MotionDesk

Tutorial

For MotionDesk 4.8

Release 2021-A – May 2021

dSPACE

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Important Notice

Contents

About This Tutorial

Contents

This tutorial introduces you to 3-D online visualization with MotionDesk. You will learn to create a virtual world in the 3-D View and animate objects in the scene.

Target group

Engineers new to MotionDesk who want to learn to design and maintain a 3-D scene and animate an ASM simulation.

Required knowledge

Basic knowledge of how to implement real-time models on dSPACE real-time hardware and how to work with ControlDesk and MotionDesk is assumed.

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.

Introduction to this Tutorial

Where to go from here

Information in this section

Introduction to the tutorial

Introduction

This tutorial guides you through your first steps with MotionDesk. MotionDesk is used to create a scene with 3-D objects and to animate the scene.

Before you begin

Before you start working with the tutorial, it is recommended to get some knowledge about 3-D graphics in general and the basics on 3-D animation with MotionDesk. Refer to

- General Information on 3-D Graphics (MotionDesk Basics 🕮)
- Basics on Animation in 3-D with MotionDesk (MotionDesk Basics 🕮)

What you will learn

In this tutorial you will learn to create a scene in MotionDesk and with road models from ModelDesk and to animate the scene offline, using a motion data file.

Preconditions

For this tutorial you must have installed:

- MotionDesk
- ControlDesk is required for lesson 4
- One of the following platforms is required for data acquisition in lesson 4:
  - Simulink
  - SCALEXIO systems
  - MicroAutoBox III
  - VEOS and VEOS on Linux

  RTI platforms
  - DS1006
  - DS1007
  - MicroLabBox (DS1202)
  - MicroAutoBox II (DS1401)
- ModelDesk is required for lessons 4, 6, 7, and 8

Overview of Lessons

Lessons

The tutorial has the following lessons:

- Lesson 1: Creating the Scene on page 13

  You will learn how to start MotionDesk, create a project and experiment, and create a simple scene for animation.
- Lesson 2: Working with the Custom Objects Library on page 37

  You will learn how to work with the custom objects library if you want to use your own 3-D objects in the scene.
- Lesson 3: Animating the Scene with Data from a File on page 49

  You will learn how to animate a scene with motion data from a file that is provided with the MotionDesk installation. This lesson does not require a dSPACE simulation platform.
- Lesson 4: Animating the Scene with Simulation Data from a Platform on page 61

  You will learn how to animate a scene with use motion data from a simulation platform.
- Lesson 5: Working with a Predefined Road from ModelDesk on page 71

  You will learn how to edit a road model in ModelDesk and use it in a MotionDesk animation.
- Lesson 6: Defining a New Road Network in ModelDesk on page 89

  You will learn how to create a road model in ModelDesk and download it to MotionDesk.
- Lesson 7: Using Objects in a MotionDesk Animation on page 117

  You will learn how to use different types of objects, such as animated traffic participants or road signs, in a MotionDesk animation.

- Lesson 8: Creating a Simple Roadwork Scenario on page 145
  You will learn how to use different shapes, such as lines and trajectories on a road in a ModelDesk roadwork scene and animate the scene in MotionDesk with motion data from a simulation platform.

Duration

Working through the entire tutorial will take you about 6 hours.

Lesson 1: Creating the Scene

Where to go from here

Information in this section

Overview of Lesson 1

Introduction	The lesson describes how to create the scene in the 3-D View. A description of the user interface is integrated into the first step.
What you will learn	You will learn how to select static objects and movable objects from the Library Browser and to create a scene with them.
Before you begin	When you start with the first steps in MotionDesk, there are no preconditions that must be met.
Steps	This lesson contains the following steps: ▪ Step 1: How to Start MotionDesk on page 15 ▪ Step 2: How to Create the Project and Experiment on page 17 ▪ Step 3: How to Prepare MotionDesk to Create a Scene on page 19 ▪ Step 4: How to Create a Virtual World Scene on page 20 ▪ Step 5: How to Add Static Objects to a Scene on page 23 ▪ Step 6: How to Delete an Object from a Scene on page 24 ▪ Step 7: How to Scale Objects in the Scene on page 25 ▪ Step 8: How to Change the Position of Static Objects on page 27 ▪ Step 9: How to Rotate a Static Object on page 29 ▪ Step 10: How to Look Around in the Scene on page 30 ▪ Step 11: How to Insert Movable Objects into a Scene on page 32
Result	The lesson concludes with a result that describes what your project looks like at the end of the lesson.

Duration 60 min.

Step 1: How to Start MotionDesk

Objective

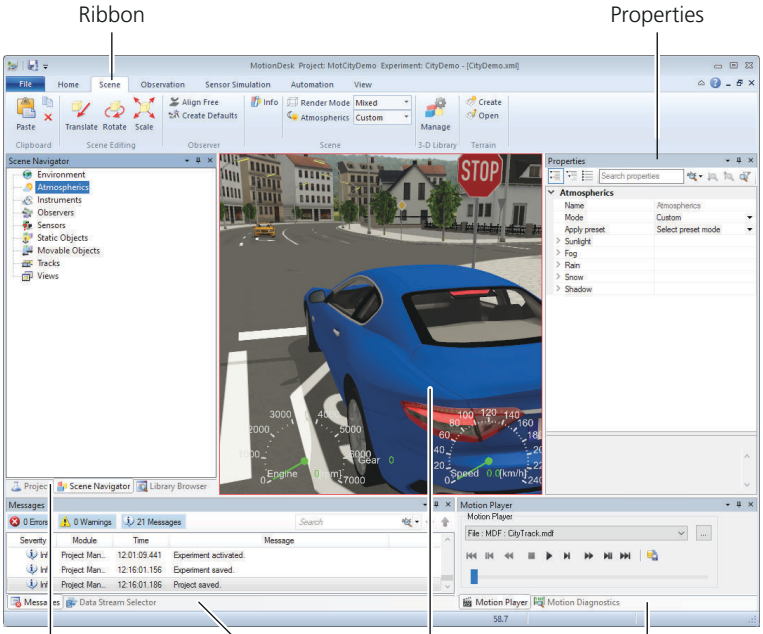
MotionDesk is installed in the MotionDesk program group. This step shows you how to start MotionDesk and introduces its user interface.

Method

To start MotionDesk

1 On the Start menu, select dSPACE MotionDesk <Release> – dSPACE MotionDesk <Release>.

MotionDesk opens. The following illustration shows the user interface window displaying a number of control panes and the 3-D View.



The following panes are displayed:

Pane	Description
Project Manager	Displays all files belonging to the open project in a tree and provides functions to handle the project and its components.

Pane	Description
Scene Navigator	Displays the scene tree with all elements of the scene. You can use the Scene Navigator for quick access to the 3-D objects.
Library Browser	Contains the dSPACE objects and the custom defined objects. The objects are used to build the virtual world. The dSPACE objects library provides all the necessary 3-D objects. In addition, you can also create and use your own 3-D objects. These 3-D object geometry files must be in COLLADA or VRML format and can be imported to the custom objects library.
Data Stream Selector	Lists all the motion data streams that are contained within the selected data source. To assign a data stream to a movable object in MotionDesk or an instrument, you can drag it directly to the movable object in the Scene Navigator pane.
Motion Player	Contains the dialog to select the motion data source and the motion player replay controls, for example, start and stop.
Motion Diagnostics	Displays information on rotation and angle values for a selected object
Properties	Displays the properties for the selected object in the Scene Navigator. The values can be specified for each of the required properties and elements.
Messages	Displays the information, warning and error messages displayed during use of MotionDesk.
User Function Output	Provides access to the output of external tools added in Automation - User Functions.

Result

You have started MotionDesk and learned the names and functions of its main panes.

What's next

The next step shows you how to create a project in MotionDesk.

Related topics

Basics

Customizing the User Interface (MotionDesk Basics 🕮)
Introduction to MotionDesk (MotionDesk Basics 🕮)

Step 2: How to Create the Project and Experiment

Objective

The first step after starting MotionDesk is to create a new project and experiment.

Basics

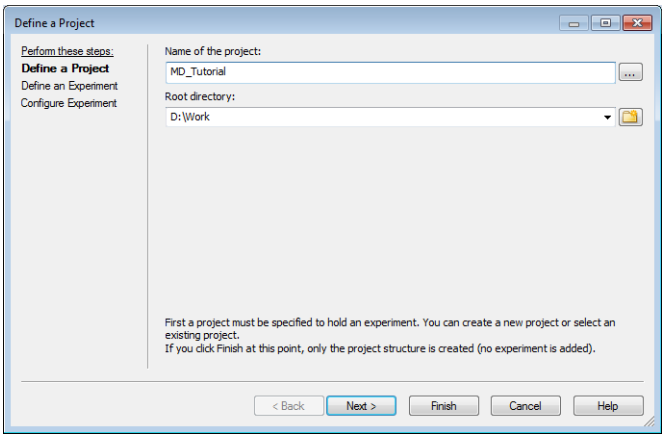
When creating a new project, you must specify the project name, experiment name and the working root folder. The working root folder is the folder in which MotionDesk saves the project file (CDP file). This contains all the information related to the project, for example, the references to the files administered by the experiment.

Method

To create a new project and experiment

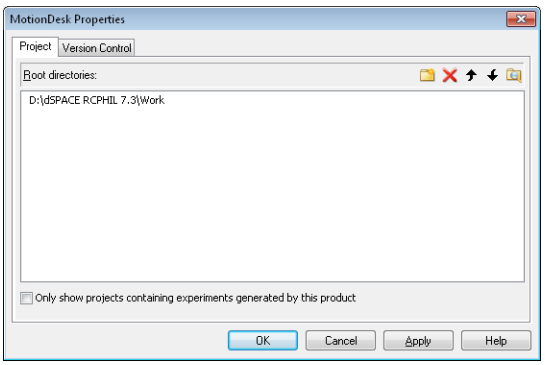
1 On the File ribbon, click New – Project + Experiment to open the Define a Project dialog.

2 In the Define a Project dialog, enter `MD_Tutorial` to specify the name of the project.



3 To specify the root folder, click .

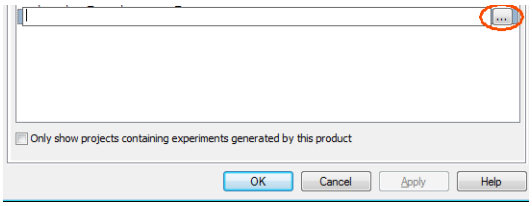
The MotionDesk Properties dialog opens.



4 In the Project tab, click .

An empty new entry is added to the root folder list.

5 Click the Browse button.



The Browse For Folder window opens.

6 Select the folder that you want to save your project data into and click Make New Folder.

7 Enter `Work` as the folder name and press `Enter`.

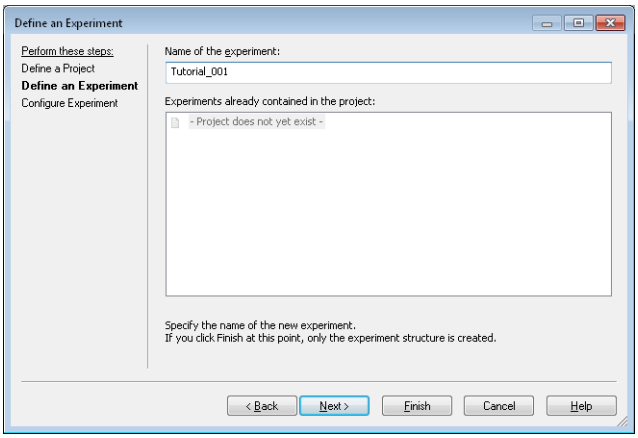
8 Click OK to save your new folder.

The Browse for Folder dialog closes. The new folder is now listed in the Project tab of the MotionDesk Properties dialog. The project will be saved in this folder.

Click OK to close the dialog.

9 Click Next to continue with the next step.

The Define an Experiment dialog opens.



10 In the dialog, specify the name of the experiment. Enter. `Tutorial_001` in the Name of the experiment field.

11 Click Finish to complete the creation process. MotionDesk creates the project and the experiment based on your settings and opens it, displaying the project tree structure.

Result

You have created a project and an experiment and learned the names and functions of the dialogs related to this process.

What's next

In the next step you will learn how to get started in creating a virtual world scene with your project and experiment in MotionDesk.

Related topics

Basics

Basics of Projects and Experiments (MotionDesk Project and Experiment Management 🕮)
Creating and Opening Projects and Experiments (MotionDesk Project and Experiment Management 🕮)

Step 3: How to Prepare MotionDesk to Create a Scene

Objective

Before animation, you must prepare the virtual world and create a scene in MotionDesk.

Basics

The scene is a virtual world built up using several static objects and movable objects, only movable objects can move in a simulation. To create and edit a scene, you can use the commands and functions available on the MotionDesk Scene ribbon. You can select 3-D objects from the object libraries and assemble them in the 3-D View to create a virtual world scene.

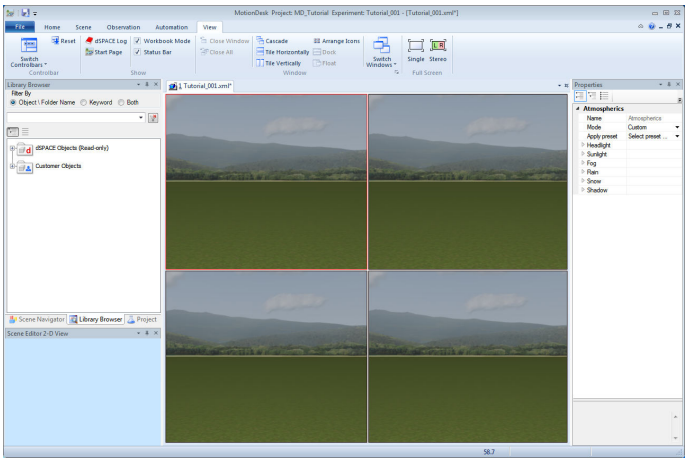
Method

To prepare MotionDesk to edit a scene

1. On the View ribbon, click Controlbar – Switch Controlbars to open a list of available panes. Select the following entries:
   - Scene Navigator: Provides you quick access to the 3-D objects used in the scene.
   - Library Browser: Displays the 3-D object libraries that contain the dSPACE 3-D objects and custom objects.
   - Properties: Displays the properties of the 3-D object in the scene that you can edit.

   The central main working area displays the 3-D View for the virtual world. This remains in view.
2. In the same list, clear the other selected entries to hide them from view. These panes are not necessary for creating a scene.

The following illustration shows one possible arrangement of the opened panes.



3 In the Scene Navigator, click View and click Top left.

4 In the Properties, select Bird's-Eye View - Enable to display a bird's-eye for the scene in the top left view.

5 Click Scene ribbon to display a range of editing commands, for example, to rotate, scale, and change the position of 3-D objects in the scene.

Result

You have learned how to display the control panes, needed for creating scenes.

What's next

The next step shows you how to create the virtual world scene with background objects.

Related topics

Basics

Basics of the Scene Editing (MotionDesk Scene Creation 🕮)
Editing a Scene in the 3-D View (MotionDesk Scene Creation 🕮)
How to Configure the 3-DView (MotionDesk Scene Animation 🕮)

Step 4: How to Create a Virtual World Scene

Objective

This topic shows how you can create a virtual world scene before you add 3-D static objects.

To create a virtual world, you can specify the environment properties for the scene. For example, you can select ground and sky textures. You can also add ground plate and dome static 3-D objects. These elements display the background environment for the scene.

You can then add additional objects, such as roads, scenery, traffic objects, and fellows to build a realistic 3-D virtual world scene.

3-D Virtual world scene

There are two methods to create the 3-D virtual world scene:

- You can use or edit the default Environment properties.

  This is useful for large road network and scenery experiments, because the flat environment has no boundaries. Refer to Method 1 on page 21.
- You can add ground plate and dome environment static objects.

  These are valuable for small 3-D virtual world scenes, because the size of the environment is limited. Custom backgrounds can also be added. The sizes of these objects must match. Refer to Method 2 on page 22.

Method 1

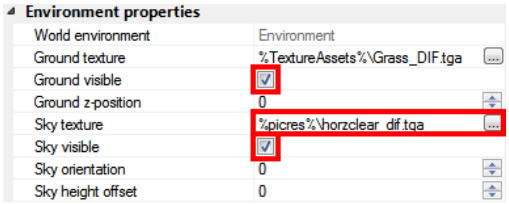
Create a virtual world using the environment properties

1. When you create a new experiment, by default MotionDesk sets a ground plate and sky horizon texture. In the new MotionDesk experiment, select Environment in the Scene Navigator.

   The Environment properties pane is displayed.
2. Select a new sky horizon texture. In the Sky texture property field click the Browse button.
3. Open the `<MotionDesk_InstallationPath>\MotionDesk\Assets\Textures\horzClear_DIF.tga` file.

   The clear day sky horizon texture is displayed in the 3-D View.
4. Select the below Environment properties.
   - Ground visible
   - Sky visible

   These are used to switch on or off the environment properties from the 3-D virtual world.



   The environment ground plate and sky horizon are not shown as Static Objects in the Scene Navigator tree.

Interim result

You have edited the default environment properties of your 3-D world scene and added a new sky texture from file.

Method 2

Create a virtual world using 3-D static objects

1 In the new MotionDesk experiment, select Environment in the Scene Navigator.

The Environment properties pane is displayed.

2 Clear the below default Environment properties:

- Ground visible
- Sky visible

The sky horizon and ground plate are removed from the 3-D View. A blank working area is shown.

3 Click the Library Browser tab and then click  .

The contents of the library are displayed hierarchically in a tree.

4 Expand the dSPACE Objects – Env_plates folder and select the GrassPlate1000 ground plate. Drag it to the 3-D View.

5 In the Properties pane, edit the x-, y- and z-positions to `0`.

6 Repeat the steps above to add the following object:

- HorzClear1000. This is the sky horizon dome. It is located in the Env_domes folder.

The ground plate and dome are displayed in the 3-D View. They are aligned and match in size.

Note

Set the Object Properties for additional ground plates and sky horizons as follows:

Object	Property	Value
Env_Domes - Horizon	Exclude from collision	Selected
Env_Plates - GrassPlate	Allow auto placement	Selected

This ensures successful ModelDesk synchronization of all roads and scenery objects to the MotionDesk experiment.

7 On the File ribbon, click Save Project to save the modifications.

Interim result

You have cleared the default environment properties and added and aligned a sky horizon dome and grass ground plate to your 3-D world scene.

The ground plate and sky horizon dome are shown in the 3-D View.

They are also shown as Static Objects in the Scene Navigator tree.

Result

You have applied the default environment properties for your 3-D world scene. You also added a limited area dome and a matching sized ground grass plate.

You learned how to check the results in the **Scene Navigator** and the **3-D View**.

What's next

In the next step you will learn, how to add 3-D static objects to your 3-D virtual world scene.

Related topics

Basics

Basics of the Scene Editing (MotionDesk Scene Creation 🕮)
Editing a Scene in the 3-D View (MotionDesk Scene Creation 🕮)

Step 5: How to Add Static Objects to a Scene

Objective

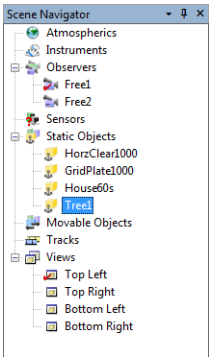
A scene consists of static objects and movable objects. You can add the first 3-D static objects to your 3-D virtual world scene in the 3-D View.

Method

How to add 3-D static objects into the virtual world scene.

1. Click the Library Browser tab and then click  .
   The contents of the library are displayed hierarchically in a tree. This helps to find the required 3-D objects.
2. Expand the **dSPACE Objects – Env_Houses** folder.
3. Select the **House60s** house type. Drag it to the **3-D View**.
   The object is listed in the **Scene Navigator** under the **Static Objects** heading.
4. Repeat the steps above for the following object:
   - **Tree1**. 3-D Trees are located in the **Env_Trees** folder.

   These steps create a simple scene. The static objects are added to a scene. The following illustration shows the **Scene Navigator** after adding the objects.



5 On the File ribbon, click Save Project to save the modifications.

Result

You have added some static objects into the 3-D scene in the 3-D View and learned how to check the results in the Scene Navigator.

What's next

In the next step you will learn, how to delete objects from a scene if they are no longer required.

Related topics

Basics

Basics of the Scene Editing (MotionDesk Scene Creation 🕮)
Editing a Scene in the 3-D View (MotionDesk Scene Creation 🕮)

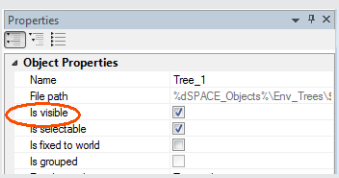
Step 6: How to Delete an Object from a Scene

Objective

You can delete objects from a scene if they are no longer required.

Tip

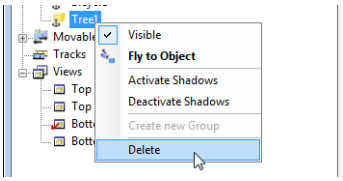
You can also hide a 3-D object from view. To do so, select the 3-D object and in the Properties pane – Object Properties, clear Is visible.



Method

To delete an object from a scene

1. Open the Scene Navigator pane.
2. Right-click the Tree1 object under the static objects heading to open the context menu and choose Delete.



MotionDesk deletes the object from the scene. The object Tree1 is no longer listed in the Scene Navigator.

Tip

You can also click delete in the Scene ribbon

Result

You have learned how to delete objects from a scene via the Scene Navigator.

What's next

The next step shows how you can scale or resize objects in a scene.

Related topics

Basics

Editing a Scene in the 3-D View (MotionDesk Scene Creation 🕮)

Step 7: How to Scale Objects in the Scene

Objective

The dimensions of a 3-D object can be edited using two different methods: You can edit the properties or use the mouse.

Method 1

To scale objects in the scene by editing the properties

1. Insert a Tree1 object into the scene (included in the Env_Trees object properties folder).
2. In the Scene Navigator, click the Tree1 object in the Static Objects section.

The Properties pane displays its properties.

Note

If the Properties pane is floating and not permanently displayed, select the Properties tab on the right of MotionDesk to display it. On the top of the Properties pane, click the Auto Hide pin to dock the pane.

3 In the Properties pane, enter the value **40** in the X-Scale property field and press Enter to confirm your entry.

The object's dimension is reduced to 40% of its original size in the x direction.

4 Repeat the step above for the Y-Scale and Z-Scale.

The tree's dimension is reduced to 40% in all directions.

5 Select Uniform scaling.

6 Change the X-Scale property to **80%**.

The Y-Scale and Z-Scale also change to **80%**. The object size is increased to **80%** and it retains its proportions.

Interim result

You resized the object using the properties. You reduced the size along each axes to 40% and then to 80% using uniform scaling.

Method 2

How to scale objects in a scene using the mouse

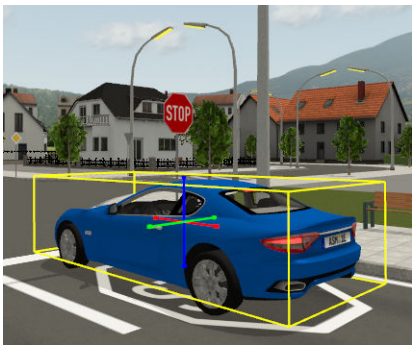
1 In the Scene Navigator, in the Static Objects node, double-click the Tree1 object.

The tree object is displayed inside a yellow box.

2 On the Scene ribbon, click Scene Editing – Scale or click **Ctrl+Alt+S**.

The three scaling movement directions around the -x, -y, and -z axes are displayed as colored lines at the center of the object.

An example is shown for a vehicle below.



3 Click and hold the left mouse button on one of the colored lines and move the mouse in the direction you want to resize the object.

4 Release the mouse button.

The object is resized in the direction you moved the mouse.

Result

You have changed the dimension of an object by changing the scale values in the properties pane and using the mouse.

What's next

The next step shows you how to specify the position of a static object.

Related topics

Basics

Editing a Scene in the 3-D View (MotionDesk Scene Creation 🕮)

Step 8: How to Change the Position of Static Objects

Objective

The following shows you how to specify and change the position of a static object.

Method 1

To specify the position of a static object by editing property values

1. In the Scene Navigator, under the Static Objects heading select the Tree1 object.
2. In the Properties pane, edit the value of the property X-position. Enter the value **4** in the property field and press **Enter** to confirm your entry.
3. Input the following values for the other position properties of the Tree1 object as follows and press **Enter**:

Y-Position	Z-Position
-0.3	-0.1

4. Repeat the steps above for the following 3-D objects:

3-D Object	X-Position	Y-Position	Z-Position
GridPlate1000	0	0	-0.1
HorzClear1000	0	0	0

These objects form the virtual world. It is easier if they are aligned to the origin of the coordinate system.

5. To prevent an unintended displacement of the object, you can protect the object:
   1. Select an object in the Scene Navigator.
      The Properties pane is filled with the property values of the object.
   2. Select the Is fixed to world property to fix the object to the world, thus preventing movement.

3. Clear the **Is selectable** property. This prevents the object from being selected in the **3-D View**.

You can undo these steps by simply changing the properties in the **Properties** pane.

Method 2

To specify the position of a static object by using mouse drag

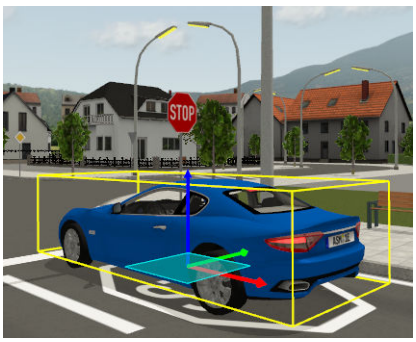
1 In the **Scene Navigator**, in the **Static Objects** node, double-click the **Tree1** object.

The tree object is displayed inside a yellow box.

2 On the **Scene** ribbon, click **Scene Editing – Translate** or click **Ctrl+Alt+T**.

The three translate movement directions along the -x, -y, and -z axes are displayed as colored lines from the center point of the object

An example is shown for a vehicle below.



3 Click and hold the left mouse button on one of the colored lines and move the mouse in the direction you want to move the object.

4 Release the mouse button.

The object is moved in the direction you moved the mouse.

Result

You have defined the position of objects in a scene.

What's next

The next step shows you how to specify the rotation of a static object.

Related topics

Basics

Editing a Scene in the 3-D View (MotionDesk Scene Creation 🕮)

Step 9: How to Rotate a Static Object

Objective

The following shows how to specify and change the orientation or rotation of a static object.

Method 1

To rotate a static object by editing properties

1. In the Scene Navigator, in the Static Objects node, double-click the Tree1 object.

   The tree object is displayed inside a yellow box.

2. In the Properties pane, edit the value of the X-Rotation property. Enter the value **-1** in the x-rotation field. Press Enter to confirm your entry.

3. Repeat the process for the remaining rotation properties with the following values:

Y-Rotation	Z-Rotation
-10	-10

Method 2

To rotate a static object using the mouse

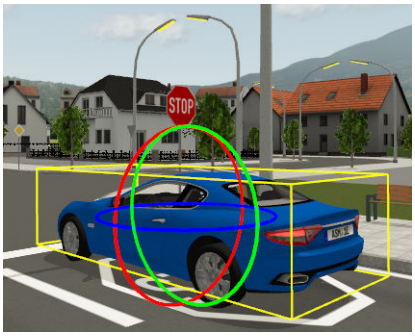
1. In the Scene Navigator, in the Static Objects node, double-click the Tree1 object.

   The tree object is displayed inside a yellow box.

2. On the Scene ribbon, click Scene Editing – Rotate or click **Ctrl+Alt+R**.

   The three rotation movement directions around the -x, -y, and -z axes are displayed as colored circles around the object.

   An example is shown for a vehicle below.



3. Click and hold the left mouse button on one of the colored lines and move the mouse in the direction you want to rotate the object.

4. Release the mouse button.

   The object is rotated in the direction you moved the mouse.

Result

You have learned how to rotate objects.

What's next

The next step shows how you can explore the scene in the 3-D View.

Related topics

Basics

Editing a Scene in the 3-D View (MotionDesk Scene Creation 🕮)

Step 10: How to Look Around in the Scene

Objective

This section explains how you can explore the scene in the 3-D View using the free observers.

Observers

Observers are positions from which the 3-D scene in the 3-D View is displayed. You can move around the 3-D View to provide a view of selected objects in the scene or from high above the scene to provide an overall Bird's-eye view. The observers provide a view of the scene as a human would see it.

To look around the 3-D scene perform the following steps:

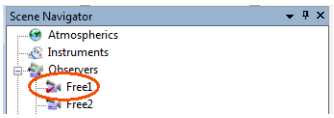
1. Select an object in the Scene Navigator and fly directly to the object in the 3-D view.

   This is useful if you want to go directly to a static or movable object to view or edit its properties. Refer to Part 1 on page 30.
2. Use the mouse to move your Free Observer and look and move around the scene from different angles. Refer to Part 2 on page 31.

Part 1

To fly to an object

1 In the Scene Navigator, double-click Observers – Free1 to select it.



The 3-D view will display an initial starting point in the scene.

2 In the Scene Navigator, right-click House60s. In the context menu, select Fly to Object.

3 In the Scene Navigator, double-click Tree1.

Double-clicking an object on the Scene Navigator or selecting Fly to Object in the context menu moves the free observer directly to it.

Interim result

You have selected an object in the Scene Navigator and navigated directly to it using the Fly to Object function.

Use this point as the starting-point for exploring or looking around the scene.

Part 2

To look and move around the scene using the mouse

1 In the 3-D View, click and hold the left mouse button and move the mouse around the screen.

The observer moves in the direction of the mouse as follows:

Mouse Direction	Observer Action
Left	Looks to the left.
Right	Looks to the right.
Up	Moves forward through the scene.
Down	Moves backward through the scene.

2 In the 3-D View, click and hold the middle mouse button or wheel and move the mouse around the screen.

The observer moves in the direction of the mouse as follows:

Mouse Direction	Observer Action
Left	Sidesteps left across the scene.
Right	Sidesteps right across the scene.
Up	Moves upward above the scene.
Down	Moves downward toward the ground.

3 In the 3-D View, click and hold the right mouse button and move the mouse around the screen.

The observer moves in the direction of the mouse as follows:

Mouse Direction	Observer Action
Left	Looks to the left.
Right	Looks to the right.
Up	Looks upward in the scene.
Down	Looks downward in the scene.

4 In the 3-D View, roll the mouse wheel forward and backward.

The observer moves forward and backward in the direction of view of the observer.

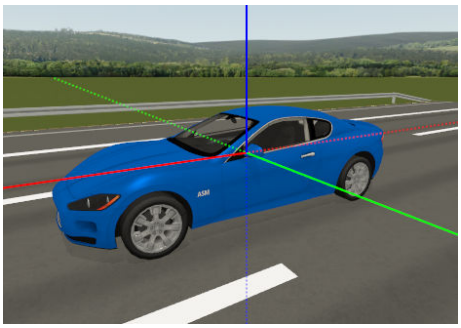
5 Press and hold the Shift keyboard key and click the left mouse button. Move the mouse forward and backward.

The observer view moves directly forward and backward through the scene at high speed.

6 In the Scene Navigator, select an object, for example, a vehicle and select Fly to object in the mouse context menu to move to the vehicle in the 3-D scene.

7 Press and hold the Ctrl keyboard button and the left mouse button. Move the mouse left across the scene.

The axis is displayed in the scene at the center of the object and the observer moves **left** in a circle around the object.



