Chapter 2

Working with Splines

Learning Objectives

After completing this chapter, you will be able to:

- *Work with spline primitives*
- *Understand spline modeling techniques*
- *Create geometries using Generators*

INTRODUCTION

In computer graphics, a spline is a line formed by connecting a sequence of vertices lying in 3D space. Although, it is formed in 3D space, it has no depth. A spline is not visible on rendering. You can create complete parametric spline primitives (with pre-defined shapes) as well as empty splines whose shapes can be defined interactively in the viewport. You can use splines to create complex geometries using Generator objects in CINEMA 4D. Generators are CINEMA 4D's most powerful modeling tools.

TUTORIALS

Before you start tutorials of this chapter, you need to download the *c02_cinema4d_r20_tut.zip* file from *www.cadcim.com*. The path of the file is as follows: *Textbooks > Animation and Visual Effects > MAXON CINEMA 4D > MAXON CINEMA 4D R20 Studio: A Tutorial Approach*

Next, you need to extract the contents of the zip file. To do so, navigate to the *Documents* folder and create a new folder in it with the name *c4dr20*. Next, you need to browse to *\Documents\ c4dr20* and create a new folder in it with the name *c02*. Then, extract the contents of the zip file in this folder.

Tutorial 1

In this tutorial, you will create 3D model of a door lock system with the help of splines and Generators. The final output of the model is shown in Figure 2-1.

(Expected time: 35 min)



Figure 2-1 *The model of door lock system*

The following steps are required to complete this tutorial:

a. Set the viewport background.
b. Create the base of the door lock system.
c. Create the key hole.
d. Create the handle.
e. Change the background color of the scene.
f. Save and render the scene.

Evaluation Copy. Do not reproduce. For information visit www.cadcim.com

Setting the Viewport Background

In this section, you will set the background image in the Front viewport.

1. Choose **File > New** from the main menu; a new scene is displayed.

2. Press the middle mouse button in the Perspective viewport; all viewports are displayed. Next, hover the cursor over the Front viewport and then press MMB to maximize it. Alternatively, choose **Cameras > Front** from the Menu in editor view, as shown in Figure 2-2; the Front viewport is maximized.

3. Choose **Options > Configure** from the Menu in editor view, as shown in Figure 2-3; the **Viewport [Front]** settings are displayed in the Attribute Manager. In the Attribute Manager, choose the **Back** button; the **Back** area is displayed. In this area, choose the browse button next to the **Image** text box, as shown in Figure 2-4; the **Open File** dialog box is displayed. Browse to *\Documents\c4dr20\c02\keyhole.jpg*. Next, choose the **Open** button; the *keyhole.jpg* is opened as the background image in the Front viewport.

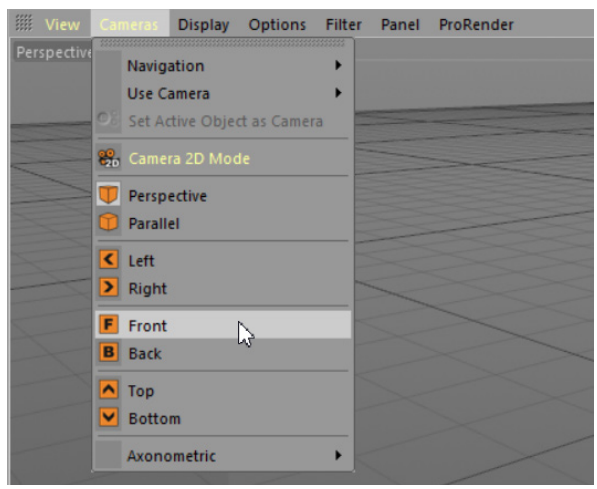


Figure 2-2 *Choosing the* ***Front*** *option from the Menu in editor view*

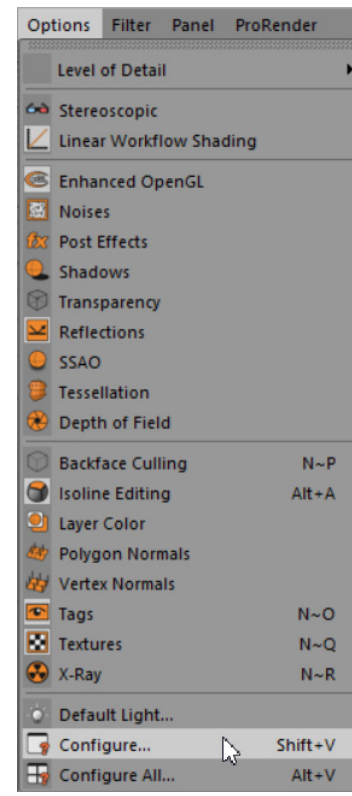


Figure 2-3 *Choosing the* ***Configure*** *option from the Menu in editor view*

Evaluation Copy. Do not reproduce. For information visit www.cadcim.com

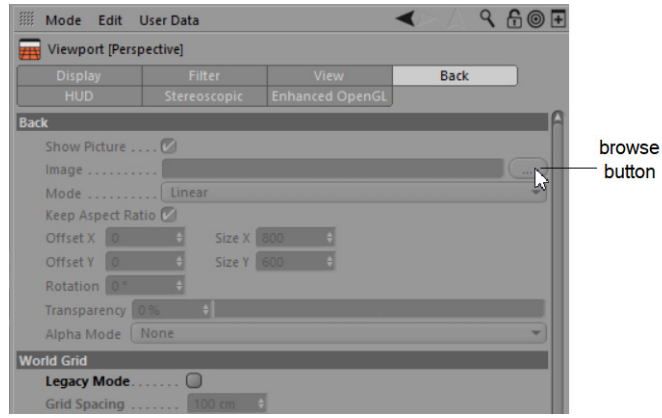


Figure 2-4 *Choosing the browse button next to the* ***Image*** *text box*

4. In the **Back** area, clear the **Keep Aspect Ratio** check box and then set the parameters as follows:

Offset X: **122** Offset Y: **2** Size X: **445**
Size Y: **500**

The **Configure** option available in the **Options** menu of the Menu in editor view is used to edit the settings of the respective viewport. It applies to all viewports. The options in the **Back** area are used to place the reference image at the desired location as the viewport background. The **Image** text box displays the location of the loaded file. Any image with a recognizable format can be loaded in CINEMA 4D.

The **Offset X** option is used to move the reference image horizontally.

The **Offset Y** option is used to move the reference image vertically.

The **Size X** and **Size Y** options are used to scale the reference image.

Creating the Base of the Door Lock System

In this section, you will create the base of the door lock system using the **Rectangle** tool.

1. Press F1; the Perspective viewport is maximized. Alternatively, choose **Cameras > Perspective** from the Menu in editor view, refer to Figure 2-2. Choose **Create > Spline** from the main menu; a cascading menu is displayed. Next, choose **Rectangle** from it, as shown in Figure 2-5; a rectangle is created in the Perspective viewport. Also, *Rectangle* is added to the Object Manager.

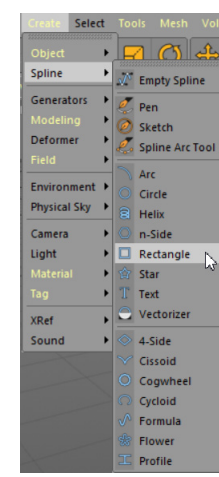


Figure 2-5 *Choosing* ***Rectangle*** *from the* ***Create*** *menu*



Note

The spline primitives are parametric in nature as their attributes such as height, radius, and so on can be altered in the Attribute Manager.

Evaluation Copy. Do not reproduce. For information visit www.cadcim.com

2. Make sure that *Rectangle* is selected in the Object Manager. In the Attribute Manager, make sure the **Object** button is chosen and then enter **121** and **465** in the **Width** and **Height** spinners, respectively, of the **Object Properties** area, refer to Figure 2-6.

   By default, the value of these parameters is set to 400. As a result, a square is displayed in the viewport.

   Next, you will extrude the rectangle.

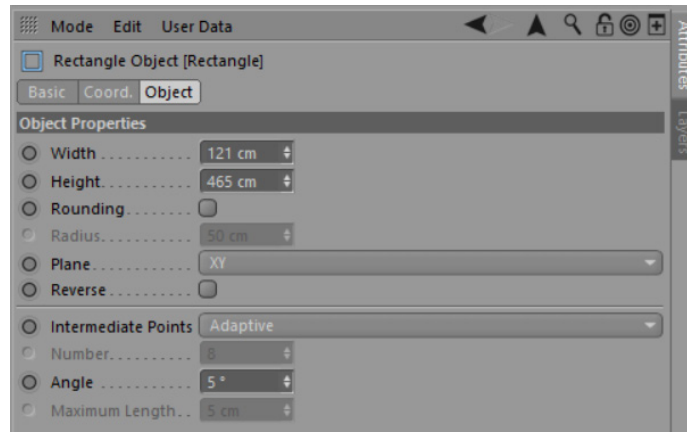


Figure 2-6 *Setting the width and height of the rectangle*



Note

You can change the units of parametric objects. To do so, choose ***Mode > Project*** *in the Attribute Manager; the* ***Project*** *area is displayed in the Attribute Manager. Make sure the* ***Project Settings*** *button is chosen in this area. In the* ***Project Settings*** *area, by default* ***Centimeters*** *is selected in the drop-down list located next to the* ***Project Scale*** *spinner. You can select any other unit from the drop-down list as per your requirement.*

3. Press and hold the left mouse button on the **Subdivision Surface** tool in the Command Palette; a flyout is displayed. Next, choose the **Extrude** tool from it, as shown in Figure 2-7; *Extrude* is added to the Object Manager, refer to Figure 2-8.

