

ModelDesk

# Glossary

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## How to Contact dSPACE

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

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Tel.: +49 5251 1638-941 or e-mail: [support@dspace.de](mailto:support@dspace.de)

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dSPACE GmbH  
Rathenaustraße 26  
33102 Paderborn  
Germany

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# ModelDesk Glossary

Introduction	The glossary briefly explains the most important expressions and naming conventions used in the ModelDesk documentation.
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## A

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**Alias variable** A variable that is used for modifying the value of one or more properties ([property reference](#)).

**ASM demo** The ASM demos include all the necessary files for the simulation, for example:

- ASM demo model
- ModelDesk project for parameterizing the model
- ControlDesk project for experimenting with the model
- MotionDesk project for animation (if useful)

**ASM demo model** A simulation model based on the ASM blocks including the simulation applications for the simulation platforms.

**Automation interface** A programming interface that allows you to automate ModelDesk, for example, by using Python scripts. The automation interface is an API which is implemented as a COM object model. The Microsoft Component Object Model (COM) supports communication between objects from different applications. It can be used by any COM-compatible application, regardless of the programming language in which it was developed.

**Automotive Simulation Model (ASM)** A Simulink model that is intended for simulation of an automotive engine (gasoline and Diesel) and vehicle dynamics. All the Simulink blocks in the model are visible, so it is possible to add or replace components with custom models to adapt the properties of modeled components to individual requirements.

## B

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**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.

**Cartesian coordinate system** A coordinate system that specifies each point uniquely by numerical coordinates, which are the signed distances from the point to fixed orthogonal directed lines. Each reference line is called an axis of the system, and the point where they meet is its origin. The coordinates can also be defined as the positions of the orthogonal projections of the point onto the axes, expressed as signed distances from the origin.

**Central lane** A lane in the center of a road. Each lane section has one central lane. You can specify a right and a left line for a central lane. For other lanes you can only specify a line at the outer side.

**Circular segment** A segment of a road that has a constant radius. You can specify the segment's length and radius. Both are measured with the reference line.

**Clothoid segment** A segment of a road that has 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.

**Concrete test case** A test that specifies the concrete values of the parameters used in the test. Parameters of the scenario and road that are modified during the text execution must be accessible via alias variable. A concrete test case bases on a logical test case.

**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.

**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.

**Cubic spline segment** A segment of a road that is an interpolated curve specified by its starting and end points, and a tangent angle. You can specify the segment's end point by the point's coordinates and the segment's tangent angle absolutely or relative to the starting point. 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 aligned in a counterclockwise turn, and an end point with a negative value is aligned in a clockwise turn.

**Custom library** A library with Simulink blocks that can be parameterized with ModelDesk. ModelDesk is designed for parameterization of ASM Simulation Packages. Using custom libraries, you can use other Simulink blocks in the same simulation model and parameterize them with ModelDesk. The Simulink block must fulfill some special requirements so that they can be used in custom libraries.

**Custom objects library** A library that contains your 3-D objects. You can import your 3-D objects in the VRML2 or COLLADA format into the library. Then you can use them in the scene in MotionDesk.

In ModelDesk, the 3-D objects are used to assign geometries to the traffic object.

## D

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**Driving trajectory** A curved path that the ASM vehicle moves on a road element or junction. Normally, the ASM vehicle follows the reference line of road elements or junctions. Using a trajectory, you can specify a different path to follow. The driving trajectory must start and end at connection points of the road elements or junctions.

**dSPACE objects library** A library that contains 3-D objects provided by dSPACE. The library contains objects for creating a virtual world especially for automotive or robotics applications. The library is read-only. You can use the objects in the scene but you cannot modify the objects nor their properties in the library.

The library includes a range of road, scenery, and vehicle objects that can be added to a MotionDesk scene. The vehicles include specific models of Mercedes, BMW, Volkswagen, and NCAP global vehicle targets (GVT). Lorries, trailers, and roadside assistance and emergency service vehicles are also included.

In ModelDesk, the 3-D objects are used to assign geometries to the traffic objects.

## E

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**Experiment** A container for collecting and managing information and files for parameterizing a simulation model. Only one experiment can be active at a time. An experiment can contain:

- Simulation model added to the experiment for parameterization
- Parameter sets, each containing the parameters of a simulation model variant
- Road created with the **Road Generator**
- Scenarios created with the **Scenario Editor** for simulating and defining the movements of the ASM vehicle and fellow vehicles (fellows) with absolute values or relative to the ASM vehicle.

## F

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**Fellow** An object that moves in relation to the ASM vehicle. It is used in scenarios to simulate traffic situations. The movement of a fellow is defined with

the Scenario Editor. To visualize a fellow in MotionDesk, a geometry of a 3-D object is assigned to it. A fellow is based on a traffic object.

## H

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**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.