8 If you lose your orientation, you can realign the observer:
On the **Scene** ribbon, click **Observer – Align Free**.

Interim result

You have looked around the scene in relation to the objects with the mouse as if you were a person in the scene.

Result

You learned how to look and move around the 3-D scene in the 3-D View using the free observers and moved directly to an object using the **Fly to Object** function.

What's next

In the next step you learn how to insert movable objects into a scene.

Related topics

Basics

Working with Observers (MotionDesk Scene Animation 🕮)

HowTos

How to Move the Observer Using the Mouse (MotionDesk Scene Animation 🕮)
How to Rotate Around an Object in Front of the Observer (Trackball) (MotionDesk Scene Animation 🕮)

Step 11: How to Insert Movable Objects into a Scene

Objective

In the previous steps, you have learned how to build a virtual world with static objects. Because you want to animate objects in a simulation, you also have to add movable objects to the scene. These objects move in the scene in a simulation. It is therefore not necessary to specify their exact positions or align them in the scene. A movable object derives its position data in the scene from a

simulation or a motion data file. You can however specify offset values that additionally move or rotate the object in relation to its motion data.

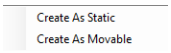
Create as property

The objects in the library have a Create as property. This property specifies whether an object is created as movable or static object by default. If you drag an object from the library to the scene with the left mouse button pressed, the default setting is used. If you drag an object with the right mouse button pressed, MotionDesk asks how the object is to be used. This step shows both methods.

Method

To insert movable objects to a scene

1. In the Library Browser, open the Car_Simple folder.
2. Right-click the SimpleCarYellow_MOV object and drag it to the 3-D View. Release the right-click. A context menu opens in which you have to specify if the object is to be added as a movable or a non-movable static object.

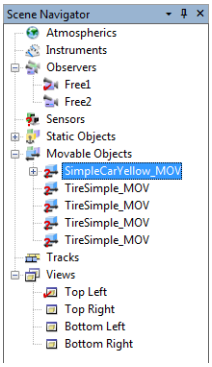
   

   Select Create As Movable, to define the object as movable.

   Using this method, you can create objects as movable or static, independent of their default setting.
3. In the Library Browser, left-click a TireSimple_MOV object (Car_Simple folder) and drag it into the 3-D View.

   As this object is a movable object by default, it is created as movable object. The context selection dialog is not shown.
4. Repeat the previous step for three more TireSimple_MOV objects.

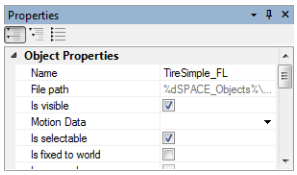
   When these steps have been completed, the scene is complete. The following illustration shows what the Scene Navigator displays at this point.

5. All tire objects have the same name in the scene. To distinguish between the objects, you must rename them:
   - Click a TireSimple_MOV object in the Scene Navigator.

     The Properties pane shows its properties.

- In the **Name** field, enter **TireSimple_FL**. This tire object will later be used as the front left tire.



- Repeat this step for the other tire objects. Use the following names:

Name	Description
TireSimple_FR	Front right tire
TireSimple_RL	Rear left tire
TireSimple_RR	Rear right tire

6 On the **File** ribbon, click **Save Project** to save the modifications.

Result

You have learned how to insert movable objects into a scene.

What's next

For a summary of this lesson, you can refer to the result of the lesson.

Related topics

Basics

Editing a Scene in the 3-D View (MotionDesk Scene Creation 🕮)

Result of Lesson 1

Result

After working through all the steps in the lesson, the **3-D View** looks like this:

In this lesson, you took your first steps with MotionDesk: you opened it, got to know its user interface, and created a new project and experiment. You learned the different between the environment properties and the sky horizon dome and

ground static objects. In the **3-D View**, you added static objects to a scene and scaled, rotated and moved them. You learned how to look around in the scene and how to add movable objects to it.

Where to go from here

MotionDesk comes with a set of predefined 3-D objects, but also provides the possibility to use customized 3-D objects. In the next lesson, you will learn how to manage these objects with the 3-D Library Manager.

Related topics

Basics

3-D Object Libraries (MotionDesk Scene Creation 🕮)
Coordinate System Used in MotionDesk (MotionDesk Calculating and Streaming Motion Data 🕮)
Features of MotionDesk (MotionDesk Basics 🕮)
Projects and Experiments (MotionDesk Project and Experiment Management 🕮)

Lesson 2: Working with the Custom Objects Library

Where to go from here

Information in this section

Overview of Lesson 2

Basics

The 3-D Library Manager allows you to manage the 3-D objects of the dSPACE objects library as well as the custom objects library. You can import and export objects and edit them, for example.

What you will learn	In this lesson, you will learn how to work with the **3-D Library Manager**. ▪ You will switch the view of the library. ▪ You will assign keywords to objects and filter in the library. ▪ You will group 3-D objects in the library. ▪ You will import 3-D objects to the custom objects library. This is only necessary if you want to use your own 3-D objects. ▪ You will export 3-D objects from the library.
Before you begin	There are no preconditions that must be met for this lesson.
Steps	This lesson contains the following steps: ▪ Step 1: How to Work With the 3-D Library Manager on page 38 ▪ Step 2: How to Group Objects in the Library on page 41 ▪ Step 3: How to Import Objects Into the Custom Objects Library on page 44 ▪ Step 4: How to Export Objects from the Library on page 46
Result	The lesson concludes with a result topic.
Duration	30 min.

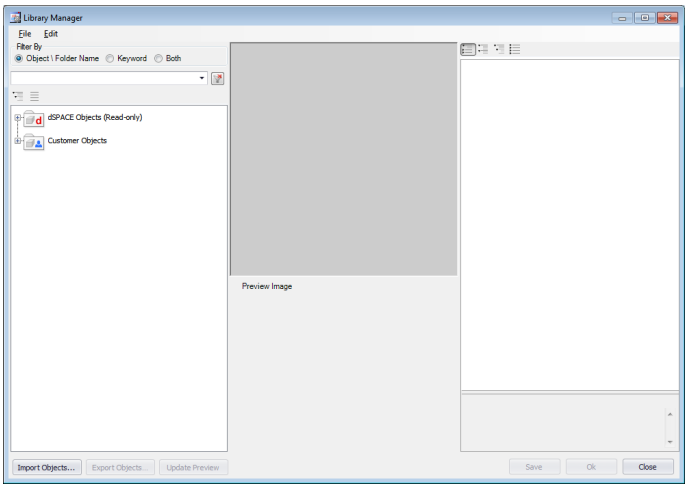
Step 1: How to Work With the 3-D Library Manager

Objective	The **3-D Library Manager** displays all 3-D objects for you to use in a scene. To simplify the retrieval of objects, you can assign keywords and filter by keywords and object names.

Method 1

To open the 3-D Library Manager

1 On the Scene ribbon, click 3-D Library – Manage to open the 3-D Library Manager.



Method 2

To specify the view on the library

1 In the 3-D Library Manager, click .
This opens the hierarchical view of the library.

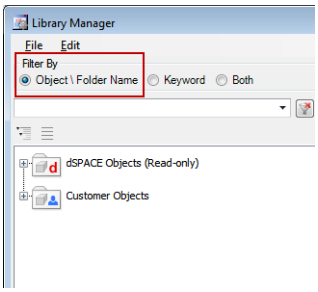
Note

Click to switch to the flat view. This displays all objects in a long flat list.

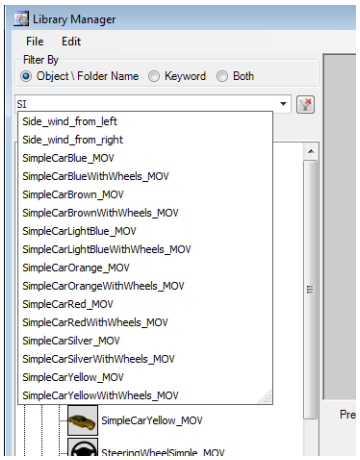
Method 3

To filter objects

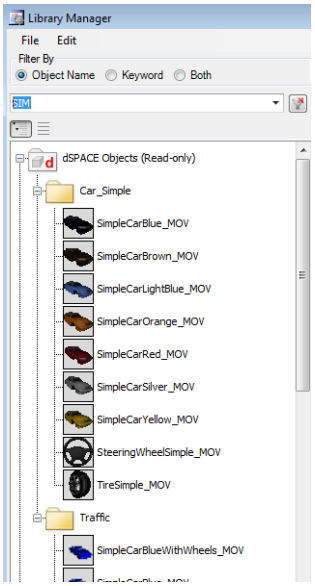
1 In the 3-D Library Manager, Filter By group select Object \ Folder Name.



2 In the edit field, enter **SIM**. The filtered results are immediately listed below the edit field as you enter characters.

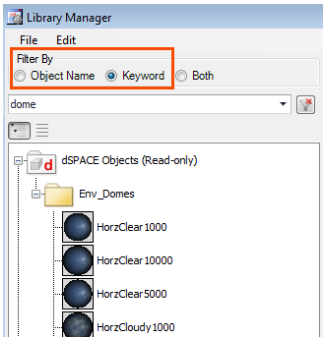


To see the filter results in the folder structure where the objects are stored with their preview image, press **Enter**. The filtered results are listed below. The list contains all objects whose names contain *SIM*.



3 To clear the filter entry in the edit field, click  . The results listed disappear.

4 Now select in the **Filter By** group **Keyword**. Enter **dome** in the edit field and press **Enter**. The list of results contains all objects with the assigned keyword *dome*.



Result

You have learned to use filters in the 3-D Library Manager.

What's next

You will group objects in the 3-D Library Manager.

Related topics

Basics

3-D Object Libraries (MotionDesk Scene Creation 🕮)
Basics of the 3-D Library Manager (MotionDesk Custom Object Library Management 🕮)

Step 2: How to Group Objects in the Library

Objective

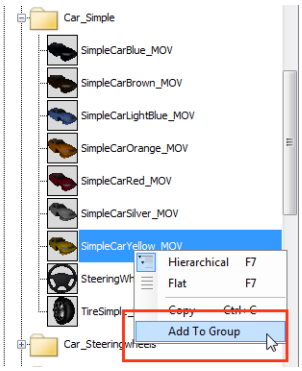
In the 3-D Library Manager, you can group objects. This can be useful, if there are objects you frequently combine in a scene, for example, a car with a particular set of wheels.

Method

To group objects in the library

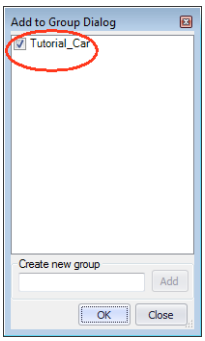
1 In the tree of the 3-D Library Manager, open dSPACE Objects – Car_Simple.

2 Right-click the SimpleCarYellow_MOV object and select Add To Group.



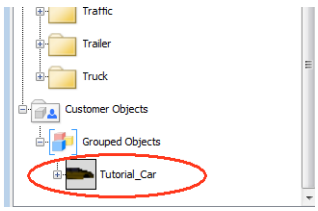
3 The Add To Group dialog opens. Enter `Tutorial_Car` in the Create new group edit field and click Add.

The group is created and listed in the Add to Group dialog. Select it and click OK.



The SimpleCarYellow_MOV object is assigned to the created group by default. Each object you assign to the group becomes a *child* of the group.

The structure of the group is displayed in the Customer Objects folder of the Library Browser or the 3-D Library Manager.



4 In the CarSimple folder, right-click the TireSimple_MOV object and select Add to Group from the context menu.

In the Add to Group dialog, select Tutorial_Car and click OK.

The object is added to the group.

5 In the 3-D Library Manager, open Customer Objects – Grouped Objects – Tutorial_Car and right-click the TireSimple_MOV object.

On the context menu, select rename. Change the object's name to `front_r`.

Tip

The name of the child object can also be edited in the Child properties pane of the 3-D Library Manager.

6 Add three more TireSimple_MOV objects to the group.

Rename them as follows:

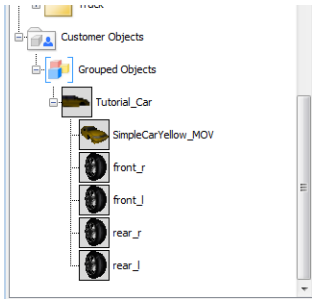
- `front_l`
- `rear_r`
- `rear_l`

Tip

You can assign a Keyword for the new object group in the Child properties pane of the 3-D Library Manager. Add the desired value in the Keyword field from the list or add a new keyword. This keyword will then be used in the keyword filter, refer to Step 1: How to Work With the 3-D Library Manager.

Result

You have created the Tutorial_Car object group and assigned objects to it. You also renamed some of the objects.



What's next

You will import an object to the 3-D Library Manager.

Related topics

Basics

3-D Object Libraries (MotionDesk Scene Creation 🕮)
Basics of the 3-D Library Manager (MotionDesk Custom Object Library Management 🕮)

Step 3: How to Import Objects Into the Custom Objects Library

Objective

You can import files to the 3-D Library Manager. It is possible to import single files or entire object folders. The files you want to import have to be of one of the following formats:

- COLLADA (*.dae),
- VRML2 (*.wrl) and
- MotionDesk Export (*.mtx).

During the import process, you can create and assign keywords. These keywords will ease the retrieval of objects in a large object library.

You can import a single file or several files from a folder. In this step, you will import a file.

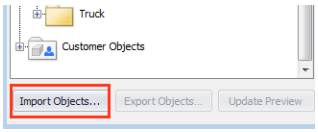
Precondition

You only need to work through this step if you have your own 3-D object that you want to use in MotionDesk. If not, continue with the following step.

Method

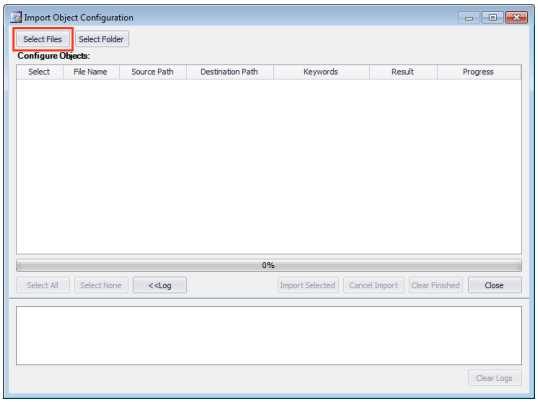
To import objects into the custom objects library

1 In the 3-D Library Manager, click Import Objects.



The Import Object Configuration window opens.

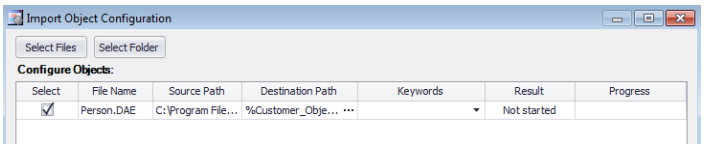
2 Click Select Files.



A standard Select File dialog opens.

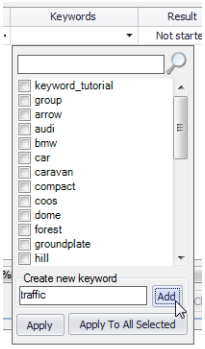
3 Browse to the file you want to import and click Open.

4 The Import Object Configuration window lists the selected file in the Configure Objects table.

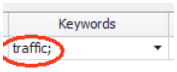


5 In the Configure Objects table, click the Keywords cell. A dialog to assign keywords to objects opens.

6 Enter a new keyword for the selected object in the Create new keyword edit field and click Add.



7 The keyword is added to the pool of keywords. The keyword is automatically preselected for the object you have selected for the import.

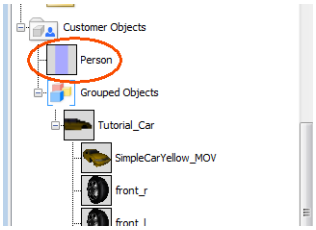


8 Click Apply to assign the keyword to the imported file.

9 Click Import Selected to start the import procedure.

The import starts and the Progress Status indicates the progress of the import.

10 Click Close to close the Import Object Configuration window. The object is imported to the Customer Objects folder and you can use it to create scenes.



Note

In the Message Viewer, you can check, whether your import has been successful. If the Message Viewer is not displayed, go to the View ribbon and click Controlbar – Switch Controlbars – Messages to open the messages pane.

Result

You have imported a 3-D object to the custom objects library. You can use this object in a MotionDesk scene.

What's next

You will export an object from the custom objects library.

Related topics

Basics

3-D Object Libraries (MotionDesk Scene Creation 🕮)
Basics of the 3-D Library Manager (MotionDesk Custom Object Library Management 🕮)

Step 4: How to Export Objects from the Library

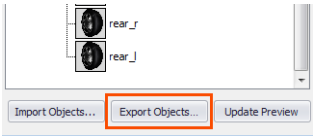
Objective

You can export custom objects to provide these objects for use by other MotionDesk users or to create a backup. The export files are saved in the MotionDesk Export (*.MTX) format. When you select several objects for export, they will be merged into one MTX file.

Method

To export objects from the library

1. In the 3-D Library Manager, open the Customer Objects folder.
2. Select the Tutorial_Car object group.
3. Click Export Objects.



A Save As dialog opens.

4. Browse your file system and open the folder, in which you want to save the export file. The export file is saved in the MTX file format.
5. Enter a name for the export file. Click Save. The MTX file is saved in the selected folder.

Result

You have exported a 3-D object group.

What's next

You can refer to the result for a short summary of the lesson.

Related topics

Basics

3-D Object Libraries (MotionDesk Scene Creation 🕮)
Basics of the 3-D Library Manager (MotionDesk Custom Object Library Management 🕮)

Result of Lesson 2

Result

In this lesson, you learned how to work with the **3-D Library Manager**. You filtered and grouped objects and changed the type of view of the 3-D Object Library. You also learned to import and export objects.

Where to go from here

A scene created in MotionDesk can be animated offline and online. In the next lesson, you will learn to prepare the scene for an animation.

Related topics

Basics

3-D Object Libraries (MotionDesk Scene Creation 🕮)
Basics of the 3-D Library Manager (MotionDesk Custom Object Library Management 🕮)

Lesson 3: Animating the Scene with Data from a File

Where to go from here

Information in this section

Overview of Lesson 3

Basics

A MotionDesk scene can be animated offline with motion data from an MDF file or online with motion data from a simulation on a platform. This lesson describes how to animate a scene using an MDF file and without using a simulation platform.

What you will learn

In this lesson, you will learn to animate a MotionDesk scene with data from an MDF file.

- You will open an MDF file in MotionDesk.
- You will get to know the Motion Player.
- You will assign motion data to movable objects in a scene.
- You will animate the scene.
- You will improve the presentation.
- You will specify atmospheric settings for the scene.

Before you begin

Before you start the animation, you must have previously created a scene in lesson 1. The following description assumes you have done so.

Steps

This lesson contains the following steps:

Result

The lesson concludes with a result that describes how your project looks like at the end of the lesson.

Duration

30 min.

Step 1: How to Observe Movable Objects

Objective

If you want to observe a movable object, an observer moving synchronously with the object is helpful. MotionDesk contains some default observers that can be attached to a movable object. These observers were already assigned to a

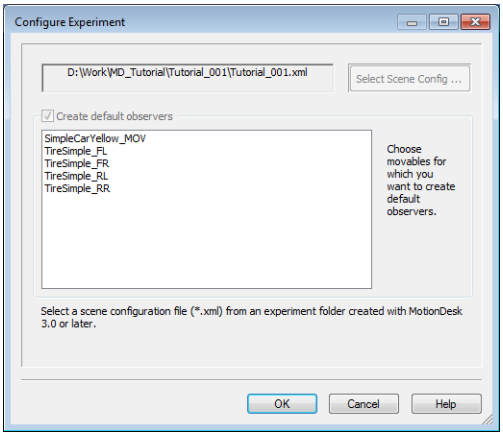
movable object when you created the experiment and can be added for use in the experiment later when playing the animation.

Method

To observe movable objects

1 On the Observation ribbon, click Observers – Create Defaults to create the default assigned observers.

The following dialog opens.



2 Select the SimpleCarYellow_MOV object and click OK.

MotionDesk creates several observers and attaches them to the SimpleCarYellow_MOV object. The observers follow the movable object and view it from different view angles.

3 In the Scene Navigator, under the Observer heading, double-click the SimpleCarYellow_MOV Rear observer to select it and display this view in the 3-D View.

Result

You can observe the car from behind because the observer is following it. There are no movable objects because, you have not yet assigned motion data to the object.

What's next

You will select an MDF file that provides stream data for the movable objects.

Related topics

Basics

Working with Observers (MotionDesk Scene Animation 🕮)

Step 2: How to Select a Motion Data File

Objective

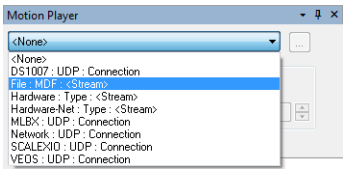
In offline animation, MotionDesk gets the motion data from a motion data file (MDF file).

Method

To select a motion data file

1 On the View ribbon, click Controlbar – Switch Controlbars. From the list, select Motion Player to open the Motion Player pane.

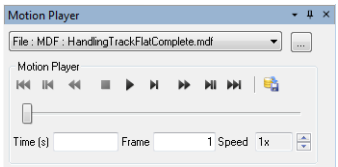
In the Motion Player, list select File : MDF : <Stream> to select an MDF file as the data stream.



2 In the Motion Player, click the Browse button to specify the MDF file. You can find some example MDF files in the `<MotionDesk_InstallationPath>\Demos\MotionDesk\` folder.

Select`AutomotiveDemo\MotAutomotiveDemo\InstrScene\InstrHandlingTrackFlat.mdf`.

MotionDesk loads the MDF file.



Result

A motion data file (MDF file) is now assigned to this experiment. The file name of the motion data file selected is displayed in the Motion Player list field.

What's next

You will assign the motion data of the motion data file to movable objects in the scene.

Related topics

Basics

Data Source for Motion Data (MotionDesk Scene Animation 🕮)

Step 3: How to Assign Motion Data to the Movable Objects

Objective

To animate the movable objects in a MotionDesk scene, you must assign motion data to them.

Methods

There are two ways to assign motion data:

- You can select motion data in the object's properties. This method is used for the chassis object. Refer to Part 1.
- You can drag motion data from the Data Stream Selector pane. This method is used for the wheels. Refer to Part 2.

Part 1

To assign motion data to movable objects via properties

1 To observe the animation, select the Near observer.

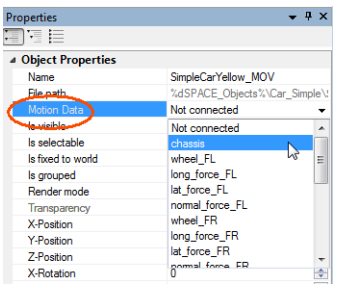
2 On the Motion Player, click ▶.

Because no assignments of the motion data to the movable objects have been made, nothing moves.

3 In the Scene Navigator, select SimpleCarYellow_MOV.

4 In the Properties pane, click the Motion Data property value cell.

5 From the Motion Data list, select chassis.



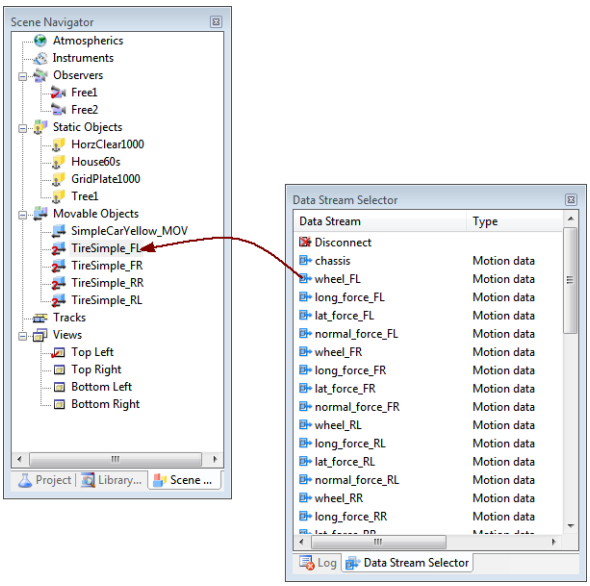
The motion data for the chassis is now assigned to the SimpleCarYellow_MOV object, which then begins to move.

Part 2

To assign motion data to movable objects via drag & drop

1 On the View ribbon, click Controlbar – Switch Controlbars and select Data Stream Selector. The Data Stream Selector opens and displays the MDF file's motion data.

2 In the Data Stream Selector, click the wheel_FL data stream and drag it to TireSimple_FL object in the Scene Navigator.



3 Repeat the above step for the other movable objects. Assign the following motion data:

Motion Data	Movable Object
wheel_FR	TireSimple_FR
wheel_RL	TireSimple_RL
wheel_RR	TireSimple_RR

All wheels start moving.

Note

The motion data assigned to each wheel can be seen in each of the Properties panes as a value in the Motion Data property cell.

4 On the File ribbon, click Save Project to save the modifications.

5 On the Motion Player, click ■ to stop the animation.

Result

You have assigned motion data to the car chassis and each of the four wheels and observed the car and wheels moving in the animation.

What's next

You will learn how to replay an animation.

Related topics

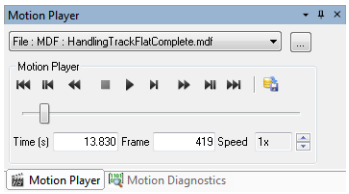
Basics

Setting up Movable Objects (MotionDesk Scene Animation 🕮)

Step 4: How to Replay the Animation

Objective

Replaying an animation allows you to analyze the motion data. You can control the replay with the buttons on the **Motion Player**, which also displays the frame ID and the name of the MDF file.



Method

To replay the animation

1. On the **Motion Player**, use the following buttons:

   You can use them to:
   - Start or stop the replay
   - Move forward or backwards
   - Go to the next or previous frame
   - Jump to the first or last frame

   You can also use the slider to move the animation.
2. Stop the replay.
3. Drag the slider to the desired position.

What's next

You will adjust the movable objects to improve the presentation.

Related topics

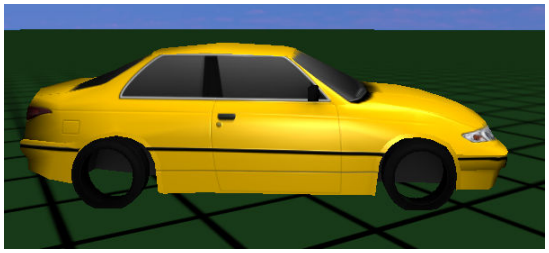
HowTos

How to Replay an Animation (MotionDesk Scene Animation 🕮)

Step 5: How to Improve the Presentation

Objective

If the dimensions of the car in the simulation model differ from the 3-D car object used in the scene, there can be some errors in the presentation. In this example, the wheels on the right side of the car are not displayed correctly. The rear wheels are outside the wheel housing, refer to the following illustration:



In this case, you must do the following steps:

- Rotate the wheels of the right side, refer to Part 1.
- Scale the chassis, refer to Part 2.

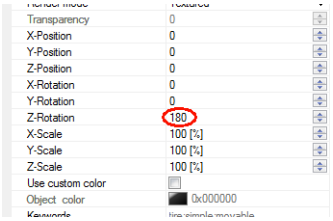
Part 1

To rotate the wheels of the right side

1 In the Scene Navigator, select TireSimple_FR.

The Properties pane displays the property values of the object. By editing the properties you can displace or rotate the object's coordinate system, or scale the object. In this case it is sufficient to rotate the wheel.

2 In the Z-Rotation property cell, enter **180**.



3 Select TireSimple_RR and enter **180** in the Z-Rotation property cell.

Part 2

To scale the chassis

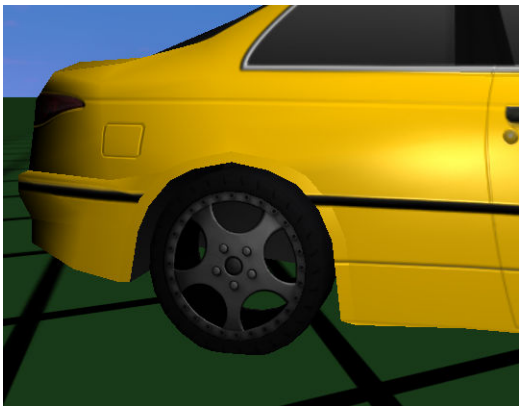
1 To observe the scaling, in the Scene Navigator, select the Side observer.

2 In the Scene Navigator, select SimpleCarYellow_MOV.

The Properties pane displays the property values of the object. By editing the properties you can displace or rotate the object's coordinate system, or scale the object. In this case it is sufficient to scale the chassis.

3 In the X-Scale, Y-Scale, and Z-Scale property value cells, enter **103**.

4 The following illustration shows the scene after adapting the movable objects.



5 On the File ribbon, click Save Project to save the modifications.

Result

When the movable objects are adjusted correctly, your visualization displays correctly.

You have learned how to animate a scene with an MDF file, making small appearance edits.

What's next

You will specify atmospheric settings for the scene to make the animation more realistic.

Related topics

Basics

Setting up Movable Objects (MotionDesk Scene Animation 🕮)

Step 6: How to Add Atmospherics to a Scene

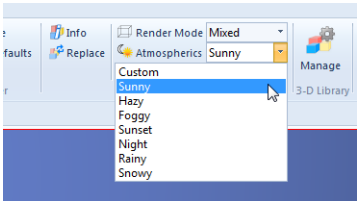
Objective

You can add atmospherics such as rain, snow or fog to a scene to make it more realistic.

Method

To add atmospherics to a scene

1 On the Scene ribbon, click Scene – Atmospherics to open the list of predefined atmospherics settings.



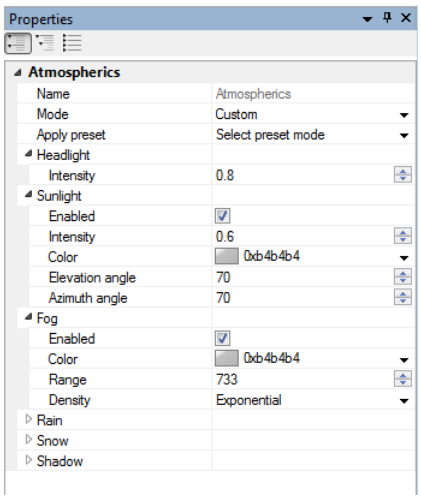
2 In the list, click Snowy to select the snowy atmospheric settings for the current MotionDesk scene.

Snow falls in the scene in the 3-D View.

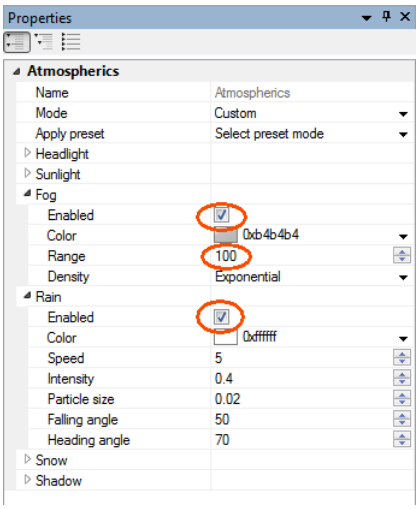
3 From the list of atmospherics, select Custom.

The custom mode lets you specify your own atmospheric settings by combining properties of the predefined atmospherics.

Click the Atmospherics heading in the Scene Navigator to display the atmospherics properties in the Properties pane.



4 In the Properties pane, enable fog and rain. Enter **100** as the fog's range.



The scene is foggy and rain falls.

Result

You have specified atmospherics for a scene in MotionDesk.