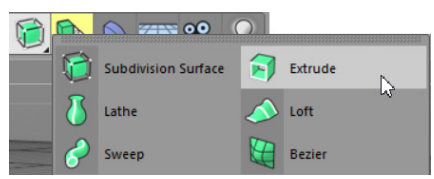


Figure 2-7 *Choosing* ***Extrude*** *from the flyout*

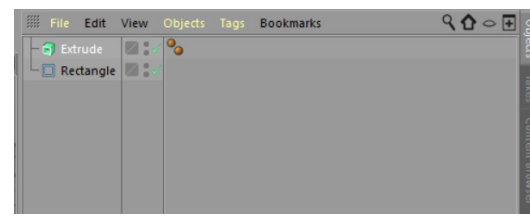


Figure 2-8 *Extrude added to the Object Manager*

4. Select *Rectangle* in the Object Manager. Press and hold the left mouse button on *Rectangle* and drag the cursor to *Extrude* in the Object Manager; *Rectangle* is connected to *Extrude* in the Object Manager. Also, *Rectangle* is extruded in the Perspective viewport, as shown in Figure 2-9.

Evaluation Copy. Do not reproduce. For information visit www.cadcim.com

On pressing and holding the left mouse button on **Subdivision Surface**, a flyout is displayed with various tools. You can use these tools to create complex models with relatively less number of control points. Models created using these tools can be converted into polygons. The **Extrude** tool is used to extrude the spline in any direction. The effect of this tool is only visible when the spline is connected to the Extrude object.

Creating the Keyhole

In this section, you will create a keyhole using the **Pen** tool.

1. Press F4; the Front viewport is maximized. Choose **Create > Spline** from the main menu; a cascading menu is displayed. Now, choose **Pen** from it, as shown in Figure 2-10. Alternatively, choose the **Pen** tool in the Command Palette; the shape of the cursor changes, as shown in Figure 2-11.

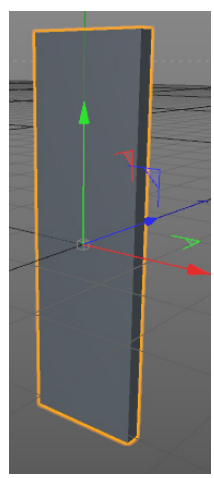


Figure 2-9 *Rectangle extruded in the Perspective viewport*

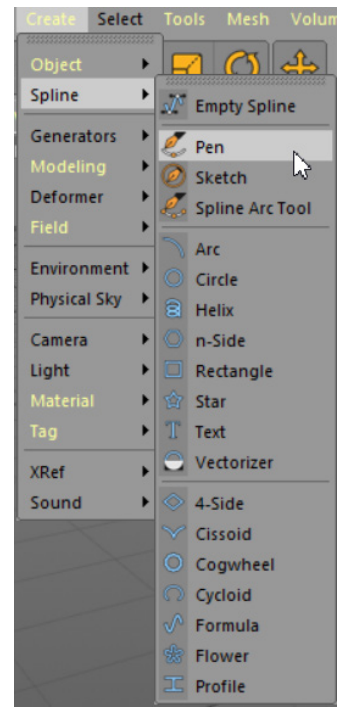


Figure 2-10 *Choosing* ***Pen*** *from the main menu*

2. In the Front viewport, draw the shape of the keyhole on the reference image, as shown in Figure 2-12. You will notice that *Spline* is also added to the Object Manager.

3. Invoke the **Move** tool from the Command Palette and select the points of *Spline*. Next, edit the shape of *Spline* to give it the shape of a keyhole, as shown in the reference image, refer to Figure 2-12. You can also use the **Pen** tool to move and edit points on the line.

4. Select the *Spline* in the Object Manager. In the Attribute Manager, make sure that the **Object** button is chosen. In the **Object Properties** area, make sure the **Close Spline** check box is selected. Next, choose the **Basic** button; the **Basic Properties** area is displayed. In this area,

Evaluation Copy. Do not reproduce. For information visit www.cadcim.com

enter **keyhole** in the **Name** text box; *Spline* is renamed as *keyhole* in the Object Manager, as shown in Figure 2-13.



Note

The spline also closes if you click on the first point of the spline.

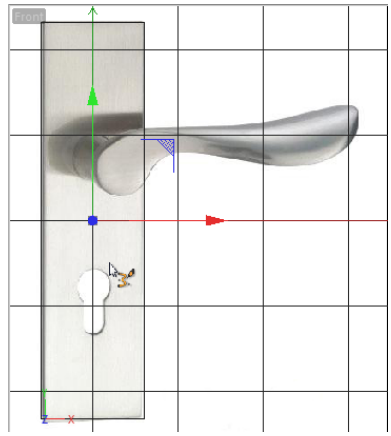


Figure 2-11 *The changed shape of the cursor*

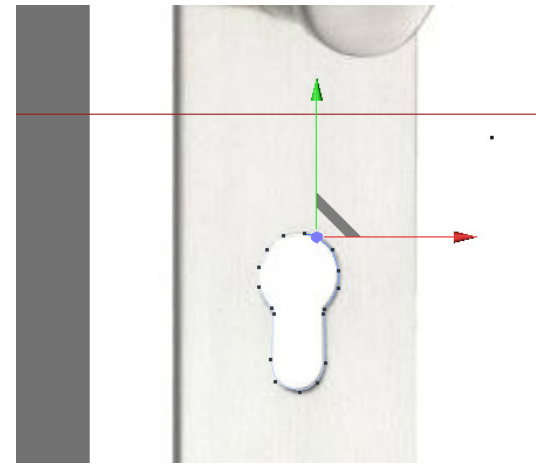


Figure 2-12 *Shape of the keyhole*

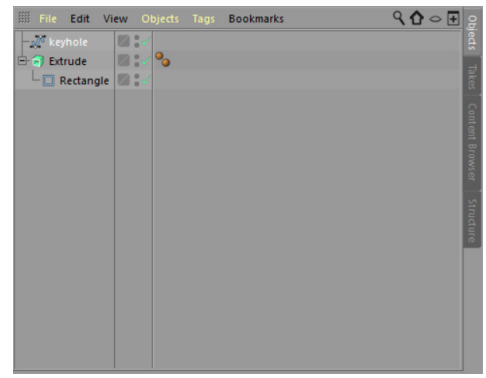


Figure 2-13 *Spline renamed as keyhole*

5. Press F1; the Perspective viewport is maximized. Press and hold the left mouse button on the **Subdivision Surface** tool in the Command Palette; a flyout is displayed. Next, choose **Extrude** from it, as shown in Figure 2-14; *Extrude.1* is added to the Object Manager. Next, drag *keyhole* on *Extrude.1* in the Object Manager; *keyhole* is connected to *Extrude.1*.

6. Select *Extrude.1* in the Object Manager. Next, choose the **Object** button in the Attribute Manager, if it is not already chosen; the **Object Properties** area is displayed. In this area, enter **40** in the Z spinner of the **Movement** parameter; the *keyhole* is extruded.

Evaluation Copy. Do not reproduce. For information visit www.cadcim.com

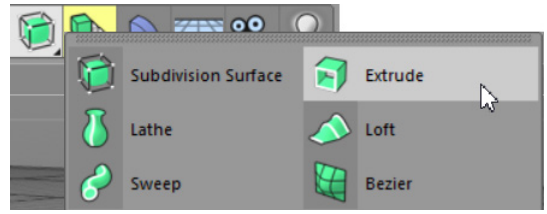


Figure 2-14 *Choosing* ***Extrude*** *from the flyout*

7. In the Attribute Manager, choose the **Coord** button; the **Coordinates** area is displayed. In this area, enter **-5.409** in the **P . Z** spinner. Figure 2-15 displays *keyhole* in the Perspective viewport.

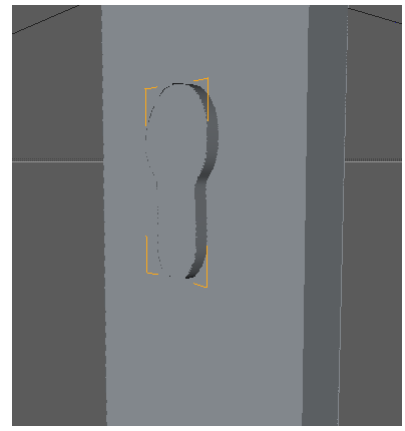


Figure 2-15 *keyhole extruded in the Perspective viewport*

8. Press and hold the left mouse button on the **Instance** tool in the Command Palette; a flyout is displayed. Next, choose **Boole** from the flyout, as shown in Figure 2-16; *Boole* is added to the Object Manager. Now, select *Extrude.1* and drag the cursor to *Boole*; *Extrude.1* is connected to *Boole*.

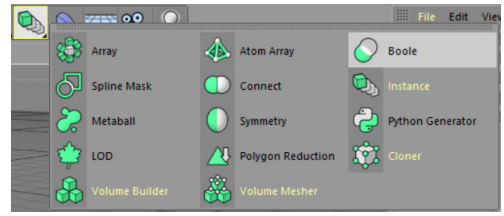


Figure 2-16 *Choosing* ***Boole*** *from the flyout*

9. In the Object Manager, select *Extrude* and press and hold the left mouse button; the shape of the cursor is changed. Next, drag *Extrude* to *Boole*; *Extrude* is connected to *Boole*, as shown in Figure 2-17. Also, *keyhole* is subtracted from *Extrude* and a hole is created in the Perspective viewport, as shown in Figure 2-18.

The **Boole** tool is used to subtract two or more objects to create a hole in the object. Mostly, this tool is used to perform operations on splines and polygon primitives.

