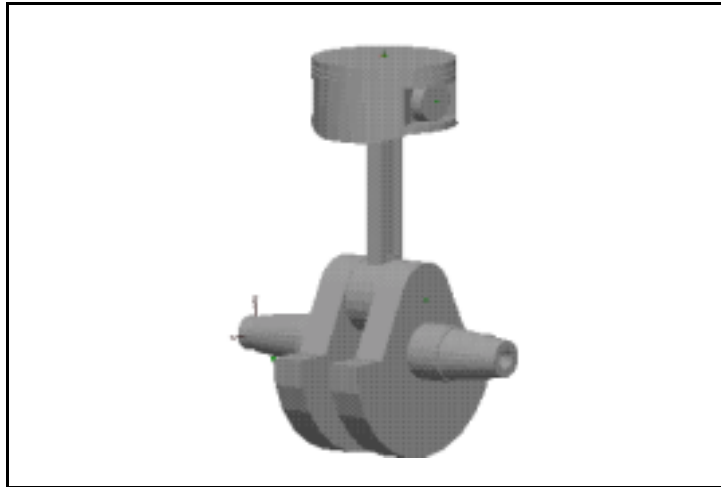


CHAPTER 4

Animating a Model

**Objectives**

In this exercise, you will learn to

- Apply texture to surfaces.
- Keyframe cameras.
- Insert spotlights.
- Export video clips.
- Create part explosions.

Software

MSC.visualNastran 4D, MSC.visualNastran Desktop FEA, or
MSC.visualNastran Motion

Support Files

- Tutorials\Chapter 04\Piston.wm3

Apply Texture and Photorealism

With MSC.visualNastran Desktop products, you can quickly and easily render models with photorealistic effects.

1. Launch MSC.visualNastran Desktop.
2. Choose **Open** from the **File** menu.
3. Browse the **Tutorials\Chapter 04** folder and open the file **Piston.wm3**.

Now you will change the background color, add a ground plane and create a “stage” to showcase the piston.

4. Choose **Background Color** from the **View** menu.

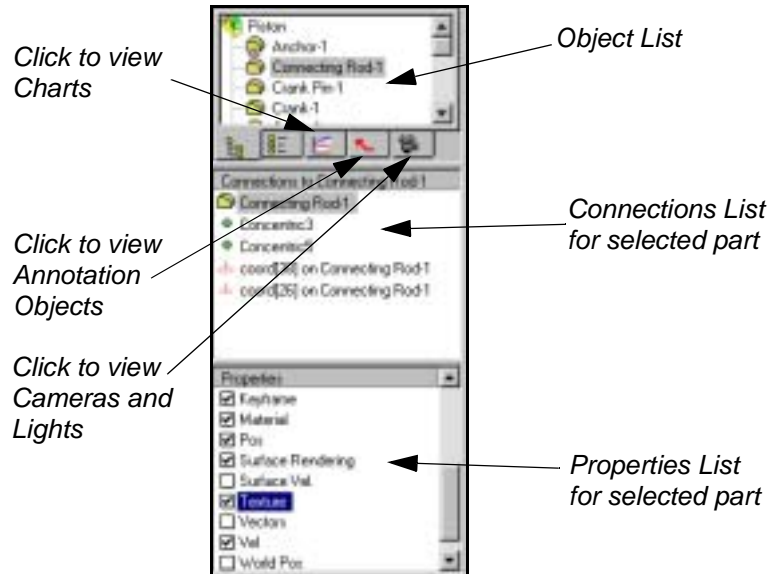
This displays the **Color** dialog.

5. Click a dark background color and click **OK**.
6. Choose **Ground Plane** from the **Insert** menu.

MSC.visualNastran Desktop inserts a ground plane under the piston.

7. Right-click the ground plane and choose **Properties** from the pop-up menu.
8. Click the checkboxes for **Surface Rendering** and for **Texture** in the **Properties** list of the **Object Manager**.

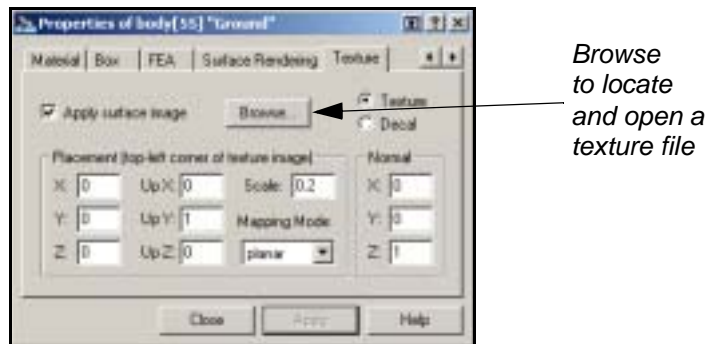
Figure 4-1
Object Manager



This enables the **Surface Rendering** and **Texture** pages of the **Properties** window.

