Chapter 9

Material Editor: Texture Maps-II

Learning Objectives

After completing this chapter, you will be able to:

- *Create transparent materials*
- *Apply transparency maps to objects*
- *Create procedural maps*



INTRODUCTION

In this chapter, you will create materials using opacity and procedural maps. A procedural map is mathematically generated. If the object has a hole cut in it, the texture will still appear correct. Procedural maps have settings that modify their appearance.

Opacity maps are used to control the transparency of a material. The image file used as the map controls the transparency. Black pixels are completely transparent and white pixels are opaque. Pixels in shades of gray proportionally control the transparency. An opacity map can be applied to a simple 3D object to give it an appearance of a complex shape.

TUTORIAL

Before starting the tutorial, you need to download the *c09_3dsmaxdesign_2014_tut.zip* file from www.cadcim.com. The path of the file is as follows: *Textbooks > Animation and Visual Effects > 3ds Max Design > Autodesk 3ds Max Design 2014: A Tutorial Approach*

Extract the contents of the zip file and save them in the *Documents* folder.

Tutorial 1

In this tutorial, you will create materials that use special texture maps. You will use the opacity and diffuse color maps to make a square block look like a flower. The diffuse color map will be used to define the shape and color of the flower and the opacity map will make the area surrounding the flower completely transparent. A procedural map will be created to represent a solid piece of wood, refer to Figure 9-1. **(Expected time: 20 min)**



Figure 9-1 *The vase and flower models*

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The following steps are required to complete this tutorial:

a. Create the project folder.
b. Open the file.
c. Create a new material library.
d. Create the vase material.
e. Create the flower material.
f. Create the wood block material.
g. Assign the material to the scene.
h. Save and render the scene.

Creating the Project Folder

Create the project folder with the name *c09_tut1* in the *3dsmaxdesign 2014* folder as discussed in earlier chapters.

Opening the File

1. Open Windows Explorer and then browse to *\Documents\c09_3dsmaxdesign_2014*. Next, copy all image files to *\Documents\3dsmaxdesign 2014\c09_tut1\sceneassets\images*.

2. Choose **Open** from the **Application** menu; the **Open File** dialog box is displayed. In this dialog box, browse to the location *\Documents\c09_3dsmaxdesign_2014_tut* and select the **c09_tut1_start.max** file from it. Choose the **Open** button to open the file, refer to Figure 9-2.

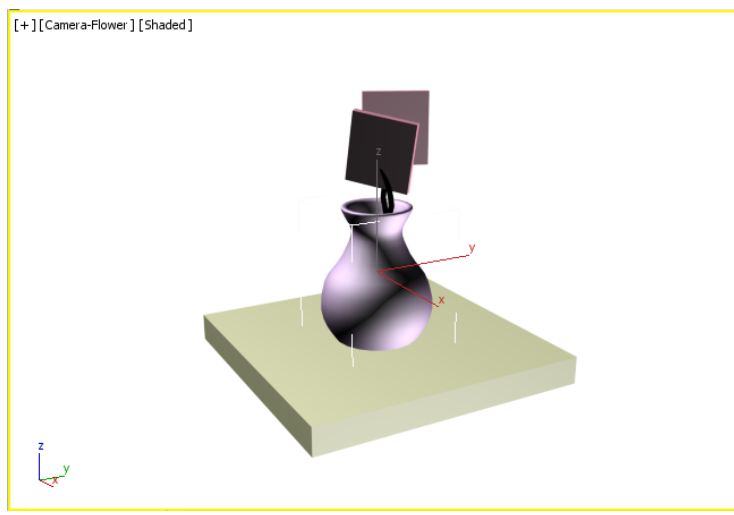

Figure 9-2 *The c09_tut1_start file*

3. Choose **Save As** from the **Application** menu; the **Save File As** dialog box is displayed. Browse to the location *\Documents\3dsmaxdesign 2014\c09_tut1\scenes*. Save the file with the name *c09tut1.max* at this location.

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Creating New Material Library

In this section, you will create new material library which will contain materials created in the scene.

