rail posts.
StartTerminal	Double	To specify the length of the start terminal.
Type	GeometryTypes[1)]	To get the geometry type.
Width	Double	To get the width of the guard rail.

[1)] Refer to GeometryTypes on page 539.

Methods –

Related topics

References

Class Description (ShapeGeometry)..... 494
Shape Properties..... 272

JunctionNode

Purpose

To specify a node of a shape on a junction.

Class Description (JunctionNode)

Syntax

```
JunctionNode = Nodes.Item(object Variable)
```

Purpose

To specify a node of a shape on a junction.

Attributes

The class contains the following attributes:

Attributes	Type	Purpose
X	Double	To get/set the x coordinate of the node.
Y	Double	To get/set the y coordinate of the node.
SectionType	JunctionSectionTypes[1)]	To get/set the kind of course between the nodes.

[1)] Refer to JunctionSectionTypes on page 540.

Methods

–

Related topics

References

Nodes..... 486

JunctionShapePosition

Purpose

To get the position of a shape on a junction.

Class Description (JunctionShapePosition)

Syntax

```
JunctionShapePosition = Line.Position
JunctionShapePosition = ContinuousObject.Position
JunctionShapePosition = RepeatingObject.Position
```

Purpose

To get the position of a shape on a junction.

Attributes

The class contains the following attributes:

Attributes	Type	Purpose
X	Double	To get/set the x coordinate of the shape's start position.
Y	Double	To get/set the y coordinate of the shape's start position.

Methods

–

Related topics

References

ContinuousObject..... 481
Line..... 484
RepeatingObject..... 491

Line

Purpose

To specify a Line shape.

Class Description (Line)

Syntax

No direct creation

Purpose

To specify a Line shape.

Attributes

The class contains the following attributes:

Attributes	Type	Purpose
Description	String	To get/set the description for the shape.
ID	Integer	To get/set the index of the shape.
Line	LineProperty[1)]	To get the properties of the line used for the shape.
Name	String	To get/set the name of the shape.
Nodes	Nodes[2)]	To get the nodes of the shape
Position	RoadShapePosition or JunctionShapePosition[3)]	To get/set the start position of the shape.
Type	ShapeTypes[4)]	To get the shape type.
ZOrder	ZOrderTypes[5)]	To get/set the level of the z-order.

1) Refer to LineProperty on page 394.
2) Refer to Nodes on page 486.
3) Refer to RoadShapePosition on page 493 or JunctionShapePosition on page 484.
4) Refer to ShapeTypes on page 542.
5) Refer to ZOrderTypes on page 544.

Methods

–

Related topics

Basics

Lines.....51
Shapes.....62

References

Lines Properties.....254
Shape Properties.....272

Nodes

Purpose

To get all the nodes of a shape.

Where to go from here

Information in this section

Class Description (Nodes) 486
To describe the class and its attributes.

Add 487
To add a new node.

InsertAfter 488
To insert a node after a specific node.

Item 488
To get a specific node.

Remove 489
To remove a node.

Class Description (Nodes)

Syntax

```
Nodes = Line.Nodes
```

Or

```
Nodes = RepeatingObject.Nodes
```

Or

```
Nodes = ContinuousObject.Nodes
```

Purpose

To get the nodes of a shape.

Attributes

The class contains the following attributes:

Attributes	Type	Purpose
Count	Integer	To get the number of nodes.

Methods

The class contains the following methods:

Method	Purpose
Add	To add a new node. Refer to Add on page 487.
InsertAfter	To insert a node after a specific node. Refer to InsertAfter on page 488.
Item	To get a specific node. Refer to Item on page 488.
Remove	To remove a node. Refer to Remove on page 489.

Related topics

References

ContinuousObject 481
Line 484
RepeatingObject 491

Add

Class

Nodes

Syntax

```
RoadNode = Nodes.Add()
JunctionNode = Nodes.Add()
```

Purpose

To add a new node.

Parameters

–

Return value

The method returns the following parameter:

Type	Description
RoadNode or JunctionNode[1)]	The new node.

[1)] Refer to RoadNode on page 492 or JunctionNode on page 483.

Related topics

References

Class Description (Nodes) 486

InsertAfter

Class

Nodes

Syntax

```
RoadNode = Nodes.InsertAfter(Index)
JunctionNode = Nodes.InsertAfter(Index)
```

Purpose

To insert a node after a specific node.

Parameters

The method uses the following parameters:

Parameter	Type	Description
Index	Integer	Index of the node after which the new node is inserted.

Return value

The method returns the following parameter:

Type	Description
RoadNode or JunctionNode[1)]	The new node.

[1)] Refer to RoadNode on page 492 or JunctionNode on page 483.

Related topics

References

Class Description (Nodes) 486

Item

Class

Nodes

Syntax

```
RoadNode = Nodes.Item(Variable)
JunctionNode = Nodes.Item(Variable)
```

Purpose

To get a specific node.

Parameters

The method uses the following parameters:

Parameter	Type	Description
Variable	object	Index of the node

Return value

The method returns the following parameter:

Type	Description
RoadNode or JunctionNode[1)]	The specific node.

[1)] Refer to RoadNode on page 492 or JunctionNode on page 483.

Related topics

References

Class Description (Nodes)..... 486

Remove

Class

Nodes

Syntax

```
RetVal = Nodes.Remove(Value)
```

Purpose

To remove a node.

Parameters

The method uses the following parameters:

Parameter	Type	Description
Value	object	Index of the node to be removed.

Return value

The method returns the following parameter:

Type	Description
Boolean	True if successful

Related topics

References

Class Description (Nodes)..... 486

RedAndWhiteBarrier

Purpose

To specify a red-and-white barrier.

Class Description (RedAndWhiteBarrier)

Syntax

No direct creation

Purpose

To specify a red-and-white barrier.

Attributes

The class contains the following attributes:

Attributes	Type	Purpose
Height	Double	To get the height of the red-and-white barrier.
InitialOffset	Double	To get/set the initial offset for the red-and-white barrier.
Type	GeometryTypes[1)]	To get the geometry type.
Width	Double	To get the width of the red-and-white barrier.

[1)] Refer to GeometryTypes on page 539.

Methods

–

Related topics

References

Class Description (ShapeGeometry)..... 494
Shape Properties..... 272

RepeatingObject

Purpose To specify a RepeatingObject shape.

Class Description (RepeatingObject)

Syntax No direct creation

Purpose To specify a RepeatingObject shape.