Evaluation Copy. Do not reproduce. For information visit www.cadcim.com

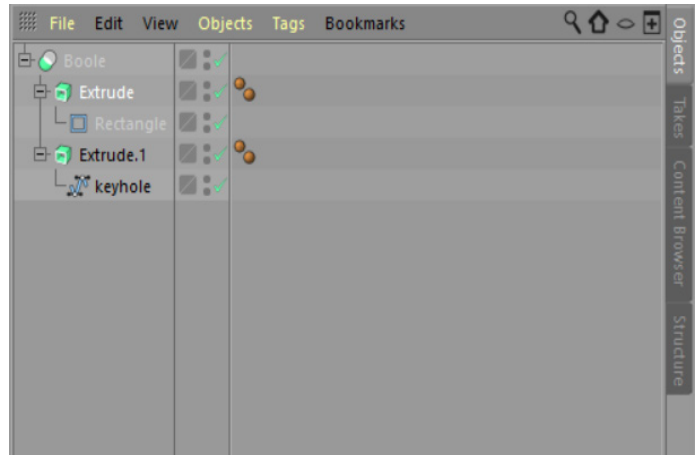


Figure 2-17 *Extrude connected to Boole*

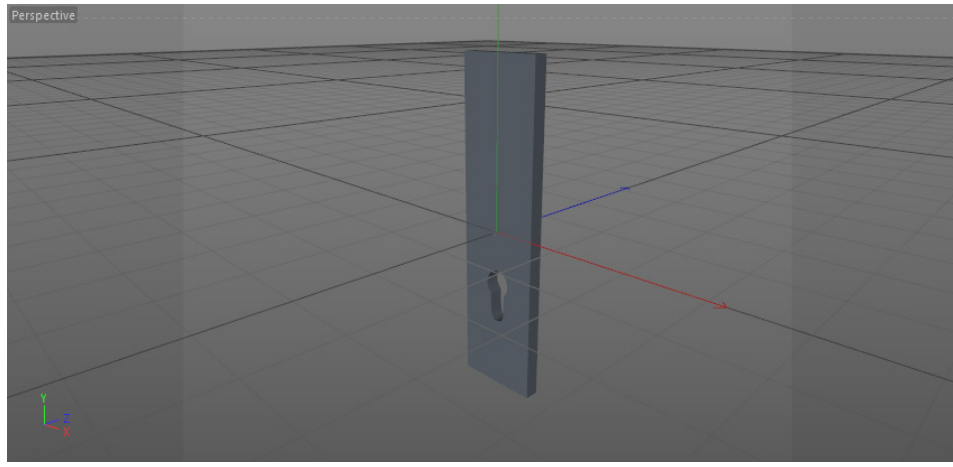


Figure 2-18 *The hole created in the Perspective viewport*

Creating the Handle

In this section, you will create the handle of the door using the **Pen** tool.

1. Press F4; the Front viewport is maximized. Choose **Create > Spline** from the main menu; a cascading menu is displayed. Choose **Pen** from it; the shape of the cursor is changed. Alternatively, choose the **Pen** tool from the Command Palette.

2. In the Front viewport, draw the shape of the door handle on the reference image, refer to Figure 2-19. You will notice that *Spline* is added to the Object Manager. Make sure that the **Close Spline** check box is selected in the **Object Properties** area in the Attribute Manager.

Evaluation Copy. Do not reproduce. For information visit www.cadcim.com

3. In the Attribute Manager, choose the **Basic** button; the **Basic Properties** area is displayed. In this area, type **Handle** in the **Name** text box; the name of *Spline* changes to *Handle* in the Object Manager.

   Figure 2-19 displays *Handle* placed in the Front viewport.

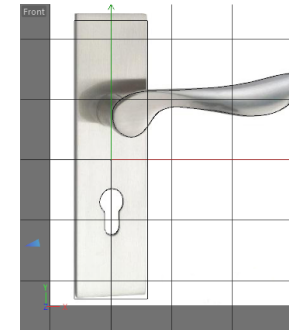


Figure 2-19 *Handle placed in the front viewport*

4. Press F1; the Perspective viewport is maximized. Next, press and hold the left mouse button on the **Subdivision Surface** tool in the Command Palette; a flyout is displayed. Next, choose **Extrude** from it; *Extrude* is added to the Object Manager. Now, select *Handle* in the Object Manager and drag *Handle* to *Extrude*; *Handle* is connected to *Extrude* and is extruded in the Perspective viewport, as shown in Figure 2-20.

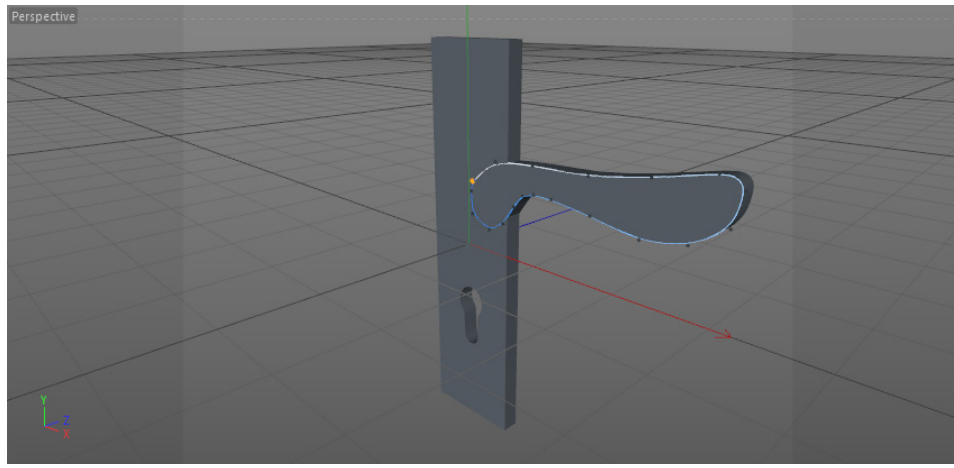


Figure 2-20 *Handle extruded in the Perspective viewport*

5. In the Attribute Manager, choose the **Coord** button; the **Coordinates** area is displayed. In this area, set the parameters as follows:

   P . X: **-30.7** P . Y: **18.1** P . Z: **-45**

   P . X, **P . Y**, and **P . Z** parameters are used to specify the position values of X, Y, and Z axes. The **S . X**, **S . Y**, and **S . Z** parameters are used to specify the scale values of X, Y, and Z axes. Similarly, the **R . X**, **R . Y**, and **R . Z** parameters are used to specify the rotational values of X, Y, and Z axes.

   Next, you will create the joint behind the handle and the base of the door.

6. Press F2; the Top viewport is maximized. Next, choose **Create > Spline** from the main menu; a cascading menu is displayed. Choose **Circle** from it, as shown in Figure 2-21; a circle is created in the Top viewport and *Circle* is added to the Object Manager.

Evaluation Copy. Do not reproduce. For information visit www.cadcim.com

7. Make sure that *Circle* is selected in the Object Manager. Next, in the Attribute Manager, choose the **Basic** button. In the **Basic Properties** area, type **Joint** in the **Name** text box; *Circle* is renamed as *Joint* in the Attribute Manager. Next, choose the **Coord** button; the **Coordinates** area is displayed. In this area, set the parameters as follows:

P . Y: **81.591** R . P: **90**

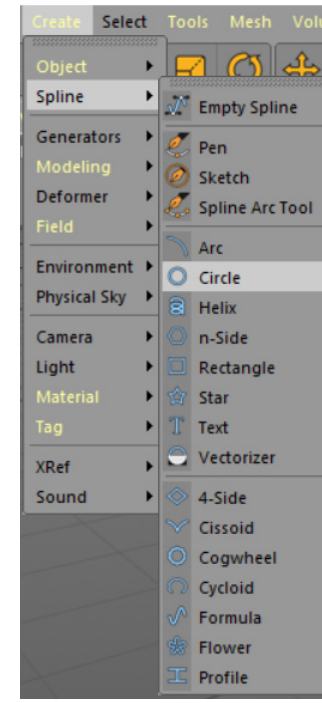


Figure 2-21 *Choosing* ***Circle*** *from the main menu*

8. Choose the **Object** button in the Attribute Manager; the **Object Properties** area is displayed. In this area, enter **20** in the **Radius** spinner.

9. Press F1; the Perspective viewport is maximized. Make sure that *Joint* is selected in the Object Manager. Now, create a copy of *Joint* by pressing both the CTRL key and the left mouse button. Now, drag the cursor and release the left mouse button; a copy of *Joint* is created in the Object Manager with the name *Joint.1*. You can also create a copy in the viewport by CTRL dragging.

10. Make sure that *Joint.1* is selected in the Object Manager. In the Attribute Manager, make sure that the **Coordinates** area is displayed and enter **-24.05** in the **P . Z** spinner. Figure 2-22 shows the position of *Joint* and *Joint.1* in the Perspective viewport.

Next, you will create the surface of the joints.

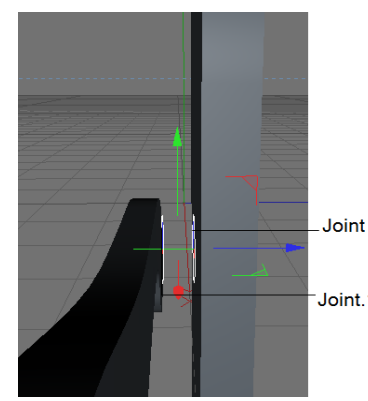


Figure 2-22 *The position of Joint and Joint.1 displayed in the Perspective viewport*

11. Press and hold the left mouse button on the **Subdivision Surface** tool in the Command Palette; a flyout is displayed. Next, choose the **Loft** tool from it; *Loft* is added to the Object Manager.

12. Press F5; all viewports are displayed. Select *Joint* and *Joint.1* in the Object Manager by using the SHIFT key and then press and hold the left mouse button and drag the cursor on *Loft*; the *Joint* and *Joint.1* are connected to the *Loft* in the Object Manager. Also, a surface is created. Figure 2-23 displays the surface in all viewports.