1. Choose **Rendering > Material Editor > Compact Material Editor** from the menu bar; the **Material Editor** dialog box is displayed. You will notice that in the first slot there is a material named *Stem* which is applied to the flower stems.

2. Choose the **Get Material** button in the **Material Editor** dialog box; the **Material/Map Browser** dialog box is displayed.

3. Choose the **Material/Map Browser Options** button from the **Material/Map Browser** dialog box; the **Material/Map Browser Options** flyout is displayed. Select **New Material Library** from the **Material/Map Browser Options** flyout; the **Create New Material Library** dialog box is displayed.



   As the project folder is already set, the *materiallibraries* folder of this project is displayed in the **Save in** drop-down list of this dialog box.

4. Enter **Still-Life** in the **File name** text box as the new name for the material library and choose the **Save** button; the new **Still-Life** material library is created in the **Material/Map Browser** dialog box.

5. Close the **Material/Map Browser** dialog box to return to the **Material Editor** dialog box.

Creating the Vase Material

In this section, you will create the transparent vase material by setting different parameters in the **Material Editor** dialog box.

1. Select the second material sample slot in the **Material Editor** dialog box to make it the current sample.

2. Choose the **Arch & Design** button to change the material type; the **Material/Map Browser** dialog box is displayed. In this dialog box, select the **Standard** material from the **Maps > Standard** rollout and then choose the **OK** button; the **Arch & Design** material is replaced by the **Standard** material. Also, various rollouts are displayed in the **Material Editor** dialog box to modify the **Standard** material.

3. In the **Shader Basic Parameters** rollout, select **Blinn** from the drop-down list, if it is not already selected.

4. Select the **2-Sided** check box in the **Shader Basic Parameters** rollout; the current material becomes a 2-sided material.

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Note

*The **2-sided** check box in the **Material Editor** need not be selected if the object is fully closed, such as a box, sphere, or capped cylinder.*

5. In the **Blinn Basic Parameters** rollout, unlock the **Ambient** and **Diffuse** color swatches. Next, choose the **Ambient** color swatch**;** the **Color Selector: Ambient Color** dialog box is displayed.

6. In the **Color Selector: Ambient Color** dialog box, set the values as given next:

   Red: **133** Green: **166** Blue: **47**

   The ambient color is set to green. Choose the **OK** button to close the **Color Selector: Ambient Color** dialog box.

7. Choose **Rendering > Environment** from the menu bar; the **Environment and Effects** dialog box is displayed. In the **Global Lighting** area of the **Common Parameters** rollout, choose the **Ambient** color swatch; the **Color Selector: Ambient Light** dialog box is displayed. In this dialog box, set the value **75** in the **Value** spinner and close the dialog box. Next, close the **Environment and Effects** dialog box; a small amount of ambient light is added to the scene.

   This ambient light will bring out the ambient portion of the material color, which was added in the previous steps. If the ambient light value remained at 0, the ambient color settings would have no effect on the appearance of the material.

8. In the **Material Editor** dialog box, choose the **Diffuse** color swatch; the **Color Selector: Diffuse Color** dialog box is displayed.

9. In this dialog box, set the values as given next and then choose the **OK** button to close this dialog box:

   Red: **153** Green: **175** Blue: **255**

10. In the **Material Editor** dialog box, choose the **Specular** color swatch; the **Color Selector: Specular Color** dialog box is displayed.

11. In this dialog box, set the values as given next:

    Red: **255** Green: **255** Blue: **255**

12. Close the **Color Selector: Specular Color** dialog box.

13. In the **Specular Highlights** area of the **Blinn Basic Parameters** rollout, set the value **60** in the **Specular Level** spinner.

14. Set the value **40** in the **Glossiness** spinner and **30** in the **Opacity** spinner.

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Note that smaller the opacity value, more transparent the material will be.

15. Choose the **Background** button located in the right side of the **Material Editor** dialog box; the background is displayed in the selected sample slot. This helps to see the effect of transparency settings in a better way; refer to Figure 9-3.