Attributes The class contains the following attributes:

Attributes	Type	Purpose
AngleX	Double	To get/set the rotation around the x-axis for all the traffic objects
AngleY	Double	To get/set the rotation around the y-axis for all the traffic objects.
AngleZ	Double	To get/set the rotation around the z-axis for all the traffic objects.
Description	String	To get/set the description for the shape.
Distance	Double	To get/set the distance between the repeated traffic objects.
ID	Integer	To get/set the index of the shape.
TrafficObjectType	ActiveTrafficObjectType[1)]	To get the traffic object of the shape.
Name	String	To get/set the name of the shape.
Nodes	Nodes[2)]	To get the nodes of the shape
Offset	Double	To get/set the initial offset.
OffsetToOwner	Double	To get/set the height offset to the road element or junction.
Position	RoadShapePosition or JunctionShapePosition[3)]	To get/set the start position of the shape.
Type	ShapeTypes[4)]	To get the shape type.

1) Refer to ActiveTrafficObjectType on page 321.
2) Refer to Nodes on page 486.
3) Refer to RoadShapePosition on page 493 or JunctionShapePosition on page 484.
4) Refer to ShapeTypes on page 542.

Methods

–

Related topics

Basics

Shapes.....62

References

Shape Properties.....272

RoadNode

Purpose

To specify a node of a shape on a road element.

Class Description (RoadNode)

Syntax

```
RoadNode = Nodes.Item(Variable)
```

Purpose

To specify a node of a shape on a road element.

Attributes

The class contains the following attributes:

Attributes	Type	Purpose
S	Double	To get/set the s coordinate of the node.
D	Double	To get/set the d coordinate of the node.
SectionType	RoadSectionTypes[1)]	To get/set the kind of course between the nodes and the reference line.

[1)] Refer to RoadSectionTypes on page 541.

Methods

–

Related topics

References

Nodes.....486

RoadShapePosition

Purpose

To get the position of a shape on a road element.

Class Description (RoadShapePosition)

Syntax

```
RoadShapePosition = Line.Position
RoadShapePosition = ContinuousObject.Position
RoadShapePosition = RepeatingObject.Position
```

Purpose

To get the position of a shape on a road element.

Attributes

The class contains the following attributes:

Attributes	Type	Purpose
S	Double	To get/set the s coordinate of the shape's start position.
D	Double	To get/set the d coordinate of the shape's start position.

Methods

–

Related topics

References

ContinuousObject.....481
Line.....484
RepeatingObject.....491

ShapeGeometry

Purpose

To get the geometry of a continuous object shape.

Where to go from here

Information in this section

Class Description (ShapeGeometry) 494
To describe the class and its attributes.

Activate 495
To activate a geometry type.

Class Description (ShapeGeometry)

Syntax

```
Geometry = ContinuousObject.Geometry
```

Purpose

To get the geometry of a continuous object shape.

Attributes

The class contains the following attributes:

Attributes	Type	Purpose
ActiveElement	ConcreteBarrier, RedAndWhiteBarrier, or YellowBarrier[1)]	To get the geometry type.

1) Refer to ConcreteBarrier on page 480, RedAndWhiteBarrier on page 490, or YellowBarrier on page 499.

Methods

The class contains the following methods:

Method	Purpose
Activate	To activate a shape geometry. Refer to Activate on page 495.

Related topics

References

ContinuousObject 481

Activate

Class

ShapeGeometry

Syntax

```
Geometry = ShapeGeometry.Activate(Type)
```

Purpose

To activate a geometry type.

Parameters

The method uses the following parameters:

Parameter	Type	Description
Type	ShapeTypes on page 542[1)]	The type to be activated.

[1)] Refer to ShapeTypes on page 542.

Return value

The method returns the following parameter:

Type	Description
ConcreteBarrier, RedAndWhiteBarrier, or YellowBarrier[1)]	The activated geometry type.

[1)] Refer to ConcreteBarrier on page 480, RedAndWhiteBarrier on page 490, or YellowBarrier on page 499.

Related topics

References

Class Description (ShapeGeometry)..... 494

Trajectory

Purpose

To specify a Trajectory shape.

Where to go from here

Information in this section

Class Description (Trajectory)..... 496
To describe the class and its attributes.

ConnectToConnectionPoint.....497
To connect the trajectory to a connection point.

ConnectToRoadLane.....498
To connect the trajectory with the preferred lane of a road element.

ConnectToTrajectory.....499
To connect the trajectory to another trajectory.

Class Description (Trajectory)

Syntax

No direct creation

Purpose

To specify a Trajectory shape.

Attributes

The class contains the following attributes:

Attributes	Type	Purpose
Description	String	To get/set the description for the shape.
ID	Integer	To get/set the index of the shape.
IsConsistent	Boolean	To get the information whether the shape is consistent.
Name	String	To get/set the name of the shape.
Nodes	Nodes[1)]	To get the nodes of the shape
Position	RoadShapePosition or JunctionShapePosition[2)]	To get/set the start position of the shape.
Type	ShapeTypes[3)]	To get the shape type.
Violation	TrajectoryViolationTypes[4)]	To get the information about which rule is violated by the trajectory.

1) Refer to Nodes on page 486.
2) Refer to RoadShapePosition on page 493 or JunctionShapePosition on page 484.
3) Refer to ShapeTypes on page 542.
4) Refer to TrajectoryViolationTypes on page 544.

Methods

The class contains the following methods:

Method	Purpose
ConnectToConnectionPoint	To connect the trajectory to a connection point. Refer to ConnectToConnectionPoint on page 497.

Method	Purpose
ConnectToRoadLane	To connect the trajectory with the preferred lane of a road element. Refer to ConnectToRoadLane on page 498.
ConnectToTrajectory	To connect the trajectory to another trajectory. Refer to ConnectToTrajectory on page 499.

Related topics

Basics

Shapes 62

References

Shape Properties 272

ConnectToConnectionPoint

Class

Trajectory

Syntax

```
RetVal = Trajectory.ConnectToConnectionPoint(ConnectionPoint, Reference, Offset)
```

Purpose

To connect the trajectory to a connection point.

Parameters

The method uses the following parameters:

Parameter	Type	Description
ConnectionPoint	Object	The connection point to which the trajectory is connected.
Reference	ShapeReferenceType[1]	To select whether the first or the last node of the trajectory is connected.
Offset	Double	Distance between the connected node and the connection point.

[1] Refer to ShapeReferenceType on page 544.

Return value

The method returns the following parameter:

Type	Description
Boolean	True if successful. The connection fails if the connection point and the trajectory are not part of the same road network element.

Related topics

References

Class Description (Trajectory)..... 496

ConnectToRoadLane

Class

Trajectory

Syntax

```
RetVal = Trajectory.ConnectToRoadLane(Direction, Reference, RoadConnectionPoint)
```

Purpose

To connect the trajectory with the preferred lane of a road element.

Parameters

The method uses the following parameters:

Parameter	Type	Description
Direction	RouteDirectionType[1)]	The direction (direct or oncoming) specified for the route.
Reference	ShapeReferenceType[2)]	To select whether the first or the last node of the trajectory is connected.
RoadConnectionPoint	RoadConnectionPoint[3)]	The connection point of the road that contains the preferred lane.

1) Refer to RouteDirectionType on page 541.
2) Refer to ShapeReferenceType on page 544.
3) Refer to RoadConnectionPoint on page 402.