Next, you will group the surfaces together.

13. In the Object Manager, select *Boole*, *Extrude*, and *Loft* by using the CTRL key. Next, choose **Group Objects** from the **Objects** menu in the Object Manager, refer to Figure 2-24; all selected objects are grouped and *Null* is added to the Object Manager. Rename *Null* as **Door Lock** by double-clicking its label in the Object Manager.

Evaluation Copy. Do not reproduce. For information visit www.cadcim.com

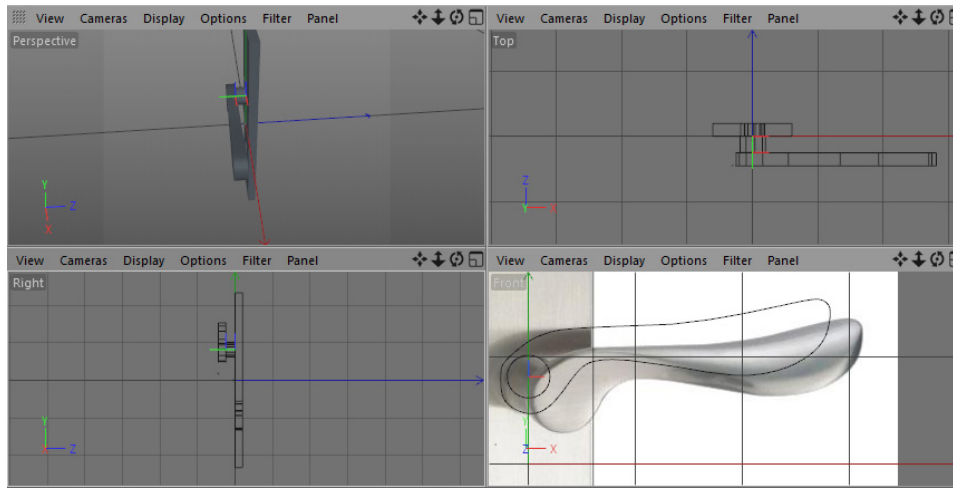


Figure 2-23 *Joint and Joint.1 lofted to create a surface*

Changing the Background Color of the Scene

In this section, you will change the background color of the scene.

1. Choose **Create > Environment** from the main menu; a cascading menu is displayed. Choose the **Background** option from it, as shown in Figure 2-25; *Background* is added to the Object Manager.

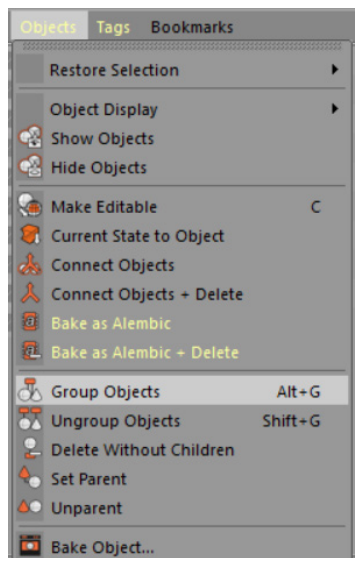


Figure 2-24 *Choosing* ***Group Objects*** *from the* ***Objects*** *menu*

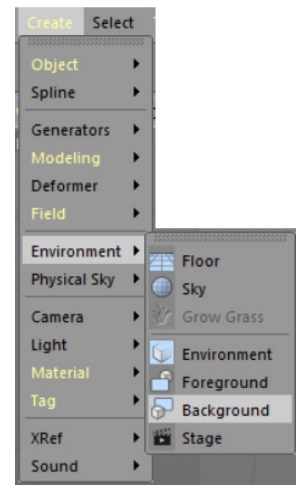


Figure 2-25 *Choosing the* ***Background*** *option from the main menu*

The **Background** option is used to change the background with the color or image which is only visible in the render view.

Evaluation Copy. Do not reproduce. For information visit www.cadcim.com

Next, you will change the background color to white.

2. Make sure *Background* is selected in the Object Manager, as shown in Figure 2-26. In the Attribute Manager, choose the **Basic** button; the **Basic Properties** area is displayed. In this area, select **On** from the **Use Color** drop-down list. On doing so, the **Display Color** parameter is activated, as shown in Figure 2-27. By default, the white color is selected in this spinner. As a result, the background color changes to white.

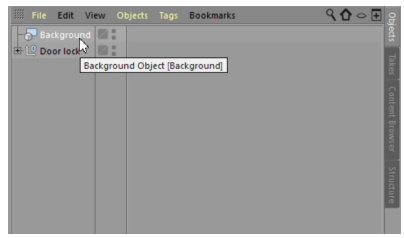


Figure 2-26 *The* ***Background*** *Object selected in the Object Manager*

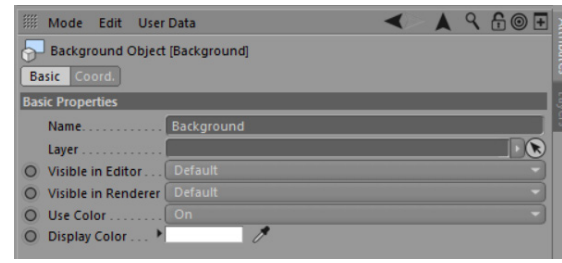


Figure 2-27 *The* ***Display Color*** *parameter activated*

The options in the **Use Color** drop-down list are used to determine whether the selected objects in the viewport use the color assigned to them or not. You need to select the **On** option from the **Use Color** drop-down list to ensure that the display color is used even if the materials are applied to it.

Saving and Rendering the Scene

In this section, you will save and render the scene. You can also view the final render of the scene by downloading the file *c02_cinema4d_r20_rndr.zip* from *www.cadcim.com*. The path of the file is mentioned at the beginning of the chapter.

1. Choose **File > Save** from the main menu; the **Save File** dialog box is displayed. In this dialog box, browse to the location *\Documents\c4dr20\c02*.

2. Enter **c02tut1** in the **File name** text box and then choose the **Save** button.

3. In the Perspective viewport, set the camera angle using the Viewport Navigation Tools located at the top right of the Perspective viewport. Next, choose the **Render to Picture Viewer** tool from the Command Palette. Alternatively, press SHIFT+R; the **Picture Viewer** window is displayed, as shown in Figure 2-28.

   The **Render to Picture Viewer** tool is used to render the scene in the **Picture Viewer** window. The **Picture Viewer** window is also known as the output window in CINEMA 4D. It is used to view the output of the scene as well as to save it.

   Next, you will save the rendered image.

Evaluation Copy. Do not reproduce. For information visit www.cadcim.com

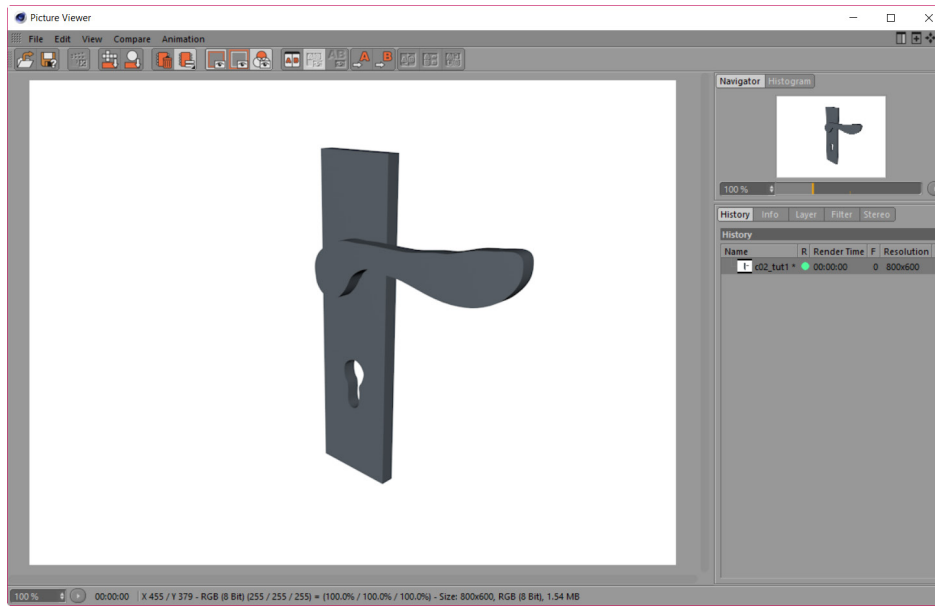


Figure 2-28 *The* ***Picture Viewer*** *window*

4. In the **Picture Viewer** window, choose **File > Save as**, as shown in Figure 2-29; the **Save** dialog box is displayed, as shown in Figure 2-30.

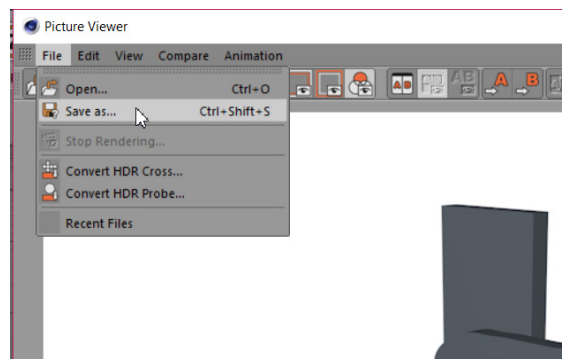


Figure 2-29 *Choosing the* ***Save as*** *option from the* ***File*** *menu*

The **Save as** option is used to save a scene or an image sequence in the format based on your requirement. The **Save** dialog box is displayed with specific parameters which helps you in saving the still image or image sequence in an uncompressed format.