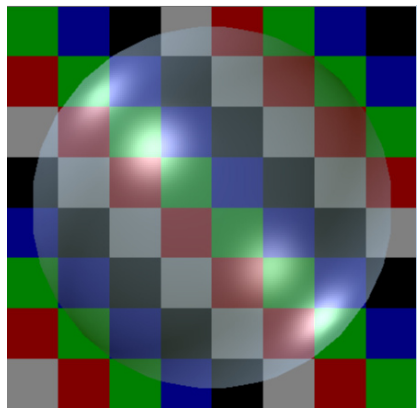

Figure 9-3 *The background displayed in the material sample slot in the* ***Material Editor*** *dialog box*

Next, you will name the material and save it in the material library.

16. Choose the **Put to Library** button in the **Material Editor** dialog box; a flyout is displayed. Choose **Still-Life.mat** from the flyout; the **Put To Library** dialog box is displayed.

    If the **Material Editor** message box is displayed prompting to put the entire material/map tree to the library, choose the **Yes** button. If you are at the root level of the material definition, the **Material Editor** message box does not appear because the entire tree is added by default.

17. Enter **Vase** as the name of the new material in the **Put To Library** dialog box and choose the **OK** button; the material is assigned the name *Vase* and is added to the **Still-Life** material library.

Creating the Flower Material

In this section, you will create the flower material using the opacity maps.

1. In the **Material Editor** dialog box, select the third material sample slot and choose the **Arch & Design** button to change the material type; the **Material/Map Browser** dialog box is displayed. Select **Standard** from the **Materials > Standard** rollout and choose the **OK** button; the **Arch & Design** material is replaced by the **Standard** material. Also, various rollouts are displayed in the **Material Editor** dialog box to modify the **Standard** material.

2. Expand the **Maps** rollout. Next, choose the **Diffuse Color** map button, currently labeled **None**; the **Material/Map Browser** dialog box is displayed showing the types of maps that may be added.

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3. Select the **Bitmap** map from the **Maps > Standard** rollout and choose the **OK** button; the **Select Bitmap Image File** dialog box is displayed.

4. In this dialog box, make sure **All Formats** is selected in the **Files of type** drop-down list. As the project folder is already set, the *images* folder of this project is displayed in the **Look in** drop down list of this dialog box. Select the **daisy.tif** file and choose the **Open** button; the image file is loaded and the parameters are displayed for the map in the **Material Editor** dialog box.

5. In the **Material Editor** dialog box, click and hold the **Square** button from the **Sample Type** flyout on the right side of the material slots. 

6. In the **Coordinates** rollout, clear the **Use Real-World Scale** check box and set the value **1** in the **U: Tiling** and **V: Tiling** spinners.

   The material currently is an image of a daisy. When the material is applied to an object, you want the background portion of the image to be transparent. This can be done with an opacity map. The map consists of another image of the daisy with the daisy portion completely white (opaque) and the background portion completely black (transparent).

7. Choose the **Go to Parent** button in the **Material Editor** dialog box to move one level up; the root level of the material is displayed. 

8. In the **Maps** rollout, choose the **Opacity** map button that is currently labeled as **None**; the **Material/Map Browser** dialog box is displayed showing the types of maps that can be added.

9. Select the **Bitmap** map from the **Maps > Standard** rollout and choose the **OK** button; the **Select Bitmap Image File** dialog box is displayed.

10. In this dialog box, make sure **All Formats** is selected in the **Files of type** drop-down list. As the project folder is already set, the *images* folder of this project is displayed in the **Look in** drop down list of this dialog box. Select the **daisy-o.tga** file and choose the **Open** button; the image file is loaded and the parameters are displayed for the map in the **Material Editor** dialog box.

    You will notice that in the preview of the **Select Bitmap Image File** dialog box that the image has black and white areas. The white area will be opaque while the black area will be transparent when the material is rendered.

11. In the **Coordinates** rollout, clear the **Use Real-World Scale** check box and set the value **1.0** in the **U: Tiling** and **V: Tiling** spinners.