What's next

For a summary of this lesson, you can refer to the result of the lesson.

Related topics

Basics

Atmospheric Settings (MotionDesk Scene Animation 🕮)

Result of Lesson 3

Result

In this lesson, you animated a scene with an MDF file.

You assigned motion data to the movable objects in the scene and started the animation. You also created observers to view the car in the animation. You also defined realistic atmospheric settings for the scene.

Where to go from here

The motion data for an animation in MotionDesk can be calculated on a platform. This will be explained in the following lesson.

Related topics

Basics

Basics of Atmospheric Settings (MotionDesk Scene Animation 🕮)
Basics on Selecting the Data Source (MotionDesk Scene Animation 🕮)
Default Observers (MotionDesk Scene Animation 🕮)

References

Motion Player (MotionDesk Scene Animation 🕮)

Lesson 4: Animating the Scene with Simulation Data from a Platform

Where to go from here

Information in this section

Overview of Lesson 4

Basics

A MotionDesk scene can be animated with motion data calculated on a simulation platform. It allows you to drive a virtual car using ControlDesk and visualize it in MotionDesk.

What you will learn

In this lesson, you will learn to work with the simulation in MotionDesk.

- You will register a simulation platform.
- You will create a ModelDesk project based on the Vehicle Dynamics ASM demo and use the files included in the demo for simulation.
- You will connect the motion data from a simulation to movable objects in a MotionDesk scene.
- You will control a vehicle using ControlDesk.
- You will visualize the movements of the vehicle in MotionDesk.

Before you begin

It is assumed that you are familiar with the user interfaces of MotionDesk, ModelDesk, and ControlDesk.

It is also assumed that you are familiar with the animation of a scene using an MDF file. Refer to Lesson 3: Animating the Scene with Data from a File. The following description assumes you have completed this lesson successfully.

Tip

You can also user your own simulation application running on your selected simulation platform. For more information, refer to Tutorials (ASM Vehicle Dynamics Model Description 🕮). You must then also configure your own MotionDesk and ControlDesk projects to run this lesson.

Preconditions

Simulation platform To animate the scene using a simulation application in this lesson, you need one of the following platforms:

- Simulink
- SCALEXIO systems
- VEOS

You must also have installed **ModelDesk** and the **ASM Vehicle Dynamics Blockset** that includes the ASM Vehicle Dynamics demo.

Steps

Result	The lesson concludes with a result that describes how your project looks at the end of the lesson.
Duration	25 min.
Related topics	**Basics** Introduction to ControlDesk (ControlDesk Introduction and Overview 🕮)

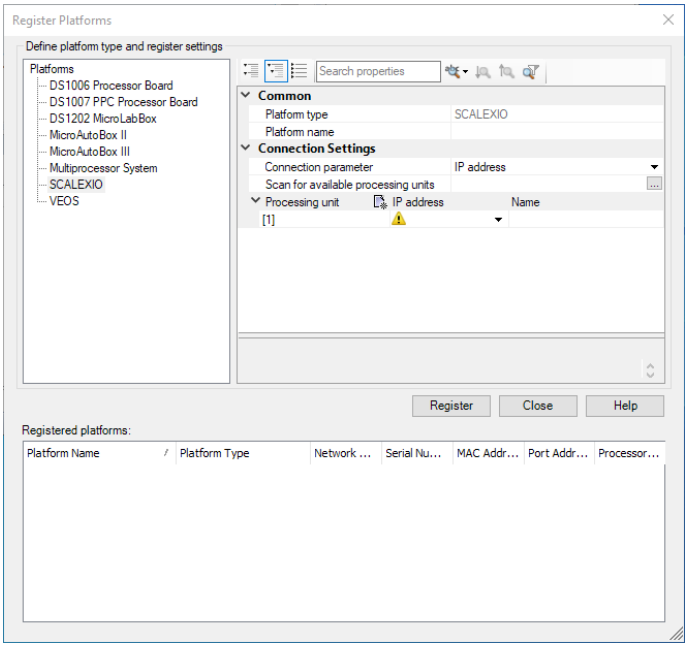
Step 1: How to Load and Start the Simulation Application

Objective	You will register your simulation platform and load the simulation application thats calculates the movement of the vehicle and the motion data for MotionDesk.
Overview	You will register your simulation platform and create a ModelDesk project based on the ASM Vehicle Dynamics demo. You will then use the files included in the demo for the simulation, for example, to control the vehicle in ControlDesk and to view the movements of the vehicle in MotionDesk.
Simulation platform	**Simulation platform** In this step, details for using a SCALEXIO platform are provided as an example. The steps are similar when performed using another simulation platform. Ensure that your simulation platform is configured correctly and running. Refer to your simulation platform documentation for details.

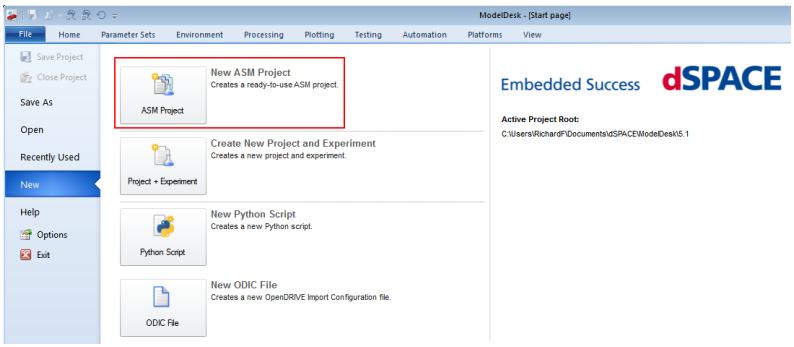
Method

To load and start a simulation application based on an ASM demo project

1. Start ModelDesk.
2. If your simulation platform is not registered, follow the steps to register a platform:
   1. On the Platforms ribbon, click Platform Management – Register Platforms.
   2. Select your simulation platform, for example, `SCALEXIO`, in Register Platforms – Platforms.
   3. Specify the platform connection settings and select the simulation platform.

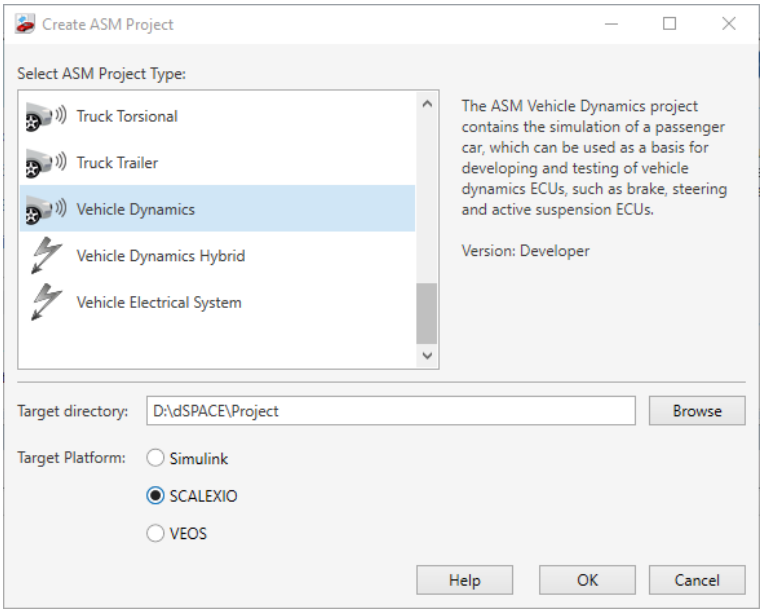


3 In ModelDesk, on the File ribbon, select New - New ASM Project.



4 In the Create ASM Project dialog, select the following values:

- Select ASM Project Type: `Vehicle Dynamics`
- Target platform: `SCALEXIO`.



5 Select OK.

The new ModelDesk project is displayed with the Vehicle Dynamics ASM demo.

The working folder for the Vehicle Dynamics project that you created contains the following folders with the files required for the lesson:

- Animation: Contains the MotionDesk project
- Instrumentation: Contains the ControlDesk project
- Parameterization: Contains the ModelDesk project
- Simulation : Contains all the files required for simulation, for example, the Simulink model and the simulation application.

6 To save the ModelDesk project, select File - Save.

7 Drag the application file to the registered platform node.

Result

You created a ModelDesk project based on the Vehicle Dynamics ASM demo and loaded and started the simulation application.

What's next

You will open the MotionDesk project to display the movements of the vehicle in the simulation.

Related topics

Basics

Introduction to ControlDesk (ControlDesk Introduction and Overview 🕮)
Introduction to Managing Platforms/Devices (ControlDesk Platform Management 🕮)
Managing Real-Time Applications on DS1007, DS1202 MicroLabBox, MicroAutoBox III, and SCALEXIO Platforms (ModelDesk Platform Management 🕮)

HowTos

How to Register a Platform (ModelDesk Platform Management 🕮)

Step 2: How to Open the MotionDesk Project and Experiment

Objective

To view the vehicle in the simulation, you can open the MotionDesk project included in the ASM Vehicle Dynamics demo project.

Method

To open the MotionDesk project and experiment

1 In ModelDesk, click **Home - Open MotionDesk Project** to open the MotionDesk project included in the ASM Vehicle Dynamics demo project.

MotionDesk loads the project and experiment.

Result

You opened the MotionDesk project included with the ASM Vehicle Dynamics demo project.

What's next

You will assign the motion data of the running simulation to the movable objects in the scene in MotionDesk.

Related topics

Basics

Creating and Opening Projects and Experiments (MotionDesk Project and Experiment Management 🕮)

Step 3: How to Connect the Simulation Data to the Movable Objects

Objective

To see the movements of the vehicle in MotionDesk, you must assign the motion data from the simulation to the movable objects in the scene.

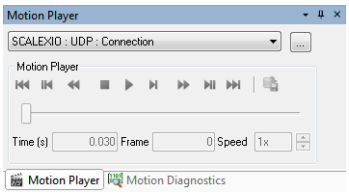
You must carry out the following steps:

- Select the simulation platform as the data source in the **Motion Player**, refer to Part 1.
- Get the motion data from the simulation application, refer to Part 2.
- Assign the motion data to the movable objects, refer to Part 3.

Part 1

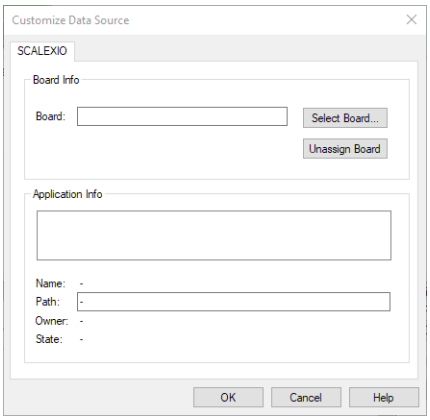
To select the simulation platform as the data source

1 On the **Motion Player**, select the simulation data source. For example, for SCALEXIO select **SCALEXIO : UDP : Connection**.



For more information on the data source required for your simulation platform, refer to Simulation Data Sources (MotionDesk Scene Animation 🕮)

2 On the **Motion Player**, click the **Browse** button to select the hardware. The **Customize Data Source** dialog opens.



3 Specify the platform and select **OK** to confirm your settings.

For more information on how to customize the data source for your platform, refer to How to Select the Data Source (MotionDesk Scene Animation 🕮).

Interim result

Now the simulation platform is the data source for the animation. You can start to get the motion data of the simulation.

Part 2

To get the motion data from the simulation application

1 On the Home ribbon, click Simulation – Go Online.

Interim result

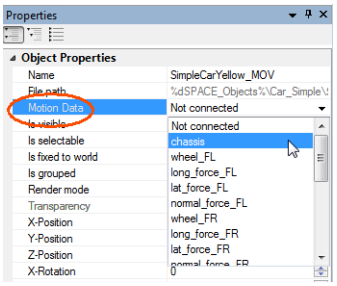
MotionDesk gets the motion data from the simulation application. The Motion Player's Frame ID field shows the flow of data. The motion data can now be assigned to the movable objects.

Part 3

To assign motion data to the movable objects

1 In the Scene Navigator, select SimpleCarYellow_MOV.

The Properties pane displays the properties of the selected object. The Motion data list contains all the available data streams for the simulation.



2 In the Motion Data list, select Chassis to assign the motion data to the SimpleCarYellow_MOV object.

The car will then start to move.

3 Repeat the above steps for the other movable objects. Assign the following motion data:

Movable Object	Motion Data
TireSimple_FL	WheelFL
TireSimple_FR	WheelFR
TireSimple_RL	WheelRL
TireSimple_RR	WheelRR

The wheel objects also start moving.

4 You can also improve the animation as you did in Step 5: How to Improve the Presentation on page 56.

Result

The movable objects in the scene are connected to the simulation data and are moving in the scene.

What's next

Now your virtual car is ready for driving control in ControlDesk.

Related topics

Basics

Data Source for Motion Data (MotionDesk Scene Animation 🕮)
Setting up Movable Objects (MotionDesk Scene Animation 🕮)

HowTos

How to Select the Data Source (MotionDesk Scene Animation 🕮)

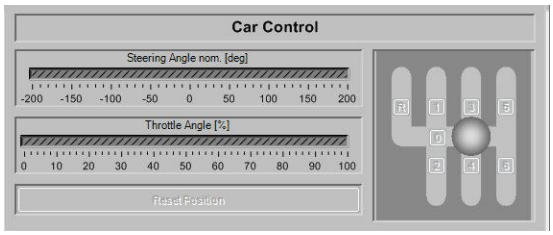
Step 4: How to Execute the Driving Test

Objective

When the simulation is running and MotionDesk is prepared for online animation, you can drive the virtual vehicle using ControlDesk.

Overview

To control the vehicle, you use the Car Control application in the ControlDesk layout. The car control application is shown as follows.



You can can control the vehicle speed, steering angle, and gear. You can also reset the vehicle position.

Method

To open the ControlDesk project and control the vehicle

1. In ModelDesk, click Home - Open ControlDesk Project to open the ControlDesk project included in the ASM Vehicle Dynamics demo project.
   ControlDesk loads the project and experiment.
2. In the Car Control, move the Throttle Angle slider to set the throttle angle.
3. Click a gear button to select a gear.
   In MotionDesk the vehicle starts to move and increases speed. Changes to the vehicle coordinate values are shown in ControlDesk.
4. In the Car Control, move the Steering Angle nom. slider to the left or to the right to steer the vehicle in the scene.
   In MotionDesk, the vehicle turns left and right.
5. If the car has moved and is not in the correct position, for example, outside the scene, you can return it to its initial position.
   In the Car Control, click Reset Position.

Result	You have driven the vehicle using the **Car Control** application in ControlDesk and viewed the movements of the vehicle in the MotionDesk 3-D View.
What's next	For a summary of this lesson, you can refer to the result of the lesson.

Result of Lesson 4

Result	In this lesson, you learned how to animate a scene in MotionDesk with data from a simulation platform. You created a ModelDesk project based on the **Vehicle Dynamics** ASM demo project and assigned the simulation data to the movable objects in MotionDesk. You then executed a driving test with ControlDesk and viewed the movements of the virtual vehicle in the MotionDesk 3-D View.
Where to go from here	A road model can be created and specified in ModelDesk to be used in the MotionDesk scene. In the next lesson, you will learn to edit an existing road in ModelDesk and to use it in the MotionDesk animation.
Related topics	Basics Basics on Selecting the Data Source (MotionDesk Scene Animation 🕮) Introduction to ControlDesk (ControlDesk Introduction and Overview 🕮) References Motion Player (MotionDesk Scene Animation 🕮)

Lesson 5: Working with a Predefined Road from ModelDesk

Where to go from here

Information in this section

Overview of Lesson 5

Basics

You can create detailed road models in ModelDesk's Road Generator. On the basis of these road models, MotionDesk creates static 3-D road objects that can be used in 3-D scenes. ModelDesk comes with some predefined road networks, and MotionDesk with predefined motion data files (MDF files). You can add scenery to the road networks and use them with the MDF files for animation in MotionDesk.

What you will learn

In this lesson, you will learn how to generate a scene in MotionDesk on the basis of a road model you created in ModelDesk.

- You will get to know the user interface of ModelDesk's Road Generator.
- You will create a new project and experiment in ModelDesk.
- You will open a predefined road network in ModelDesk and edit it by specifying its scenery in the Road Generator. Note that in this lesson, you will be working with a network consisting of a complex road element but not including junctions.
- You will create a 3-D object of the road network in MotionDesk.
- You will add static objects to the road network in MotionDesk.
- You will add movable objects to the scene and animate it.

Before you begin

It is assumed that you know how to add objects to a scene in MotionDesk. You must have created a project in MotionDesk. The project must be open. Refer to Lesson 1: Creating the Scene on page 13.

Steps

This lesson contains the following steps:

Result

The lesson is concluded by a result, that describes how your project looks after working through this lesson.

Duration

60 min.

Step 1: How to Start ModelDesk

Objective

When you start ModelDesk, you must either select an existing project or create a new one. In this step, you will create a new project and experiment.

Method

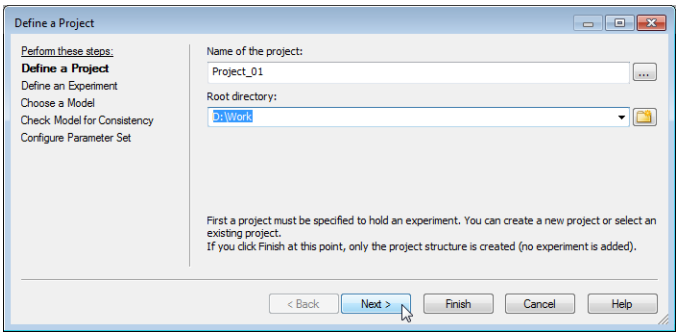
To start ModelDesk

1 On the Start menu, select dSPACE RCP & HIL <Release> – dSPACE ModelDesk <Release>.

ModelDesk opens. Its windows are empty. To work with ModelDesk, you must create a new project and experiment.

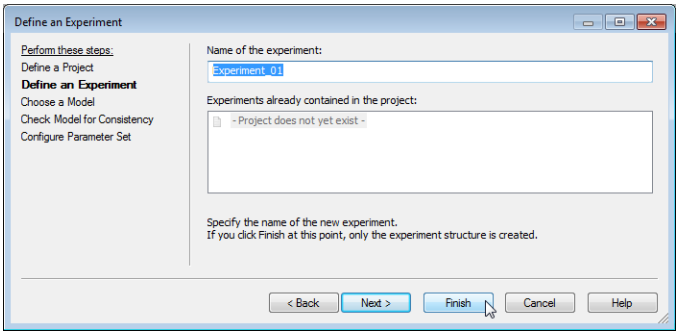
2 On the File ribbon, click New – Project + Experiment.

ModelDesk's Define a Project dialog opens.

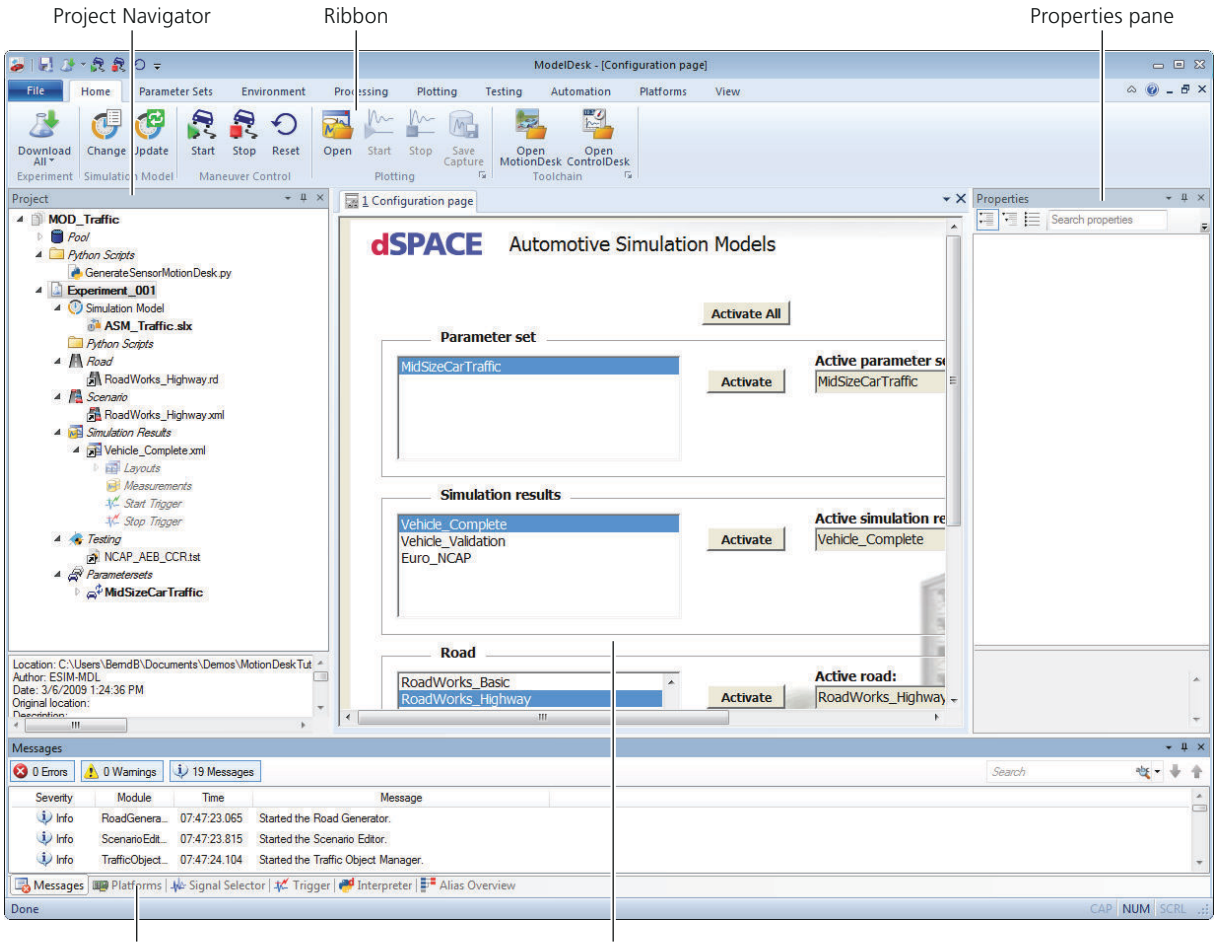


Enter `Project_01` as the project's name and specify the root directory. Click Next.

3 Enter `Experiment_01` as the experiment's name and click Finish.



ModelDesk's main window opens and the Configuration page is displayed. The project and experiment are open. They are displayed in the Project Navigator. The following illustration shows an example of ModelDesk's main window:



- Messages
- Platforms
- Signal Selector
- Trigger
- Interpreter
- Alias Overview
- User Functions Output

Pane	Description
Project Navigator	Displays all the files belonging to the open project hierarchically and provides functions to handle the project and its components. The most important nodes in the **Project Navigator** are: ▪ Pool: Contains all the project-specific files such as parameter, road and maneuver files. They are available for

Pane	Description
	the entire project and linked to the experiments belonging to it. ▪ Experiment: Contains all the files belonging to a specific parameterization task of a model. Multiple Experiments can be attached to one project. ▪ Road: Contains the road model linked to the experiment. ▪ Scenario: Contains the maneuver and traffic scenario linked to the experiment. A maneuver defines how a vehicle moves while a traffic scenario defines the movement of fellow vehicles. ▪ Simulation results: Contains the simulation results. ▪ Parameter sets: Contains all the parameters of a vehicle variant.
Working area	Allows you to view and edit experiments, roads and scenarios. Depending on what you are working on, it displays the: ▪ Scenario Editor ▪ Road Generator ▪ Navigation and parameter pages ▪ Simulation results pages ▪ Configuration page: Displays all Parameter sets, simulation results, and roads as well as scenarios, which are available in an experiment. You can use this page to activate, open for editing, or download one of them for simulation.
Controlbar panes	Displays several tabs with different functions, such as displaying status messages, selecting, and monitoring simulation platforms or executing Python commands.

Result

You have started ModelDesk and created a project and experiment. You have also been introduced to the basic functions of ModelDesk.

Tool automation

You can use tool automation to automate this step via script. Refer to Handling Projects and Experiments in Python (ModelDesk Project and Experiment Management 🕮).

What's next

You will open the **Road Generator**, which allows you to specify a road network's properties.

Related topics

Basics

Creating Projects and Experiments (ModelDesk Project and Experiment Management 🕮)
Introduction to ModelDesk (ModelDesk Basics 🕮)

Step 2: How to Start the Road Generator and Open a Road

Objective

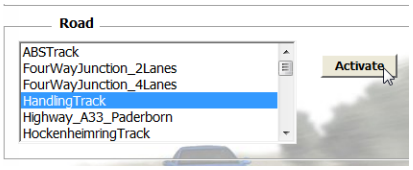
ModelDesk's Road Generator provides three different views with different panes that allow you to specify the properties of a road network.

Method

To start the Road Generator and open a road

1 If the Configuration Page is not open in the main working area, click the Experiment node in the Project Navigator to open it.

In the Road list, select HandlingTrack and click Activate next to it.



By activating the road, you have linked it to the open experiment.

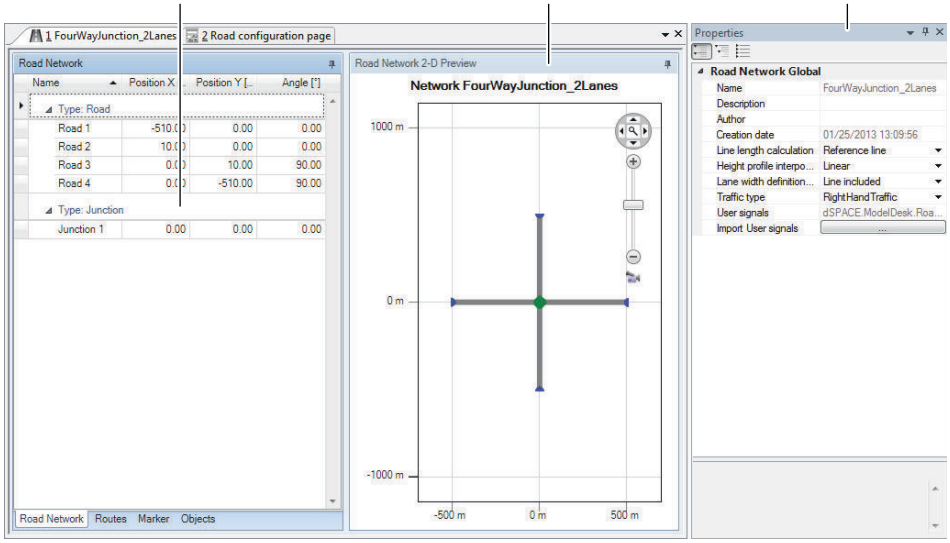
2 To view and edit the road, it must be open. Click Open.

The Road Generator opens in the Road Network view. It looks something like this:

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

Road Network 2-D Preview pane

Properties pane



The Road Network view displays the following panes:

Panes	Description
Road Network 2-D Preview pane	Displays a 2-D preview of the full road network. Double clicking the road network in this view will open a detailed road network view where each road section and junction can be edited.

Panes	Description
Properties pane	Displays and lets you modify the properties of the road network of a selected element or section of the road in the detailed view display.
Road Network Pane Group ▪ Road Network pane ▪ Routes pane ▪ Marker pane ▪ Objects pane	Displays four panes which can be selected by tabs at the foot of the pane. This lets you modify different elements of a road network.

Result

You have opened a road in the Road Generator.

Tool automation

You can use tool automation to automate this step via script. Refer to Example of Creating a Road Network and Accessing its Elements in Python (ModelDesk Road Creation 🕮)

What's next

You will start modifying the road.

Related topics

Basics

Introduction to the Road Generator (ModelDesk Road Creation 🕮)

Step 3: How to Specify the Scenery of the Road

Objective

You can specify different properties of a road network, such as scenery along the road. There are several kinds of default scenery types, which can be added to the road sections and visualized in MotionDesk with the road. This is an easy way to create scenery for a scene in MotionDesk. More objects can be added directly to the scene in MotionDesk.

Method

To specify the scenery of the road

1 Double-click the road in the Road Network 2-D Preview pane. The Road Element view opens and displays different panes that let you modify different properties of the road network element.

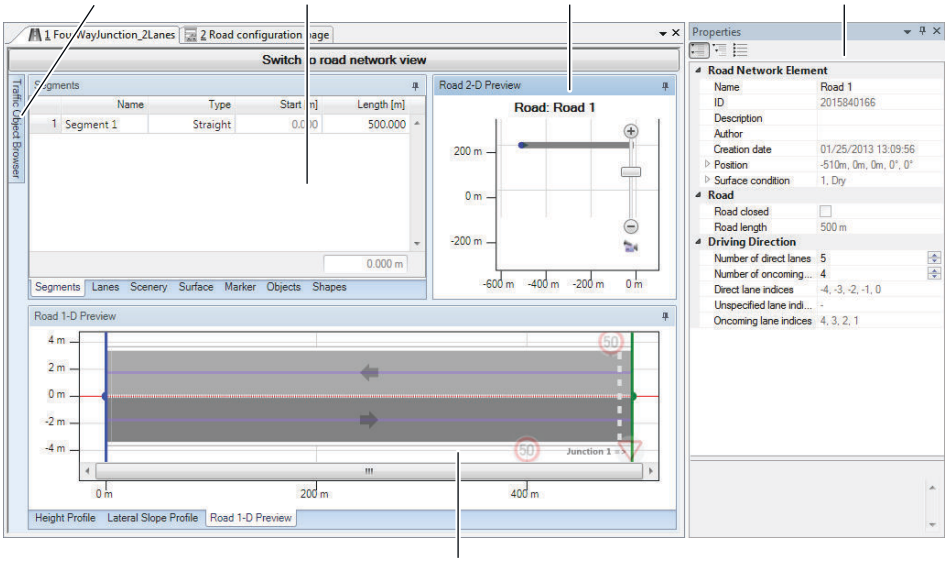
The Road Element view looks something like this:

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

Traffic Object Browser

Road 2-D Preview pane

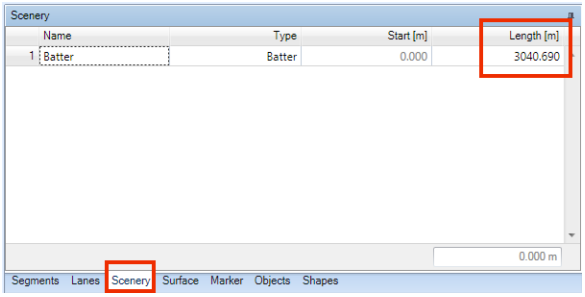
Properties pane



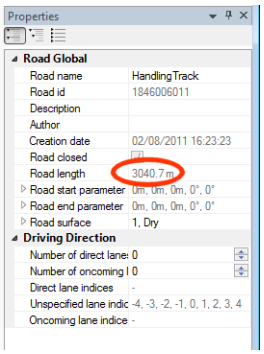
- Road 1-D Preview pane
- Height Profile pane
- Lateral Slope Profile pane

Element	Description
Switch to road network view button	Returns to the Road network view.
Road segments pane group ▪ Segments pane ▪ Lanes pane ▪ Scenery pane ▪ Surface pane ▪ Marker pane ▪ Objects pane ▪ Shapes pane	A pane that contains a number of tabs to let you modify different properties of the road, such as its geometry, lanes, specific surface, and scenery conditions or to add objects such as signposts or lane separators.
Road 2-D Preview pane	Displays a 2-D preview of a road network element.
Road 1-D Preview Group ▪ Road 1-D Preview pane ▪ Height Profile pane ▪ Lateral Slope Profile pane	Displays a 1-D preview of a road network element. More pages are available to edit the height profile of the road network in addition to the horizontal or lateral profile.
Properties pane	Lets you modify the properties of a selected road network section or element.