5. In the **Save** dialog box, select **JPEG** from the **Format** drop-down list and then choose the **OK** button; the **Save Dialog** dialog box is displayed. Next, browse to *\Documents\c4dr20\c02*. In the **File Name** text box, type **c02_tut1_rndr**. Next, choose the **Save** button; the rendered image is saved at the desired location.

The output of the model is shown in Figure 2-1.

Evaluation Copy. Do not reproduce. For information visit www.cadcim.com

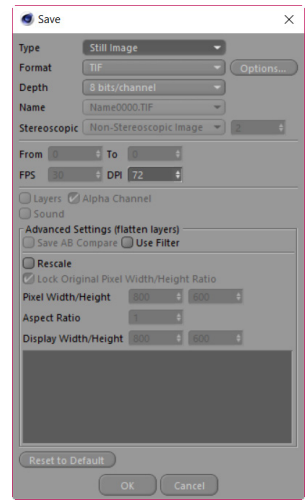


Figure 2-30 *The* ***Save*** *dialog box*

Tutorial 2

In this tutorial, you will create a hand bag with the help of splines and generators. The final output of the model is shown in Figure 2-31. **(Expected time: 25 min)**



Figure 2-31 *The model of a hand bag*

The following steps are required to complete this tutorial:

a. Create the shape of the hand bag.
b. Create the handles of the hand bag.
c. Create text on the hand bag.
d. Change the background color of the scene.
e. Save and render the scene.

Evaluation Copy. Do not reproduce. For information visit www.cadcim.com

Creating the Shape of the Hand Bag

In this section, you will create the shape of the hand bag using the **Spline** tool.

1. Choose **File > New** from the menu bar; a new scene is started. Next, choose **Create > Spline** from the main menu; a cascading menu is displayed. Choose **Rectangle** from the menu; a rectangle is created in the Perspective viewport and *Rectangle* is added to the Object Manager.

2. Make sure that *Rectangle* is selected in the Object Manager. In the Attribute Manager, choose the **Object** button; the **Object Properties** area is displayed. In this area, set the values of the parameters as follows:

   Width: **980** Height: **340**

3. In the **Object Properties** area, select the **Rounding** check box and enter **55** in the **Radius** spinner. Next, select the **XZ** option from the **Plane** drop-down list.

4. In the Attribute Manager, choose the **Coord** button; the **Coordinates** area is displayed. In this area, set the parameters as follows:

   P . X: **1.6** P . Z: **-4**

   After entering the values, *Rectangle* is placed in the Perspective viewport, as shown in Figure 2-32.

5. Make sure that *Rectangle* is selected in the Object Manager. Press and hold the left mouse button and the CTRL key and then drag and drop the cursor in the empty space above it; the copy of *Rectangle* is created in the Perspective viewport and added to the Object Manager with the name *Rectangle.1*, as shown in Figure 2-33.

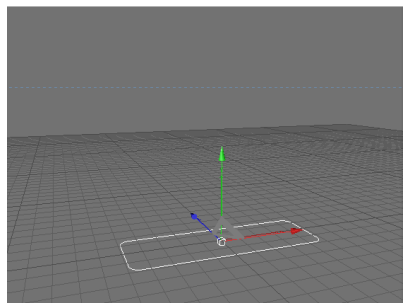


Figure 2-32 *Rectangle placed in the Perspective viewport*

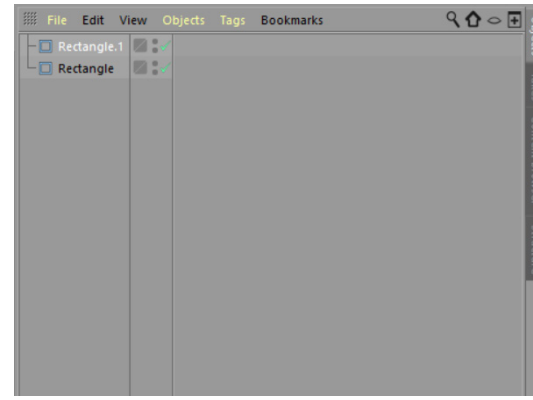


Figure 2-33 *Rectangle.1 added to the Object Manager*

Evaluation Copy. Do not reproduce. For information visit www.cadcim.com

6. Make sure that *Rectangle.1* is selected in the Object Manager. In the Attribute Manager, make sure that the **Object** button is chosen. In the **Object Properties** area, set the parameters as follows:

   Width: **730** Height: **129**

7. In the Attribute Manager, choose the **Coord** button; the **Coordinates** area is displayed. In this area, enter **286.8** in the **P . Y** spinner.

   After entering the values, *Rectangle.1* is placed in the Perspective viewport, as shown in Figure 2-34.

8. Make sure that *Rectangle.1* is selected in the Object Manager. Press and hold the left mouse button and the CTRL key and then drag and drop the cursor in the empty space; a copy of the *Rectangle.1* is created and added to the Object Manager with the name *Rectangle.2*, as shown in Figure 2-35.

9. Make sure that *Rectangle.2* is selected in the Object Manager. In the Attribute Manager, make sure that the **Object** button is chosen. In the **Object Properties** area, set the parameters as follows:

   Width: **815** Height: **165**

   Make sure that the **Rounding** check box is selected and enter **82.5** in the **Radius** spinner.

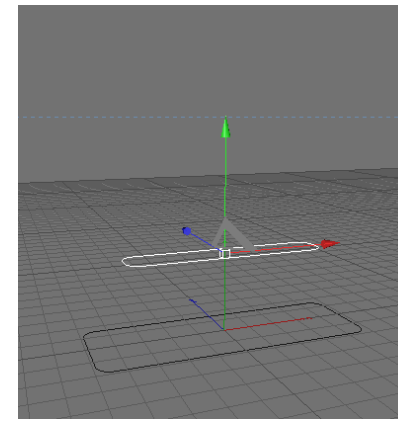


Figure 2-34 *Rectangle.1 placed in the Perspective viewport*

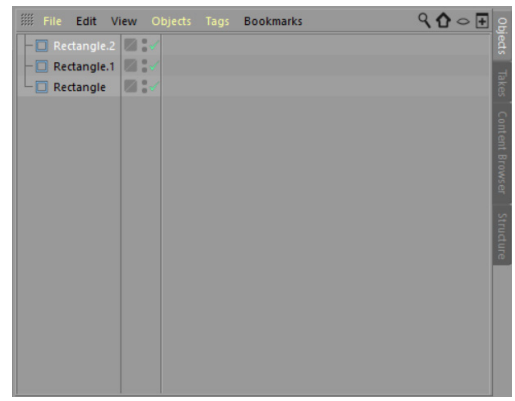


Figure 2-35 *Rectangle.2 added to the Object Manager*

10. In the Attribute Manager, choose the **Coord** button; the **Coordinates** area is displayed. In this area, enter **-3.66** in the **P . Y** spinner. After entering the values, *Rectangle.2* is placed in the Perspective viewport, as shown in Figure 2-36.

Evaluation Copy. Do not reproduce. For information visit www.cadcim.com

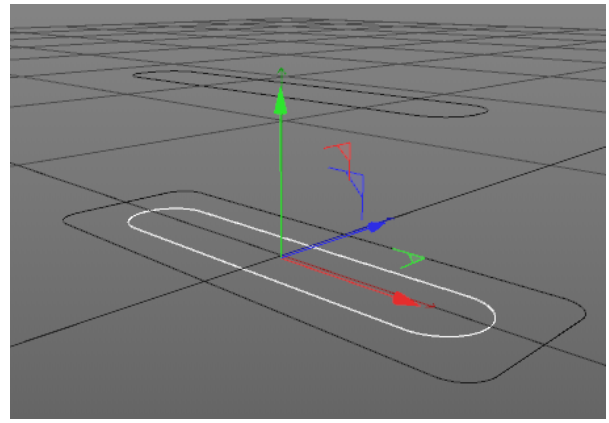


Figure 2-36 *Rectangle.2 placed in the Perspective viewport*

11. Make sure that *Rectangle.2* is selected in the Object Manager. Next, press and hold the left mouse button and the CTRL key and then drag and drop the cursor in the empty space; a copy of *Rectangle.2* is created and added to the Object Manager with the name *Rectangle.3*, as shown in Figure 2-37.

12. Make sure that *Rectangle.3* is selected in the Object Manager. In the Attribute Manager, make sure that the **Object** button is chosen. In the **Object Properties** area, set the parameters as follows:

    Width: **527** Height: **55**

    Clear the **Rounding** check box.

13. In the Attribute Manager, choose the **Coord** button; the **Coordinates** area is displayed. In this area, set the parameters as follows:

    P . X: **-1.9** P . Y: **647.4**

    After entering the values, *Rectangle.3* is placed in the Perspective viewport, as shown in Figure 2-38.

14. Press and hold the left mouse button on the **Subdivision Surface** tool in the Command Palette; a flyout is displayed. Choose the **Loft** tool from the flyout, as shown in Figure 2-39; *Loft* is added to the Object Manager.

15. In the Object Manager, select *Rectangle*.2. Next, drag and drop *Rectangle.2* on *Loft*; *Rectangle.2* is connected to *Loft*, as shown in Figure 2-40. Also, *Rectangle*.2 is lofted with a surface in the Perspective viewport.