9. Click the **Texture** tab to view the **Texture** page of the **Properties** window.

Figure 4-2
Properties Window
(Texture Page)



10. Click the checkbox for **Apply surface image** and click the **Browse** button to locate and open the texture file **Parquet2.jpg** in the folder **Textures/floor**.

This specifies the file used to apply texture to the ground plane.

11. Enter 0.2 in the **Scale** box.

This sets an appropriate scale for the texture pattern.

12. Click **Apply** and then **Close**.

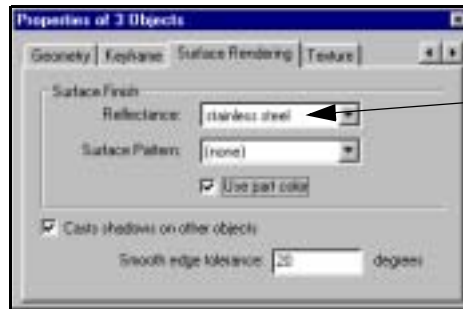
Next you will render the piston parts.

13. Select **Crank-1**, **Crank-2**, and **ConnectingRod-1**. (Hold down the **CTRL** key while clicking to select all these parts.)
14. Right-click over the selected parts and choose **Properties** in the popup menu.

MSC.visualNastran Desktop displays a **Properties** window for all three objects.

15. Click the **Surface Rendering** tab to view the **Surface Rendering** window.

Figure 4-3
Properties Window
(Surface Rendering Page)



Select a
Reflectance
material

16. Choose **stainless steel** from the **Reflectance** scrolling list and click the **Use part color** setting checkbox.

The connecting rod and cranks are rendered in stainless steel. (The **Use the part color** setting allows you to retain the colors of model parts.) Note that you will see the changes when you perform a render preview as described below.

17. Select **Piston Head-1**.

18. Choose **Polished Gold** from the **Reflectance** scrolling list.



19. Click the **Preview** button in the **Render Toolbar**.

If the screen is not large enough, the render toolbar does not appear.

The piston model is rendered in the **Rendering Preview** window.

Figure 4-4
Rendered Piston



20. Close the **Rendering Preview** window.

Enable the Keyframe Property

To animate models, MSC.visualNastran Desktop uses a technique known as keyframing. With keyframing you can specify motions in ways that are not based on physics. For example, you can script a corporate logo flying through the air, or a parts-exploding automobile engine to show how it is assembled. Even cameras can be keyframed to create “movie-like” scenes that pan, zoom, and highlight product features. You can also combine physics-based, simulated movement with keyframed animation to create motion sequences.

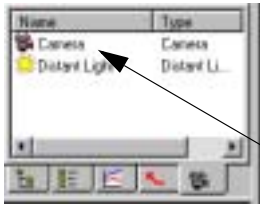
Here, you will build an animation sequence in which the camera angle is keyframed. You can also keyframe objects. First, you will enable MSC.visualNastran Desktop’s camera and keyframe capabilities.



1. Click the **Camera** tab on the **Object Manager**.

This displays the cameras and lights. MSC.visualNastran Desktop lets you insert cameras and lights as needed. The active camera has a red lens.

Figure 4-5
*Object Manager
(Camera and Lights)*



*Red lens
indicates
active camera*

2. Select the **Camera**.

Build the Keyframe List

Next you will use the **Tape Player** and **View** controls to create a keyframe list—a set of recorded frames that MSC.visualNastran Desktop uses to compile an animation sequence.



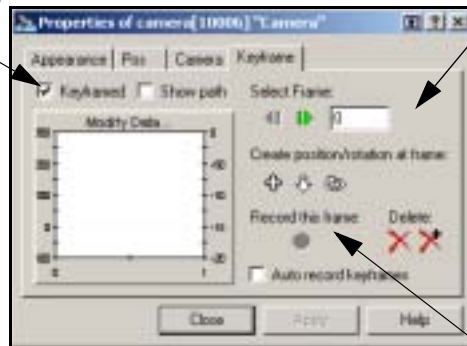
1. Click the **Zoom** tool and zoom in on the crank pin.
2. Right-click the camera in the **Object Manager** and choose **Properties** from the popup menu to view the **Properties** window.