Return value

The method returns the following parameter:

Type	Description
Boolean	True if successful. The connection fails if the connection point is incorrect or the preferred lane is not part of the road element.

Related topics

References

Class Description (Trajectory)..... 496

ConnectToTrajectory

Class

Trajectory

Syntax

```
Result = Trajectory.ConnectToTrajectory(SourceReference, TargetReference,
Trajectory)
```

Purpose

To connect the trajectory to another trajectory.

Parameters

The method uses the following parameters:

Parameter	Type	Description
SourceReference	ShapeReferenceType[1)]	To select whether the first or the last node of the trajectory is connected.
TargetReference	ShapeReferenceType[1)]	To select whether the first or the last node of the selected trajectory is connected.
Trajectory	Trajectory[2)]	The selected trajectory.

1) Refer to ShapeReferenceType on page 544.
2) Refer to Trajectory on page 495.

Return value

The method returns the following parameter:

Type	Description
Boolean	True if successful. The connection fails if the selected trajectory is not part of the connected road element or the selected connection point of the target trajectory is not connected.

Related topics

References

Class Description (Trajectory)..... 496

YellowBarrier

Purpose

To specify a yellow barrier.

Class Description (YellowBarrier)

Syntax

No direct creation

Purpose

To specify a yellow barrier.

Attributes

The class contains the following attributes:

Attributes	Type	Purpose
Height	Double	To get the height of the yellow barrier.
InitialOffset	Double	To get/set the initial offset for the yellow barrier.
Type	GeometryTypes[1)]	To get the geometry type.
Width	Double	To get the width of the yellow barrier.

[1)] Refer to GeometryTypes on page 539.

Methods

–

Related topics

References

Class Description (ShapeGeometry)..... 494
Shape Properties..... 272

SegmentTypes Interfaces

Purpose

To get a segment type.

Where to go from here

Information in this section

Circular..... 501
To get a circular segment.

Clothoid..... 503
To get a clothoid segment.

Spline..... 505
To get a spline segment.

SplineParameters..... 507
To get the spline parameters.

SplineParameter..... 508
To get the parameters of a spline.

SplineVector..... 509
To specify the parameters of a spline vector.

Straight..... 510
To get a straight segment.

Vector..... 512
To get/set the values of a vector.

Circular

Purpose

To get a circular segment.

Where to go from here

Information in this section

Interface Description (Circular)..... 501
To describe the interface and its attributes.

AddAlias..... 502
To add an alias variable.

Interface Description (Circular)

Syntax

No direct creation

Purpose

To specify a circular segment type.

Attributes

The interface contains the following attributes:

Attributes	Type	Purpose
AbsoluteEndVector	SplineVector[1)]	To get the absolute end vector.
AbsoluteStartVector	SplineVector[1)]	To get the absolute start vector.
Angle	Double	To get/set the angle of the segment in degrees.
Index	Integer	To get the index of the segment.
IsConsistent	Boolean	To get the information whether the segment is consistent.
Length	Double	To get/set the length of the segment.
Name	String	To get/set the name of the segment.
Radius	Double	To get/set the radius of the circular segment.
S	Double	To get the start value of the segment in meters.
Type	SegmentTypes[2)]	To get the segment type.

1) Refer to SplineVector on page 509.
2) Refer to SegmentTypes on page 542.

Methods

The interface contains the following methods:

Method	Description
AddAlias	To add an alias variable. Refer to AddAlias on page 502.

Related topics

References

Class Description (Segment) 447

AddAlias

Class

Circular

Syntax

```
RetVal = Circular.AddAlias(PropertyName)
```

Purpose

To add an alias variable.

Parameters

The method uses the following parameters:

Parameter	Type	Description
PropertyName	String	The property name for the alias variable.

Return value

The method returns the following parameter:

Type	Description
Boolean	True if successful

Related topics

References

Interface Description (Circular)..... 501

Clothoid

Purpose

To get a clothoid segment.

Where to go from here

Information in this section

Interface Description (Clothoid)..... 503
To describe the interface and its attributes.

AddAlias..... 504
To add an alias variable.

Interface Description (Clothoid)

Syntax

No direct creation

Purpose

To specify a clothoid segment type.

Attributes

The interface contains the following attributes:

Attributes	Type	Purpose
AbsoluteEndVector	SplineVector[1)]	To get the absolute end vector.
AbsoluteStartVector	SplineVector[1)]	To get the absolute start vector.
Index	Integer	To get the index of the segment.
IsConsistent	Boolean	The get the information whether the clothoid is consistent.
IsInfinite	Boolean	To get/set the radius of the clothoid segment's end as infinite.
Length	Double	To get/set the length of the segment.
Name	String	To get/set the name of the segment.
Radius	Double	To get/set the radius of the clothoid segment's end.
S	Double	To get the start value of the segment in meters.
Type	SegmentTypes[2)]	To get the segment type.

1) Refer to SplineVector on page 509.
2) Refer to SegmentTypes on page 542.

Methods

The interface contains the following methods:

Method	Description
AddAlias	To add an alias variable. Refer to AddAlias on page 504.

Related topics

References

Class Description (Segment)..... 447

AddAlias

Class

Clothoid

Syntax

```
RetVal = Clothoid.AddAlias(PropertyName)
```

Purpose

To add an alias variable.

Parameters

The method uses the following parameters:

Parameter	Type	Description
PropertyName	String	The property name for the alias variable.

Return value

The method returns the following parameter:

Type	Description
Boolean	True if successful

Related topics

References

Interface Description (Clothoid) 503

Spline

Purpose

To get a spline segment.

Where to go from here

Information in this section

Interface Description (Spline) 505
To describe the interface and its attributes.

AddAlias 507
To add an alias variable.

Interface Description (Spline)

Syntax

No direct creation

Purpose

To specify a spline segment type.

Attributes

The interface contains the following attributes:

Attributes	Type	Purpose
AbsoluteEndVector	Vector[4]	To get/set the end vector of the spline segment's end relative to the origin of the coordinate system.
AbsoluteStartVector	SplineVector[1]	To get the absolute start vector.
DefinitionType	SplineDefinitionTypes[2]	To get/set the definition type.
Index	Integer	To get the index of the segment.
IsConsistent	Boolean	To get information whether the segment is consistent.
Length	Double	To get/set the length of the segment.
Name	String	To get/set the name of the segment.
Parameters	SplineParameters[3]	To get/set the spline parameters.
RelativeEndVector	Vector[4]	To get/set the end vector of the spline segment's end relative to the end of the previous segment.
S	Double	To get the start value of the segment in meters.
Type	SegmentTypes[5]	To get the segment type.

[1] Refer to SplineVector on page 509.
[2] Refer to SplineDefinitionTypes on page 543.
[3] Refer to SplineParameters on page 507.
[4] Refer to Vector on page 512.
[5] Refer to SegmentTypes on page 542.