12. Choose the **Background** button in the **Material Editor** dialog box; the material sample slot reflects the effect of opacity map, as shown in Figure 9-4.

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Figure 9-4 *The material sample slot displayed in the* ***Material Editor*** *dialog box*



Note

The transparent area of the material will still accept specular highlights. In other words, it will look like a clear glass. If you want the transparent areas of the material to be completely invisible, you can set ***0*** *in the* ***Specular Level*** *spinner of the* ***Blinn Basic Parameters*** *rollout or add a specular level map that matches the opacity map.*

Next, you will name the material and save it in the material library.

13. Choose the **Put to Library** button in the **Material Editor** dialog box; a flyout is displayed. Choose **Still-Life.mat** from the flyout; the **Put To Library** dialog box is displayed.



If the **Material Editor** message box is displayed prompting to put the entire material/map tree to the library, choose the **Yes** button. If you are at the root level of the material definition, the **Material Editor** message box does not appear because the entire tree is added by default.

14. Enter **Daisy** as the name of the new material in the **Put To Library** dialog box and then choose the **OK** button; the material is assigned the name *Daisy* and is added to the **Still-Life** material library.

Creating the Wood Block Material

In this section, you will create a wood procedural map.

1. Select the fourth material sample slot in the **Material Editor** dialog box and choose the **Arch & Design** button to change the material type; the **Material/Map Browser** dialog box is displayed. In this dialog box, select **Standard** from the **Materials > Standard** rollout and then choose the **OK** button; the **Arch & Design** material is replaced by the **Standard** material in the **Material Editor** dialog box.

2. Expand the **Maps** rollout. Next, choose the **Diffuse Color** map button that is currently labeled as **None**; the **Material/Map Browser** dialog box is displayed, showing the types of maps that can be added.

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3. Select **Wood** from the **Maps > Standard** rollout and choose the **OK** button; the **Material/Map Browser** dialog box is closed and the parameters for the wood map are displayed in the **Material Editor** dialog box.

   Various settings in the **Wood Parameters** rollout in the **Material Editor** dialog box allow you to control the appearance of the wood material.

4. Adjust the color settings and other parameters as per your requirement.

   As you change parameters, the material sample is dynamically updated.

   Next, you will name the material and save it in the material library.

5. Choose the **Go to Parent** button in the **Material Editor** dialog box to move one level up; the root level of the material is displayed. Next, choose the **Put to Library** button in the **Material Editor** dialog box; a flyout is displayed.



6. Choose **Still-Life** from the flyout; the **Put To Library** dialog box is displayed.

7. Enter **Wood** as the name of the new material in the **Put To Library** dialog box and choose the **OK** button; the material is assigned the name *Wood* and is added to the **Still-Life** material library.

8. Choose the **Get Material** button in the **Material Editor**; the **Material/Map Browser** dialog box is displayed.



   Next, you will save the **Still-Life** material library.

9. Right-click on the **Still-Life.mat** in the **Material/Map Browser** dialog box; a flyout is displayed. Choose **Save As** from the flyout, as shown in Figure 9-5; the **Export Material Library** dialog box is displayed.

10. As the project folder is already set, the *materiallibraries* folder of this project is displayed in the **Save in** drop-down list of this dialog box. Next, choose the **Save** button; the **Save Material library** message box is displayed. Choose the **Yes** button in this message box; the **Still-Life** material library is saved.