2 Open the Scenery pane.



3 As this road has only one scenery section, the pane displays only one entry. In this case, the length of the scenery section equals the length of the whole road network element, which is displayed in the Properties pane.



In the Scenery pane, change the length of the scenery section to `1000 m`.

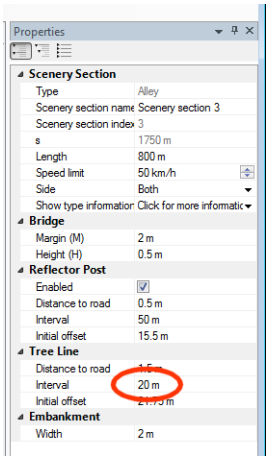
4 Right-click the Scenery pane and select Append Scenery Section – Country Road. A scenery section of the Country Road type is added to the road. Change its length to `750 m`.

5 Append two more scenery sections:

Scenery Type	Length
Alley	800 m
City	490.7 m

6 In the Scenery pane, click the Alley section. Its properties are displayed in the Properties pane.

In the Tree Line – Interval edit field, enter `20 m`. This sets the distance between the trees to 20 m in this Alley section.



7 On the File ribbon, click to save the modifications.

Result

You have created scenery sections of different types along the road.

What's next

You can create a road in MotionDesk based on the specifications you made in ModelDesk.

Related topics

Basics

Scenery (ModelDesk Road Creation 🕮)

HowTos

How to Specify Scenery Sections (ModelDesk Road Creation 🕮)

Step 4: How to Create a Road 3-D Object in MotionDesk

Objective

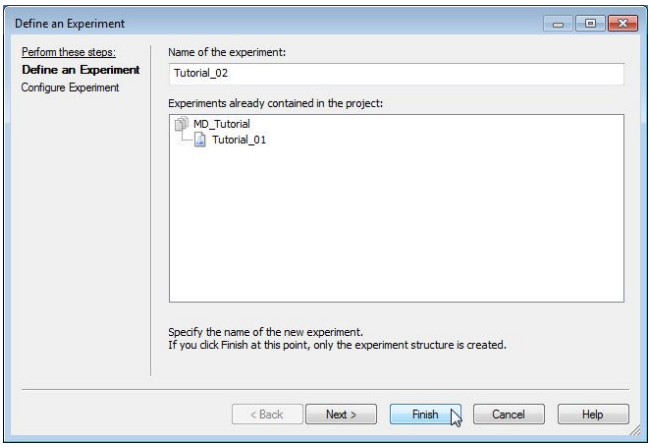
A road model specified in ModelDesk can be generated in MotionDesk and visualized as a 3-D object. The road model can be created in MotionDesk with or without scenery.

Method

To create a road 3-D object in MotionDesk

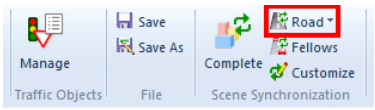
1 In MotionDesk, create a new experiment in the open `MD_Tutorial` project. On the File ribbon, click New – New Experiment. In the Define an

Experiment dialog, enter `Tutorial_02` as the experiment's name and click Finish. This experiment will be used to load and visualize the road created in ModelDesk.

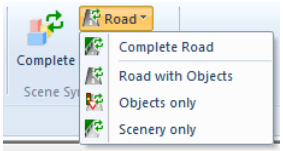


The experiment is created and opened.

2 In ModelDesk, go to the Environment ribbon and click the Scene Synchronization – Road list.

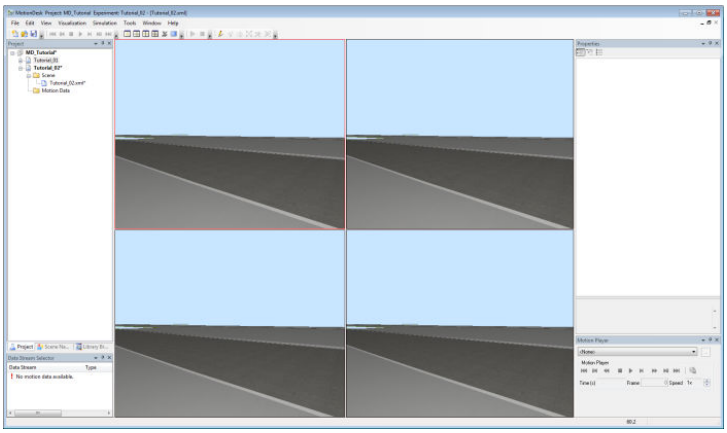


From the Road list, select Road with Objects



A road 3-D object is created in MotionDesk.

After the update, MotionDesk looks like this:



Only the HandlingTrack road has been created, not the scenery specified in ModelDesk.

3 In MotionDesk, go to File ribbon and click Save Project to save the modifications.

Result

You have created a new experiment in MotionDesk and created a road 3-D object based on the HandlingTrack road edited in ModelDesk.

What's next

The road model needs some scenery. You will update the road in MotionDesk with scenery and add some static objects to the scene.

Related topics

Basics

Basics on Roads (ModelDesk Road Creation 🕮)
Creating a Road (ModelDesk Road Creation 🕮)

Step 5: How to Create Scenery for a Road 3-D Object in MotionDesk

Objective

For realistic visualization, the road 3-D object needs some scenery.

- You can update the scenery you created for the road in ModelDesk, refer to Part 1.
- You can add further objects to it in MotionDesk, refer to Part 2.

Part 1

To create scenery for a road 3-D object in MotionDesk

1 When you create a new experiment, a default a ground plate and sky horizon are set. In the new MotionDesk experiment `Tutorial_02`, select Environment in the Scene Navigator.

The Environment properties pane is displayed.

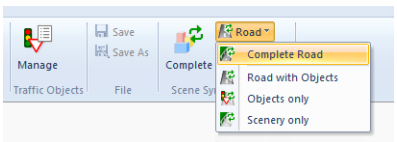
2 Select a new sky horizon. In the Sky texture property field click the Browse button. Open the `<MotionDesk_InstallationPath>\MotionDesk\Assets\Textures\horzCloudy_DIF.tga` file.

Sky visible and Ground visible are by default selected.

The cloudy day sky horizon and grass ground plate are visible in the MotionDesk 3-D View.

3 On the File ribbon, click Save Project to save the modifications.

4 Switch back to ModelDesk and on the Environment ribbon and click Scene Synchronization – Road – Complete Road to synchronize the road model. A road model with its scenery is generated in MotionDesk. This can take a while.



5 On the File ribbon in MotionDesk, click Save Project to save the modifications.

Interim result

The Road and the scenery you specified in ModelDesk is displayed in MotionDesk. Continue by adding more objects to the scene in MotionDesk.

Part 2

To complement a scene with static objects in MotionDesk

1 Switch back to MotionDesk. In the Scene Navigator, under the Static Objects heading, navigate to HandlingTrackFlatScenery – Scenery section 4 – Building line – Right side – House_3 right-click and select Fly to Object. The free observer moves to the house object.

Tip

You can also double-click an object in the Scene Navigator tree to move the observer to its position in the 3-D View.

2 In the Library Browser, select the Bench object from the Env_city folder and drag it to the 3-D View.

3 The object is inserted in the scene near the House_3 object. Right-click it and select Translate. Drag the arrows to move the object to the position you want.

4 Right-click the object and select Rotate. Drag the arrows to rotate its orientation the way you want it.

5 Right-click the object and select Scaling. Drag the arrows to resize the object to the dimensions you want.

After the modifications, it looks like this:

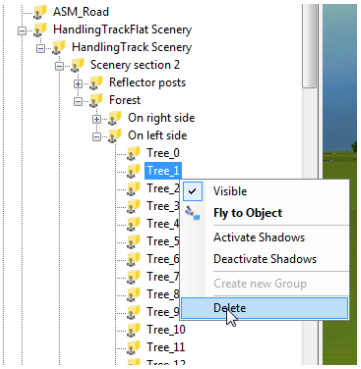
6 In the Library Browser, select the Bicycle object from the same Env_City dSPACE object folder and drag it to the scene. Specify its position, orientation and dimensions as you did for the Bench object in Steps 3 to 5.

Tip

If several objects are positioned close to each other in the 3-D View, select the object in the Scene Navigator and then select the Translate and Scale buttons in the Scene Editing ribbon group.

7 On the File ribbon, click Save Project to save the modifications.

8 In the Scene Navigator, navigate to HandlingTrackFlatScenery – HandlingTrackScenery – Scenery section 2 – Forest – Left side and right-click the Tree_1 object. On the context menu, select Fly to Object then reload the context menu and select Delete. The object is deleted from the scenery.



9 Switch to ModelDesk and go to the Environment ribbon and click Scene Synchronization – Road - Complete Road.

The scenery is once again loaded to the MotionDesk scene.

The ModelDesk road scenery tree object you deleted remains deleted, and the objects you added to the scene in MotionDesk also remain in the scene.

Note

Static Objects in Simulation

MotionDesk static objects are for display only. They are not considered in the simulation, for example, for a collision check.

Static objects used in an animated simulation must be added in the ModelDesk environment and included in a simulation scenario. They can be recognized as objects in the simulation if a sensor is connected.

Result

You have synchronized the ModelDesk road's scenery with MotionDesk and complemented it with MotionDesk static objects.

What's next

You will add movable objects to the scene and animate them.

Related topics

Basics

Scenery (ModelDesk Road Creation 🕮)

HowTos

How to Specify Scenery Sections (ModelDesk Road Creation 🕮)

Step 6: How to Animate the Scene in MotionDesk

Objective

To animate a movable object in MotionDesk, you must connect it to motion data.

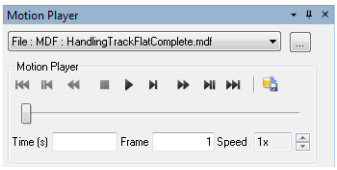
Method

To animate the scene in MotionDesk

1 In MotionDesk, the Motion Player must be open. If it is not, go to the View ribbon and click Controlbar – Switch Controlbars and select Motion Player from the list.

In the Motion Player pane, select File: MDF: <Stream> and click the Browse button.

2 A standard Open dialog opens. Select the following file: `<MotionDesk_InstallationPath>\Demos\MotionDesk\AutomotiveDemo\MotAutomotiveDemo\InstrScene\HandlingTrackFlatComplete.mdf`. The motion data is loaded to the experiment and the Motion Player displays the MDF file's name.



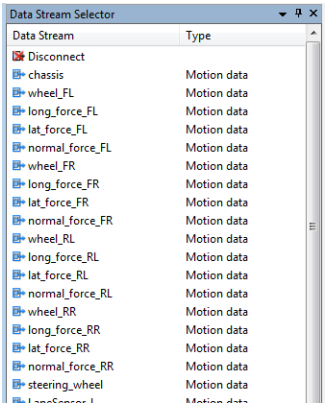
3 In the Library Browser, open the Car_Compact folder and drag the CompactCar_MOV object to the scene.

4 As the car needs tires and a steering wheel, add the following objects from the Car_Compact folder to the scene:

- SteeringWheelCompact_MOV
- 4 × TireCompact_MOV

There is no need to align the objects manually, but you must assign motion data to them.

5 The Data Stream Selector displays the motion data. If it is not open, go to the View ribbon and click Controlbar – Switch Controlbars and select Data Stream Selector from the list.



6 Drag the chassis motion data from the Data Stream Selector to the CompactCar_MOV object in the Scene Navigator. Make the following assignments in the same way:

Movable Object	Motion Data
SteeringWheelCompact_MOV	steering_wheel
TireCompact_MOV	wheel_FL
TireCompact_MOV	wheel_FR
TireCompact_MOV	wheel_RL
TireCompact_MOV	wheel_RR

7 Before animating the movable objects, you must create an observer to follow the car. On the Observation ribbon, click Observer – Create Defaults and select the CompactCar_MOV object to be observed.

MotionDesk creates a set of observers for this object. In the **Scene Navigator**, select the **CompactCar Rear** observer.

8 Select the **Play** and **Stop** buttons in the Motion Player pane to start and stop the animation. You now follow the moving vehicle around the **HandlingTrack** from the position of the rear observer. This is shown below.

9 On the **File** ribbon, click **Save Project** to save the modifications.

Result

The car is driving in the scene. You can observe it from the position of the rear observer. The **Motion Player** displays the time and the frame number of the animation.

What's next

For a summary of this lesson, refer to the result of the lesson.

Related topics

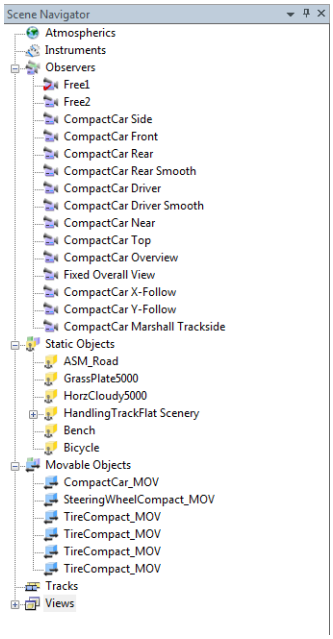
HowTos

How to Replay an Animation (MotionDesk Scene Animation 🕮)

Result of Lesson 5

Result

After working through all the steps in this lesson, the **Scene Navigator** displays the following structure:



In this lesson, you learned to work with ModelDesk and added scenery to a road model. Based on this road model, you created a road 3-D object in MotionDesk, where you added static and movable objects to the scene. In the end, you opened an MDF file, assigned the motion data to the movable objects and animated the scene.

Where to go from here

ModelDesk allows you to create entire road networks from road elements and junctions and to specify different properties of these elements. In the next lesson, you will learn to create a road network which can be visualized in a MotionDesk scene.

Related topics

Basics

Basics on Roads (MotionDesk Scene Creation 🕮)
Basics on Selecting the Data Source (MotionDesk Scene Animation 🕮)
Default Observers (MotionDesk Scene Animation 🕮)
Features of ModelDesk (ModelDesk Basics 🕮)
Scenery (MotionDesk Scene Creation 🕮)
Using Scene Generation (MotionDesk Scene Creation 🕮)

Lesson 6: Defining a New Road Network in ModelDesk

Where to go from here

Information in this section

Overview of Lesson 6

Basics

You can create road networks in ModelDesk and visualize them in MotionDesk. ModelDesk allows you to define many different features for them. These are the subject of this lesson.

What you will learn

In this lesson, you will learn how to create a road network in ModelDesk and use it in MotionDesk.

- You will create a new experiment for an existing project in ModelDesk.
- You will create a road network starting from scratch.
- You will specify various properties of the road network, such as the number of lanes or a height profile.
- You will create a new experiment to an existing project in MotionDesk.
- You will load the road network to MotionDesk.
- You will add a plate and a dome object to the scene.

Before you begin

It is assumed that you are familiar with ModelDesk's user interface. See Step 2: How to Start the Road Generator and Open a Road on page 76. The projects you created in ModelDesk and MotionDesk in the previous lessons must be open.

Steps

This lesson contains the following steps:

Result

The lesson concludes with a result, that describes how your project looks after working through this lesson.

Duration

60 min.

Step 1: How to Create a New Experiment in ModelDesk

Objective

As a project can contain several experiments, you can create a new experiment in an existing project.

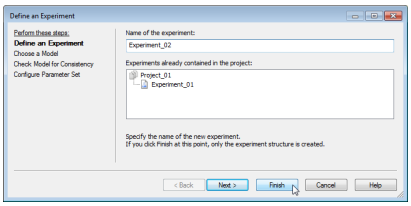
Method

To create a new experiment in ModelDesk

1 If Project_01 in ModelDesk is not open, go to the File ribbon and click Recently Used and open it from the list.

2 On the File ribbon, select New – New Experiment.

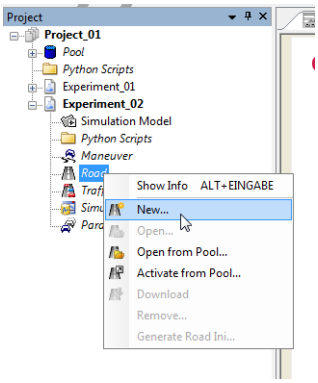
The Define an Experiment dialog opens.



Enter `Experiment_02` as the experiment's name and click Finish.

3 ModelDesk's main page opens. As you want to create a new road, you will not take an existing road from the pool.

In the **Project Navigator**, open the **Experiment_02** node and right-click **Road** and select **New**.



Note

You can also select **Road – New** on the **Environment** ribbon.

Result

A new experiment is created. The **Road Generator** opens in the **Road Network** view. One road element already exists as the starting point for the new road network.

Tool automation

You can use tool automation to automate this step via script. Refer to Handling Projects and Experiments in Python (ModelDesk Project and Experiment Management 🕮).

What's next

You will add road elements and junctions to create a road network.

Related topics

Basics

Creating Projects and Experiments (ModelDesk Project and Experiment Management 🕮)

Step 2: How to Specify the Profile of a Road Element

Objective

A road network is built from several road elements and junctions that you connect in ModelDesk's **Road Generator**. As a road element has already been

created as the starting point when you created the experiment, you can start by specifying its profile.

Method

To specify the profile of a road element

1 In the Road Generator's Road Network view, open the Road Network tab pane. Specify the position of the road element by modifying the values as displayed in the following table:

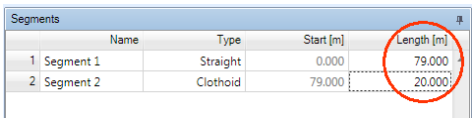
Property	Value
Position x	-39.8
Position y	0.33
Angle	23.0

2 In the Road Network 2-D Preview pane, double-click the road element. The Road Element view now opens and displays several panes to specify the road element.

Open the Segments pane to add segments to the road element. Adding segments of different types will modify the road element's shape.

There is already one segment for the full length of the road element.

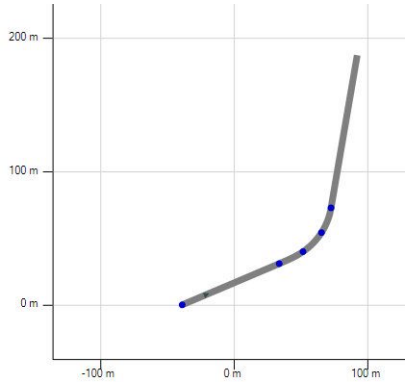
3 Right-click the Segments pane and select Append Segment – Clothoid. A clothoid is a transition curve with a changing radius along its path. Now change the length of Segment 1 to `79 m` and the length of Segment 2 to `20 m`.



4 Append three more segments with the following specifications:

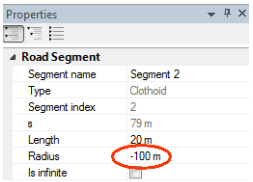
Name	Type	Length
Segment 3	Circular	20 m
Segment 4	Clothoid	20 m
Segment 5	Straight	116 m

The following illustration is an example of how the road network element is displayed in the Road 2_D Preview:



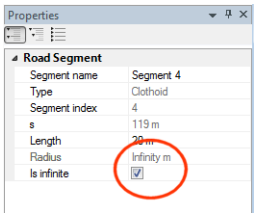
5 The road segments have different properties that you can specify.

In the **Segments** pane, select Segment 2. The **Properties** pane displays its properties. In the **Properties** pane, change the segment's radius to `-100`.



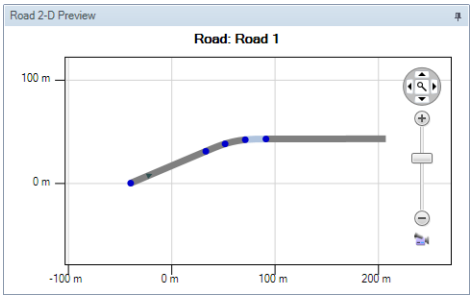
Specify the same value for Segment 3's radius.

6 Select Segment 4 to display its properties in the **Properties** pane. Select **Is infinite**. This sets the radius at the segment's end as infinite.



7 To save the project, go to the **File** ribbon and click **Save Project**.. Name the road network `Road_Tutorial`.

The following illustration displays the road network element in the **Road 2_D Preview**:



Result

You have specified the horizontal profile of a road element.

Tool automation

You can use tool automation to automate this step via script. Refer to Example of Specifying a Road Element in Python (ModelDesk Road Creation 🕮).

What's next

You will append a junction to the road element and specify its profile.

Related topics

Basics

Horizontal Profile of a Road Element (ModelDesk Road Creation 🕮)

HowTos

How to Specify the Horizontal Profile of a Road Element (ModelDesk Road Creation 🕮)

Step 3: How to Create a Junction and Specify its Profile

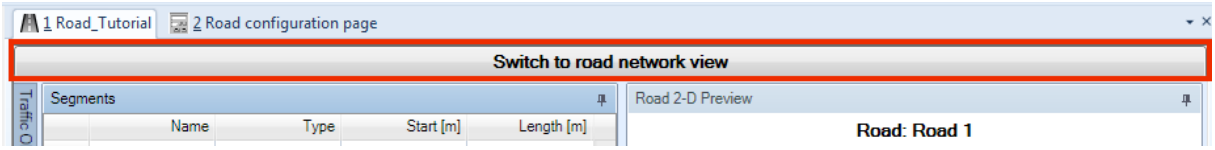
Objective

The profile of a junction is defined by the number and position of its connection points.

Part 1

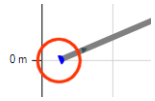
To create a junction

1 Click the Switch to road network view button at the top of the window.



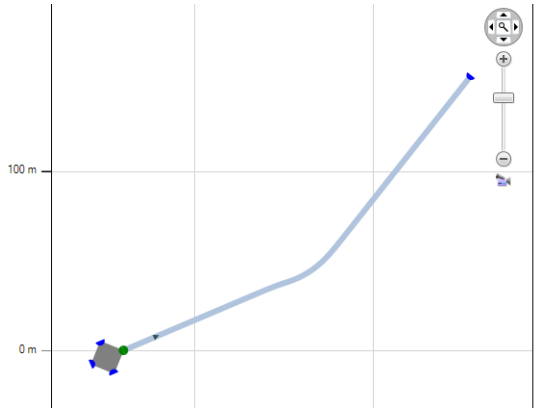
The Road Network view opens.

2 In the Road Network 2-D Preview pane, right-click the road element's starting point and select New junction – 4 connections.



Interim Result

The following illustration is an example of how the junction with four connection points is attached to the road network element. It is displayed in the Road 2_D Preview:

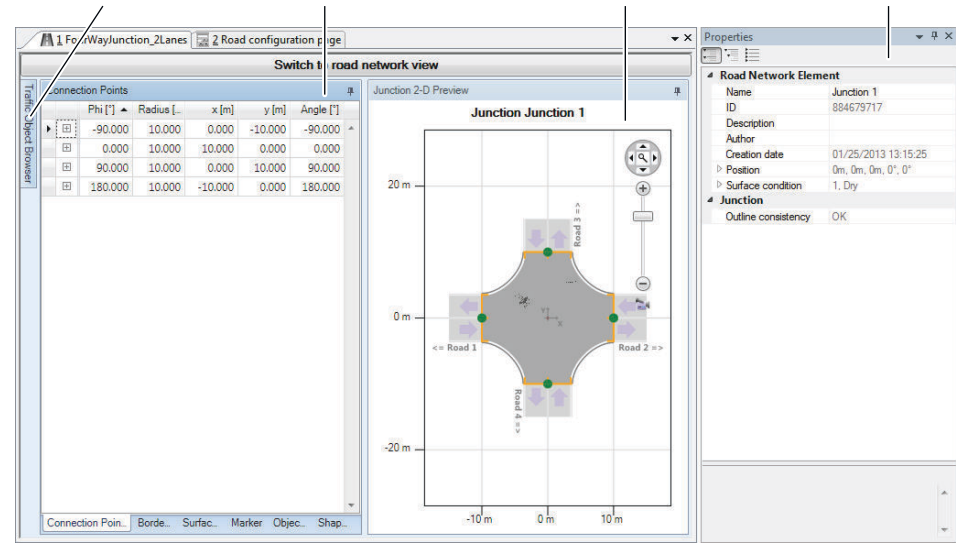


Part 2

To specify the profile of a junction

1 In the Road Network 2-D Preview pane, double-click the junction. The Junction view opens. It looks something like this:

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



The Junction view contains the following elements:

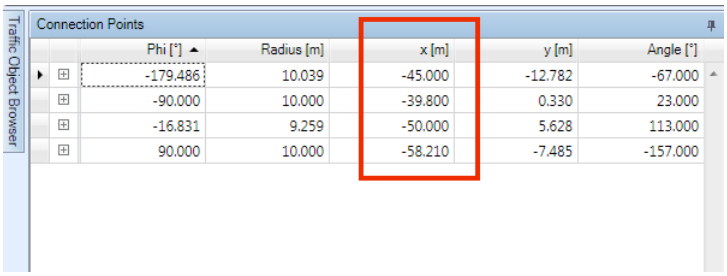
Pane	Description
Switch to road network view button	Returns to the Road network view.
Connection points pane group ▪ Connection Points pane ▪ Borders pane ▪ Marker pane ▪ Surfaces pane ▪ Objects pane ▪ Shapes pane	Displays a number of panes selected using the tabs at the foot of the pane that let you modify different elements on a junction. This includes the specific geometric property, road surface, borders and any additional objects.
Junction 2-D Preview pane	Displays a 2-D preview of a junction.
Properties pane	Displays and lets you modify the individual properties of a selected element of the junction.

2 To specify the profile of a junction, you must specify the positions of the junction's connection points.

Open the Connection Points pane. It displays different values for the connection points that define their positions and orientations.

Change the x- values of the second connection point to `-50 m` and of the fourth connection point to `-45 m`.

When you change the values, the Junction 2-D Preview changes as well as the order of the connection points in the Connection Points pane.



Note

If you modify the first connection point, it can break the connection of the junction to the road element.
The connection point is shown with a blue dot if you have broken the connection. To restore it follow the below steps:
Restore junction connection

1. Return to the **Road Network View**. Refer to Step 1.
2. Right click the blue semicircle of the junction's connection point and select **Connect (Move)**. The road segments connection points turn orange.
3. Click the orange semicircle of the road. The junction and the road element are now reconnected and the connection point is green.

This can affect the accuracy of the following steps in the tutorial. You can close the experiment without saving and reload it to restart Step 3.

3 Now change the angle of the connection point that is now on the fourth position in the list to `180°` and its y-value to `-5 m`.

4 Select the third connection point in the list and enter `90°` for the angle-value.

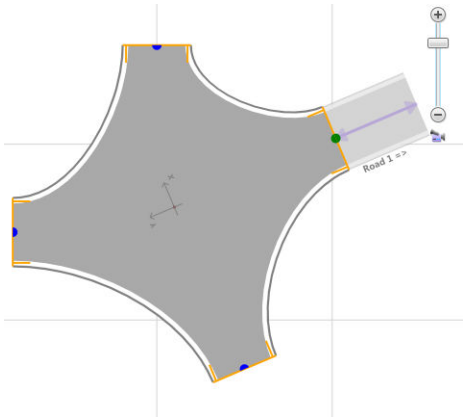
Connection Points

	Phi [°]	Radius [m]	x [m]	y [m]	Angle [°]
⊞	-179.486	10.039	-45.000	-12.782	-67.000
⊞	-90.000	10.000	-39.800	0.330	23.000
⊞	-16.831	9.259	-50.000	5.628	90.000
⊞	75.786	9.314	-58.210	-5.000	180.000

5 To save the project, go to the **File** ribbon and click **Save Project**.

Result

You specified the junction profile. The Junction 2-D view looks like this:



At this point, the road network consists of a road element and a junction.

Tool automation

You can use tool automation to automate this step via script. Refer to Example of Creating a Junction in Python (ModelDesk Road Creation 🕮).

What's next

You will add more elements to the road network.

Related topics

Basics

Profile of a Junction (ModelDesk Road Creation 🕮)

HowTos

How to Specify the Profile of a Junction (ModelDesk Road Creation 🕮)

Step 4: How to Add more Elements to a Road Network

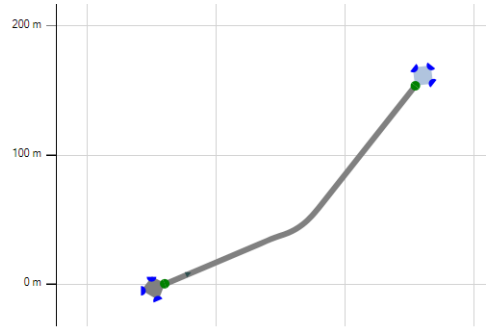
Objective

You can connect several road elements and junctions to one road network.

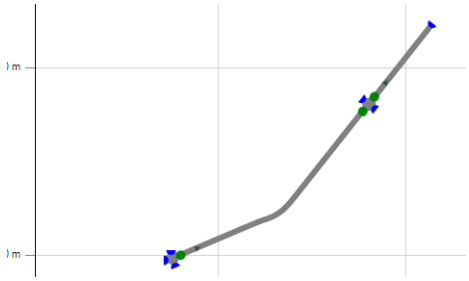
Method

To add more elements to a road network

1. Switch back to the **Road Network** view.
2. Right-click the connection point on the other end of the road element and select **New Junction – 4 connections**. Another junction is added to the road network.



3. Right-click the **Road Network 2-D Preview** pane and select **New Road** on the context menu. A new road element is created but not connected to the road network.
4. To connect it, drag the road element to the right connection point of the junction you just created. When the connection point turns orange you can connect both elements. Green circles show that the road is successfully connected to the junction.



5 To save the project, go to the File ribbon and click Save Project.

Result

The road network now consists of two road elements and two junctions.

In the same way, you can add more elements to create a more complex road network. For the purpose of this tutorial, this road network is sufficient.

What's next

You can specify different properties of your road network. You will begin with the height profile.

Related topics

HowTos

How to Specify a Road Network (ModelDesk Road Creation 🕮)

Step 5: How to Specify the Height Profile of a Road Element

Objective

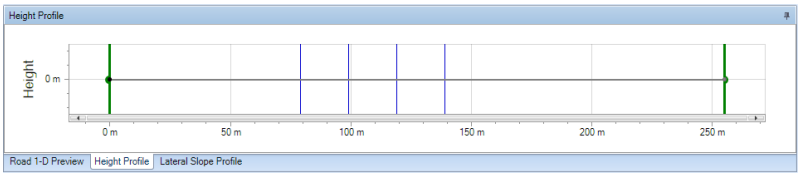
Road elements can have a height profile. This means that they are not always flat. Junctions do not have a height profile, only one single height value for the entire junction.

Method

To specify the height profile of a road element

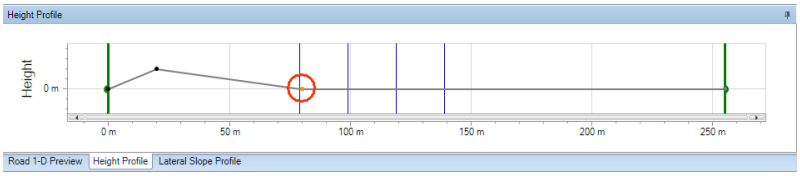
1 Double-click Road 1 in the Road Network 2-D Preview pane to open the Road Element view.

2 Open the Height Profile tabbed pane. It allows you to specify height points on the road element. The horizontal axis describes the distance from the height point to the road element's starting point. The vertical axis describes the height of the height point.