**Horizontal profile** A profile that describes the course of a road in the x-y plane of the earth coordinate system. The horizontal profile results from the segments that are used to form the road. When you specify the horizontal profile, the reference line is also specified.

**Host PC** A standard PC that the dSPACE test and experiment software is installed on. In the host PC, you can configure the dSPACE hardware, download a simulation application to the platform and control the simulation.

## I

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**Instance ID** An identifier that is used to distinguish ASM or custom blocks of the same type in a model. The instance ID is specified when the model is implemented in MATLAB/Simulink. ModelDesk uses the instance ID to parameterize the correct ASM block.

**Instance name** A name of an instance of an ASM block. It is specified together with the instance ID to distinguish ASM or custom blocks of the same type.

**IOCNET** IOCNET (I/O carrier network) is a dSPACE-specific high-speed serial communication bus that connects all the real-time hardware in a SCALEXIO system. IOCNET can also be used to build a multiprocessor system that consists of multiple SCALEXIO processor hardware components.

## J

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**Junction** An element of a road with at least two connections. It is used to connect road elements. Using junctions and road elements, you can model

crossroads, for example. To get a steady connection between road elements and junction, you can adapt the properties of the junction's connection points to the properties of the connected road elements. This adapts, for example, the height, the lateral slope profile, and the settings of the lanes.

**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.

## L

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**Lane** 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.

**Lane section** 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.

**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.

**Lateral slope profile** A profile that specifies the gradient of a road in lateral direction. The lateral slope is independent of the road's segment.

**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.

**Logical test case** A test case that specifies the environment of a test. You can select the scenario, road, parameter set, and plotting configuration that are used in the logical test case.

A logical test case is the basis for concrete test cases.

**Look-up table** A one- or two-dimensional parameter set that displays the parameter values of vectors or matrices.



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## M

**Maneuver** Maneuver define how athe ASM vehicle moves. Typical maneuvers are braking on a road with different friction on each lane, performing a double lane change, step steering, and the Fishhook maneuver. Maneuvers let you simulate various driving situations with a vehicle dynamics model.

**Message Viewer** A window that shows messages generated during work with the dSPACE software to give information about errors and performed tasks. Located in the tool window.

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## N

**Navigation page** A page in the working area of ModelDesk used during the parameterization of the model. It contains an illustration of components of a vehicle and buttons to navigate to other navigation pages or parameter pages.

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## O

**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.

**Offline simulation application (OSA)** An offline simulation application (OSA) file is an executable file for VEOS. After the build process with a tool such as VEOS Player, the OSA file can be downloaded to VEOS. An OSA can contain multiple VPUs, each of which contains either a V-ECU or environment VPU. Each VPU runs in a separate process of the host PCs operating system.

**OpenDRIVE** An open file format that describes road networks including geometry, lanes, or signs. The file name extension is XODR.

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## P

**Pane** A separate area of a window, or a separate area of a complex dialog of a software program. A pane can be moved on the entire screen or be docked to a window.

**Parameter address** The parameter address uniquely identifies a parameter of a model. The parameter address consists of three or four parts separated by a dot:

**Main component**.**Block name**.**Block parameter name**.**Instance ID**

Each part is detailed in the following table:

<b>Main component</b>	is the first level of the model structure, for example, SoftECU, EngineBasic, Drivetrain, VehicleDynamics, Environment
<b>Block name</b>	is the name of the Simulink block the parameter belongs to.
<b>Block parameter name</b>	is the name of the parameter used in the Simulink block dialog.
<b>Instance ID</b>	is an ID that is assigned to the block when using the multi-instance feature. This part is optional.

**Parameter file** A file that contains the values of parameters. Parameter files are linked to a parameter records. They are stored in the Pool to be available for all experiments/configurations of the ModelDesk project. Parameter files can be exported to the file system and imported to other ModelDesk projects.

**Parameter page** A page on the working area of ModelDesk used for specifying parameters of the model. Normally, it contains an illustration of the component to be specified. It lets you modify scalar values or values in a table with the Table Editor.

**Parameter record** A record that specifies which parameter file is used to parameterize the corresponding parameter page or in particular cases several parameter pages. The parameter files contain the parameter values.

**Platform Manager** A software component represented by a controlbar. It provides functions to handle platforms and the applications assigned to the platforms.

**Pool** A section in the Project Navigator where the files of a ModelDesk project are stored. This makes them available to all the experiments and configurations in a ModelDesk project.

**Position marker** An invisible marker that is placed on a road element and a junction. A position marker serves as a trigger point for additional end conditions in scenarios. You can define the behavior of vehicles in relation to it.

**Project** A project manages several experiments that belong together, such as the tasks for parameterizing specific model variants. It holds the experiments related to these tasks, and the Pool filled with the files for the entire project.

**Project Navigator** A software component that manages the files belonging to a project and provides the commands necessary to handle the projects.

**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.

**Property reference** A reference to a property used by an alias variable. The value of the property can be modified by the assigned alias variable.