Evaluation Copy. Do not reproduce. For information visit www.cadcim.com

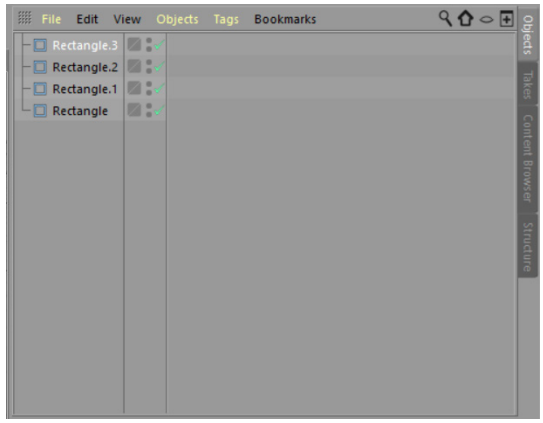


Figure 2-37 *Rectangle.3 added to the Object Manager*

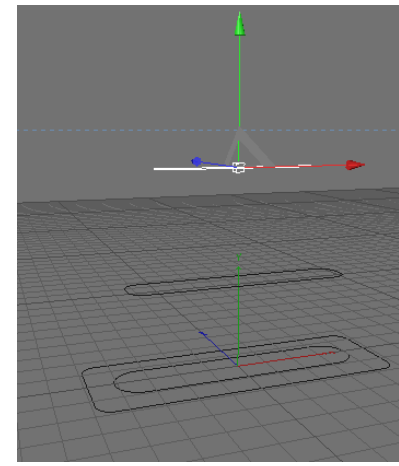


Figure 2-38 *Rectangle.3 placed in the Perspective viewport*

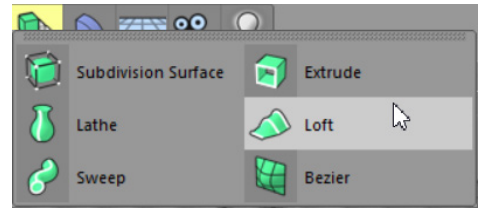


Figure 2-39 *Choosing* ***Loft*** *from the flyout*

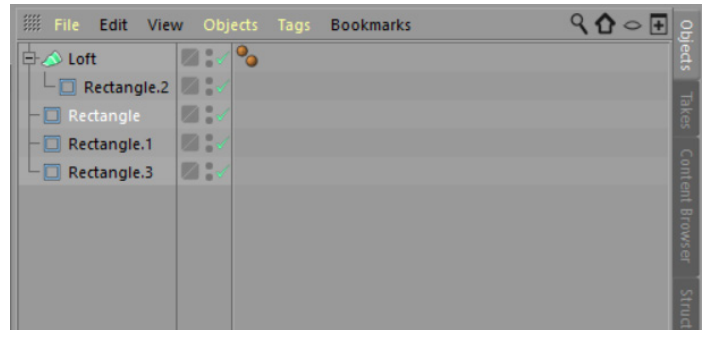


Figure 2-40 *Rectangle.2 connected to Loft in the Object Manager*

16. Connect *Rectangle.1*, *Rectangle.3*, and *Rectangle* to *Loft* in the Object Manager in the order as shown in Figure 2-41; a lofted surface resembling the shape of a hand bag is created in the Perspective viewport, as shown in Figure 2-42.

Evaluation Copy. Do not reproduce. For information visit www.cadcim.com

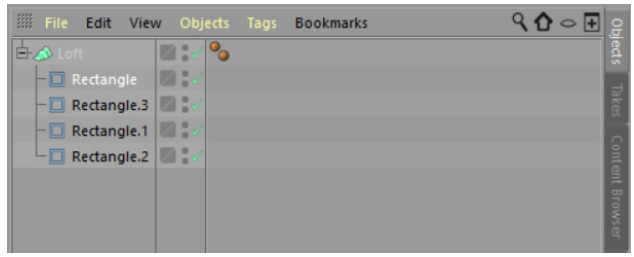


Figure 2-41 *Rectangle, Rectangle.1, and Rectangle.3 connected to Loft*

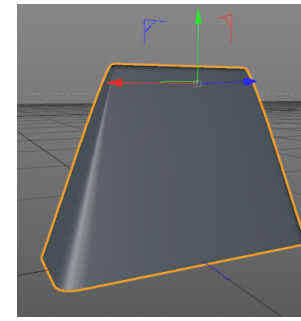


Figure 2-42 *All rectangles lofted in the Perspective viewport*

Creating the Handles of the Hand Bag

In this section, you will create the handles of the bag using the **Lathe** tool.

1. Choose **Create > Spline** from the main menu; a cascading menu is displayed. Choose **Circle** from it; a circle is created in the Perspective viewport and *Circle* is added to the Object Manager.

2. Make sure *Circle* is selected in the Object Manager. In the Attribute Manager, make sure that the **Object** button is chosen. In the **Object Properties** area, enter **8** in the **Radius** spinner. Also, make sure that the **XY** option is selected in the **Plane** drop-down list. Next, choose the **Coord** button; the **Coordinates** area is displayed. In the **Coordinates** area, set the parameters as follows:

   P . X: **242.63** P . Y: **293.5** P . Z: **-110.8**

3. Press and hold the left mouse button on the **Subdivision Surface** tool in the Command Palette; a flyout is displayed. Choose the **Lathe** tool from the flyout, as shown in Figure 2-43; *Lathe* is added to the Object Manager, refer to Figure 2-44.

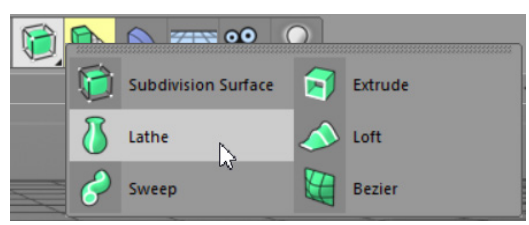


Figure 2-43 *Choosing* ***Lathe*** *from the flyout*

4. In the Object Manager, drag *Circle* and drop it on *Lathe*; *Circle* is connected to *Lathe*, as shown in Figure 2-44.

   The **Lathe** tool is used to rotate the profile curve on the Y-axis of the local axis system of the shape. It is used to generate a revolved surface.

Evaluation Copy. Do not reproduce. For information visit www.cadcim.com

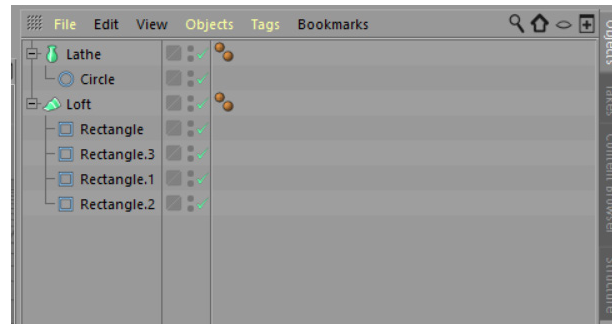


Figure 2-44 *Circle connected to Lathe in the Object Manager*

5. Select *Lathe* in the Object Manager. In the Attribute Manager, choose the **Object** button; the **Object Properties** area is displayed. In this area, enter **75** in the **Subdivision** spinner and **227** in the **Angle** spinner.

6. Choose the **Coord** button; the **Coordinates** area is displayed. In this area, set the parameters as follows:

P . X: **5.715** P . Y: **634.142** P . Z: **291.176**
S . X: **0.87** S . Z: **1.62** R . H: **90**
R . P: **90** R . B: **-90**

Figure 2-45 displays the hand bag with its handle. Next, you will create a copy of the handle.

7. Select *Lathe* in the Object Manager. Press and hold the left mouse button along with the CTRL key; the shape of the cursor is changed, as shown in Figure 2-46. Next, drag *Lathe* in the empty space above it and then release the left mouse button; a copy of *Lathe* is added with the name *Lathe.1* to the Object Manager.

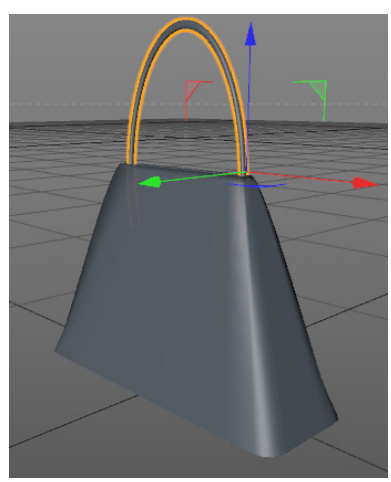


Figure 2-45 *The handle of the hand bag created*

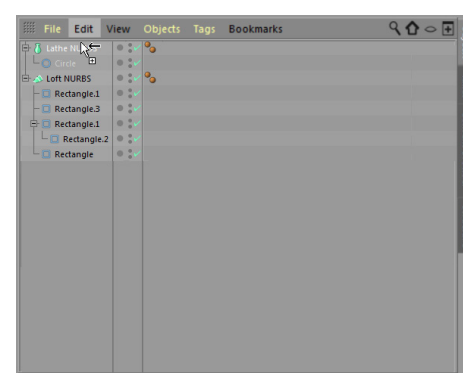


Figure 2-46 *The changed shape of the cursor in the Object Manager*

Evaluation Copy. Do not reproduce. For information visit www.cadcim.com

8. Make sure that *Lathe.1* is selected in the Object Manager and the **Coord** button is chosen in the Object Manager. In the **Coordinates** area of the Attribute Manager, enter **282.25** in the **P . Z** spinner.

Creating Text on the Hand Bag

In this section, you will create text on the hand bag using the **Extrude** tool.

1. Press and hold the left mouse button on the **Pen** tool in the Command Palette; a flyout is displayed. Choose the **Text** tool from the flyout; *Text* is created in the Perspective viewport and added to the Object Manager.

2. Make sure that *Text* is selected in the Object Manager. In the Attribute Manager, choose the **Object** button. In the **Object Properties** area, set the parameters as follows:

   Text: **S&S** Height: **274** Horizontal Spacing: **5**
   Vertical Spacing: **11**

   The **Text** edit box in the **Object Properties** area is used to write the text in the viewport. You can also type multiple lines. The **Height** parameter is used to determine the height of the text displayed in the viewport. The **Horizontal Spacing** parameter is used to determine the horizontal spaces or gaps between the characters. The **Vertical Spacing** parameter is used to determine the vertical spaces or gaps between the characters.