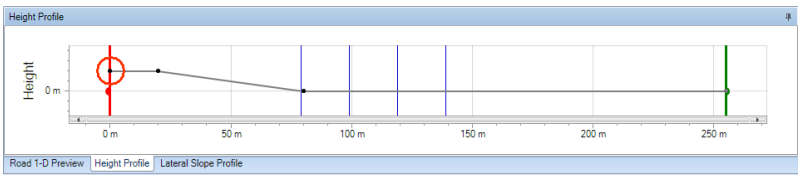


3 In the **Height Profile** pane, move the mouse pointer to the distance of `20 m` from the road element's starting point and to the height of `5 m`. Right-click and select **Insert Height Point**. A height point is inserted at this position. It is indicated by an orange dot. If it is not in the correct location, use the mouse to drag the height point to the correct position.

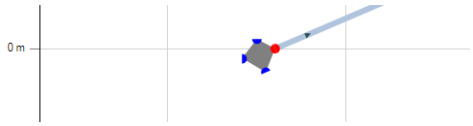
4 The inserted height point results in the remainder of the road element being raised to that height. Insert another height point at the distance of `80 m`. Drag it with the mouse to the height of `0 m`. The remainder of the road element is lowered again to 0 m.



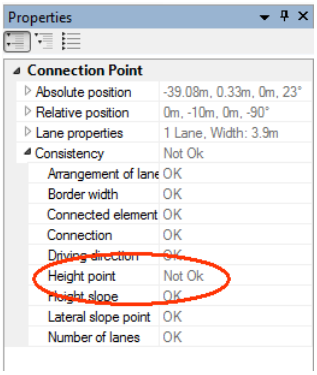
5 Each road element has a default height point at its starting point. Drag the starting height point to the height of `5 m`. The starting point vertical axis will be shown in red.



6 Switch to the **Road Network** view. In the **Road Network 2-D Preview** pane, you can see that the connection point of Road 1 and Junction 1 is red. This indicates an inconsistency at this point between the two road elements.

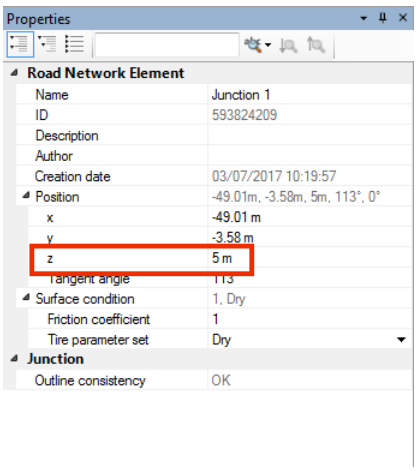


Click the red connection point. The **Properties** pane displays its properties. The inconsistency is caused by the different height values of the two elements at the connection point. This is shown with the value **Not OK** in the **Height point** property



7 In the Road Network 2-D Preview pane, right-click the connection point of Junction 1 which connects it to Road 1. The semicircle of the junction connection point will be pink. Select Adapt Properties. This adapts the properties of the junction to those of the road element. The connection is consistent again.

Double-click the junction to switch to the Junction view. In the Properties pane, you can see that the height has been adapted to the height of the road element.



8 To save the project, go to the File ribbon and click Save Project.

Result

You have specified the height profile of a road element and adapted the properties of a connected junction.

What's next

You will specify the lateral slope profile of a road element.

Related topics

Basics

Height Profile of a Road Element (ModelDesk Road Creation 🕮)

HowTos

How to Specify the Height Profile of a Road Element (ModelDesk Road Creation 🕮)

Step 6: How to Specify the Lateral Slope Profile of a Road Element

Objective

You can specify lateral or horizontal slope from one side of the road to the other for road elements. Junctions cannot have lateral slope. This means that a road element cannot have lateral slope at the connection point with a junction.

Method

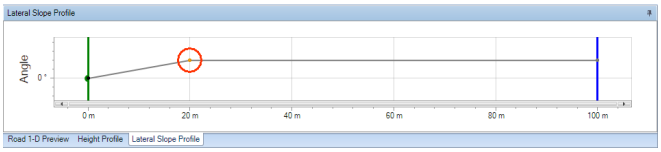
To specify the lateral slope profile of a road element

1 In the Road Network 2-D Preview pane, double-click Road 2. The Road Element view opens.

2 Open the Lateral Slope Profile pane. To specify lateral slope, you must insert lateral slope points.

The horizontal axis displays the distance of the lateral slope point to the road element's starting point. The vertical axis displays the angle of the lateral slope.

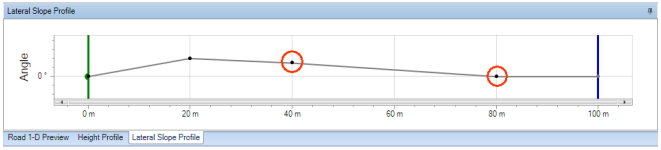
3 Right-click the Lateral Slope Profile pane at a distance of `20 m` from the road element's starting point and select Insert Lateral Slope Point. Click the lateral slope point and drag it to an angle of `4°`.



4 Insert two more lateral slope points with the following values:

- Distance = 40 m, Angle = 3°
- Distance = 80 m, Angle = 0°

Now the Lateral Slope Profile pane displays the following:



5 To save the project, go to the File ribbon and click Save Project.

6 Switch to the Road Network view.

Result

You have specified a lateral slope profile on a road element by inserting several lateral slope points.

What's next

You will create lanes on the road network.

Related topics

HowTos

How to Specify the Lateral Slope Profile of a Road Element (ModelDesk Road Creation 🕮)

Step 7: How to Specify Lanes on a Road Network

Objective

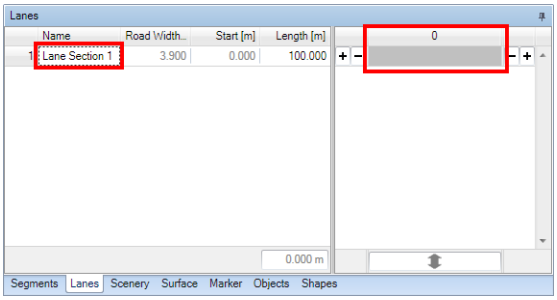
On a road network, there can be several sections with different numbers of lanes and directions of travel. Lanes can be defined on road elements and junction connection points.

Method

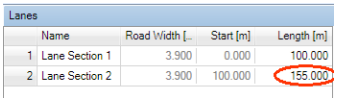
To specify lanes on a road network

1 In the Road Network 2-D Preview pane, double-click Road 1. The Road Element view opens.

2 Open the Lanes pane. One lane section already exists. It has only one lane.

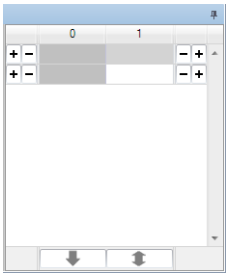


Right-click the pane below Lane Section 1 and select **Append Lane Section** to add another lane section to the road element. Change the length of the new lane section to `155 m`.



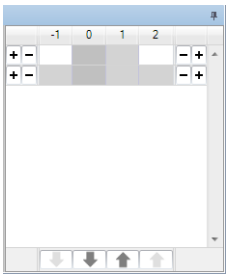
Now the road element has two lane sections and you can specify the number of lanes on each lane section.

3 Click + on the right side of the **Lanes** pane to add a lane to the right of the existing lane in **Lane Section 1**.

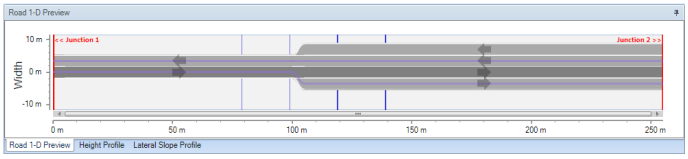


4 Now use + on the right and left to add two lanes to the right and one to the left for Lane Section 2.

The **Lanes** pane displays the following:

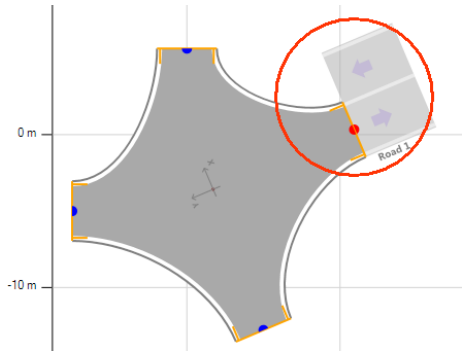


5 Open the **Road 1-D Preview** pane. You can see the lanes and lane sections on the road element in a 1-D preview. The connections to Junction 1 and Junction 2 at the start and end points of the road element are red. This inconsistency is caused by the difference in lanes between the road element and the junctions.

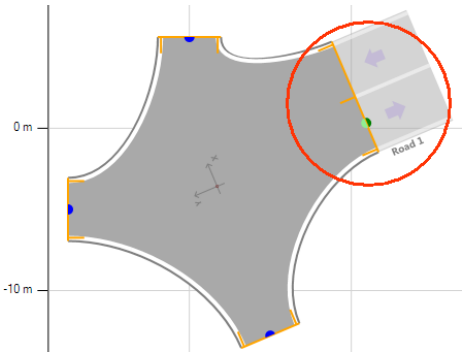


6 Double-click the name of the connected junction ("Junction 1") in the **Road 1-D Preview** pane to switch to its **Junction Element** view.

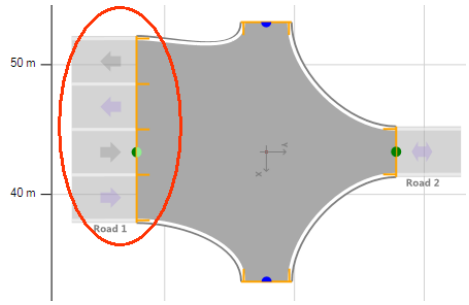
You can see the difference in the number of lanes. In the **Properties**, the Consistency checkpoint property for the **Number of lanes** is noted as **Not OK**.



Right-click the left semicircle of the connection point connecting Junction 1 and Road 1 and select **Adapt Properties**. The number of lanes on the junction is adapted to the road element.



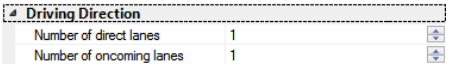
7 Switch to the **Junction Element** view of Junction 2 and adapt its properties to the properties of the road element. It then looks like this:



8 The arrow buttons on the **Lanes** pane are used to specify the direction of the travel in each lane. You can also edit the lane direction in the **Properties** pane.

Expand the **Driving Direction** list and select the:

- Number of direct lanes.
- Number of oncoming lanes.



9 To save the project, go to the **File** ribbon and click **Save Project**.

Result

You have specified lane sections with different numbers of lanes on a road element and adapted the junctions to match the joining roads.

Tool automation

You can use tool automation to automate this step via script. Refer to Example of Creating Lane Sections in Python (ModelDesk Road Creation 🕮).

What's next

You will specify surface conditions on the road network.

Related topics

Basics

Lanes of a Road Element (ModelDesk Road Creation 🕮)

HowTos

How to Specify Lane Sections and Lanes on Road Elements (ModelDesk Road Creation 🕮)

Step 8: How to Specify Surface Conditions on a Road Network

Objective

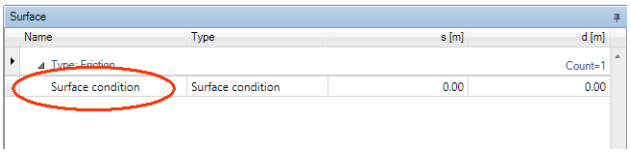
A surface condition can be specified for whole road elements and junctions as well as for specific areas on road elements and junctions. There are different types of surface conditions.

Method

To specify surface conditions on a road network

1 Switch to the Road Network view. Double-click Road 2. The Road Element view opens.

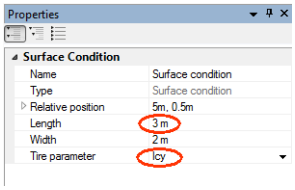
2 Open the Surface tabbed pane and right-click it. On the context menu, select New Surface – Friction – Surface Condition. A surface condition is added to the list. It is positioned on the road element's starting point with the s and d values of `0 m`.



To modify the position of the surface condition, enter the following values: s = 5 m, d = 0.5 m

In the Road 1-D Preview pane, you can see how the position of the surface condition is modified.

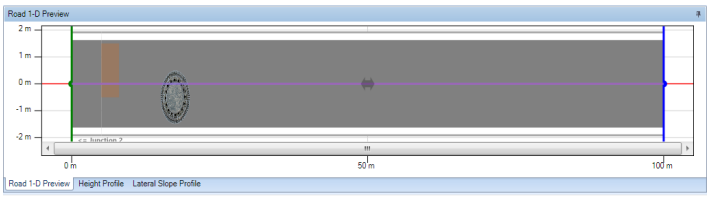
3 Click the surface condition to display its properties in the **Properties** pane. Change the area's length to `3 m` and select `Icy` as the tire parameter. This specifies the type of surface for the section.



4 Right-click the **Surface** pane again and select **New Surface – Texture Map**. Specify the following position for the texture map: s = 15 m, d = -0.5 m

In the **Properties** pane, select the **GullyCoverRound**  object.

Now the **Road 1-D Preview** pane looks like this:



5 Click the **Switch to road network view** button and open Junction 2.

The **Properties** pane displays the junction's properties. Select *wet* as the tire parameter. This specifies the surface condition for the whole junction.

6 To save the project, go to the **File** ribbon and click **Save Project**.

Result

You have specified different surface conditions for parts of the road network.

What's next

You will add road markings and a traffic object to the road model.

Related topics

Basics

Surface Condition (ModelDesk Road Creation 🕮)

HowTos

How to Specify Areas with Specific Surface Conditions or Textures (ModelDesk Road Creation 🕮)

Step 9: How to Add Road Markings and Traffic Signs to a Road

Objective

With road markings and traffic signs you can make a road model more realistic.

Method

To add road markings and traffic signs to a road

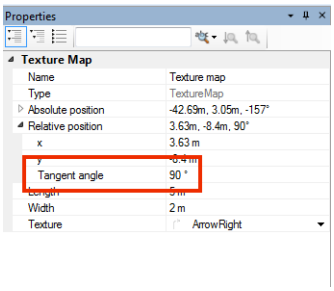
1 In ModelDesk, open the Junction Element view of Junction 1.

2 Right-click the junction and select New Surface - Texture Map from the context menu.

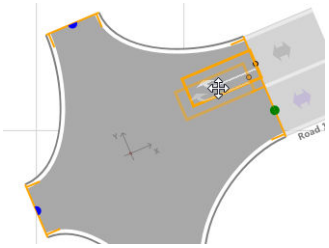
A new texture map is added to the junction.

3 In the Properties pane, in the Texture list cell select the ArrowRight texture.

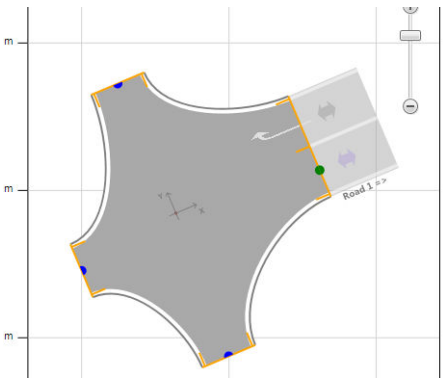
4 In the Properties pane, modify the value of the Relative position - Tangent angle property of the texture map to orient it in reasonable way.



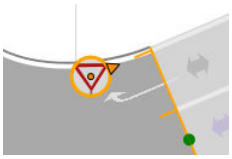
5 Drag it in the Junction 2-D Preview to correct its position on the junction.



It looks like the following:



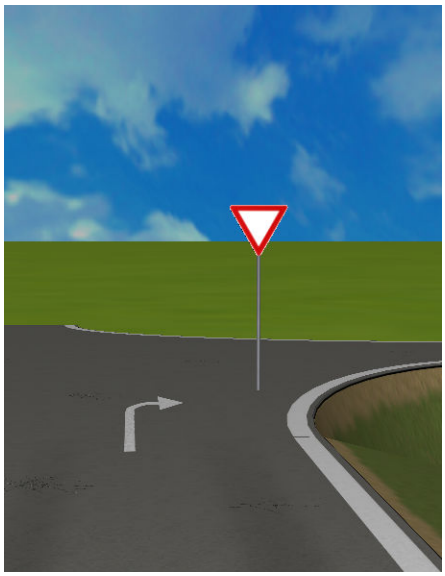
6 Open the Traffic Object Browser using the tab placed in the top left corner of the working area and select the Traffic Signs – Yield object. Drag it to the Junction 2-D Preview to add it to the junction. Position it next to the texture map. It is automatically oriented towards the closest lane.



7 To save the project, go to the File ribbon and click Save Project.

Result

You have added a road marking and a traffic sign object to the road model in ModelDesk. After synchronization with MotionDesk, it will look like this:



What's next

After specifying the properties of the road network, you will specify scenery along the road.

Related topics

Basics

Static Objects (ModelDesk Road Creation 🕮)
Texture Maps for Roads (ModelDesk Road Creation 🕮)

HowTos

How to Add Static Traffic Objects (ModelDesk Road Creation 🕮)
How to Specify Areas with Specific Surface Conditions or Textures (ModelDesk Road Creation 🕮)

Step 10: How to Specify Scenery for a Road Network

Objective

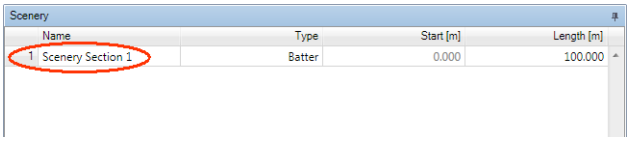
A realistic road model must have some scenery along the road. It can consist of a tree-lined road, houses and street lights in a city scenery, etc.

Scenery will make a simulation more realistic, for example, it helps to provide a sense of the vehicle's speed.

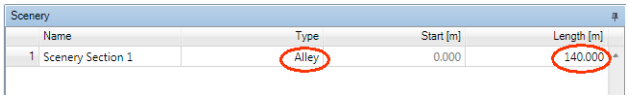
Method

To specify scenery along a road network

1 Switch to the Road Element view of Road 1 and open the Scenery pane. One scenery section already exists. You can start by modifying its properties.



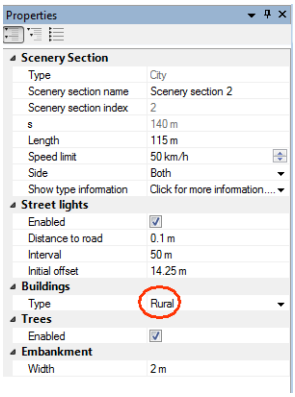
2 In the Scenery pane, change the scenery type to `Alley` and its length to `140 m`. This adds a tree-lined alley scenery to the road section.



3 Right-click the Scenery pane and select Append Scenery Section – City to add a scenery section of the City type to the road element.

Change its length to `115 m`.

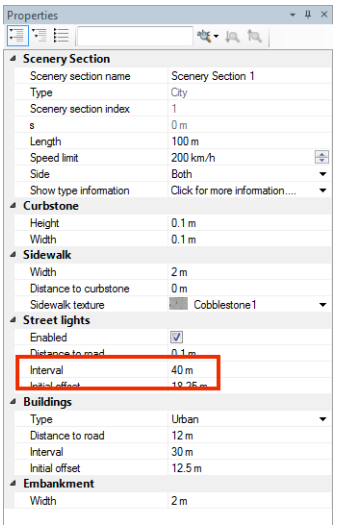
4 The Properties pane displays the properties of Scenery section 2. Change the type of building to `Rural`.



5 Switch to the Road Element view of Road 2 and open the Scenery pane. A scenery section already exists.

Select the City type.

6 In the Properties pane, change the interval of the street lights to `40 m`.



7 To save the project, go to the File ribbon and click Save Project.

8 Switch to the Configuration Page and activate the road model. Select the road in the Road list and click Activate next to the list.

Result

You have defined different scenery sections along the road network.

What's next

You have finished the specification of the road network. Next you will create a road 3-D object in MotionDesk to view the changes made in this tutorial. You will also create a new experiment in MotionDesk.

Related topics

Basics

Scenery (ModelDesk Road Creation 🕮)

HowTos

How to Specify Scenery Sections (ModelDesk Road Creation 🕮)

Step 11: How to Create a Scene Containing a Road Specified in ModelDesk

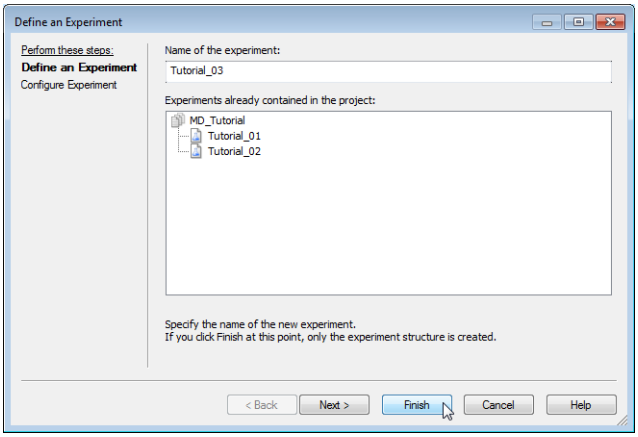
Objective

Before you create a new 3-D scene with the road model you created in ModelDesk, you must add a new experiment to your project in MotionDesk.

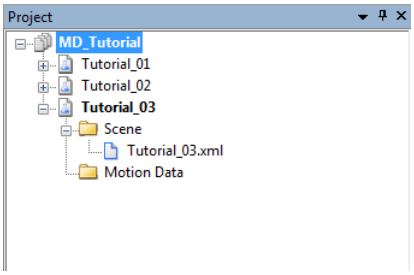
Method

To create a scene containing a road specified in ModelDesk

1 Switch to MotionDesk and on the File ribbon and click New – Experiment. In the Define an Experiment dialog, enter `Tutorial_03` as the experiment's name and click Finish.



The project structure in the Project Manager is modified.



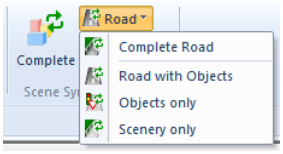
When you create a new experiment, by default a ground plate and sky horizon are set. These are displayed in the 3-D View.

2 On the Scene ribbon, select Edit. Now you can edit the scene.

3 On the File ribbon, click Save Project to save the modifications.

MotionDesk is now prepared for the synchronization of the new road created in ModelDesk. This experiment must remain open and active.

4 In ModelDesk, on the Environment ribbon click Scene Synchronization – Road - Complete Road.



The road model is synchronized with MotionDesk. This can take some time.

5 Switch to MotionDesk again. In the working area 3-D View, navigate the new road network to view all the changes made in this tutorial.

Result

You have created a new experiment for a project in MotionDesk and visualized the road model you created in ModelDesk.

What's next

For a summary of the lesson, you can refer to the result of the lesson. Result of Lesson 6.

Related topics

Basics

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

HowTos

How to Synchronize When MotionDesk and ModelDesk Run on the Same PC (ModelDesk Scene Synchronization 🕮)

Result of Lesson 6

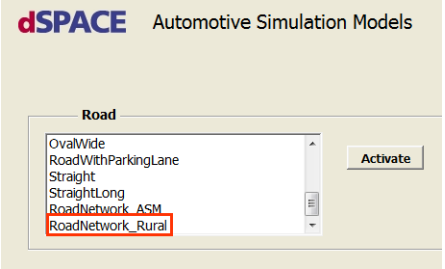
Result

After working through the lesson, the 3-D View looks as follows:

In this lesson, you got to know the different features of ModelDesk and created a road network with various specifications. After that, you created a road 3-D object of the road network in MotionDesk.

Predefined road

The road network you created in this lesson is part of a predefined road model that comes with ModelDesk: *RoadNetwork_Rural*. If you want to work with the complete road network, you can find the road model in the road pool in ModelDesk.



Where to go from here

There are different types of objects that can be used to make a MotionDesk scene more realistic or to represent traffic participants. In the next lesson (refer to Lesson 7: Using Objects in a MotionDesk Animation on page 117), you will learn how to use these objects.

Related topics

Basics

Basics of Traffic Objects (ModelDesk Traffic Object Management 🕮)
Basics on Roads (MotionDesk Scene Creation 🕮)
Coordinate System Used by the Road Generator (ModelDesk Road Creation 🕮)
Features of ModelDesk (ModelDesk Basics 🕮)
Height Profile of a Road Element (ModelDesk Road Creation 🕮)
Horizontal Profile of a Road Element (ModelDesk Road Creation 🕮)
Lanes of a Road Element (ModelDesk Road Creation 🕮)
Lateral Slope Profile of a Road Element (ModelDesk Road Creation 🕮)
Profile of a Junction (ModelDesk Road Creation 🕮)
Scenery (MotionDesk Scene Creation 🕮)
Surface Condition (ModelDesk Road Creation 🕮)
Texture Maps for Roads (ModelDesk Road Creation 🕮)
Using Scene Generation (MotionDesk Scene Creation 🕮)

Lesson 7: Using Objects in a MotionDesk Animation

Where to go from here

Information in this section

Overview of Lesson 7

Basics

MotionDesk can be used in an ADAS (advanced driver assistance system) environment. It can animate a traffic scenario with different traffic participants and their interaction with each other, such as a vehicle braking for a pedestrian crossing the road. For this, MotionDesk comes with different types of objects that can be animated in a scene.

What you will learn

In this lesson, you will learn to use different types of objects in a MotionDesk animation.

- You will use an instrument to display simulation data.
- You will open a road in ModelDesk and edit the lane properties.
- You will add traffic signs to a road model in ModelDesk.
- You will complement the scenery with further road sign objects in MotionDesk.
- You will visualize the brake lights of a vehicle in the scene.
- You will specify different types of traffic participants in the scene.
- You will animate the scene with all its participants and create new observers to watch it.
- You will generate a video of the animation.

Before you begin

It is assumed that you are familiar with the user interfaces of MotionDesk and ModelDesk and know the basic working routines described in the previous lessons.

Preconditions

To use animated characters in MotionDesk, a special license is required: MDD_ANIMATED_CHARACTERS.

Demo file

In this lesson, you will animate the scene with the Character Demo from the `<MotionDesk_InstallationPath>\Demos\MotionDesk\CharacterDemo` folder of your installation.

Steps

This lesson contains the following steps:

Result

The lesson concludes with a result that describes how your project looks after working through this lesson.

Duration

30 min.

Step 1: How to Prepare the Scene

Objective

To create a new scene in MotionDesk and build a new road model in ModelDesk, you must create new experiments in your MotionDesk and ModelDesk projects. You must then load and prepare a road model.

Overview

To prepare a scene and a new road model in ModelDesk, carry out the following steps:

1. Create new projects in ModelDesk and MotionDesk and set the global Environment properties. Refer to Part 1 on page 119.
2. Load a road model and create road lanes properties. Refer to Part 2 on page 120.
3. Assign motion data in MotionDesk for the simulation. Refer to Part 3 on page 122.

Part 1

To prepare the experiments and global environment properties

1 In MotionDesk, on the File ribbon, click New – Experiment to create a new experiment named `Tutorial_04` in your project.

2 When you create a new experiment, a default a ground plate and sky horizon texture are set.

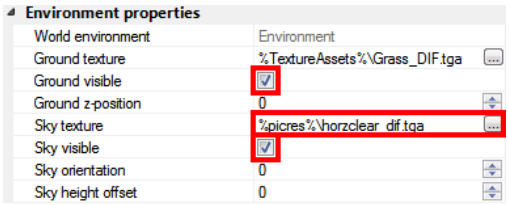
In the new MotionDesk experiment, select Environment in the Scene Navigator.

The Environment properties pane is displayed.

3 Select a new sky horizon. In the Sky texture property field, click the Browse button.

4 Open the `<MotionDesk_InstallationPath>\MotionDesk\Assets\Textures\horzClear_DIF.tga` file.

Sky visible and Ground visible are selected by default.

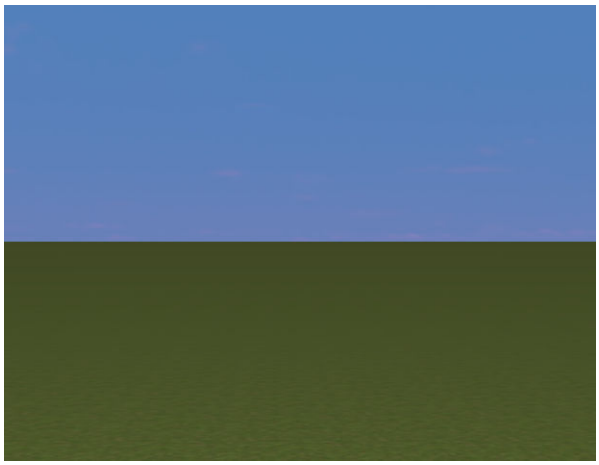


The clear day sky horizon and grass ground plate textures are displayed in the MotionDesk 3-D View.

5 Now create a new experiment for your project in ModelDesk: `Experiment_04`.

Interim Result

MotionDesk and ModelDesk experiments are created. In MotionDesk the global environment properties were set. The scene in the 3-D View looks as follows:

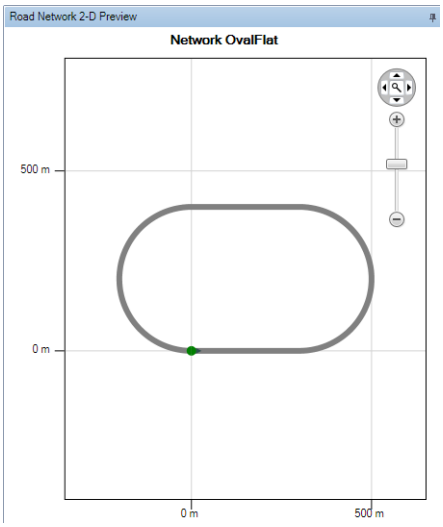


Part 2

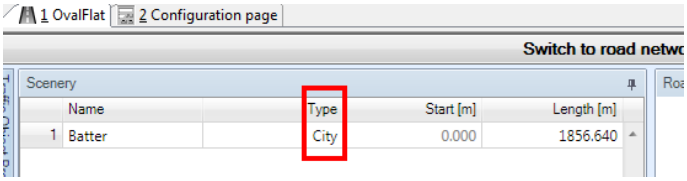
To create road lanes

1 In ModelDesk, in the project tree select the OvalFlat road, from the Pool. Click Activate and Open.

The selected road model opens.

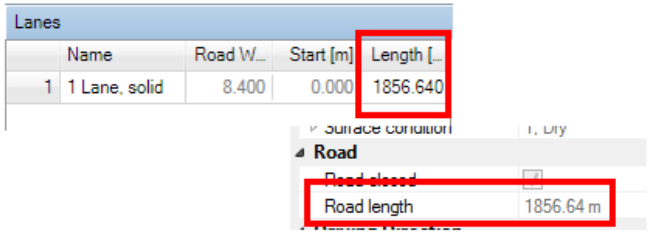


2 Double-click the road in the Road Network 2-D Preview to open the Road Element view. In the Scenery pane, select City as scenery type for the whole road element.



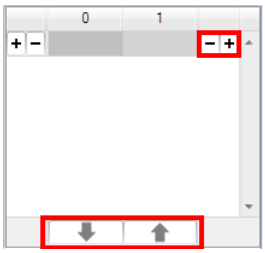
3 Open the Road 1-D Preview and the Lanes pane.

In the Lanes pane, you can see that there is only one lane section on the entire road. The lane section's length matches the road network's length.