Methods

The interface contains the following methods:

Method	Description
AddAlias	To add an alias variable. Refer to AddAlias on page 507.

Related topics

References

Class Description (Segment)..... 447

AddAlias

Class

Spline

Syntax

```
RetVal = Spline.AddAlias(PropertyName)
```

Purpose

To add an alias variable

Parameters

The method uses the following parameters:

Parameter	Type	Description
PropertyName	String	The property name for the alias variable.

Return value

The method returns the following parameter:

Type	Description
Boolean	True if successful

Related topics

References

Interface Description (Spline)..... 505

SplineParameters

Purpose

To get the spline parameters.

Interface Description (SplineParameters)

Syntax

```
SplineParameters = Spline.Parameters
```

Purpose

To get the spline parameters.

Attributes

The interface contains the following attributes:

Attributes	Type	Purpose
X	SplineParameter[1)]	To get the spline parameter of x.
Y	SplineParameter[1)]	To get the spline parameter of y.

[1)] Refer to SplineParameter on page 508.

Methods

–

Related topics

References

Interface Description (Spline)..... 505

SplineParameter

Purpose

To get the parameters of a spline.

Interface Description (SplineParameter)

Syntax

```
SplineParameter = SplineParameters.X
SplineParameter = SplineParameters.Y
```

Purpose

To get the parameter values of a spline.

Attributes

The interface contains the following attributes:

Attributes	Type	Purpose
a	Double	To get the value of a.
b	Double	To get the value of b.
c	Double	To get the value of c.
d	Double	To get the value of d.

Methods –

Related topics

References

Interface Description (SplineParameters)..... 507

SplineVector

Purpose To specify the parameters of a spline vector.

Interface Description (SplineVector)

Syntax No direct creation.

Purpose To get/set the values of a vector.

Attributes The interface contains the following attributes:

Attributes	Type	Purpose
Tangent	Double	To get/set the value of the tangent angle in degrees.
X	Double	To get/set the x value in meters.
Y	Double	To get/set the y value in meters.

Methods –

Straight

Purpose

To get a straight segment.

Where to go from here

Information in this section

Interface Description (Straight)..... 510
To describe the interface and its attributes.

AddAlias..... 511
To add an alias variable.

Interface Description (Straight)

Syntax

No direct creation

Purpose

To specify a straight segment type.

Attributes

The interface contains the following attributes:

Attributes	Type	Purpose
AbsoluteEndVector	SplineVector[1)]	To get the absolute end vector.
AbsoluteStartVector	SplineVector[1)]	To get the absolute start vector.
Index	Integer	To get the index of the segment.
IsConsistent	Boolean	To get the information whether the segment is consistent.
IsInfinite	Boolean	To get/set the radius of the clothoid segment's end as infinite.
Length	Double	To get/set the length of the segment.
Name	String	To get/set the name of the segment.
Radius	Double	To get/set the radius of the clothoid segment's end.
S	Double	To get the start value of the segment in meters.
Type	SegmentTypes[2)]	To get the segment type.

1) Refer to SplineVector on page 509.
2) Refer to SegmentTypes on page 542.

Methods

The interface contains the following methods:

Method	Description
AddAlias	To add an alias variable. Refer to AddAlias on page 511.

Related topics

References

Class Description (Segment) 447

AddAlias

Class

Straight

Syntax

```
RetVal = Straight.AddAlias(PropertyName)
```

Purpose

To add an alias variable.

Parameters

The method uses the following parameters:

Parameter	Type	Description
PropertyName	String	The property name for the alias variable.

Return value

The method returns the following parameter:

Type	Description
Boolean	True if successful

Related topics

References

Interface Description (Straight) 510

Vector

Purpose

To get/set the values of a vector.

Interface Description (Vector)

Syntax

No direct creation

Purpose

To get/set the values of a vector.

Attributes

The interface contains the following attributes:

Attributes	Type	Purpose
Tangent	Double	To get/set the value of the tangent angle in degrees.
X	Double	To get/set the x value in meters.
Y	Double	To get/set the y value in meters.

Methods

The interface has the following methods:

Method	Description
AddAlias	To add an alias variable. Refer to AddAlias on page 507.

SceneryTypes Interfaces

Purpose

To get a scenery type.

Where to go from here

Information in this section

Alley 514
To get the Alley scenery type.

Batter 515
To get the Batter scenery type.

Bridge..... 516
To get the Bridge scenery type.

BridgeItem..... 517
To specify the bridge item.

Buildings..... 518
To specify the use of buildings in a city scenery.

BuildingType..... 519
To specify the building types of a scenery.

City..... 520
To get the City scenery type.

CountryRoad..... 521
To get the CountryRoad scenery type.

Curbstone..... 523
To specify the curbstones of a city scenery.

Forest..... 523
To specify the forest of a scenery.

GuardRail..... 524
To specify the guard rail.

Highway..... 525
To get the Highway scenery type.

JunctionScenery..... 526
To specify the scenery of a junction.

JunctionSceneryAdapt..... 528
To specify an adapted scenery of a junction.

JunctionSceneryBatter..... 529
To specify a batter scenery of a junction.

JunctionSceneryBridge..... 530
To specify a bridge scenery of a junction.

Metro..... 531
To specify the Metro city scenery.

NoiseBarrier..... 531
To specify the noise barrier.

ReflectorPost..... 532
To specify the reflector posts.

Rural..... 533
To specify the Rural city scenery.

Sidewalk..... 534
To specify the sidewalks of a city scenery.

StreetLights..... 535
To specify the street lights of a scenery.

TreeLine..... 536
To specify the tree line.

Urban..... 536
To specify the Urban city scenery.

Alley

Purpose

To get the Alley scenery type.

Class Description (Alley)

Syntax

No direct creation

Purpose

To get the Alley scenery type.

Attributes

The class contains the following attributes:

Attributes	Type	Purpose
Bridge	BridgeItem[1)]	To get the settings for a bridge.
EmbankmentWidth	Double	To get/set the width of the embankment.
Index	Integer	To get the index of the scenery section.
Length	Double	To get/set the length of the scenery section.
Name	String	To get/set the name of the scenery section.
ReflectorPost	ReflectorPost[2)]	To get the settings for the reflector posts.
S	Double	To get the position of the scenery section.
SideSelection	ScenerySideSelectionTypes[3)]	To get/set the side for the scenery.
SpeedLimit	Double	To get/set the speed limit in the scenery section.

Attributes	Type	Purpose
TreeLine	TreeLine[4)]	To get the settings for the tree line.
Type	SceneryTypes[5)]	To get the scenery type.

1) Refer to BridgeItem on page 517.
2) Refer to ReflectorPost on page 532.
3) Refer to SceneryTypes on page 542.
4) Refer to TreeLine on page 536.
5) Refer to SceneryTypes on page 542.

Methods

–

Related topics

Basics

Scenery..... 56

Batter

Purpose

To get the Batter scenery type.