3. In the Attribute Manager, choose the **Coord** button; the **Coordinates** area is displayed. In this area, set the parameters as given next:

   P . X: **-249.402** P . Y: **354.604**
   P . Z: **-109.475** R . P: **-12**

   The text is placed in the Perspective viewport, as shown in Figure 2-47. Next, you will extrude the text.



Figure 2-47 *The text placed in the Perspective viewport*

4. Press and hold the left mouse button on the **Subdivision Surface** tool in the Command Palette; a flyout is displayed. Choose the **Extrude** tool from it; *Extrude* is added to the Object Manager.

5. In the Object Manager, drag *Text* and drop it on *Extrude*; *Text* is connected to *Extrude*, as shown in Figure 2-48. Also, *Text* is extruded in the Perspective viewport, refer to Figure 2-49.

Changing the Background Color of the Scene

To change the background color of the scene to white in the final output, follow the steps given in Tutorial 1 of Chapter 2.

Evaluation Copy. Do not reproduce. For information visit www.cadcim.com

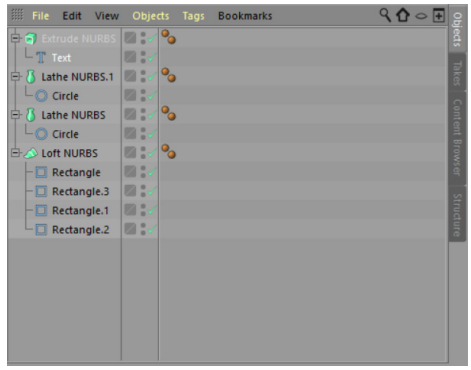


Figure 2-48 *Text connected to Extrude in the Object Manager*



Figure 2-49 *The extruded text on the hand bag*

Saving and Rendering the Scene

In this section, you will save and render the scene. You can also view the final render of the scene by downloading the file *c02_cinema4d_r20_rndr.zip* from *www.cadcim.com*. The path of the file is mentioned at the beginning of the chapter.

1. Choose **File > Save** from the main menu; the **Save File** dialog box is displayed. In this dialog box, browse to the location *\Documents\c4dr20\c02*.

2. Enter **c02tut2** in the **File name** text box and then choose the **Save** button.

3. In the Perspective viewport, set the camera angle using the Viewport Navigation Tools located on the extreme top right of the Perspective viewport. Next, you need to render the scene. For rendering, refer to Tutorial 1.

   Figure 2-31 displays the final output.

Evaluation Copy. Do not reproduce. For information visit www.cadcim.com

Tutorial 3

In this tutorial, you will create a cigar pipe with the help of splines and the **Loft** generator. The final output of the model is shown in Figure 2-50. **(Expected time: 25 min)**



Figure 2-50 *The model of the cigar pipe*

The following steps are required to complete this tutorial:

a. Set the viewport background.
b. Define the shape of the pipe.
c. Create geometry of the pipe.
d. Change the background color of the scene.
e. Save and render the scene.

Setting the Viewport Background

In this section, you will set a background image in the Front viewport.

1. Choose **File > New** from the main menu, a new scene is displayed. Press F4; the Front viewport is maximized.

2. In the Front viewport, choose **Options > Configure** from the Menu in editor view; the **Viewport [Front]** settings are displayed in the Attribute Manager. In the Attribute Manager, choose the **Back** button, if it is not already chosen; the **Back** area is displayed. In this area, choose the browse button next to the **Image** text box; the **Open File** dialog box is displayed. Browse to *\Documents\c4dr20\c02\pipe.jpg*. Next, choose the **Open** button; the *pipe.jpg* is placed as the background image in the Front viewport.

3. Enter **75** in the **Transparency** spinner.

Defining the Shape of the Pipe

In this section, you will define the shape of the pipe using the **Circle** spline.

1. Choose **Create > Spline > Circle** from the main menu bar; *Circle* is displayed in the Front viewport.

Evaluation Copy. Do not reproduce. For information visit www.cadcim.com

2. Make sure *Circle* is selected in the Object Manager and the **Object** button is chosen in the Attribute Manager. In the **Object Properties** area of the Attribute Manager, select **XZ** from the **Plane** drop-down list.

3. In the Attribute Manager, select the **Ellipse** check box and then enter **7** and **27.846** in the **Radius** and **Radius Y** spinners, respectively.

4. Choose the **Coord** button and then specify the values for the following parameters:

   P . X: **375.332** P . Y: **168.154** R . B: **89.613**

   After entering the values *Circle* is placed at the end of the pipe, as shown in Figure 2-51.

5. Double click on *Circle* in the Object Manager and rename the object as *Ellipse*.

6. In the Object Manager, create a copy of *Ellipse* using CTRL; a duplicate copy of *Ellipse* is created with the name *Ellipse.1*.

7. Make sure *Ellipse.1* is selected in the Object Manger. In the Attribute Manager, choose the **Object** button and then enter **8** and **24.818** in the **Radius** and **Radius Y** spinners, respectively.

8. In the Attribute Manager, choose the **Coord** button and then specify the following values for the following parameters:

   P . X: **344.115** P . Y: **167.142** R . B: **89.613**

   After entering the values *Ellipse.1* is next to the *Ellipse*, as shown in Figure 2-52.

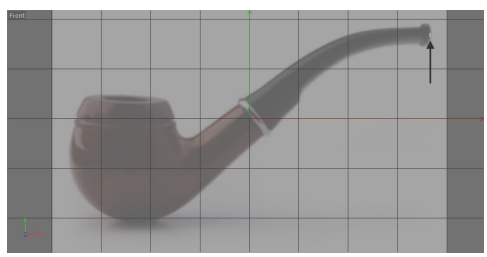


Figure 2-51 *Ellipse displayed in the Front viewport*



Figure 2-52 *Ellipse.1 displayed in the Front viewport*

9. Create a **Circle** spline as done in steps 1 through 2. In the Attribute Manager, make sure the **Object** button is chosen and then enter **18.477** in the **Radius** spinner. Choose the **Coord** button and then specify the values for the following parameters:

   P . X: **313.585** P . Y: **165.525** R . B: **89.613**

   After entering the values, *Circle* is displayed in the Front viewport, as shown in Figure 2-53.

Evaluation Copy. Do not reproduce. For information visit www.cadcim.com

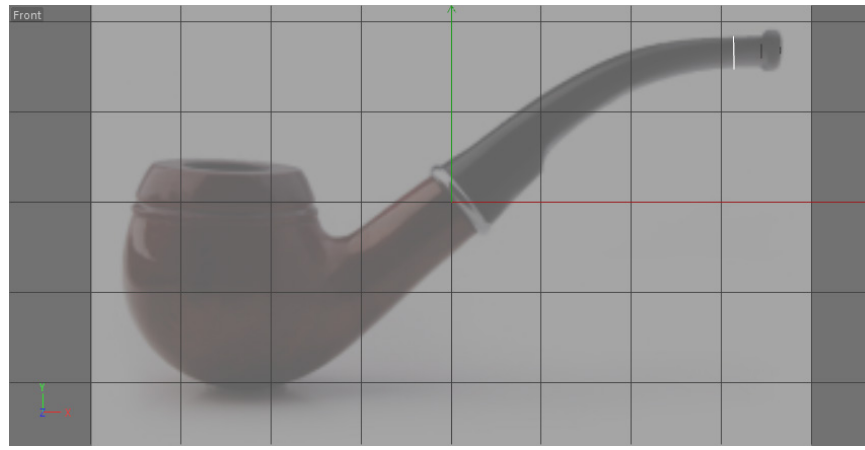


Figure 2-53 *Circle displayed in the Front viewport*

10. Create more copies of *Circle* and then use the values given in Table 2-1 to create the profile of the pipe:

Table 2-1 *Values used for creating the profile of the pipe*

Spline	Radius	P . X	P . Y	R . B
Circle.1	20.934	220.543	152.49	70.072
Circle.2	28.328	87.649	73.091	55.525
Circle.3	32.124	83.145	66.897	55.525
Circle.4	36.397	78.077	59.577	55.525
Circle.5	41.459	17.261	8.334	50.255
Circle.6	46.102	9.377	3.829	50.255
Circle.7	42.322	4.309	-2.365	50.255
Circle.8	49.721	-95.667	-82.505	57.328
Circle.9	86.573	-179.395	-115.462	111.91
Circle.10	117.524	-254.216	-66.472	149.363
Circle.11	90.684	-253.325	41.306	180.75

After entering the values the profile of the pipe is completed, as shown in Figure 2-54.

Creating Geometry of the Pipe

In this section, you will create the shape of the pipe using the **Loft** generator.

1. Choose **Create > Generators > Loft** from the menu bar; *Loft* is displayed in the Object Manager.

2. Select *Ellipse* in the Object Manager and then press and hold down SHIFT. Next, click on *Circle.11* to select all splines and then release SHIFT.