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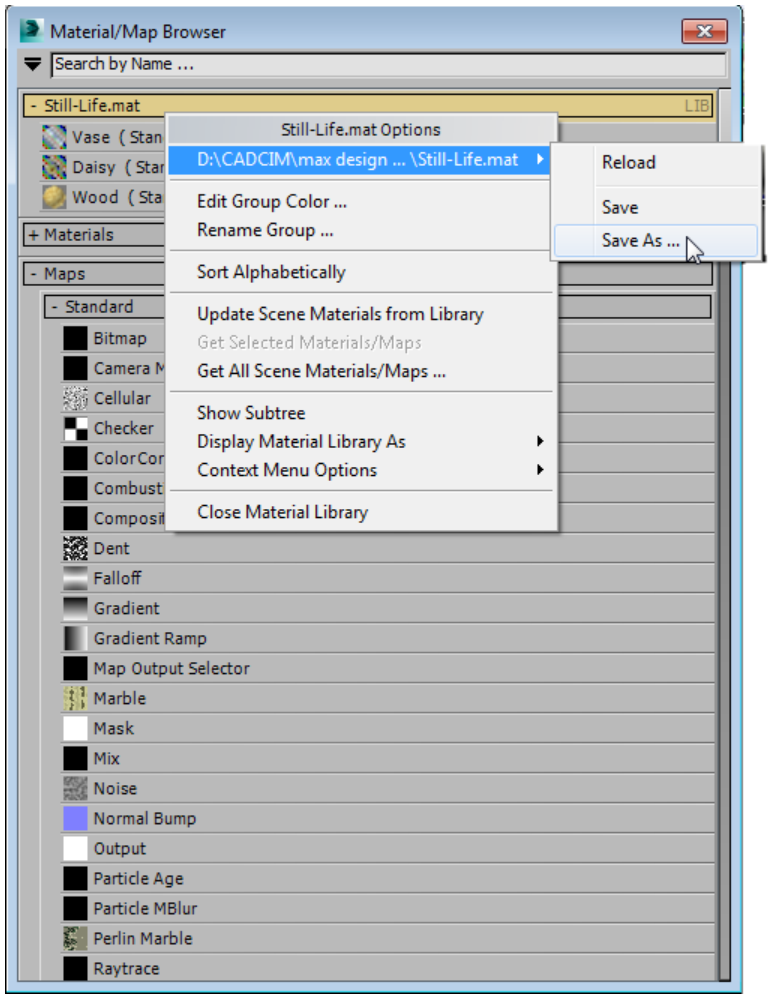

Figure 9-5 *Saving the material library*

Assigning Materials to the Scene

In this section, you will assign materials to the objects in the scene.

1. Close the **Material/Map Browser** dialog box to make more room on the screen.

2. Activate the Camera-Flower [Shaded] viewport.

3. Invoke the **Render Production** tool from the **Main Toolbar**; the rendered window is displayed.

   You will notice that all objects, except the stems, are currently assigned a default material. Notice that the flowers are created as simple 3D boxes. The opacity map on *Daisy* material will give the flowers their shape. The stems already have an appropriate material assigned. Also, the required mapping coordinates have already been applied to the objects.

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4. Close the rendered window. Next, invoke the **Select Object** tool from the **Main Toolbar**. Next, select *Vase* in the Camera-Flower [Shaded] viewport; the object is highlighted and *Vase* is displayed in the **Name and Color** rollout.

5. In the **Material Editor** dialog box, select the material sample slot which is named as *Vase* and then choose the **Assign Material to Selection** button; the *Vase* material is assigned to *Vase*. Next, choose the **Show Shaded Material in Viewport** button to display the material on *Vase* in the viewport.



6. Similarly, assign *Daisy* material to the two boxes representing the daisies. Also, assign *Wood* material to *Base*. Next, choose the **Show Shaded Material in Viewport** button to display the material on *Base* in the viewport.

   The two boxes for the daisies are a single object.

7. Close the **Material Editor** dialog box.



Note

Procedural maps are not accurately displayed in shaded viewports. They are calculated and applied only during rendering.

Saving and Rendering the Scene

In this section, you will save the scene that you have created and then render it. You can also view the final rendered image of this model by downloading the *c09_3dsmaxdesign_2014_rndr.zip* file from *www.cadcim.com*. The path of the file is as follows: *Textbooks > Animation and Visual Effects > 3ds Max Design > Autodesk 3ds Max Design 2014: A Tutorial Approach*

1. Change the background color of the scene to white.

2. Choose **Save** from the **Application** menu**.**

3. Make sure the Camera viewport is activated. Next, invoke the **Render Production** tool from the **Main Toolbar**; the rendered image is displayed, refer to Figure 9-6.