Class Description (Batter)

Syntax

No direct creation

Purpose

To get the Batter scenery type.

Attributes

The class contains the following attributes:

Attributes	Type	Purpose
Index	Integer	To get the index of the scenery section.
Length	Double	To get/set the length of the scenery section.
Margin	Double	To get/set the width of the margin.
Name	String	To get/set the name of the scenery section.
S	Double	To get the position of the scenery section.

Attributes	Type	Purpose
SpeedLimit	Double	To get/set the speed limit in the scenery section.
Type	SceneryTypes[1)]	To get the scenery type.

[1)] Refer to SceneryTypes on page 542.

Methods

–

Related topics

Basics

Scenery.....56

Bridge

Purpose

To get the Bridge scenery type.

Class Description (Bridge)

Syntax

No direct creation

Purpose

To get the Bridge scenery type.

Attributes

The class contains the following attributes:

Attributes	Type	Purpose
Height	Double	To get/set the height of the margin, which is visualized as solid in the scenery section.
Index	Integer	To get the index of the scenery section.
Length	Double	To get/set the length of the scenery section.
Margin	Double	To get/set the width of the margin.
Name	String	To get/set the name of the scenery section.
S	Double	To get the position of the scenery section.

Attributes	Type	Purpose
SpeedLimit	Double	To get/set the speed limit in the scenery section.
Type	SceneryTypes[1)]	To get the scenery type.

[1)] Refer to SceneryTypes on page 542.

Methods

–

Related topics

Basics

Scenery.....56

BridgeItem

Purpose

To specify the bridge item.

Class Description (BridgeItem)

Syntax

```
BridgeItem = Alley.Bridge
BridgeItem = CountryRoad.Bridge
```

Purpose

To specify a bridge item.

Attributes

The class contains the following attributes:

Attributes	Type	Purpose
Height	Double	To get/set the height of the margin which is visualized as solid in the scenery section.
Margin	Double	To get/set the width of the margin.

Methods

–

Related topics

References

Class Description (Alley)..... 514
Class Description (CountryRoad)..... 522

Buildings

Purpose

To specify the use of buildings in a city scenery.

Class Description (Buildings)

Syntax

```
Buildings = Urban.Buildings
Buildings = Metro.Buildings
```

Purpose

To specify the use of buildings in a city scenery.

Attributes

The class contains the following attributes:

Attributes	Type	Purpose
Distance	Double	To get/set the distance between the buildings and the road..
Offset	Double	To get/set the distance of the first building to the beginning of the scenery section.
Interval	Double	To get/set the distance between the buildings.

Methods

–

Related topics

References

Class Description (Metro)..... 531
Metro..... 531
Urban..... 536

BuildingType

Purpose

To specify the building types of a scenery.

Where to go from here

Information in this section

Class Description (BuildingType)..... 519
To describe the class and its attributes.

Activate..... 520
To activate a building type of a City scenery section.

Class Description (BuildingType)

Syntax

```
BuildingType = City.BuildingType
```

Purpose

To specify the building types of a scenery.

Attributes

The class contains the following attributes:

Attributes	Type	Purpose
ActiveElement	Metro, Rural, or Urban[1)]	To get the activated building type.

[1)] Refer to Metro on page 531, Rural on page 533, or Urban on page 536.

Methods

The class contains the following methods:

Method	Purpose
Activate	To activate a building type of a City scenery section. Refer to Activate on page 520.

Related topics

References

City..... 520

Activate

Class

BuildingType

Syntax

```
BuildingType = BuildingType.Activate(Type)
```

Purpose

To activate a building type of a City scenery section.

Parameters

The method uses the following parameters:

Parameter	Type	Description
Type	BuildingTypes[1)]	The building type to be activated.

1) Refer to BuildingTypes on page 538.

Return value

The method returns the following parameter:

Type	Description
Metro, Rural, or Urban[1)]	The activated building type.

1) Refer to Metro on page 531, Rural on page 533, or Urban on page 536.

Related topics

References

Class Description (BuildingType)..... 519

City

Purpose

To get the City scenery type.

Class Description (City)

Syntax

No direct creation

Purpose

To get the City scenery type.

Attributes

The class contains the following attributes:

Attributes	Type	Purpose
BuildingType	BuildingType[1)]	To get the building types.
Index	Integer	To get the index of the scenery section.
Length	Double	To get/set the length of the scenery section.
Margin	Double	To get/set the width of the margin.
Name	String	To get/set the name of the scenery section.
S	Double	To get the position of the scenery section.
SideSelection	SceneySideSelectionTypes[2)]	To get the side selected for the scenery.
SpeedLimit	Double	To get/set the speed limit in the scenery section.
StreetLights	StreetLights[3)]	To get the settings of the street lights.
Type	SceneryTypes[4)]	To get the scenery type.

1) Refer to BuildingType on page 519.
2) Refer to ScenerySideSelectionTypes on page 542.
3) Refer to StreetLights on page 535.
4) Refer to SceneryTypes on page 542.

Methods

–

Related topics

Basics

Scenery.....56

CountryRoad

Purpose

To get the CountryRoad scenery type.

Class Description (CountryRoad)

Syntax

No direct creation

Purpose

To get the CountryRoad scenery type.

Attributes

The class contains the following attributes:

Attributes	Type	Purpose
Bridge	BridgeItem[1)]	To get the settings for a bridge.
EmbankmentWidth	Double	To get/set the width of the embankment.
Index	Integer	To get the index of the scenery section.
Length	Double	To get/set the length of the scenery section.
Name	String	To get/set the name of the scenery section.
ReflectorPost	ReflectorPost[2)]	To get the settings for the reflector posts.
S	Double	To get the position of the scenery section.
SideSelection	SceneySideSelectionTypes[3)]	To get/set the side for the scenery.
SpeedLimit	Double	To get/set the speed limit in the scenery section.
Trees	Forest[4)]	To get the settings for the trees.
Type	SceneryTypes[5)]	To get the scenery type.

1) Refer to BridgeItem on page 517.
2) Refer to ReflectorPost on page 532.
3) Refer to SceneySideSelectionTypes on page 542.
4) Refer to Forest on page 523.
5) Refer to SceneryTypes on page 542.

Methods

–

Related topics

Basics

Scenery..... 56

Curbstone

Purpose

To specify the curbstones of a city scenery.

Class Description (Curbstone)

Syntax

```
Curbstone = Urban.Curbstone
Curbstone = Metro.Curbstone
```

Purpose

To specify the curbstones of a city scenery.

Attributes

The class contains the following attributes:

Attributes	Type	Purpose
Height	Double	To get/set the height of the curbstones.
Width	Double	To get/set the width of the curbstones.

Methods

–

Related topics

References

Metro..... 531
Urban..... 536

Forest

Purpose

To specify the forest of a scenery.

Class Description (Forest)

Syntax

No direct creation

Purpose

To specify the forest of a scenery.