4 Use the + in the Lanes pane to add another lane to the right of the existing lane.

5 Click the arrows at the bottom of the Lanes pane to specify the direction of travel as indicated in the following illustration:

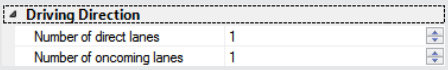


Tip

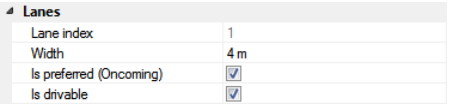
The arrow buttons on the Lanes pane are used to specify the direction of the travel in each lane. You can also edit the lane direction in the Properties pane.

Expand the Driving Direction list and select the:

- Number of direct lanes.
- Number of oncoming lanes.



6 To specify the width of the lanes, select them and enter **4** in the Width field of the Properties pane for both lanes.



The overall width of the road changes, as you can see in the Road 1-D Preview.

7 On the File ribbon, click Save Project to save the modifications.

8 On the Environment ribbon, click Scene Synchronization – Complete.

The road and its scenery are synchronized with MotionDesk.

Interim Result

You have added a lane to the road, specified the traffic direction for the lanes and edited the lane width. You also synchronized the changes to the MotionDesk experiment.

You can see the objects in the 3-D View and in the Scene Navigator tree.

Part 3

To assign motion data

1 In MotionDesk, on the View ribbon, select Switch Controlbars – Motion Player.

The Motion Player pane is displayed.

2 In the Motion Player list, select File : MDF : <Stream>.

3 Click the Browse button and open the `<MotionDesk_InstallationPath>\Demos\MotionDesk\CharacterDemo\Small scene\Traffic.mdf` file.

MotionDesk opens the MDF file and displays file name in the list.

The motion data is detailed in the Data Stream Selector pane.

Interim Result

You assigned motion data to the experiment.

Result

The scene is prepared and can be used for animation. The MotionDesk 3-D scene in the 3-D View looks as follows:

What's next

You will use instruments in MotionDesk.

Related topics

Basics

Basics of Synchronizing the Scene in MotionDesk (ModelDesk Scene Synchronization 🕮)
Creating a Road (ModelDesk Road Creation 🕮)

Step 2: How to Use Instruments in an Animation

Objective

You can use instruments to visualize simulation variables, such as the vehicle speed, in an animation.

Instrument types

There are different types of instruments for you to choose from. You can use more than one instrument in a scene if you want to visualize several data streams and display them in different windows in the 3-D View. The data for the instrument is provided by the model.

Instruments are linked to observers in the scene and have either a static position in the scene or move along a movable object in the scene.

Workflow

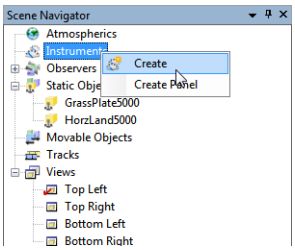
To use instruments in MotionDesk, you must perform two steps.

1. The instrument data is calculated in the simulation. You must extend the Simulink model to provide the instrument data stream for MotionDesk. As the demo model is already prepared, you do not have to do this in this lesson. Refer to How to Prepare the Real-Time Model for Using Instruments or State Objects (MotionDesk Calculating and Streaming Motion Data 🕮).
2. You must select an instrument in MotionDesk and connect it to a simulation data stream. The instrument can be linked to an object and to an observer in MotionDesk. See the instructions below.

Method

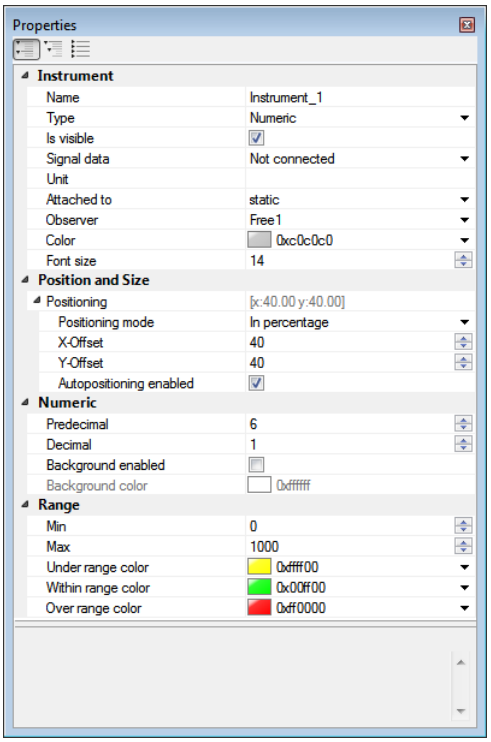
To use instruments in an animation

1 In the MotionDesk Scene Navigator, right-click Instruments and select Create from the context menu.



A new instrument is created and listed in the Scene Navigator.

2 Select the instrument in the Scene Navigator to display its properties in the Properties pane.



3 Select Gauge as the instrument type.

4 In the Signal data list, select the Speed signal data stream to be visualized. The Unit field is then filled automatically.

5 To save the project, go to the File ribbon and click Save Project.

Result

You added an instrument to the scene and specified some of its properties. You will specify the instrument's position in the scene and attach it to an observer later in the lesson.

What's next

You will specify traffic signs for the road in ModelDesk and MotionDesk.

Related topics

Basics

Using Instruments in the Scene (MotionDesk Scene Animation 🕮)

HowTos

How to Prepare the Real-Time Model for Using Instruments or State Objects (MotionDesk Calculating and Streaming Motion Data 🕮)

Step 3: How to Specify Traffic Signs on a Road

Objective

Traffic objects are a type of static object that you can add to a road.

Traffic objects

Traffic objects are added to the road in ModelDesk using the **Traffic Object Browser**. They are displayed in MotionDesk after synchronization. Traffic signs that you add to a road in ModelDesk are part of the simulation and are also visualized in MotionDesk. They can be detected by traffic sensors in a simulation.

MotionDesk also provides some traffic signs and road markings in the **Library Browser**. These can also be added to complement the scene.

Note

Static Objects in Simulation

MotionDesk static objects are for display only. They are not considered in the simulation, for example, for a collision check.

Static objects used in an animated simulation must be added in the ModelDesk environment and included in a simulation scenario. They can be recognized as objects in the simulation if a sensor is connected.

To assign and add traffic signs to a scene, you will carry out the following steps:

1. Assign objects to the Traffic Object Manager in ModelDesk. Refer to Part 1 on page 127.
2. Add traffic objects to the scene in the 3-D View, for example, traffic signs on a road. Refer to Part 2 on page 128.
3. Add a texture to the road surface for a pedestrian crossing in ModelDesk. Refer to Part 3 on page 130.
4. Save the ModelDesk project and synchronize the traffic objects and surface for display in MotionDesk. Refer to Part 4 on page 132.

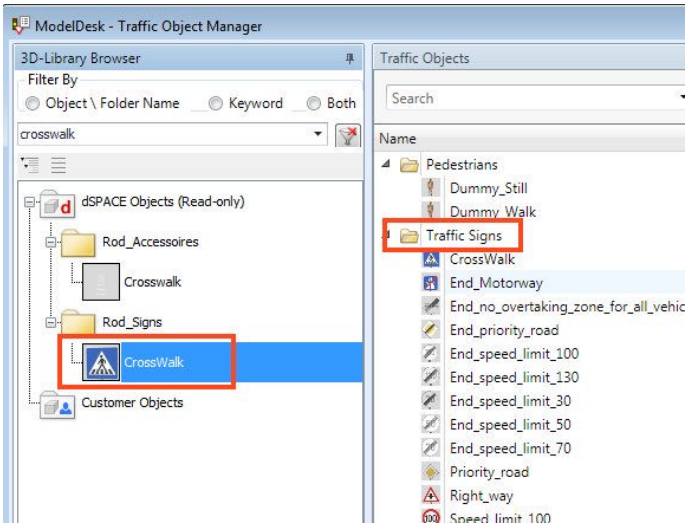
Part 1

To assign traffic signs in the Traffic Object Manager

1 In ModelDesk on the **Environment** ribbon, click **Traffic Objects – Manage** to open the Traffic Object Manager.

2 The 3-D Library Browser on the left of the Traffic Object Manager allows you to select 3-D objects from the **dSPACE Objects** or from the **Customer Objects** folder to expand the Traffic Objects in ModelDesk.

In the edit field of the 3-D-Library Browser, enter `CrossWalk`. In the results, select the **CrossWalk** road sign and drag it to the **Traffic Signs** folder of the **Traffic Objects** list.



The object is added to the Traffic Objects list.

3 Select the CrossWalk object in the Traffic Objects pane. The Properties pane is displayed. In the Name edit field, enter `CrosswalkSign`.

The object's name in the Traffic Objects list is changed.

4 Enable the traffic sign sensor. In the Properties pane select Sensors – Traffic sign – Enabled and Traffic sign basic – Enabled.

Note

A traffic object can only be recognized as an object in the simulation if a sensor is enabled for the object.

5 Click Close to close the Traffic Object Manager and Save the changes in the pop up dialog.

Interim Result

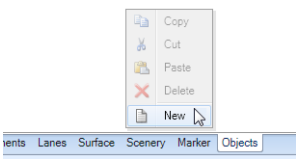
You added a traffic object to the ModelDesk Traffic Object Manager. Now you can add this object to a road in ModelDesk.

Part 2

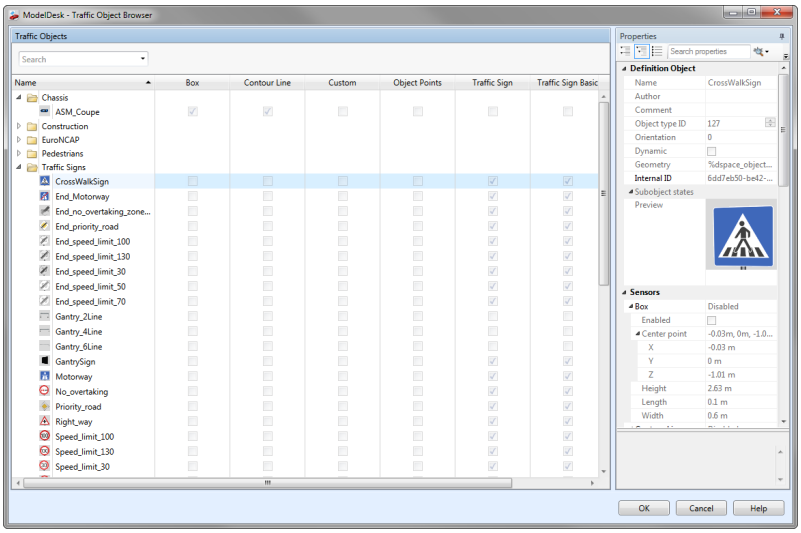
To add street signs to the 3-D scene

1 In ModelDesk, open the Road Element view and navigate to the Objects tabbed pane.

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

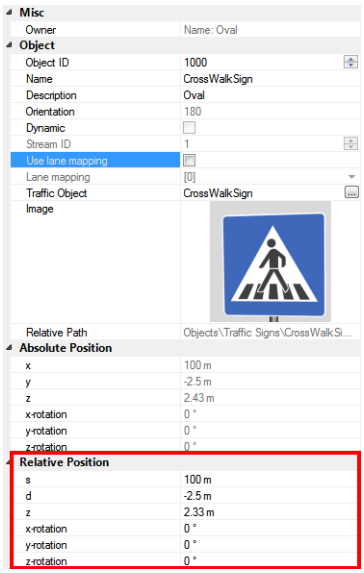


The **Traffic Object Browser** opens. It lists all the available traffic object types from which you can choose.



3 Select the newly added Crosswalk traffic object from the Traffic Signs folder and click **OK**.

4 In the **Properties** pane, change the values for the object's relative position as indicated in the following illustration:



The new position of the CrossWalkSign is displayed in the Road 1-D Preview.

5 Add another **CrossWalkSign** object from the **Traffic Object Browser** to the road model. In the **Road 1-D Preview**, drag it to the upper lane. Edit the **Relative position** values as displayed in the table:

s	**d**
110 m	6.5 m

Now it looks like this:

6 Rotate the CrossWalkSign to face the oncoming traffic. Click the small triangle and drag it to the opposite side. Alternatively edit the z-rotation Relative Position value to `-180`.

Interim Result

The traffic objects are added to the road and displayed in the Road 1-D Preview. The Properties pane for the CrossWalkSign is displayed. Both objects are oriented depending on the direction of travel of the lane.

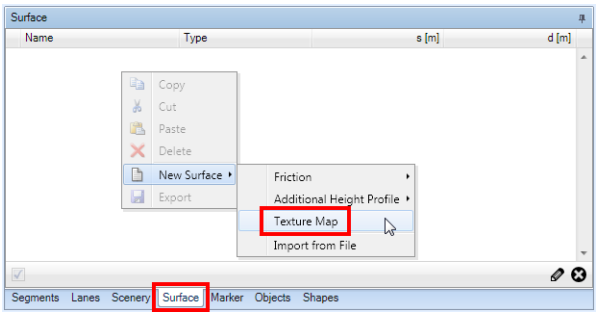
Part 3

To add a Crosswalk surface to the scene

1 In ModelDesk, open the Road Element view and navigate to the Surface pane.

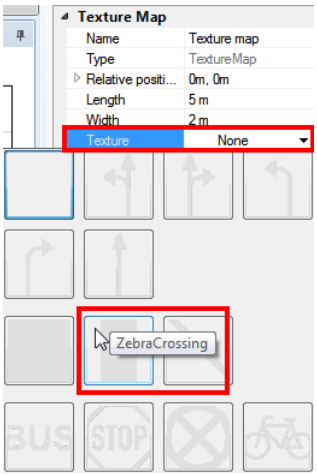
You will add the Crosswalk surface to create a more realistic road scene.

2 Right click and select New Surface – Texture Map from the context menu.



A Texture Map is added to the Surface pane. It is also shown as an orange line in the Road 1-D Preview.

3 Select the new texture map in the Surface pane and in the **Properties** pane, select the **Texture – ZebraCrossing** from the list of icons.

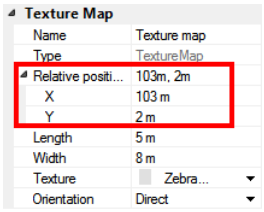


4 In the **Road 1-D Preview**, drag the orange dot for the new **ZebraCrossing** or Crosswalk to the center line of the road between the **CrossWalkSigns**.

5 Adjust the position more accurately in the **Properties** pane. Set the **Relative position X** and **Y** values as detailed in the following table:

X	Y
103 m	2 m

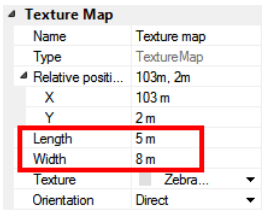
The **Relative position** properties are shown in the following screenshot of the properties dialog:



6 Adjust the size **Properties** for the Crosswalk as detailed in the following table:

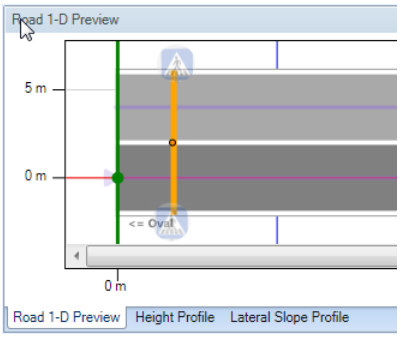
Length	Width
5 m	8 m

The **Length** and **Width** properties are shown in the following screenshot of the properties dialog:



Interim Result

You have added a Crosswalk surface to the ModelDesk scene and adjusted its positioning and size properties. You can see the object in the Road 1-D Preview. The following screenshot is an example of the Road 1-D Preview:



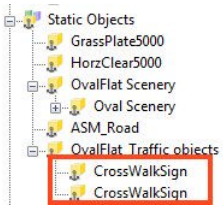
Part 4

To save and synchronize the road objects

1. To save the project, go to the File ribbon and click Save Project.
2. To synchronize with MotionDesk, go to the Environment ribbon and click Scene Synchronization – Complete.
3. Switch to MotionDesk. In the 3-D scene in the 3-D View you can see the following:
   - CrossWalkSign

- Crosswalk

You can also see the **CrossWalkSign** traffic objects in the **Scene Navigator**. The **ZebraCrossing** is not shown, because this is a surface built into the road in ModelDesk.



Interim Result

You have saved the ModelDesk Project and synchronized the changes to the MotionDesk experiment. You can see the objects in the 3-D view and in the Scene Navigator tree.

Result

You added traffic sign objects and a crosswalk road surface texture in ModelDesk. These are displayed in MotionDesk after synchronization. Only the traffic sign objects are shown in the Scene Navigator tree. The following illustration is an example of the 3-D view:

What's next

You will visualize brake lights for a vehicle.

Related topics

Basics

Static Objects (ModelDesk Road Creation 🕮)

HowTos

How to Add Static Traffic Objects (ModelDesk Road Creation 🕮)

Step 4: How to Visualize the Lighting of Brake Lights

Objective

State transition objects are objects that can change their appearance depending on a data stream. This way, you can visualize the lighting of a vehicle's brake lights or change traffic lights, for example.

Workflow

To use state transition objects in a MotionDesk scene, you must perform two steps:

- The Simulink model controls the states of the state transition objects. For the Simulink model to provide the data stream for MotionDesk, you must extend the model. As the demo model is already prepared, you do not have to do this in this lesson. For more information, see How to Prepare the Real-Time Model for Using Instruments or State Objects (MotionDesk Calculating and Streaming Motion Data 🕮).
- You must add a state transition object to the MotionDesk scene and connect a data stream to it. See the instructions below.

Method

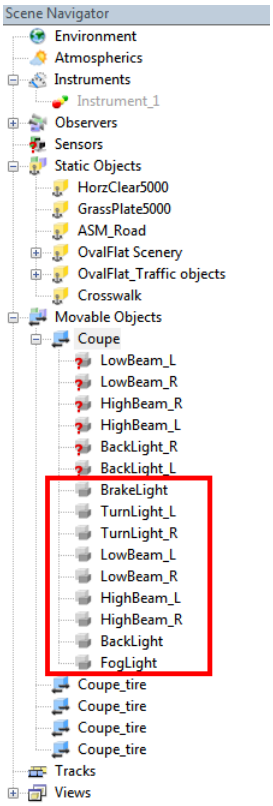
To visualize the lighting of brake lights

1. In MotionDesk, add a **Coupe** object from the **Car_ASM_Coupe** folder in the **Library Browser** to the scene.
2. Add four **Coupe_tire** objects from the same folder to the scene.

   As the vehicle and the tires will be animated, here there is no need to align them manually.
3. Use drag & drop to connect the **chassis** data stream from the **Data Stream Selector** with the **Coupe** object in the **Scene Navigator**.

   Also connect the four **Coupe_tire** objects to the following data streams:
   - wheel_FL
   - wheel_FR
   - wheel_RL
   - wheel_RR

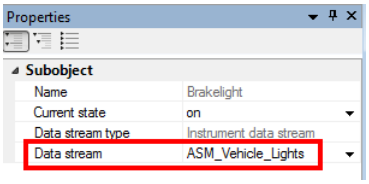
4 In the Scene Navigator you can see that the Coupe object has a number of other subobjects which you can use to specify the appearance of the Coupe.



Select the BrakeLight subobject to display its properties in the Properties pane.

5 Select the ASM_Vehicle_Lights data stream. This is the data stream controlling the vehicle's lights.

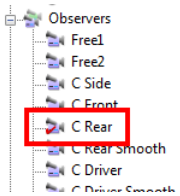
The Current state must be on. The lights on the Coupe will be switched on.



6 On the Scene ribbon click Observer – Create defaults. Select the Coupe followed by OK. Then double-click the Coupe Rear observer in the Scene Navigator.

Create defaults

1. In the Configure Experiment dialog, select Coupe from the list and click OK.
2. The Scene Navigator displays a set of new observers for the Coupe under the Observers node.
3. Select the Coupe Rear observer.



The observer view from behind the vehicle is displayed.

7 On the File ribbon, click Save Project to save the modifications.

8 On the Home ribbon, click Motion Player – Play to start the animation.

You can see the vehicle moving, braking and accelerating again. When the vehicle brakes, its brake lights come on as specified in the ASM_Vehicle_Lights data stream.

9 On the Home ribbon, click Motion Player – Stop to stop the animation.

Result

You have visualized a state transition object with a data stream and seen its different states.

What's next

You will specify more traffic participants.

Related topics

Basics

Using State Objects and Animated Characters in the Scene (MotionDesk Scene Animation 🕮)

HowTos

How to Prepare the Real-Time Model for Using Instruments or State Objects (MotionDesk Calculating and Streaming Motion Data 🕮)

Step 5: How to Specify Traffic Participants

Objective

In MotionDesk, animated characters can be used to represent traffic participants These are also known as traffic Fellows.

Animated characters

There are human and animal characters.

Just as the state transition objects, animated characters contain subobjects that define a character's behavior and appearance.

Note

To use animated characters, you must have a special MotionDesk license: MDD_ANIMATED_CHARACTERS
If you do not have this license, you can skip this step.

Method

To specify traffic participants

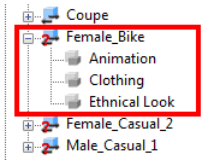
1 In the Library Browser, open the dSPACE Objects – Characters – Animated_Humans folder.

Add the following objects to the scene:

- Female_Bike
- Female_Casual_2
- Male_Casual_1

2 You can specify another state for the characters.

Open the **Female_Bike** node in the **Scene Navigator**. You can see its subobjects and use them to change the appearance of the **Female_Bike** object.



3 Click the **Animation** subobject to display its properties in the **Properties** pane.

4 In the **Properties** pane, select **slow** from the **Current state** list. This property specifies the state of the animated character. Now you can see the **Female_Bike** moving on the spot, but not yet moving through the scene.

5 For the object to move through the scene, you must connect it to a data stream.

1. Select the **Female_Bike** object.
2. In the **Properties** pane, select the **Chassis_Fellow_1** data stream from the **Motion Data** list.

The object will start moving through the scene when the animation starts.

6 You can also modify the character's appearance. Select the **Clothing** subobject in the tree and select **Casual_2** from the **Current state** list. The character's look changes.

7 Select the following data streams and character appearance properties for the other characters:

Object	Property	Value
Female_Casual_2	Motion Data	Chassis_Fellow_2
Female_Casual_2 - Animation	Current state	walk

Object	Property	Value
Male_Casual_1	Motion Data	Chassis_Fellow_3
Male_Casual_1 - Animation	Current state	stroll

8 On the File ribbon, click Save Project to save the modifications.

Result

You assigned motion data streams to different animated characters and specified their behavior and appearance.

What's next

You will animate the scene with all its participants and see them move.

Related topics

Basics

Using State Objects and Animated Characters in the Scene (MotionDesk Scene Animation 🕮)

Step 6: How to Animate the Scene

Objective

When you animate the scene with the MDF file, all the traffic participants you specified in the previous steps will move in the scene. You can also specify a suitable observer for the animation and connect the instrument for it to be used properly.

Workflow

To prepare and run the animation in MotionDesk, you will perform the following steps:

1. Create default observers and select an observer for the animation. See Part 1 on page 139.
2. Connect the instrument to an observer. See Part 2 on page 140.
3. Start and replay the animation. See Part 3 on page 141.

Part 1

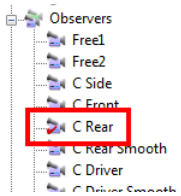
To select an observer for the scene

1 On the Observation ribbon, click Observer – Create Defaults.

2 In the Configure Experiment dialog, select Coupe from the list and click OK.

Now the Scene Navigator displays a set of new observers for the Coupe object under the Observers node.

3 Select the C Rear observer.



4 To save the project, go to the File ribbon and click Save Project.

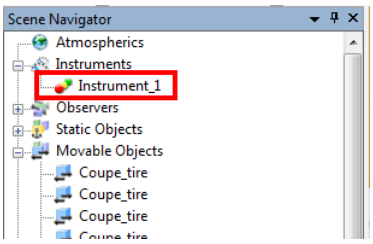
Interim result

You selected an observer.

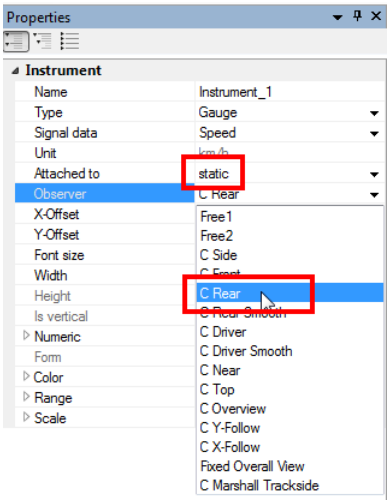
Part 2

To connect the instrument to an observer

1 In the Scene Navigator, select the instrument you created in a previous step.



In the Properties pane, select Static from the Attached to list.



2 Now, click the Observer list. It displays all observers available in the scene. Select Coupe Rear.

3 To save the project, go to the File ribbon and click Save Project.

Interim result

You specified the properties of an instrument and linked it to an observer.

Part 3

To animate the scene

1 On the Home ribbon, click Motion Player – Play to start the animation.

Result

You animated the scene with all its participants with data from an MDF file in MotionDesk. All the participants move around in the scene as specified by the assigned data streams. The instrument displays the vehicle's speed.

If the position or size of any object in the scene does not fit perfectly, you can still modify its properties at this point and then replay the animation.

When you animate the scene, the data is kept in the data buffer.

What's next

You will generate a video of the animation.

Related topics

Basics

Starting an Animation (MotionDesk Scene Animation 🕮)
Working with Observers (MotionDesk Scene Animation 🕮)

Step 7: How to Generate a Video of the Animation

Objective

MotionDesk allows you to generate a video of an animation. This way, you can replay the animation later and also watch a MotionDesk animation on a PC without MotionDesk.

Precondition

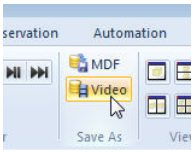
As the video is generated with the data from the frame buffer, you must have run the animation for the frame buffer to be filled.

If the frame buffer is filled, this is indicated by the values in the Motion Player.

Method

To generate a video of the animation

1 On the Home ribbon, click Save As – Video.



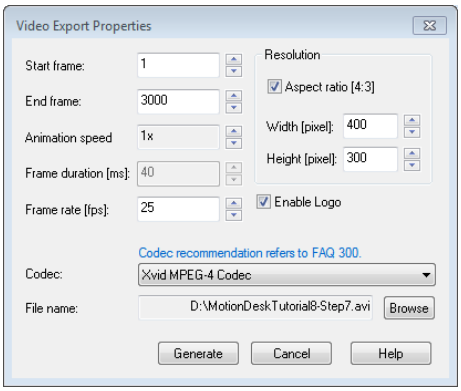
The Video Export Properties dialog opens.

2 Specify the settings for the video generation. You can specify only a part of the simulation to be used with the **Start frame** and **End frame** edit fields. In this lesson, we will use the whole data from the simulation buffer.

   Specify the folder you want the video file to be saved to and the file name.

3 Select **Enable Logo** to add a dSPACE company logo to the video.

4 Select a codec from the list. dSPACE recommends using the **Xvid MPEG-4 Codec**.



5 Click **Generate**.

   MotionDesk generates the video with a dSPACE company logo.

Tip

You can create videos from the perspective of any of the observers. Select the desired observer in the Scene Navigator and record the video.

Result

You generated a video of the animation. It is saved in the folder you specified.

You can watch the video with any suitable player.

What's next

For a summary of the lesson, you can refer to the result of the lesson.

Related topics

Basics

Postprocessing an Animation (MotionDesk Scene Animation 🕮)

Result of Lesson 7

Result

In this lesson you worked with different object types in MotionDesk.

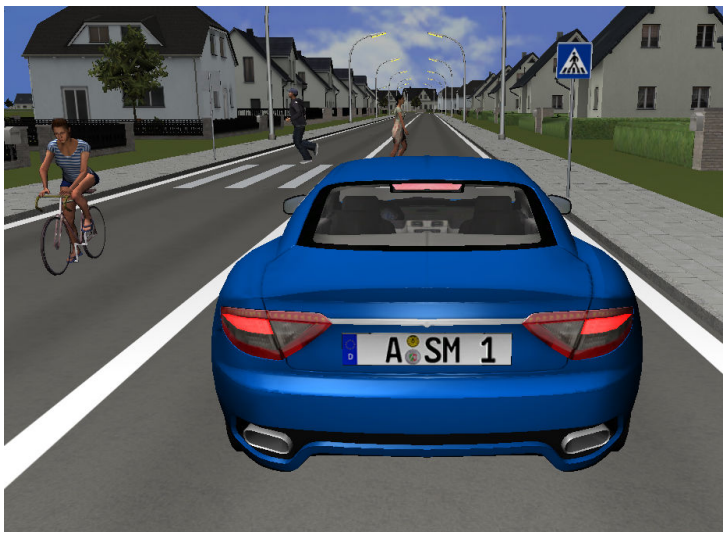
You generated a road with scenery and traffic objects from a ModelDesk road model and added a vehicle and other traffic participants to the scene.

You connected all of the objects to data streams and animated the scene with all the participants.

You used an instrument to visualize data and specified its properties.

You generated a video of the animation.

After finishing the lesson, the scene looks something like this:



Where to go from here

It is common to experience roadworks. Therefore building roadwork scenarios for your test simulations is important. Shapes are used in ModelDesk roads to build roadwork diversions and trajectories through roadwork diversions. In the next lesson (refer to Lesson 8: Creating a Simple Roadwork Scenario on page 145), you will learn how to use these shapes and animate a basic roadwork scene.

Related topics

Basics

Basics of Traffic Objects (ModelDesk Traffic Object Management 🕮)
Basics of Using Animated Characters in the Scene (MotionDesk Scene Animation 🕮)
Basics of Using State Objects in the Scene (MotionDesk Scene Animation 🕮)
Basics on Using Instruments in the Scene (MotionDesk Scene Animation 🕮)
Generating a Video of an Animation (MotionDesk Scene Animation 🕮)
Overview of Roads (ModelDesk Road Creation 🕮)

Lesson 8: Creating a Simple Roadwork Scenario

Where to go from here

Information in this section

Overview of Lesson 8

Basics

You can use ModelDesk to create and animate realistic roadwork scenarios. You can use these in an ADAS (advanced driver assistance system) environment.

You can use shapes in ModelDesk to build lines on a road to guide the traffic in roadwork scenarios. Roadwork objects can also be added to develop a realistic scene. In addition, you can define trajectories to guide the traffic through the roadworks in a simulation.

What you will learn

In this lesson, you will learn how to use different types of shapes in ModelDesk and add routes for the simulation.

- You will create a road in ModelDesk and enter the lane properties.
- You will adjust the border and line properties of the road lanes in ModelDesk.
- You will add shapes to build the lane diversion lines for the roadwork scene.
- You will add shapes to build the repeating delineators for the roadwork scene.
- You will add static traffic objects to the roadwork scene.
- You will add shapes to build the trajectory through the roadworks for the traffic in a simulation.
- You will add a route to the road network for the animation.
- You will connect to the simulation platform to animate the scene and view it with new observers.

Before you begin

It is assumed that you are familiar with the user interfaces of ModelDesk and MotionDesk.

After you have built the roadwork scene in ModelDesk, you can animate the scene in MotionDesk to show a vehicle moving through the roadwork scene in Step 9 (refer to Step 9: How to Animate the Scene on page 170). It is therefore assumed that you are familiar with simulation applications as described in Lesson

4: Animating the Scene with Simulation Data from a Platform on page 61. The following description assumes you have completed this lesson successfully.