NOTE: You may need to click the **Keyframe** checkbox in the **Properties List** of the **Object Manager** to enable the Keyframe page.

3. Click the **Keyframe** tab of the **Properties** window.

Figure 4-6
Properties Window
(Keyframe Page)

*Click to
enable
keyframing*



*Select
Frame*

*Click to
record
keyframes*

4. Click the **Keyframed** checkbox.

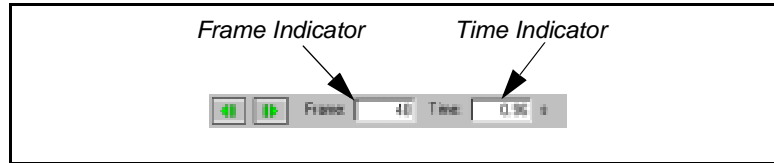
This enables keyframing for the camera. The first keyframe is automatically recorded.

5. Click the **Advance 1 Frame** button under **Select Frame** several times to see the simulation advance. Enter **48** in the **Select Frame** field and click **Apply** or press **Enter**.



You can advance the simulation using the **Frame Slider** of the **Tape Player**.

Figure 4-7
Tape Player
Frame Indicator



6. Zoom out to view the model.
7. Click the **Record** button (red dot) in the **Keyframe** page.

This records the camera view at 48 frames.

8. Enter **96** in the **Select Frame** field and press **Enter**.



9. Click the **Rotate Around** tool, drag the piston about 30 degrees, and click the **Record** button in the **Keyframe** page.

10. Enter **144** in the **Select Frame** field and press **Enter**.



11. Click the **Zoom** tool and zoom in to the crank pins.

12. Click the **Record** button in the **Keyframe** page.



13. Reset the **Select Frame** field to zero. Close the Camera **Properties** window and click the **Run** button in the **Tape Player Control**.

This plays back the animation sequence. Notice how MSC.visualNastran Desktop interpolates the motion between recorded keyframes.

NOTE: When you keyframe bodies, use MSC.visualNastran Desktop's auto-record feature to streamline recording; MSC.visualNastran Desktop automatically records a keyframe when you advance the frame sequence and move the selected body. Instead, you can disable the auto-record feature and manually click the **Record** button as you did in this exercise (Steps 7, 9, and 12).

Insert Lights

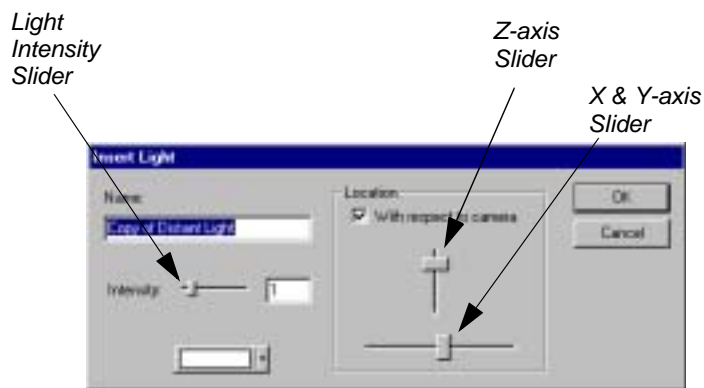
With MSC.visualNastran Desktop you can insert two kinds of lights: distant lights and spotlights. Lights are listed in the **Object List** under the **Camera list** view.

You can add distant lights as needed. By default, each blank document has one distant light.

1. Choose **Light** from the **Insert** menu and then choose **Distant Light**.

This displays the **Insert Light** window.

Figure 4-8
Insert Light Window



2. Move the **Location** sliders to set the position of the light source.
3. Enter a name for the light in the **Name** text region.

The default distant light perspective is that of the camera through which you view the modeling window.

4. Click the **Color** button and select a blue light, and click **OK**.
5. Click OK to close the **Insert Light** window.



This inserts the light according to your selections. The light is added to the **Object List**. Click the **Camera object list** icon to display lights and cameras.

Insert a Spotlight

Next you will add a spotlight. You can insert and orient spotlights anywhere in the workspace. When placing and using spotlights, you may want to darken the background color.