Attributes

The class contains the following attributes:

Attributes	Type	Purpose
Density	ForestDensityType[1)]	To get/set the density of the trees.
Enabled	Boolean	To get/set the use of a forest.
Width	Double	To get/set the width of the forest.

1) Refer to ForestDensityType on page 538.

Methods

–

Related topics

References

Class Description (CountryRoad)..... 522

GuardRail

Purpose

To specify the guard rail.

Class Description (GuardRail)

Syntax

```
GuardRail = Highway.GuardRail
```

Purpose

To specify the guard rail of a scenery.

Attributes

The class contains the following attributes:

Attributes	Type	Purpose
Distance	Double	To get/set the distance between guard rail posts and road.
Enabled	Boolean	To get/set the generation of a guard rail.
HasEndTerminal	Boolean	To get/set the generation of an end terminal.
HasStartTerminal	Boolean	To get/set the generation of a start terminal.
Height	Double	To get/set the height of the guard rail.
Interval	Double	To get/set the interval of the guard rail posts.
Offset	Double	To get/set the initial offset of the guard rail.

Methods

–

Related topics

References

Class Description (Highway)..... 525

Highway

Purpose

To get the Highway scenery type.

Class Description (Highway)

Syntax

No direct creation

Purpose

To get the Highway scenery type.

Attributes

The class contains the following attributes:

Attributes	Type	Purpose
Bridge	BridgeItem[1)]	To get the settings for a bridge.
EmbankmentWidth	Double	To get/set the width of the embankment.
GuardRail	GuardRail[2)]	To get the settings for the guard rail.

Attributes	Type	Purpose
Index	Integer	To get the index of the scenery section.
Length	Double	To get/set the length of the scenery section.
Name	String	To get/set the name of the scenery section.
NoiseBarrier	NoiseBarrier[3)]	To get the settings for the noise barrier.
ReflectorPost	ReflectorPost[4)]	To get the settings for the reflector posts.
S	Double	To get the position of the scenery section.
SideSelection	SceneryDideSelectionTypes[5)]	To get/set the side for the scenery.
SpeedLimit	Double	To get/set the speed limit in the scenery section.
Type	SceneryTypes[6)]	To get the scenery type.

1) Refer to BridgeItem on page 517.
2) Refer to GuardRail on page 524.
3) Refer to NoiseBarrier on page 531.
4) Refer to ReflectorPost on page 532.
5) Refer to SceneryDideSelectionTypes on page 542.
6) Refer to SceneryTypes on page 542.

Methods

–

Related topics

Basics

Scenery..... 56

JunctionScenery

Purpose

To specify the scenery of a junction.

Where to go from here

Information in this section

Class Description (JunctionScenery)..... 527
To describe the class and its attributes.

Activate 527
To activate a scenery of the junction's border.

Class Description (JunctionScenery)

Syntax

```
JunctionScenery = Border.Scenery
```

Purpose

To specify the scenery of a junction.

Attributes

The class contains the following attributes:

Attributes	Type	Purpose
ActiveElement	JunctionSceneryAdapt, JunctionSceneryBatter, or JunctionSceneryBridge[1)]	To get the active scenery of the junction's border.

1) Refer to JunctionSceneryAdapt on page 528, JunctionSceneryBatter on page 529, orJunctionSceneryBridge on page 530.

Methods

The class contains the following methods:

Method	Purpose
Activate	To activate a scenery of the junction's border. Refer to Activate on page 527.

Related topics

References

Class Description (Border) 328

Activate

Class

JunctionScenery

Syntax

```
Object = JunctionScenery.Activate(Type)
```

Purpose

To activate a scenery of the junction's border.

Parameters

The method uses the following parameters:

Parameter	Type	Description
Type	JunctionSceneryAdapt, JunctionSceneryBatter, or JunctionSceneryBridge[1)]	The type to be activated.

[1)] Refer to JunctionSceneryAdapt on page 528, JunctionSceneryBatter on page 529, orJunctionSceneryBridge on page 530.

Return value

The method returns the following parameter:

Type	Description
JunctionSceneryAdapt, JunctionSceneryBatter, or JunctionSceneryBridge[1)]	The activated scenery of the junction's border.

[1)] Refer to JunctionSceneryAdapt on page 528, JunctionSceneryBatter on page 529, orJunctionSceneryBridge on page 530.

Related topics

References

Class Description (JunctionScenery)..... 527

JunctionSceneryAdapt

Purpose

To specify an adapted scenery of a junction.

Class Description (JunctionSceneryAdapt)

Syntax

No direct creation.

Purpose

To specify an adapted scenery of a junction's border.

Attributes

The class contains the following attributes:

Attributes	Type	Purpose
Type	JunctionSceneryTypes[1)]	To get the type of the scenery's border.

[1)] Refer to JunctionSceneryTypes on page 540.

Methods

–

Related topics

References

Border Line Properties..... 246

JunctionSceneryBatter

Purpose

To specify a batter scenery of a junction.

Class Description (JunctionSceneryBatter)

Syntax

No direct creation.

Purpose

To specify a batter scenery of a junction's border.

Attributes

The class contains the following attributes:

Attributes	Type	Purpose
Margin	Double	To get/set the width of the margin.
Type	JunctionSceneryTypes[1)]	To get the type of the scenery's border.

[1)] Refer to JunctionSceneryTypes on page 540.

Methods –

Related topics References

Border Line Properties..... 246

JunctionSceneryBridge

Purpose To specify a bridge scenery of a junction.

Class Description (JunctionSceneryBridge)

Syntax No direct creation.

Purpose To specify a bridge scenery of a junction's border.

Attributes The class contains the following attributes:

Attributes	Type	Purpose
Height	Double	To get/set the height.
Margin	Double	To get/set the width of the margin.
Type	JunctionSceneryTypes[1)]	To get the type of the scenery's border.

[1)] Refer to JunctionSceneryTypes on page 540.

Methods –

Related topics References

Border Line Properties..... 246

Metro

Purpose

To specify the Metro city scenery.

Class Description (Metro)

Syntax

No direct creation

Purpose

To specify the Metro city scenery.

Attributes

The class contains the following attributes:

Attributes	Type	Purpose
Curbstone	Curbstone[1)]	To get the curbstones.
Sidewalk	Sidewalk[2)]	To get the sidewalk.
Buildings	Buildings[3)]	To get the buildings.
Type	BuildingTypes[4)]	To get the type.

1) Refer to Curbstone on page 523.
2) Refer to Sidewalk on page 534.
3) Refer to Buildings on page 518.
4) Refer to BuildingTypes on page 538.

Methods

–

Related topics

References

Class Description (BuildingType)..... 519

NoiseBarrier

Purpose

To specify the noise barrier.

Class Description (NoiseBarrier)

Syntax

No direct creation

Purpose

To specify the noise barrier of a scenery.