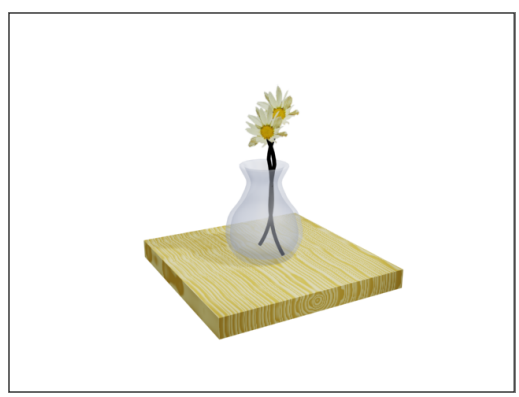

Figure 9-6 *The rendered image with materials assigned to the objects*

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Self-Evaluation Test

Answer the following questions and then compare them to those given at the end of this chapter:

1. Which of the following maps is used to control transparency of the material?

   (a) **Opacity** (b) **Procedural**
   (c) **Mix** (d) None of these

2. Which of the following maps uses an algorithm (mathematical equation) to generate a pattern?

   (a) **Opacity** (b) **Procedural**
   (c) **Mix** (d) None of these

3. The _____ check box in 3ds Max Design is used to assign color on both sides of the face in an object.

4. In an opacity map, _____ pixels will be completely transparent and _____ pixels will be opaque.

5. The lower the value in the **Opacity** spinner, the higher will be the transparency of the material.

Review Questions

Answer the following questions:

1. Which of the following buttons in the **Material Editor** is used to display the effects of the transparency for the currently rendered material?

   (a) **Background** (b) **Make Preview**
   (c) **Backlight** (d) None of these

2. Which of the following maps is calculated and applied only during rendering?

   (a) **Opacity** (b) **Procedural**
   (c) **Mix** (d) None of these

3. The opacity maps help control the _____ of a material.

4. The procedural maps are only calculated and applied during rendering. (T/F)

5. The _____ button in the **Main Toolbar** is used to render the current frame in the viewport.

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6. If you apply a procedural map to an object with a whole cut in it, the texture will still appear correct. (T/F)

EXERCISES

The rendered output of the models used in the following exercises can be accessed by downloading the *c09_maxdesign_2014_exr.zip* from *www.cadcim.com*. The path of the file is as follows: *Textbooks > Animation and Visual Effects > 3ds Max Design > Autodesk 3ds Max Design 2014: A Tutorial Approach*

Exercise 1

Extract the contents of the *c09_3dsmaxdesign_2014_exr.zip* and then open *c09_exr01_start.max*. Next, create materials to assign to three glasses placed on a tray, as shown in Figure 9-7. You will require three transparent materials with different opacity settings.

(Expected time: 20 min)



Figure 9-7 *Three glasses with assigned materials*

Exercise 2

Open *c09_exr02_start.max*. Create materials needed to assign to a scene displaying a broken piece of marble and a wooden board with a notch cut in it, as shown in Figure 9-8. In this exercise, you need to create two procedural map materials. **(Expected time: 15 min)**

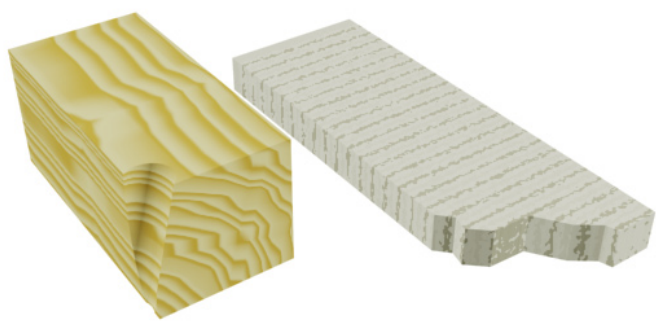

Figure 9-8 *Broken piece of marble and a wooden board*

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Answers to Self-Evaluation Test

1. a, **2.** b, **3. 2-Sided**,**4.** black, white **5.** T