1. Choose **Lights** from the **Insert** menu and then choose **Spotlight**.
2. Move the cursor over a part and click.

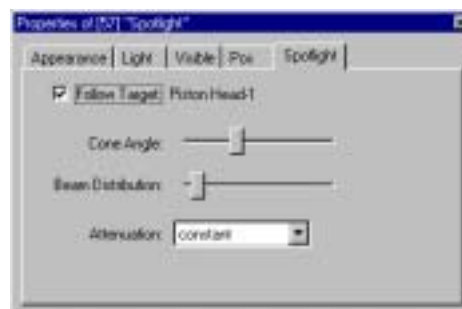
This places a spotlight on the part and a spotlight entry in the **Object list**.

3. With the spotlight still selected, choose **Detach from Body** from the **Object** menu.



4. Click the **Drag** button on the **Edit** toolbar and move the spotlight into position away from the model.
5. Right-click the spotlight, choose **Direct Spotlight to...** (from the popup menu), and left-click the piston head.
6. Double-click the spotlight, or click the spotlight icon in the **Object list** to view the **Properties** window.
7. Click the **Spotlight** tab on the **Properties** window.

Figure 4-9
Spotlight Page



8. Move the **Cone Angle** and **Beam Distribution** sliders to the left to focus the spotlight tightly on the piston head.



9. Click the **Preview** button on the **Rendering** toolbar.

The piston model is rendered in the **Render Preview** window.

10. Close the **Render Preview** window and the **Properties** window for the spotlight.

Export Video

Next, you will export a video clip of the rendered piston model to an AVI (**Video for Windows**) file.

Video for Windows is a standard animation file format for the Windows operating system. You can specify various parameters such as frame rate, compression method, and compression rates.

NOTE: To export and play back **Video for Windows** files, you must have the **Video for Windows Runtime Library** installed on your machine. The **Video for Windows** system is included with Windows Operating Systems.

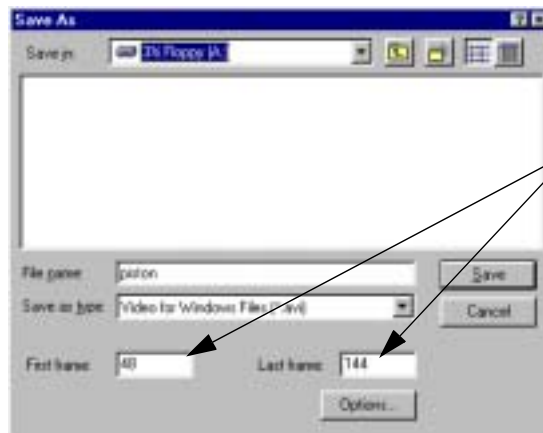


1. Click the **AVI Export** button on the **Render** toolbar.

This displays the **Save As** dialog for exporting video.

NOTE: If the export video button is not enabled, it may be because you changed a property that has erased the motion history. If this is the case, click the **Play** button on the tape control to re-generate the object's motion.

Figure 4-10
Export Video
Save As Dialog



2. Enter the **48** and **144** in the **First frame** and **Last frame** boxes, respectively.

This specifies the keyframed sequence as the video clip MSC.visualNastran Desktop will export.

3. Enter a filename (browse as needed) and click **Save**.

MSC.visualNastran Desktop exports the image. Exporting a fully rendered video clip may take some time. Toolbars, coords, menu items, the document name, and the **Tape Player Control** do *not* appear in the exported video file.

4. When video exporting is completed, you will be prompted to play back the file.

Create a Part Explosion

Next, you will explode the parts of the piston. Part explosions are keyframed animation sequences that demonstrate or highlight product connections or features. Parts explosions can also be used with annotations.

1. Select the Subassembly List View tab and select **Crank-2** from the **Object List**.

This designates the anchor for the part explosion.

2. Choose **Explode** from the **Tools** menu.

A dialog displays explaining that constraints and gravity are ignored during the part explosion.

3. Click **OK**.

The parts explode away from the crank as a keyframed animation sequence.

4. To replay the explosion, reset the tape controls and click the **Run** tape control button.

The parts explode away from the crank with the keyframed camera sequence generated in **Enable the Keyframe Properties**.

NOTE: If you do not select a part before running the explosion, MSC.visualNastran Desktop will select the largest anchored body (determined by the largest dimension of its bounding box) from which all other parts will explode. In this exercise, that would be the ground plane. If

there are no anchored bodies in the assembly, MSC.visualNastran Desktop will select the largest body. If the ground plane were removed from this exercise, that part would be the connecting rod.



You may wish to annotate or dimension parts prior to a part explosion. Annotations and dimensions that are attached to bodies move with the bodies during an explosion.