Tip

You can also user your own simulation application running on your selected simulation platform. For more information, refer to Tutorials (ASM Vehicle Dynamics Model Description 🕮). You must then also configure your own MotionDesk and ControlDesk projects to run this lesson.

Preconditions

Simulation platform To animate the scene using a simulation application in this lesson, you need one of the following platforms:

- Simulink
- SCALEXIO systems
- VEOS

You must also have installed **ModelDesk** and the **ASM Vehicle Dynamics Blockset** that includes the ASM Vehicle Dynamics demo.

Steps

This lesson contains the following steps:

- Step 1: How to Prepare the Scene on page 148
- Step 2: How to Prepare Road Lanes on page 149
- Step 3: How to Add Roadside Line Shapes on page 151
- Step 4: How to Add Roadwork Lane Line Shapes on page 153
- Step 5: How to Add Delineator Repeating Object Shapes on page 160
- Step 6: How to Add Roadwork Traffic Objects on page 161
- Step 7: How to Add Trajectory Shapes on page 165
- Step 8: How to Add Routes on page 168
- Step 9: How to Animate the Scene on page 170

Result

The lesson concludes with a result (refer to Result of Lesson 8 on page 178) that describes how your project looks after working through this lesson.

Duration

90 min.

Step 1: How to Prepare the Scene

Objective

To create a new road model in ModelDesk and animate a new scene in MotionDesk, you must first create new experiments in your MotionDesk and ModelDesk projects. Then you can create a new road.

Overview

To prepare the scene you will carry out the following steps:

1. Prepare the project experiments in MotionDesk and ModelDesk. Refer to Part 1 on page 148.
2. Create, rename and activate a new road in ModelDesk. Refer to Part 2 on page 149.

Part 1

To prepare the experiments and global environment properties

1 In MotionDesk, on the File ribbon, click New – Experiment to create a new experiment named `Tutorial_005` in your project.

2 Click Environment in the Scene Navigator.

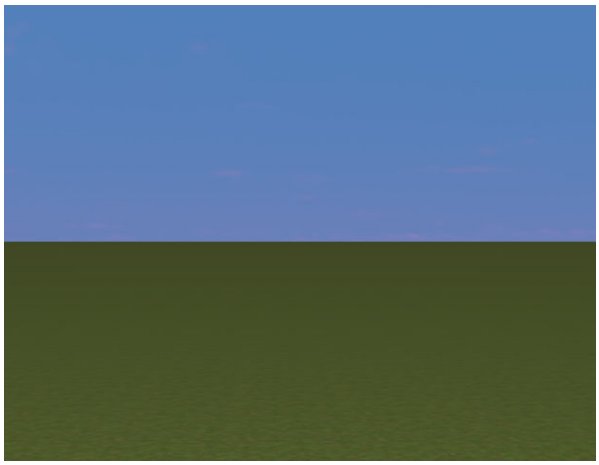
3 In the Environment properties – Sky texture property field click the Browse button and open the `<MotionDesk_InstallationPath>\MotionDesk\Assets\Textures\horzClear_DIF.tga` file.

The clear day sky horizon and grass ground plate textures are displayed in the MotionDesk 3-D View.

4 Now create a new experiment for your tutorial project in ModelDesk. On the File ribbon, click New – Experiment and name the experiment: `Experiment_005`.

Interim result

A ModelDesk and MotionDesk experiments are created. The MotionDesk 3-D scene is ready for animation. It looks like this:



Part 2

To create a new road

1. In the new ModelDesk experiment, right-click Road – New from the context menu of the Project Navigator.
   A new road will be opened in a pane in the main working area.
2. Click the new road in the Road Network pane.
   The Properties pane is displayed.
3. Rename the road in Properties – Road Network Element: `RoadWorks_Basic1`.
4. In the Project tree, right-click Road – Save As from the context menu.
5. In the Browse to dialog, select the Pool – Environment – Road folder of the project and save the road as `RoadWorks_Basic1`.
6. Click Road in the Project tree and select `RoadWorks_Basic1` from the Road list.
7. Click Activate to activate the road for editing.
   The activated road is displayed in the project tree under the Road node.

Result

You have prepared the scene.

You created new experiments in ModelDesk and MotionDesk. In ModelDesk you created a new road and activated it. The road is now ready for you to edit.

What's next

You will prepare the road lanes for the roadwork scene in ModelDesk.

Related topics

Basics

Features of ModelDesk (ModelDesk Basics 🕮)
Overview of Roads (ModelDesk Road Creation 🕮)

HowTos

How to Define a Project (ModelDesk Project and Experiment Management 🕮)
How to Define an Experiment (ModelDesk Project and Experiment Management 🕮)

Step 2: How to Prepare Road Lanes

Objective

You will prepare the road lanes in the roadwork scene.

You will also select the center road line type and add a road shoulder for the traffic diversion.

Method

To prepare the road lanes

1 Double-click the road in the Road Network pane to open the Road Element view.

2 In the Segments pane, enter the Length as `700`.

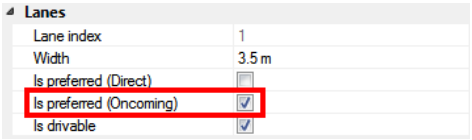
3 In the Scenery pane, select the below properties for Scenery Section 1:

Scenery Property	Value
Type	`CountryRoad`
Length [m]	`700`

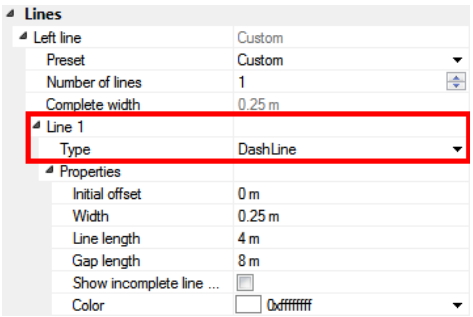
4 Click + on the right side of the Lanes pane to add a lane to the right of the existing lane for Lane Section 1.

The Lane Properties pane is displayed.

5 Select Is preferred (Oncoming) for road lane `1`.



6 Click lane 0 and adjust the properties Left line – Type to DashLine.



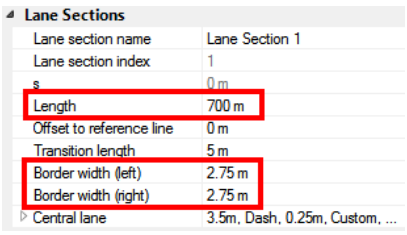
A dotted line in the center of the road is displayed in the Road 1-D Preview.

7 Click Lane Section 1 in the Lanes pane.

The Properties pane is displayed for Lane Section 1.

8 Adjust the below properties for Lane Section 1:

Lane Sections Property	Value
Length	`700`
Border width (left)	`2.75`
Border width (right)	`2.75`

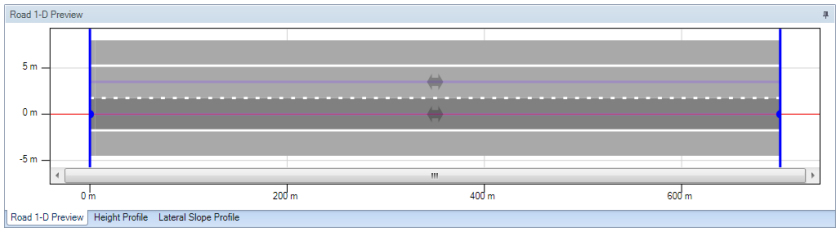


A road shoulder lane is displayed in the **Road 1–D Preview**. The border of the road is widened beyond the driving lanes.

Result

You have prepared the road lanes for the roadwork scene in ModelDesk.

You have adjusted the length of the road, added scenery and changed the center road line type. You have also added a road shoulder lane on the road by widening the lane section borders.



What's next

You will start to add line shapes on the road in ModelDesk to help guide the traffic in the roadwork scenario.

Related topics

Basics

Lanes of a Road Element (ModelDesk Road Creation 🕮)
Workflow for Creating a Simple Roadwork Scenario Using a Driving Trajectory (ModelDesk Road Creation 🕮)

HowTos

How to Specify Lane Sections and Lanes on Road Elements (ModelDesk Road Creation 🕮)
How to Specify Scenery Sections (ModelDesk Road Creation 🕮)

References

Road Properties (ModelDesk Road Creation 🕮)

Step 3: How to Add Roadside Line Shapes

Objective

You will add a roadside line on the road shoulder in the roadwork scene. You will add shapes to create the lines on the road.

Method

Add roadside line shapes

1 Click Shapes to display the Shapes pane.

2 Right-click the shapes pane and click New – Line from the context menu.

A new Line type shape is displayed in the shapes list. The line has a sub-table that contains two default Node Elements.

3 Rename the shape in the Name column of the Shapes table:
`Solid_GreyLine_1`

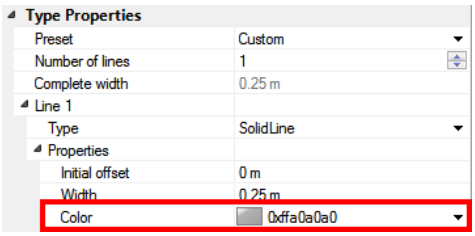
4 In the Node Elements sub-table, adjust the length of the line in relation to the reference line by setting the s coordinate in meters of the first and second node:

Node Element	Node	Value
s [m]	First node	0
s [m]	Second node	700

5 Adjust the lateral position of the line in relation to the reference line. Enter the d-coordinate in meters of the first and second node:

Node Element	Node	Value
d [m]	First node	-4.25
d [m]	Second node	-4.25

6 In the Properties pane select gray in the Type Properties – Line 1 – Color list.



7 Repeat the above steps to add the roadside border for the oncoming lane.

The property values of the line must be set as follows.

Property	Value
Name	`Solid_GreyLine_2`

The Node Element values of the line must be set as follows:

Node Element	Node	Value
s [m]	First node	0
s [m]	Second node	700
d [m]	First node	7.75
d [m]	Second node	7.75

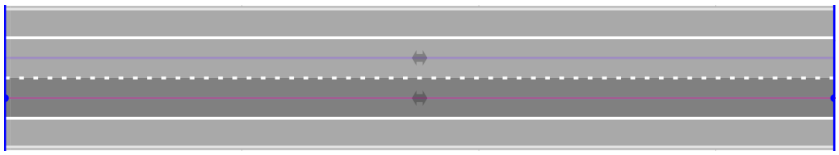
Tip

You can copy & paste a shape in the **Road 1-D Preview** or **Shapes** pane using the context menu.
You can then adjust the properties and node element values as needed.

8 Click **File – Save Project** to save your work.

Result

You have added roadside line shapes. A gray line is displayed at the edge of the roadside border in the direct lane and oncoming lanes. The **Road 1-D Preview** in ModelDesk looks like this:



What's next

You will add roadwork lane lines on the road in ModelDesk to help guide the traffic in the roadwork scene.

Related topics

Basics

Shapes (ModelDesk Road Creation 🕮)
Workflow for Creating a Simple Roadwork Scenario Using a Driving Trajectory (ModelDesk Road Creation 🕮)

HowTos

How to Specify Shapes (ModelDesk Road Creation 🕮)

Step 4: How to Add Roadwork Lane Line Shapes

Objective

You will add roadwork lane lines to create a realistic roadwork scene.

You will add shapes to create roadwork lane lines on the road.

Overview

Roadworks lane lines are used to help guide the traffic in a simulation diverting it outside the normal road lanes. These lines are normally yellow and can sometimes be damaged.

To add the yellow roadwork lane lines you will carry out the following steps:

1. Add roadwork lane line shapes on each lane to guide the traffic outside the normal white lanes of the road. Refer to Part 1 on page 154.
2. Add lane separation lines between the lanes. These provide safety separation between the traffic in the new roadwork lanes. Refer to Part 2 on page 156.
3. Add broken roadwork lane lines. Line shapes are used to display damaged traffic lane lines. Refer to Part 3 on page 157.

Part 1

To add roadwork lane lines

1 Right-click the shapes pane and click **New – Line** from the context menu.

A new **Line** type shape is displayed in the shapes list. The line has a sub-table containing two default **Node Elements**.

2 Rename the shape in the **Name** column of the **Shapes** table: `Solid_YellowLine_1`.

3 In the **Node Elements** subtable, adjust the length and position of the line by setting the s and d coordinates in meters.

1. For the first and second node set the values as follows:

Node Element	s[m]	d[m]
1	220	5.35
2	250	5.35

2. Right-click the second node element and click **Insert After** in the context menu.
3. Insert the below nodes and adjust their length and position s and d coordinates in meters.

Node Element	s[m]	d[m]
3	300	2.50
4	400	2.50
5	450	5.22
6	480	5.22

Note

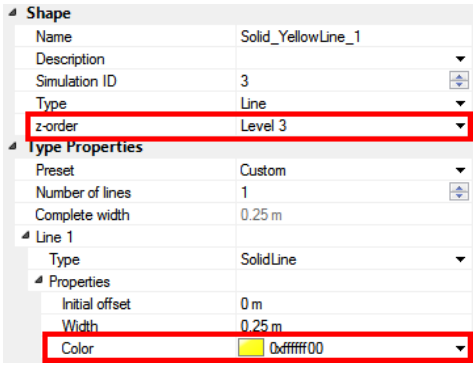
The **Node Elements – Section Type** must be `SmoothOffset`.
The connection between the nodes of the line shape will be a smooth curve.

4 Click the `Solid_YellowLine_1` in the shapes table.

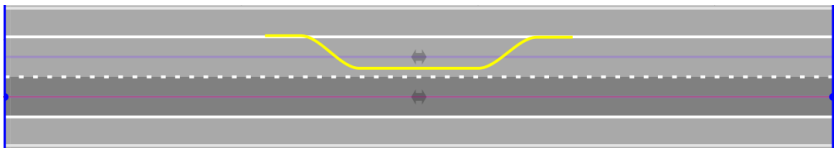
The line shape **Properties** pane is displayed.

5 Adjust the z-order layer and line color properties as follows:

Property	Value
Shape – z-order	Level 3
Type Properties – Line 1 – Color	Yellow



The oncoming roadwork lane line is displayed as a layer on top of the regular traffic lane line in the Road 1-D Preview.



6 To add the direct roadwork lane, repeat the above steps, and enter the line shape properties as follows:

Line shape properties

1. Shape Name

Property	Value
Name	`Solid_YellowLine_2`

2. Node Elements

Node Element	s[m]	d[m]
1	220	-1.65
2	250	-1.60
3	300	-3.52
4	400	-3.52
5	450	-1.75
6	480	-1.75

3. Line Properties

Property	Value
Shape – z-order	Level 3
Type Properties – Line 1 – Color	Yellow

7 To add the dividing roadwork lane line, repeat the previously described above steps to step 5 on page 154 and enter the line shape properties as follows:

Line shape properties

1. Shape Name

Property	Value
Name	`Solid_YellowLine_3`

2. Node Elements

Node Element	s[m]	d[m]
1	220	1.65
2	250	1.75
3	300	-0.50
4	400	-0.50
5	450	1.75
6	480	1.75

3. Line Properties

Property	Value
Shape – z-order	Level 3
Type Properties – Line 1 – Color	Yellow

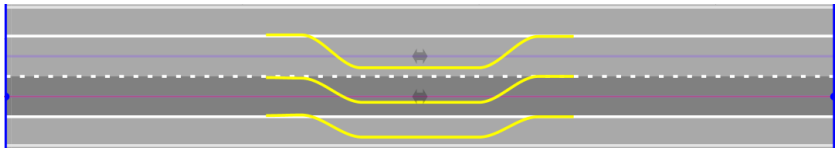
Tip

A shape can be copied and pasted in the Road 1-D Preview or Shapes pane using the context menu.
The properties and node element values can then be adjusted as needed.

8 Click File – Save Project to save your work.

Interim result

The direct, oncoming, and dividing roadwork lane lines are displayed on top of the regular traffic lane line in the Road 1-D Preview.



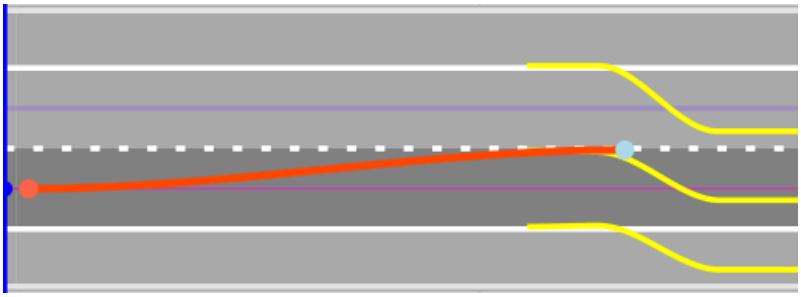
Part 2

To add lane separation lines

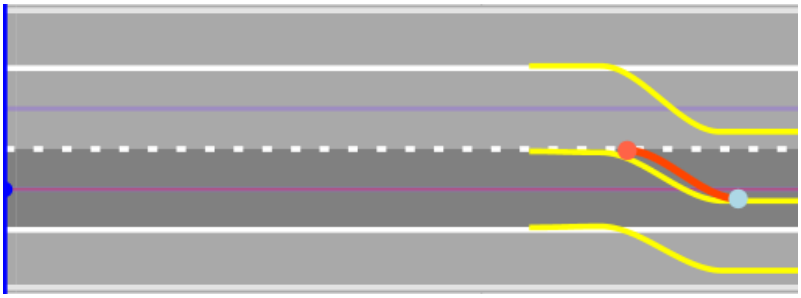
1 Right-click the shapes pane and select New – Line from the context menu.

2 Rename the shape in the Name column of the Shapes table: `Solid_YellowLine_4`.

3 In the Road 1-D Preview pane, hold down the left mouse button and drag the red start point of the line next to the start of the first curve of the dividing lane.



4 Hold down the left mouse button and drag the red end point of the line to a point beyond the end of the second curve of the dividing lane.



5 Click the `Solid_YellowLine_4` in the Shapes pane.

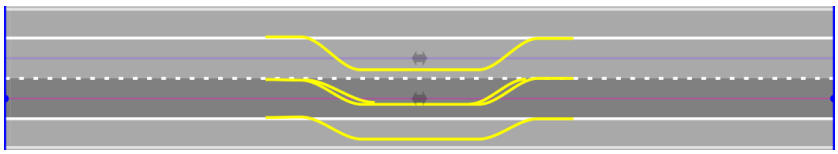
In the Properties pane enter the line properties as follows:

Property	Value
Shape – z-order	Level 3
Type Properties – Line 1 – Color	Yellow

6 To add a separation line on the last curve of the dividing line, repeat the above steps and name the line `Solid_YellowLine_5`.

Interim result

The roadwork separator lines are displayed beside the curves of the dividing lane in the Road 1-D Preview.



Part 3

To add a broken roadwork line

1 Click `Solid_YellowLine_2`.

2 In the Node Elements sub-table shorten the line by entering a later start position for the first node.

Enter in the s[m] coordinates: `235`.

3 Right-click the Road 1-D Preview pane and click New Shape – Line from the context menu.

4 Enter the line shape properties in the Shapes pane as follows:

Line shape properties

1. Shape Name

Property	Value
Name	Broken_YellowLine_1

2. Node Elements

Node Element	s[m]	d[m]
1	220	1.75
2	230	1.75

3. Line Properties

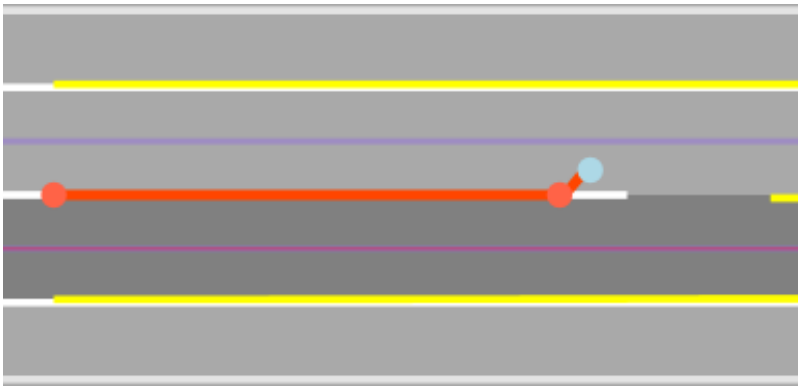
Property	Value
Shape – z-order	Level 3
Type Properties – Line 1 – Color	Yellow

5 Click the new line in **Road 1-D Preview**, right-click the end node and click **Insert After** on the context menu.

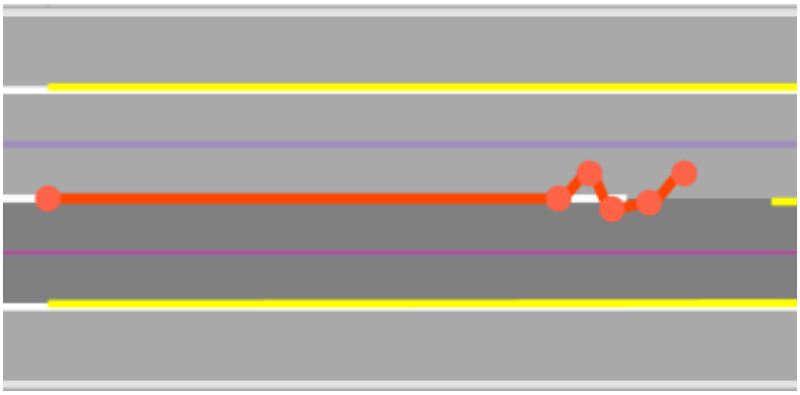
Tip

Roll your mouse wheel forward and backwards to zoom in and out, in the **Road 1-D Preview**.

6 Hold down the left mouse button and drag the blue end node of the new line section into the oncoming driving lane as displayed below:



7 Repeat steps 5 and 6 to add 3 more small line sections as displayed below:



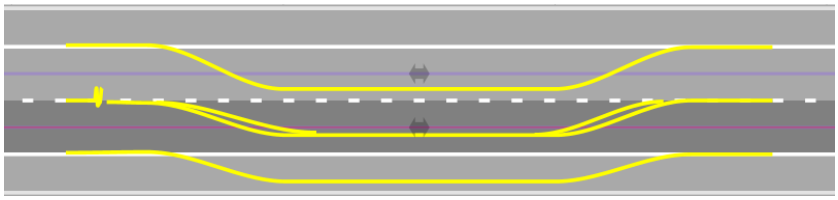
8 Click File – Save Project to save your work.

Result

You have added yellow roadwork lane lines to your realistic roadwork scene.

You learned how to add lanes by entering the position values and by mouse drag. You also adjusted the color and layer properties of the road line shapes.

Your roadwork scene looks like this:



What's next

You will add delineators to the roadwork scene by adding a repeating shape.

Related topics

Basics

Shapes (ModelDesk Road Creation 🕮)
Workflow for Creating a Simple Roadwork Scenario Using a Driving Trajectory (ModelDesk Road Creation 🕮)

HowTos

How to Specify Shapes (ModelDesk Road Creation 🕮)

Step 5: How to Add Delineator Repeating Object Shapes

Objective

You will add roadwork traffic delineators to create a realistic roadwork scene. You will add repeating object shapes to create roadwork delineators and other repeating traffic objects on the road.

Overview

In a realistic roadwork scenario repeating delineators guide the traffic in a roadwork lane.

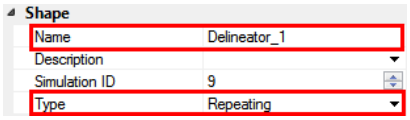
To add delineators you will add a repeating object shape on the oncoming roadwork lane line using the copy & paste function.

Method

To add a delineator repeating object

1. Right-click `Solid_YellowLine1` in the Shapes pane. In the context menu, click Copy.
2. Right-click the Shapes pane. In the context menu, click Paste.

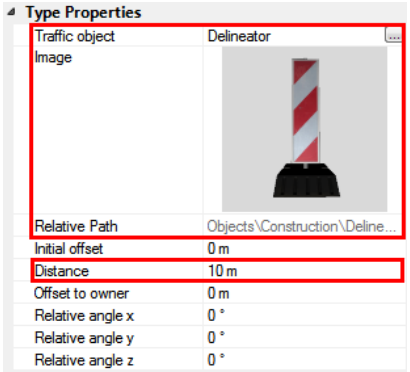
   A new Line type shape is displayed in the shapes list. It is also displayed in red as a layer on top of the existing lane line in the Road 1-D Preview.
3. In the Properties – Shape pane:
   1. Rename the shape in Name: `Delineator_1`.
   2. Change the shape type in Type: `Repeating`.



4. In the Properties – Type Properties pane, select the Traffic object button ....

   The Traffic Object Browser selection screen is displayed.
5. Select `Delineator` in the Construction folder and click OK.

   The delineator is displayed with an image in the Type Properties.

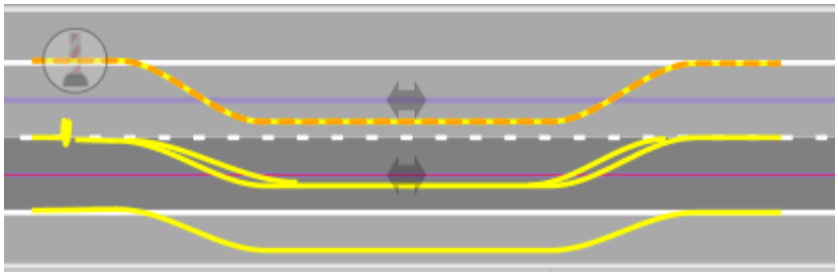


6. Set the Distance between the delineators to 10 meters.
7. Click File – Save Project to save your work.

Result

You have added repeating delineator objects along the path of the oncoming roadwork traffic lane. This provides a guide for the traffic around the roadwork site.

The **Road 1-D Preview** in ModelDesk looks like this:



What's next

You will add roadwork traffic objects to the roadwork scene.

Related topics

Basics

Shapes (ModelDesk Road Creation 🕮)
Workflow for Creating a Simple Roadwork Scenario Using a Driving Trajectory (ModelDesk Road Creation 🕮)

HowTos

How to Specify Shapes (ModelDesk Road Creation 🕮)

Step 6: How to Add Roadwork Traffic Objects

Objective

You will add roadwork traffic objects to create a realistic roadwork scene. You can add traffic objects to a road using the Traffic Objects Browser.

Overview

You can select traffic objects from the **Traffic Object Browser** to animate a realistic roadwork scene.

You will add the below traffic objects to your roadwork scene:

- Safety barricades with lamps
- Flashing direction arrow on a trailer
- Road service truck

There are two methods to add traffic objects:

1. Add the s[m] and d[m] coordinates in the Traffic Objects pane. See Method 1 on page 162.
2. Move the objects into position using the mouse. See Method 2 on page 163.

Method 1

To add objects using coordinates

1 Click the Object pane in the Road Element view.

2 Right-click and click New from the context menu.

The Traffic Object Browser selection screen is displayed.

3 Double-click `Safety_barrier_lamps` in the Construction folder.

The safety barrier with lamps is displayed in the Objects pane and on the Road 1-D Preview inside an orange circle. The orange arrow shows which direction the barricade is pointing. 

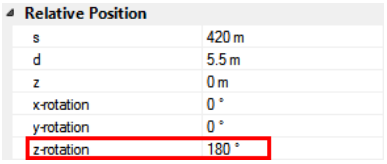
An image of the safety barricade is displayed in the Properties pane.

4 In the Traffic Objects pane, enter the position coordinates as follows:

Name	s[m]	d[m]
`Safety_barrier_lamps`	420	5.50

The safety barricade is moved to the beginning of the roadwork diversion for the oncoming lane traffic.

5 In the Properties pane, set the Relative Position – z-rotation to `180`.



The orange arrow on the Road 1-D Preview is rotated to face the oncoming traffic.

6 Repeat from step 2 on page 162 to step 4 on page 162 and set the position coordinates as follows:

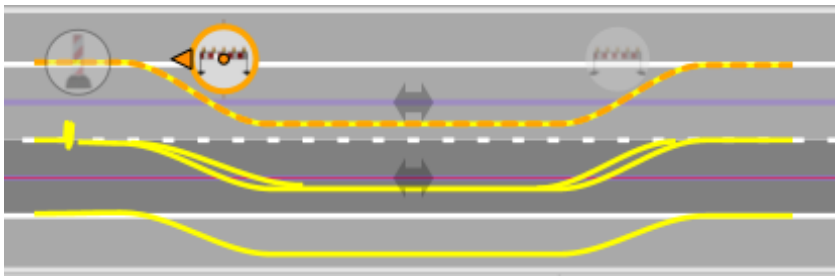
Name	s[m]	d[m]
`Safety_barrier_lamps`	285	5.50

The safety barricade is moved to the beginning of the roadwork diversion for the direct lane traffic. It is facing the correct direction.

7 Click File – Save Project to save your work.

Interim result

You have added two flashing safety barricades using the coordinates and the properties pane. The Road 1-D Preview looks like this.



Method 2

To add and move objects using the mouse

1. Right-click the Road 1-D Preview pane and click New Traffic Object from the context menu.

   The Traffic Object Browser selection screen is displayed.

2. Double-click `Trailer_change_to_left` in the Construction folder.

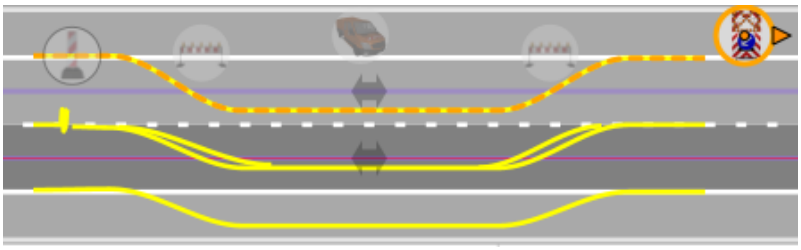
   The flashing direction arrow on a trailer is displayed with an image in the Type Properties.

3. Repeat from the above steps and select `Truck_RoadService` in the Vehicles folder.

   The road service truck is displayed with an image in the Type Properties.

4. Using the mouse, drag the two traffic objects into place:
   1. Drag the `Trailer_change_to_left` to the road shoulder lane at the beginning of the roadworks for the oncoming lane.
   2. Drag the `Truck_RoadService` to the road shoulder lane inside the roadwork section.
5. Using the mouse, drag the orange arrow of the `Trailer_change_to_left` to face in the direction of the oncoming lane traffic.

The flashing direction arrow on a trailer is now displayed with the arrow facing the oncoming traffic lane in the **Road 1-D Preview**.



6 Click **File – Save Project** to save your work.

7 On the **Environment** ribbon, click **Scene Synchronization – Complete**.

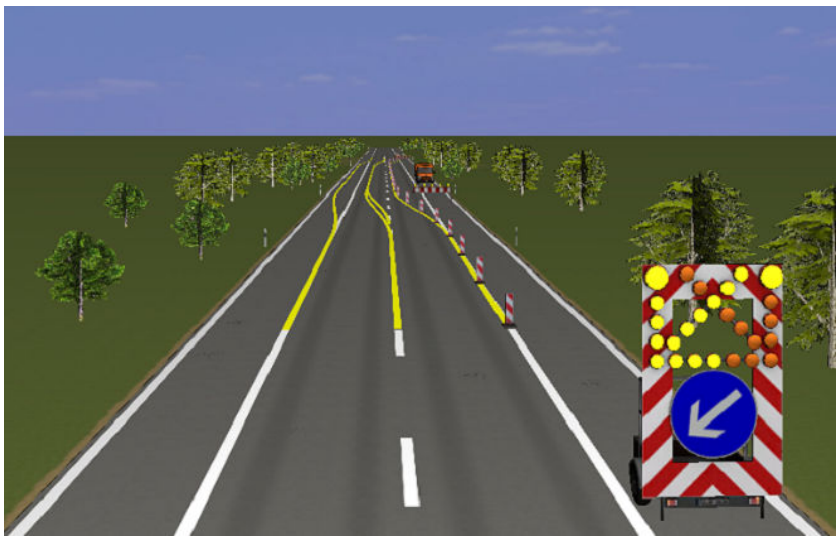
The road, scenery, roadwork shapes, and traffic objects are synchronized with the new MotionDesk experiment.