Attributes

The class contains the following attributes:

Attributes	Type	Purpose
Distance	Double	To get/set the distance between noise barrier and road.
Enabled	Boolean	To get/set the generation of a noise barrier.
HasEndTerminal	Boolean	To get/set the generation of an end terminal.
HasStartTerminal	Boolean	To get/set the generation of a start terminal.
Height	Double	To get/set the height of the noise barrier.
Interval	Double	To get/set the interval of the noise barrier posts.
Offset	Double	To get/set the initial offset of the noise barrier.
WallStyleType	WallStyleType[1)]	To get/set the style of the wall.

1) Refer to WallStyleType on page 544.

Methods

–

Related topics

References

Class Description (Highway)..... 525

ReflectorPost

Purpose

To specify the reflector posts.

Class Description (ReflectorPost)

Syntax

```
ReflectorPost = Alley.ReflectorPost
```

```
ReflectorPost = Highway.ReflectorPost
ReflectorPost = CountryRoad.ReflectorPost
```

Purpose

To specify the reflector posts.

Attributes

The class contains the following attributes:

Attributes	Type	Purpose
Enabled	Boolean	To get/set the use of reflector posts.
Distance	Double	To get/set the distance between the trees and the road.
Interval	Double	To get/set the distance between the trees.
Offset	Double	To get/set the distance between the first tree and the beginning of the scenery section.

Methods

–

Related topics

References

Class Description (Alley) 514
Class Description (CountryRoad) 522
Class Description (Highway) 525

Rural

Purpose

To specify the Rural city scenery.

Class Description (Rural)

Syntax

No direct creation

Purpose

To specify the Rural city scenery.

Attributes

The class contains the following attributes:

Attributes	Type	Purpose
Trees	ForestDensityType[1)]	To get the density of the trees.
Type	BuildingTypes[2)]	To get the type.

1) Refer to ForestDensityType on page 538.
2) Refer to BuildingTypes on page 538.

Methods

–

Related topics

References

Class Description (BuildingType)..... 519

Sidewalk

Purpose

To specify the sidewalks of a city scenery.

Class Description (Sidewalk)

Syntax

No direct creation

Purpose

To specify the sidewalks of a city scenery.

Attributes

The class contains the following attributes:

Attributes	Type	Purpose
Distance	Double	To get the distance of the sidewalk to the curbstones.
Texture	SideWalkTextureType[1)]	To get/set the texture of the sidewalk.
Width	Double	To get/set the width of the sidewalk.

1) Refer to SideWalkTextureType on page 542.

Methods

–

Related topics

References

Class Description (Metro) 531

StreetLights

Purpose

To specify the street lights of a scenery.

Class Description (StreetLights)

Syntax

```
StreetLights = City.StreetLights
```

Purpose

To get the street lights of a City scenery type.

Attributes

The class contains the following attributes:

Attributes	Type	Purpose
Enabled	Boolean	To get/set the use of street lights.
Distance	Double	To get/set the distance between street lights and road.
Offset	Double	To get/set the distance of the first street light to the beginning of the scenery section.
Interval	Double	To get/set the distance between the street lights.

Methods

–

Related topics

References

Class Description (City) 521

TreeLine

Purpose

To specify the tree line.

Class Description (TreeLine)

Syntax

```
TreeLine = Alley.TreeLine
```

Purpose

To specify a tree line.

Attributes

The class contains the following attributes:

Attributes	Type	Purpose
Distance	Double	To get/set the distance between the trees and the road.
Interval	Double	To get/set the distance between the trees.
Offset	Double	To get/set the distance between the first tree and the beginning of the scenery section.

Methods

–

Related topics

References

Class Description (Alley)..... 514

Urban

Purpose

To specify the Urban city scenery.

Class Description (Urban)

Syntax

No direct creation

Purpose

To specify the Urban city scenery.

Attributes

The class contains the following attributes:

Attributes	Type	Purpose
Curbstone	Curbstone[1)]	To get the curbstones.
Sidewalk	Sidewalk[2)]	To get the sidewalk.
Buildings	Buildings[3)]	To get the buildings.
Type	BuildingTypes[4)]	To get the type.

1) Refer to Curbstone on page 523.
2) Refer to Sidewalk on page 534.
3) Refer to Buildings on page 518.
4) Refer to BuildingTypes on page 538.

Methods

–

Related topics

References

Class Description (BuildingType)..... 519

Enumerations for Roads

Enumerations for Roads

Introduction

You can use predefined constants in the tool automation.

Constants of the Road Generator

The following constants exist to automate the Road Generator.

BorderType The following constants are used to specify the border type:

Value	Description
Spline = 0	Spline
Straight = 1	Straight

BuildingTypes The following constants are used to specify the kind of buildings of a city scenery:

Value	Description
Urban = 0	Urban
Metro = 1	Metro
Rural = 2	Rural

CustomFrictionMapType The following constants are used to specify the custom friction map type:

Value	Description
Constant = 0	Friction is constant in the area
Table = 1	Friction is specified by a table in the area

EnvironmentObjectSide The following constants are used to specify the roadside where a traffic object is added:

Value	Description
Left = 0	Left side
Right = 1	Right side

ExportTypes The following constants are used to specify the type when the road model is exported to a file:

Value	Description
OpenDRIVE_14	OpenDRIVE 1.4H format

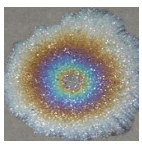
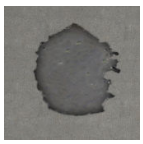
ForestDensityType The following constants are used to specify the density of the forest:

Value	Description
Thick = 0	Thick
Medium = 1	Medium
Thin = 2	Thin
Bare = 3	Bare

FrictionBasedSurfaceTypes The following constants are used to specify the tire parameter types which correspond to road surface conditions:

Value	Description
CustomFrictionMap = 0	Area that has friction coefficients different to the remaining road
SurfaceCondition = 1	Area that has a surface condition different to the remaining road

FrictionTextureType The following constants are used to specify the texture type for a friction area:

Value	Description
None = 0	No texture
Leaves = 1	
OilPatch = 2	
Puddle = 3	

GeometryTypes The following constants are used to specify the geometry of the continuous object for a shape:

Value	Description
ConcreteBarrier = 0	Concrete barrier
RedAndWhiteBarrier = 1	Red and white barrier
YellowBarrier = 2	Yellow barrier

HeightBasedSurfacesTypes The following constants are used to specify a texture for an area with additional height profile:

Value	Description
CustomHeightMap = 0	Additional height specified by a table of height points
Sinusoidal = 1	Sine half-waves used as additional height
Trapezoidal = 2	Trapezoid profiles used as additional height

HeightProfileInterpolationType The following constants are used to specify the interpolation type for the height profile:

Value	Description
Linear = 0	Linear
Smooth = 1	Smooth
Cubic = 2	Cubic

HeightTextureType The following constants are used to specify a texture for an area with additional height profile:

Value	Description
None = 0	No texture
GullyCoverRound = 1	Round gully cover

Value	Description
GullyCoverRectangular = 2	Rectangular gully cover
Chuckhole = 3	Pothole

JunctionSectionTypes The following constants are used to specify the course between the nodes of a shape on a junction:

Value	Description
Straight = 0	Nodes are linearly connected.
Spline = 1	Nodes are connected using a spline curve.