## R

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**Real-time application** An application running in real time on a dSPACE platform. A real-time application can be built, for example, from a Simulink model containing RTI blocks. A real-time application for a SCALEXIO system is built from a real-time model in ConfigurationDesk.

**Reference line** A line that is used as reference for the road. The reference line results from the segments that are used to form the road. It defines the coordinate system for the road that is used by the height or lateral slope profiles, for example.

**Reference point** When you create a junction, a reference point is created automatically. The reference point is the origin of the coordinate system on the junction, which can be used to define the position of an element on the junction.

**Road** Any model created with the Road Generator.

**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.

**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).

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

**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.

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

**Road network element** The generic term for [road element](#) and [junction](#).

**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.

**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.

**Route** A path on the road network that is followed by the ASM vehicle or fellows. A route consists of a sequence of road elements and junctions. The exact position of a vehicle is defined by the preferred lane on a road element or an automatically calculated course for a junction or a trajectory as alternative. A route is defined in the **Road Generator** and selected in a scenario in the **Scenario Editor**.

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

## S

**SCALEXIO platform** A platform in experiment software such as ControlDesk that provides access to a single-core, multicore or multiprocessor SCALEXIO system connected to the host PC for HIL simulation and function prototyping purposes.

**SCALEXIO system** A dSPACE hardware-in-the-loop (HIL) system consisting of at least one processing hardware component, I/O boards, and I/O units. They communicate with each other via the [IOCNET](#). In a SCALEXIO system, two types of processing hardware can be used, a DS6001 Processor Board or a real-time industry PC as the SCALEXIO Processing Unit. The SCALEXIO system simulates the environment to test an ECU. It provides the sensor signals for the

ECU, measures the signals of the ECU, and provides the power (battery voltage) for the ECU and a bus interface for restbus simulation.

**Scenario** A definition of the movement of the ASM vehicle and the movements of fellows relative to the ASM vehicle or to the road. You can simulate traffic situations such as vehicles overtaking and changing lanes.

**Scenario Editor** A component of ModelDesk that you can use to create maneuvers and traffic scenarios for controlling the movement of the ASM vehicle and simulating traffic situations such as vehicles overtaking and changing lanes.

**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.

**Segment (road)** A part of a road that forms the horizontal profile of the road. The **Road Generator** provides different segment types so that you can build any kind of roads: Straight, circular, clothoid, and cubic spline.

**Segment (scenario)** A part of a scenario that contains one activity and one transition. Segments are used to specify the movement or settings of the maneuver, fellows, and global user signals.

**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.

**Sequence** A part of a scenario that contains the specifications of the settings of the maneuver, fellows, and global user signals. A sequence can have several segments. In a scenario you can specify multiple sequences which have different start properties. Sequences are executed one after the other.

**Shape** An object that you can use to add multiple elements of the same type to a road network element. A shape 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 construction site on a road.

**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.

**Simulation application** The generic term for real-time application and offline simulation application. The application runs on a simulation platform.

**Simulation platform** The generic term for real-time systems that calculates the real-time application in real time and simulators that are not connected to a physical system and therefore independent of the real time.

**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.

**Straight segment** A segment of a road that is specified by its starting point and length. You can only specify the segment's length.

**Supporting parameter** Parameters that are used only for calculating model parameters. They are not downloaded to the simulation or real-time model.

**Surface pane (road element view)** 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- $\mu$  sections, etc. The values of the properties can be specified in this pane and the **Properties** pane.

**Surfaces pane (junction view)** 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. The values of the properties can be specified in this pane and the **Properties** pane.

## T

**Time Plotter** A plotter whose x-axis visualizes the time dimension (time axis) and whose one or more y-axes visualize the assigned signals (signal axes). The Time Plotter shows the measured signal in relation to the measurement time.

**Tool Window** A software component that provides certain tools depending on the activated Navigator.

**Traffic object** An object that can be used as static object on a road network or as a fellow in a traffic scenario. An traffic object is used in simulations for object detection sensors. To visualize a traffic object in MotionDesk, a geometry of a 3-D object is assigned to them.

**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.

**Traffic Object Manager** Component of ModelDesk that is used to create and manage traffic objects of a ModelDesk project.

**Traffic scenario** A definition of movements of fellows in relation to the ASM vehicle whose movement is defined in the ASM maneuver. With a traffic scenario, you can simulate traffic situations such as vehicles overtaking and changing lanes.

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

**Trajectory** 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 a trajectory 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 roads or a automatically calculated course for junctions.

## V

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**Validation function** A function that is used to check whether a signal has the expected values.

## X

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**XODR file** A file in [OpenDRIVE](#)  format.

**XY Plotter** A plotter that displays the relationship between measurement signals. The x-axis is used as a signal axis. The XY Plotter can display one or more signals on the y-axes in relation to the signal on the x-axis.