8 Switch to MotionDesk and navigate your roadwork scene.

Result

You have added roadwork traffic objects to the scene using the coordinates and the mouse. You also animated your roadwork scene in ModelDesk.

The MotionDesk experiment looks like this:



What's next

You will add trajectory shapes through the roadworks that the traffic objects will follow in the simulation.

Related topics

Basics

Basics of Using State Objects in the Scene (MotionDesk Scene Animation 🕮)
Workflow for Creating a Simple Roadwork Scenario Using a Driving Trajectory (ModelDesk Road Creation 🕮)

HowTos

How to Add Static Traffic Objects (ModelDesk Road Creation 🕮)

Step 7: How to Add Trajectory Shapes

Objective

You will add trajectory shapes to the roadwork scene to guide the traffic though the roadwork scene in the simulation. You will add shapes to create the trajectories.

Overview

In a ModelDesk virtual world scene, road lanes can be created with a specific direction of travel. Preferred lanes can also be set. These can be used in the simulation to provide information on which lane the traffic normally uses. For example, this can be the inside lane of a highway.

A trajectory is used in the simulation as path along a road when traffic must divert from the preferred lanes in ModelDesk. Trajectories are added in the Shapes pane and must follow the correct direction of travel.

You will add the below trajectory shapes to your roadwork scene in the direction of travel:

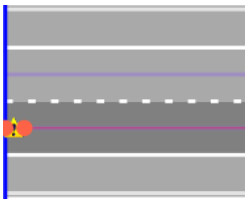
- Along the center of the Direct lane and through the roadwork lanes.
- Along the center of the Oncoming lane and through the roadwork lanes.

Method

To add a trajectory shape

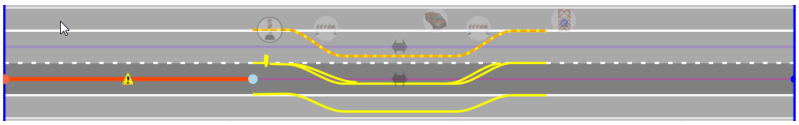
1 Right-click the Shapes pane and click New – Trajectory from the context menu.

A new trajectory type shape is displayed in the shapes list. It is also displayed in red in the Road 1-D Preview. It is placed on the start connection line of the direct lane.



2 Rename the trajectory shape `Trajectory_Direct` in the Shapes – Name table.

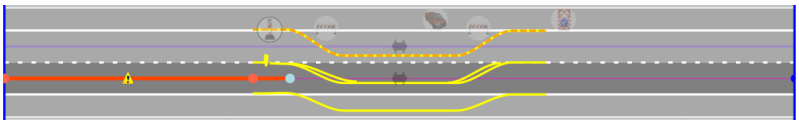
3 Drag the end node of the line to a point on the lane reference line at the beginning of the roadwork lanes.



4 Right-click the blue end node and click Insert After on the context menu

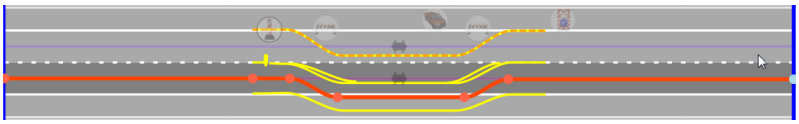
A new trajectory node is added.

5 Drag the end node of the line to a point on the lane reference line at the beginning of the first roadwork curve.

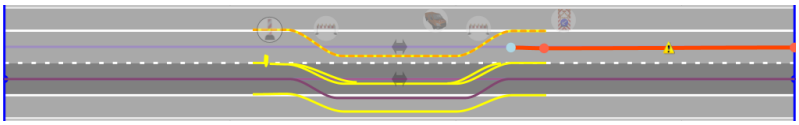


6 To complete the trajectory shape, repeat steps 4 and 5 above until you have added 4 more nodes. Rename the trajectory shape `Trajectory_Oncoming`.

You must add the trajectory line on a path through the center of the direct roadwork lane and finish on the blue connection line at the end of the road section. It is displayed as follows:



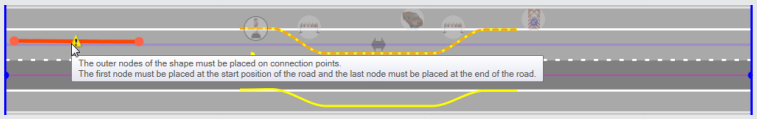
7 To add the trajectory line on the oncoming lane, repeat steps 1 to 6 above.
You must add the start node at the beginning of the oncoming lane. The start is a point on the blue connection line on the right side of the road in the Road 1-D Preview as displayed below:



8 Click File – Save Project to save your work.

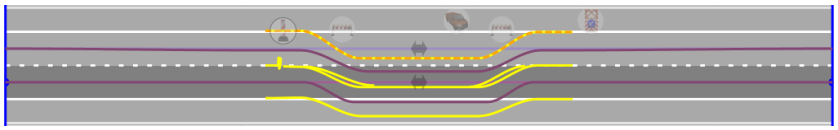
Note

You must place the start and end nodes of a trajectory line at the start and end connection points of the road in the direction of travel for the lane. The connection points are displayed in the Road 1-D Preview as vertical blue lines.
If the nodes are not placed on the connection points or the trajectory direction is not correct, a warning triangle containing a rollover tooltip is displayed.



Result

You have added trajectory shapes in the correct direction of travel to the roadwork scene. You learned how to move trajectory shapes into place using the mouse and to join them with the connection points of the road. The ModelDesk Road 1-D Preview looks like this:



Tip

Trajectory lines are not displayed in the MotionDesk 3-D animation.
To animate the trajectories in the animation, copy & paste the trajectory shapes in ModelDesk and change the Type to Line.

What's next

You will add routes in the roadwork scene for the direct and oncoming traffic in the simulation.

Related topics

Basics

Trajectories (ModelDesk Road Creation 🕮)
Workflow for Creating a Simple Roadwork Scenario Using a Driving Trajectory (ModelDesk Road Creation 🕮)

HowTos

How to Specify Trajectories (ModelDesk Road Creation 🕮)

Step 8: How to Add Routes

Objective

You must add routes in the roadwork scene for the direct and oncoming traffic to guide the traffic in a simulation.

Overview

ModelDesk uses routes to define paths through a road network. These routes are necessary for vehicle movement in the road network.

In a roadwork scenario, the traffic must move outside the normal preferred lane and follow a trajectory through the roadwork lanes. Therefore, you will add a route that follows the trajectory paths, which you added in the previous step.

Routes are used to build a path through a simple or complex road network one road section at a time.

You will add Routes that follow the trajectory shapes on your simple roadwork scene in the direction of travel of the following lanes:

- Direct lane.
- Oncoming.

Method

To add a route

1. Click Switch to road network view to return to the overall road network view.
2. Click the tab of the Routes pane.
   The routes pane is displayed and contains one default route with one route section.
3. In the Routes pane Name column, enter `Roadworks_Direct`.
4. In the Path column of the existing Route Section select the trajectory created in the previous step for the direct lane: `Trajectory_Direct`.
5. Right-click the Routes pane and click New Route on the context menu.

A new route in edit mode is added to the routes pane. This route does not yet contain any route sections. The road network is displayed with orange semicircle nodes in the **Road Network 2_D Preview**.

6 Click the start point for the oncoming route. This is the orange road point on the right at the 700 meters position.

Tip

Right click **Route Sections** and click **Edit Route** if you have changed focus and the orange semicircle nodes turn blue. This indicates you have exited edit mode for the route.

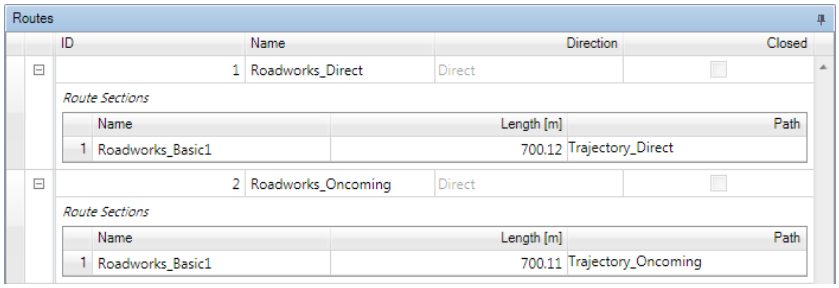
7 In the **Path** column, select the trajectory created in the previous step for the direct lane: `Trajectory_Oncoming`.

8 Enter `Roadworks_Oncoming` in the **Name** column of the new route and **Save** the project.

Result

You added routes in the direct and oncoming lane directions that follow the trajectories created in the previous step.

The **Routes** pane looks like this:



What's next

You will add a vehicle to the scene and animate the roadwork scene with simulation data from a platform.

Related topics

Basics

Routes on a Road Network (ModelDesk Road Creation 🕮)
Workflow for Creating a Simple Roadwork Scenario Using a Driving Trajectory (ModelDesk Road Creation 🕮)

HowTos

How to Specify Routes on Road Networks (ModelDesk Road Creation 🕮)

Step 9: How to Animate the Scene

Objective

You will prepare the simulation platform and MotionDesk experiment and then play the scene animation to demonstrate the traffic flow through the roadwork scene.

Simulation overview

Simulation platform In this step, details for using a SCALEXIO platform are provided as an example.

The steps are similar when performed using another simulation platform.

Ensure that your simulation platform is configured correctly and running. Refer to your simulation platform documentation for details.

Before you begin

It is assumed that you are familiar with simulation applications as described in Lesson 4: Animating the Scene with Simulation Data from a Platform on page 61. The following description assumes you have completed this lesson successfully.

For more information on the preconditions for this step, refer to Overview of Lesson 8 on page 146.

Overview

To animate a scene and demonstrate the traffic flow in both directions through the roadwork scene using the defined trajectories and routes, you will carry out the following tasks:

1. Prepare the simulation platform for the animation. In this step, you load the simulation application, activate the scenario, and download the experiment to the platform. Refer to Part 1 on page 171.
2. Prepare the MotionDesk experiment for the animation. In this step, you will link to the simulation platform, add a vehicle, and assign the motion data. Lastly, you will create the animation observers. Refer to Part 2 on page 174.

3. Control and animate the roadwork scene along both trajectory routes. In this step, you will control the animation and switch between the routes. Refer to Part 3 on page 176.

Part 1

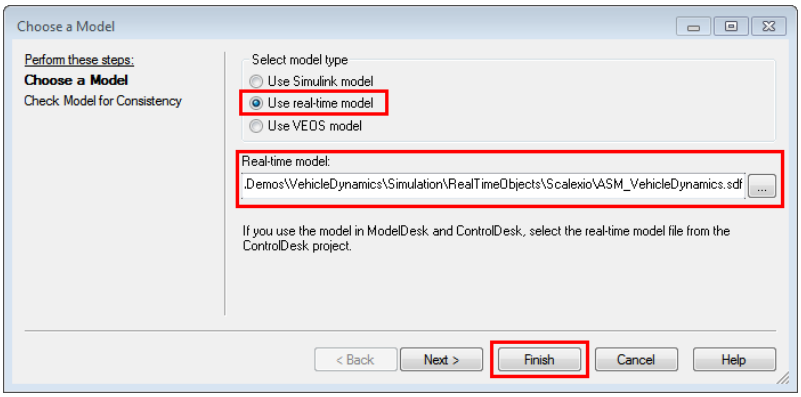
To prepare the simulation platform

1 In ModelDesk, on the Parameter Sets ribbon, click Simulation Model – Change.

The Choose a Model dialog is displayed.

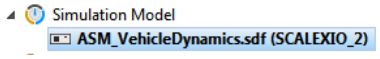
2 Click Select model type – Use real-time model and browse for the `ASM_VehicleDynamics.sdf` simulation application that you prepared in Lesson 4: Animating the Scene with Simulation Data from a Platform on page 61.

Click Finish.

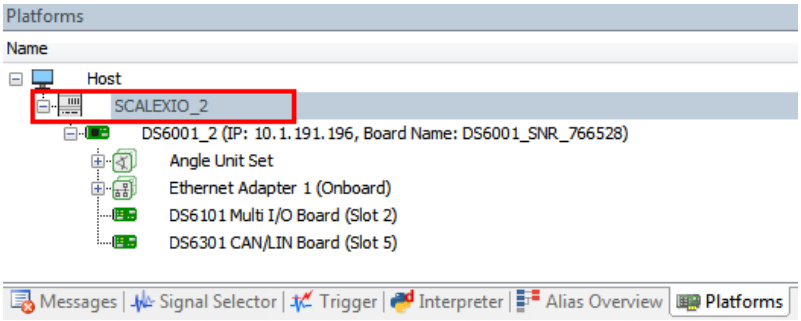


3 Right-click the `ASM_VehicleDynamics.sdf` in the experiment tree, click Specify Platform from the context menu and select the Platform Name from the list.

The platform name is displayed in the experiment tree. The red cross is no longer visible, indicating that the simulation model has been defined correctly.

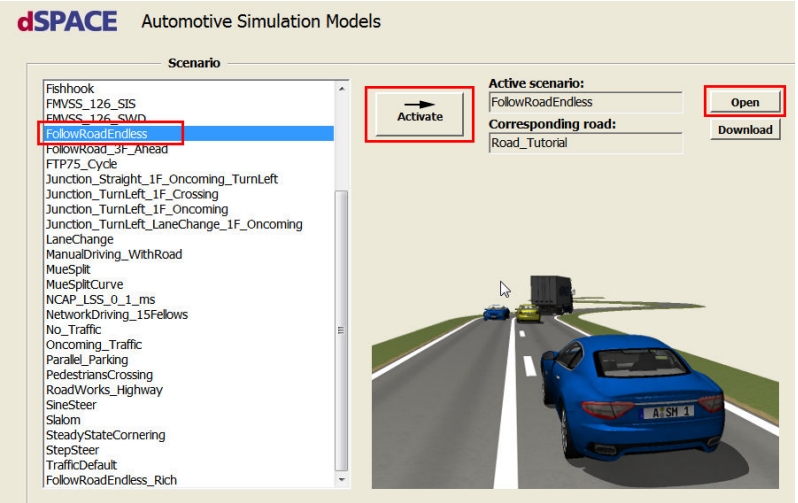


4 To download the application on the simulation platform, drag the real-time simulation model `ASM_VehicleDynamics.sdf` to the Host – SCALEXIO node in the Platforms pane of ModelDesk.

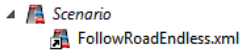


5 Double-click the Scenario node in the ModelDesk experiment, and in the Scenario configuration page – Scenario, select `FollowRoadEndless`.

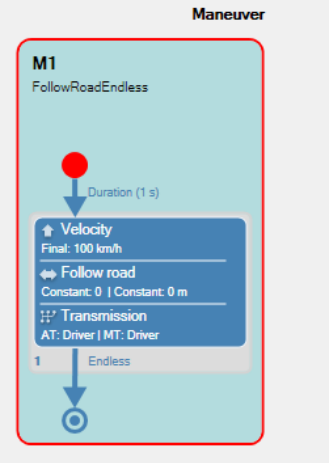
Click Activate then Open.



The `FollowRoadEndless.xml` scenario is added to the Scenario node in the experiment tree view as follows.



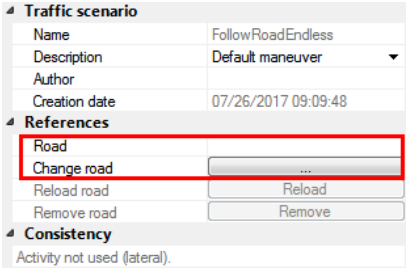
The scenario is also opened for editing in a new pane. It has a red start node because it is not yet connected to a road.



6 Connect the road to the scenario

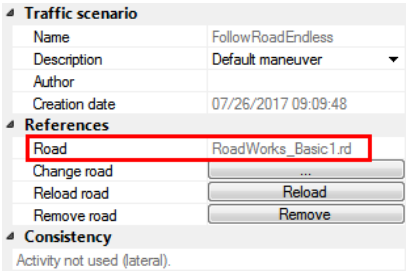
1. Click inside the gray border area of the Scenario to load the Traffic scenario properties:

2. Click References – Change road.

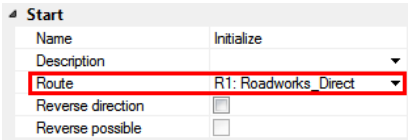


3. Select `RoadWorks_Basic1` from your experiment Pool – Environment – Road folder and click OK.

   `RoadWorks_Basic1` is displayed in the Road, field and the scenario start node turns blue.



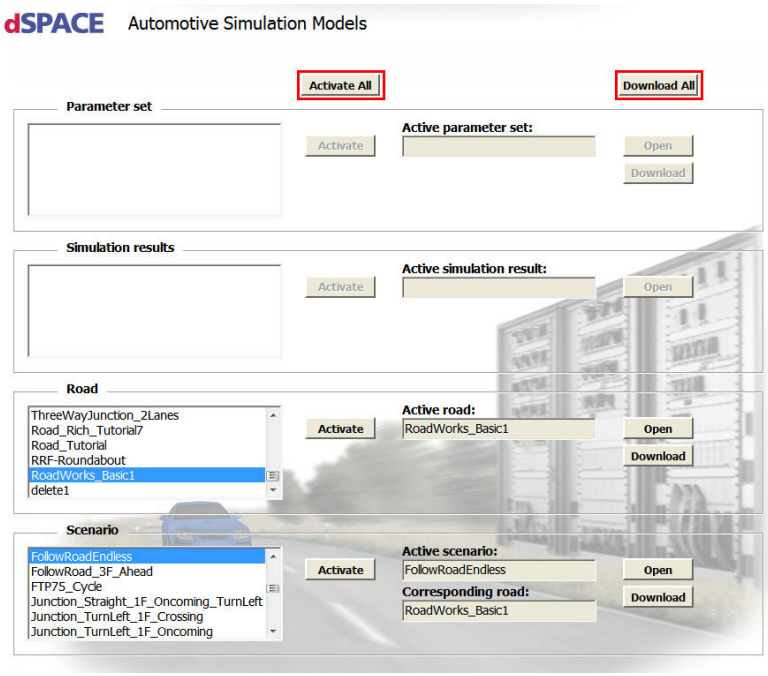
4. Click the blue scenario start node, and in the Properties pane, select Route – R1: Roadworks_Direct.



7 Click File – Save Project to save your work.

8 Double-click the experiment node `Experiment_005`, and on the Configuration page click:

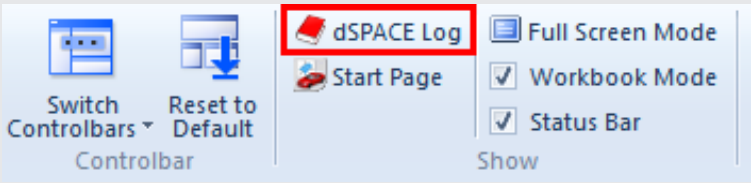
1. Activate All to ensure the road and scenario are activated in the experiment.
2. Download All to download the road and scenario to the connected SCALEXIO simulation platform.



The road and scenario are downloaded to the simulation platform and synchronized with the MotionDesk 3-D animation.

Tip

To view the log and troubleshoot any errors, in ModelDesk, on the View ribbon, click Show – dSPACE Log.



Interim result

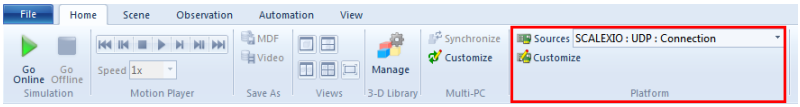
You prepared the simulation platform for the animation. You loaded the simulation application, activated the follow road scenario and downloaded the experiment to the simulation platform.

Part 2

To prepare the MotionDesk experiment

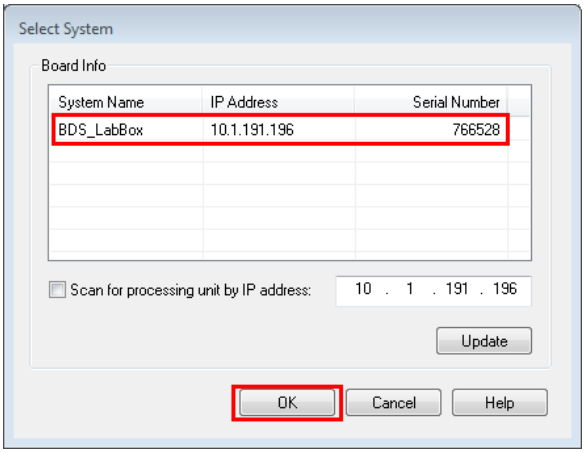
1 Connect to your simulation data source in MotionDesk.

On the Home ribbon, click Platform – Source and select SCALEXIO : UDP : Connection from the list.



2 Click Customize and Select Board in Customize Data Source.

3 Select the system in Board Info and click OK.

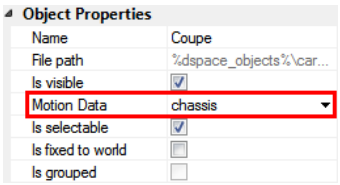


4 Add a movable vehicle object to the MotionDesk scene.

In the Library Browser pane, drag Car_ASM_Coupe – Coupe and 4 Coupe_tires to the 3-D View.

5 Click the Movable Objects in the MotionDesk Scene Navigator and the assign the motion data as follows in the Object Properties to the vehicle.

Wheel	Motion Data
Coupe	chassis
Coupe_tire	Wheel_FL
Coupe_tire	Wheel_FR
Coupe_tire	Wheel_RL
Coupe_tire	Wheel_RR



6 On the Scene ribbon, click Observer – Create Defaults and select Coupe in the Configure Experiment list to create default observer views to the car.

7 Click Observer – Coupe Rear in the Scene Navigator tree.

8 Click File – Save Project to save your work.

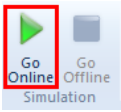
Interim result

You prepared MotionDesk for animation by connecting to the simulation platform. You also added a vehicle to and assigned the motion data to it. Lastly, you added the default observers. The simulation is now ready to be run.

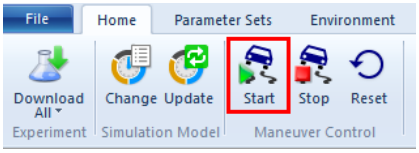
Part 3

To control the scenario and view the animation

1 In MotionDesk, on the Home ribbon, click Simulation – Go Online to connect to the simulation.



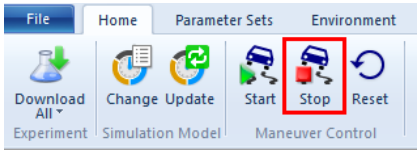
2 In ModelDesk, on the Home ribbon, click Maneuver Control – Start to start the scenario on the simulation platform.



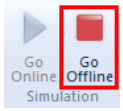
You will view your Coupe from the rear observer, driving through the roadwork scene along the direct lane.

3 Stop the animation.

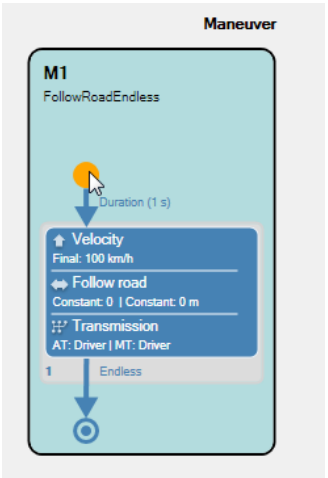
1. Click Stop to stop the animation in ModelDesk.



2. Click Go Offline in MotionDesk.



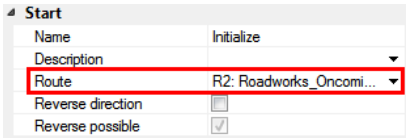
4 To view the animation in the oncoming direction, in ModelDesk, click the `FollowRoadEndless.xml` tab in the working area and click the start node.



Note

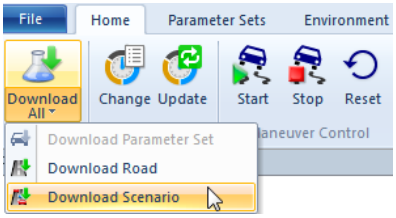
If the scenario was previously closed, double-click Scenario in the experiment tree to reopen the Scenario configuration page. Then Open `FollowRoadEndless.xml`.

5 In the Properties pane, select Route – R2: Roadworks_Oncoming.



6 Click File – Save Project to save your work.

7 On the Home ribbon, click Experiment – Download All – Download Scenario to download the scenario to the simulation platform with the changed scenario route.



8 Repeat steps 1 to 3 to Start and Stop the simulation, also using Reset to restart the animation.

Tip

Use two screens to control the simulation:
- ModelDesk: Scenario control.
- MotionDesk: Simulation connection and animation display.

Interim result

You viewed the Coupe from the rear observer, driving through the roadwork scene along the direct and oncoming lanes.

Result

In this step, you prepared the simulation platform with the simulation application and the ModelDesk experiment. You then assigned the motion data to the vehicle in MotionDesk before you started the simulation and viewed the animation in the 3-D View.

What's next

For a summary of the lesson, you can refer to the result of the lesson.

Related topics

Basics

Basics of Synchronizing the Scene in MotionDesk (ModelDesk Scene Synchronization 🕮)
Registering Platforms (ModelDesk Platform Management 🕮)
Scenarios (ModelDesk Scenario Creation 🕮)
Setting up Movable Objects (MotionDesk Scene Animation 🕮)
Starting an Animation (MotionDesk Scene Animation 🕮)

HowTos

How to Replay an Animation (MotionDesk Scene Animation 🕮)

Result of Lesson 8

Result

In this lesson:

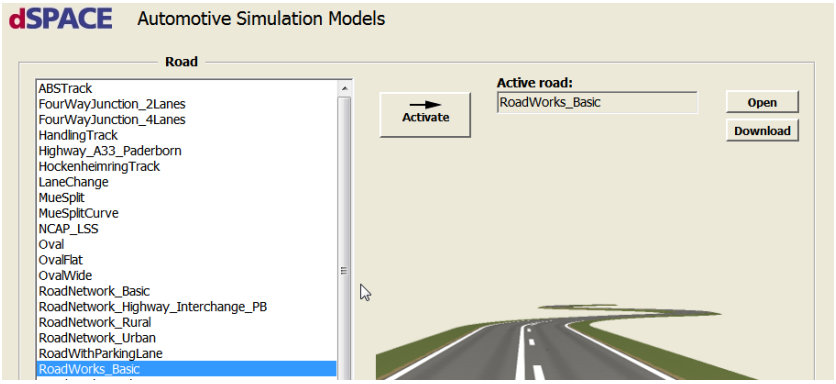
1. You worked with different shape types in ModelDesk.
2. You created a road with scenery and lanes and adjusted the road lines in a road model scene.
3. You added shapes to build the lane diversion lines, repeating delineators, and trajectories for the roadwork scene.
4. You added static traffic objects to the roadwork scene
5. You added a route to the road network for the animation.
6. You connected to the simulation platform and animated the scene with all its participants and view it with new observers.

After finishing the lesson, the scene looks like this:

Predefined road

The road network you created in this lesson is part of a predefined road model that comes with ModelDesk: *RoadWorks_Basic*.

If you want to work with the complete road network, you can find the road model in the road pool in ModelDesk. Activate the road from the **Configuration page** and synchronize it to a new MotionDesk experiment.



Where to go from here

You have worked through the whole tutorial. For a short overview of the work results, refer to the summary of this tutorial.

Related topics

Basics

Basics of Synchronizing the Scene in MotionDesk (ModelDesk Scene Synchronization 🕮)
ModelDesk Glossary
MotionDesk and Sensor Simulation Glossary
Lanes of a Road Element (ModelDesk Road Creation 🕮)
Overview of Roads (ModelDesk Road Creation 🕮)
Routes on a Road Network (ModelDesk Road Creation 🕮)
Setting up Movable Objects (MotionDesk Scene Animation 🕮)
Shapes (ModelDesk Road Creation 🕮)
Starting an Animation (MotionDesk Scene Animation 🕮)
Trajectories (ModelDesk Road Creation 🕮)
Workflow for Creating a Simple Roadwork Scenario Using a Driving Trajectory (ModelDesk Road Creation 🕮)

HowTos

How to Add Static Traffic Objects (ModelDesk Road Creation 🕮)
How to Replay an Animation (MotionDesk Scene Animation 🕮)
How to Specify Routes on Road Networks (ModelDesk Road Creation 🕮)
How to Specify Scenery Sections (ModelDesk Road Creation 🕮)
How to Specify Shapes (ModelDesk Road Creation 🕮)
How to Specify Trajectories (ModelDesk Road Creation 🕮)

References

Road Properties (ModelDesk Road Creation 🕮)

Summary

Your Working Results

Introduction

You have finished your work successfully and learned about typical working routines in MotionDesk and ModelDesk that you now can use.

What you learned

You learned:

- To use the features of MotionDesk.
- To create a scene in MotionDesk with static and movable objects and atmospherics.
- To modify the position, dimensions, and orientation of objects.
- To create and use observers.
- To work with the custom object library.
- To animate a scene in MotionDesk with motion data from an MDF file.
- To animate a scene in MotionDesk with motion data calculated on a simulation platform.
- To work with the features of ModelDesk.
- To specify different properties of a road network.
- To synchronize a MotionDesk scene with a road model in ModelDesk.
- To use traffic objects in ModelDesk, such as traffic signs.
- To use state objects.
- To use animated characters.
- To visualize simulation data with instruments.
- To generate a video of an animation.
- To work with shapes and routes and build roadwork scenes in ModelDesk.

What's next

There are several possibilities for your next step:

- You can start working with MotionDesk and create a project.
- You can open and work with the demo projects in MotionDesk that are provided with the installation.

The demos are installed in the `<MotionDesk_InstallationPath>\Demos\MotionDesk` folder.

For an overview of the MotionDesk demos provided with the installation, refer to Working with the MotionDesk Demos (MotionDesk Basics 🕮).

- You can also refer to ASM demo projects. The demos are installed in the `<RCP_HIL_InstallationPath>\Demos\ASM` folder.

  For information on the ASM tutorials, which also include tutorial videos, refer to Tutorial (ASM User Guide 🕮).
- You can look for more information on MotionDesk. Refer to:
  - MotionDesk Basics 🕮
  - MotionDesk Project and Experiment Management 🕮
  - MotionDesk Custom Object Library Management 🕮
  - MotionDesk Calculating and Streaming Motion Data 🕮
  - MotionDesk Scene Creation 🕮
  - MotionDesk Scene Animation 🕮
  - MotionDesk Terrain Generation 🕮
  - MotionDesk Automation 🕮
- You can look for more information on ModelDesk. Refer to Introduction to the Road Generator (ModelDesk Road Creation 🕮).
- You can look for information on Sensor Simulation. Refer to:
  - Sensor Simulation Overview 🕮
  - MotionDesk Sensor Simulation Control 🕮
  - Sensor Simulation Manual 🕮
  - Sensor Simulation Tutorial 🕮
- You can look for more information on the Model and Sensor Interface Blockset. Refer to Basics of the Blockset and Connected Systems (Model and Sensor Interface Blockset Manual 🕮).