JunctionSceneryTypes The following constants are used to specify the scenery type of the junction:

Value	Description
Batter = 0	Batter scenery type
Bridge = 1	Bridge scenery type
Adapt = 2	Type is adapted to the scenery type of the connected road

LineInterpretationTypes The following constants are used to specify the line interpretation type:

Value	Description
LineIncluded = 0	Line included
LineExcluded = 1	Line excluded

LinePresets The following constants are used to specify a preset for a line.

Value	Description
None = 0	No preset
Dash = 1	Dashed line
Solid = 2	Solid line
DashSolid = 3	Dashed solid line
SolidDash = 4	Solid dashed line
Race = 5	Race line
DoubleSolid = 6	Double solid line
DoubleDash = 7	Double dashed line
Custom = 8	Custom-defined line

LineSpacingTextureTypes The following constants are used to specify the texture which is used at the space between lines:

Value	Description
None = 0	No texture
BarredLine = 1	Barred line

LineTypes The following constants are used to specify the type of a line.

Value	Description
Solid = 0	Solid line
Dash = 1	Dashed line
Bicolor = 2	Bi-colored line

RoadConnectionPointType The following constants are used to specify the road connection point type:

Value	Description
Start = 0	Start connection point
End = 1	End connection point

RoadNetworkElementTypes The following constants are used to specify the road network element type:

Value	Description
Road = 0	Road
Junction = 1	Junction

RoadSectionTypes The following constants are used to specify the course between the nodes and the reference line of a shape on a road:

Value	Description
Offset = 0	The offset between nodes and reference line is linear.
SmoothOffset = 1	The offset between nodes and reference line is smooth.

RoadSideTypes The following constants are used to specify the side of a road:

Value	Description
Left = 0	Left side
Right = 1	Right side

RouteDirectionType The following constants are used to specify the route direction type:

Value	Description
Direct = 0	Direct
Oncoming = 1	Oncoming
None = 2	Nondirectional

RouteElementPathTypes The following constants are used to specify the path that is used on a route element:

Value	Description
Default = 0	The default path is used.
Trajectory = 1	A path specified by a trajectory is used.

SceneryDeSideSelectionTypes The following constants are used to specify the side for the scenery:

Value	Description
Left = 0	Left
Both = 1	Left and right
Right = 2	Right

SceneryTypes The following constants are used to specify the type of the scenery:

Value	Description
Batter = 0	Batter
Bridge = 1	Bridge
Alley = 2	Tree-lined road
CountryRoad = 3	Country road
City = 4	City
Highway = 5	Highway

SegmentTypes The following constants are used to specify the segment type:

Value	Description
Straight = 0	Straight
Circular = 1	Circular
Clothoid = 2	Clothoid
Spline = 3	Spline

ShapeTypes The following constants are used to specify the shape type:

Value	Description
Line = 0	Line type
RepeatingObject = 1	Repeating type
ContinuousObject = 2	Continuous type

SideWalkTextureType The following constants are used to specify the texture of a sidewalk:

Value	Description
Concrete = 0	Concrete
Cobblestone1 = 1	Cobblestone variant 1
Cobblestone2 = 2	Cobblestone variant 2
Cobblestone3 = 3	Cobblestone variant 3
Cobblestone4 = 4	Cobblestone variant 4
Cobblestone5 = 5	Cobblestone variant 5

SplineDefinitionTypes The following constants are used to specify how a spline is defined:

Value	Description
EndVector = 0	The spline is defined by an end vector.
ParameterBased = 1	The spline is defined by parameters.

TextureBasedSurfaceTypes The following constants are used to specify the texture-based surface type:

Value	Description
TextureMap = 0	Texture map

TextureMapOrientationTypes The following constants are used to specify the texture map orientation type:

Value	Description
Direct = 0	Direct
Oncoming = 1	Oncoming
Left = 2	Left
Right = 3	Right

TextureType The following constants are used to specify the texture type:

Value	Description
None = 0	No texture
GullyCoverRound = 1	Round gully cover
GullyCoverRectangular = 2	Rectangular gully cover
Pothole1 = 3	Pot hole type 1
Pothole2 = 4	Pot hole type 2
FatigueCracking1 = 5	Fatigue cracking type 1
FatigueCracking2 = 6	Fatigue cracking type 2
FatigueCracking3 = 7	Fatigue cracking type 3
ArrowStraightAhead = 8	Arrow straight ahead
ArrowLeft = 9	Arrow left
ArrowRight = 10	Arrow right
ArrowAheadAndLeft = 11	Arrow ahead and left
ArrowAheadAndRight = 12	Arrow ahead and right
StopLine = 13	Stop line
ZebraCrossing = 14	Zebra crossing
BarredArea1 = 15	Barred Area1
MarkerBusLane = 16	Marker bus lane
MarkerStop = 17	Marker Stop
MarkerNoParking = 18	Marker no parking
MarkerBikeLane = 19	Marker bike lane
MarkerHandicappedParking = 20	Marker handicapped parking
MarkerSpeedLimit1 = 21	Marker speed limit

TireParameterTypes The following constants are used to specify the tire parameter types which correspond to surface conditions:

Value	Description
Dry = 1	Tire parameter set for dry surface
Damp = 2	Tire parameter set damp surface
Wet = 3	Tire parameter set wet surface
Icy = 4	Tire parameter set icy surface

TrafficType The following constants are used to specify the traffic type:

Value	Description
RightHandTraffic = 0	Right-hand traffic
LeftHandTraffic = 1	Left-hand traffic

TrajectoryViolationTypes The following constants are used to get information which rule is violated by a trajectory:

Value	Description
Valid = 0	The trajectory is valid.
FirstNodeApartConnectionPointLine = 1	The first node is outside the connection point line.
LastNodeApartConnectionPointLine = 2	The last node is outside the connection point line.
FirstNodeOutOfRange = 4	The first node is out of range.
LastNodeOutOfRange = 8	The last node is out of range.
MonotonyViolated = 16	The trajectory is not monotone.
CourseNotSmooth = 32	The course is not smooth.

ShapeReferenceType The following constants are used to specify the shape reference type:

Value	Description
Start = 0	The start of the shape is referenced.
End = 1	The end of the shape is referenced.

WallStyleType The following constants are used to specify the style of a wall:

Value	Description
MetallicBlue = 0	Metallic blue
Concrete = 1	Concrete
Wooden = 2	Wooden

ZOrderTypes The following constants are used to specify the z-order:

Value	Description
Level1 = 1	Level 1
Level2 = 2	Level 2
Level3 = 3	Level 3
Level4 = 4	Level 4

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