Evaluation Copy. Do not reproduce. For information visit www.cadcim.com

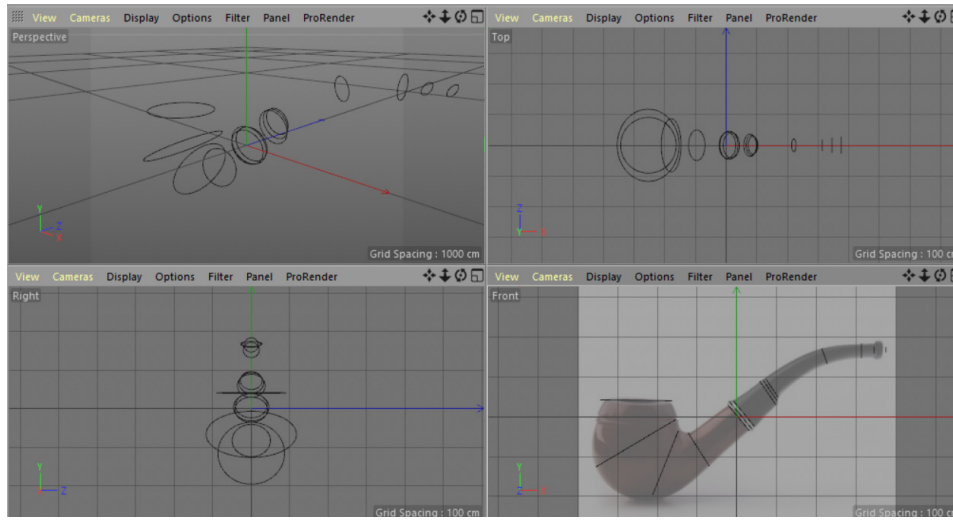


Figure 2-54 *The profile of the pipe displayed*

3. Press and hold the left mouse button and then drag the splines to *Loft*; all splines are connected to *Loft*, refer to Figure 2-55. Also, shape of the pipe is displayed in the scene, as shown in Figure 2-56.

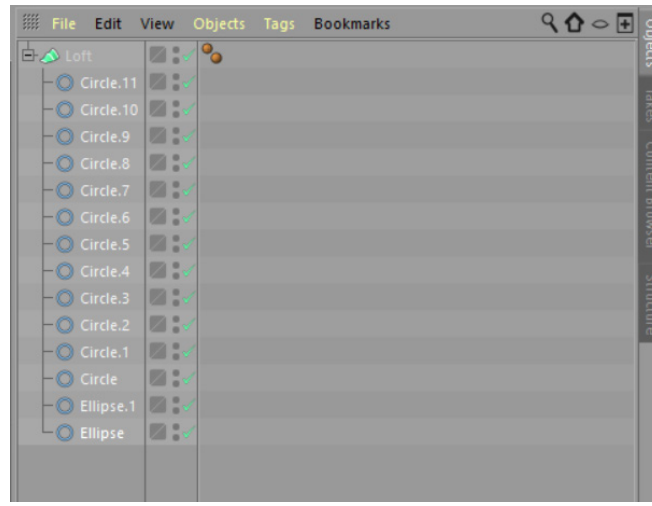


Figure 2-55 *The splines connected with Loft*

4. Press F1 to activate the Perspective viewport.

5. Make sure *Loft* is selected in the Object Manager and then choose the **Caps** button in the Attribute Manager; the **Caps and Rounding** area is displayed.

6. In this area, select **Fillet** from the **Start** and **End** drop-down lists. Next, select the **Constrain** check box. Select **Half Circle** from the **Fillet Type** drop-down list.

Evaluation Copy. Do not reproduce. For information visit www.cadcim.com

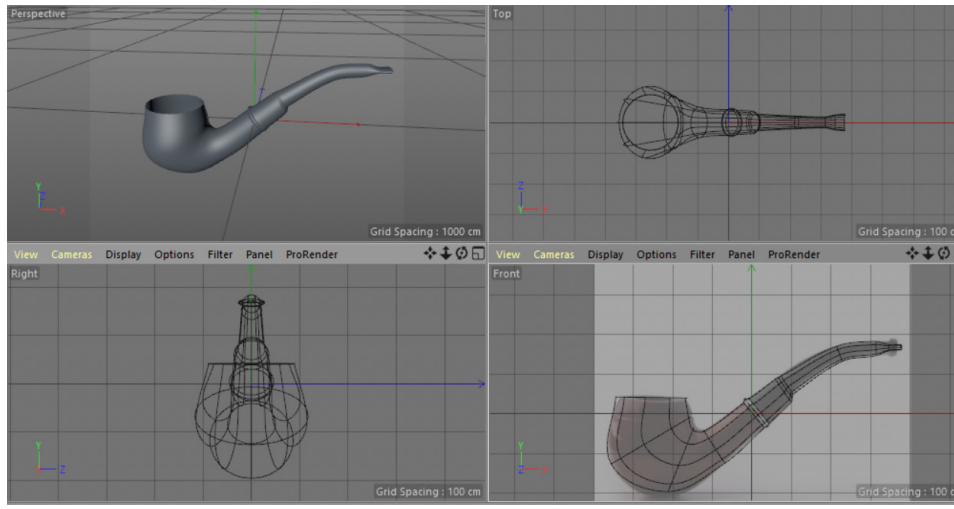


Figure 2-56 *The shape of the pipe displayed*

7. Enter **10** and **1** in the **Steps** and **Radius** spinners, respectively, corresponding to the **Start** drop-down list. Similarly, enter **10** and **6** in the **Steps** and **Radius** spinners, respectively, corresponding to the **End** drop-down list. After entering the values, the cigar pipe is displayed with the fillet caps, as shown in Figure 2-57.

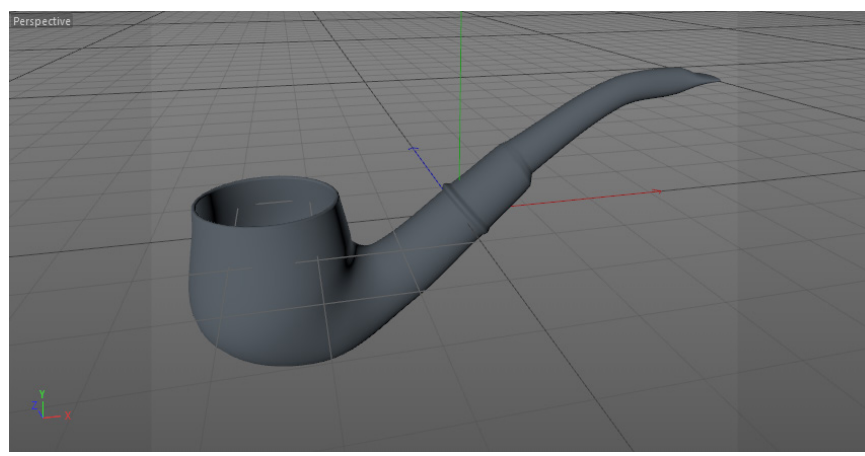


Figure 2-57 *The pipe with the fillet caps displayed*

Next, you will modify the end part of the pipe to maintain the flow of the geometry.

8. Select *Circle* in the Object Manager and then make sure the **Object** button is chosen in the Attribute Manager. Set the value **9.652** for the **Radius** parameter.

9. Select *Ellipse* in the Object Manager and make sure the **Object** button is chosen in the Attribute Manager. Next, set the values **1.757** and **12.231** for the **Radius** and **Radius Y** spinners, respectively. Similarly, set the values **4.178** and **12.962** for the **Radius** and **Radius Y** spinners, respectively, for *Ellipse.1*. After entering the values, the modified shape of the pipe is displayed, refer Figure 2-50.

Evaluation Copy. Do not reproduce. For information visit www.cadcim.com

Changing the Background Color of the Scene

To change the background color of the scene to white in the final output, follow the steps given in Tutorial 1.

Saving and Rendering the Scene

In this section, you will save and render the scene. You can also view the final render of the scene by downloading the file *c02_cinema4d_r20_rndr.zip* from *www.cadcim.com*. The path of the file is mentioned at the beginning of the chapter.

1. Choose **File > Save** from the main menu; the **Save File** dialog box is displayed. In this dialog box, browse to the location *\Documents\c4dr20\c02*.

2. Enter **c02tut3** in the **File name** text box and then choose the **Save** button.

3. In the Perspective viewport, set the camera angle using the Viewport Navigation Tools located on the extreme top right of the Perspective viewport. Next, you need to render the scene. For rendering, refer to Tutorial 1.

   Figure 2-50 displays the final output.

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 tools is used to create complex models using relatively less number of control points?

   (a) **Pen** (b) **Subdivision Surface**
   (c) **Move** (d) None of these

2. Which of the following tools is used to extrude a spline object or a curve?

   (a) **Pen** (b) **Loft**
   (c) **Extrude** (d) All of these

3. Which of the following combinations of shortcut keys is used to render a scene?

   (a) ALT+Q (b) CTRL+D
   (c) SHIFT+R (d) None of these

4. The _____ tool in the Command Palette is used to subtract two or more objects from an object to create a hole in that object.

5. The _____ option in the **Options** menu is used to edit the settings of the respective viewport.

Evaluation Copy. Do not reproduce. For information visit www.cadcim.com

6. The **Angle** parameter in the _____ area of the Attribute Manager is used to define the angle of rotation of the spline.

7. The Viewport Navigation Tools are located at the top right corner of the viewport. (T/F)

8. The three spinners corresponding to the **Movement** parameter are used to specify the extrusion taking place along the **X**, **Y**, or **Z** axis. (T/F)

9. The **Background** tool is used to change the foreground with the color or the image which is visible only in the render view. (T/F)

10. The **R . P** parameter in the Attribute Manager is used to determine the rotational values of the X axis. (T/F)

Review Questions

Answer the following questions:

1. Which of the following tools is used to revolve a profile curve about the Y axis of the local axis system of the spline shape?

   (a) **Lathe** (b) **Subdivision Surface**
   (c) **Pen** (d) None of these

2. Which of the following tools is used to create text in the viewport in CINEMA 4D?

   (a) **Lathe** (b) **Text**
   (c) **Pen** (d) **Render to Picture Viewer**

3. The _____ parameter of the **Background** object is used to select the background color of the scene for the rendering purpose.

4. By default, the height of a rectangle spline primitive is set to _____ .

5. The _____ dialog box consists of specific parameters which help you in saving a still image or image sequence in an uncompressed format.

6. CINEMA 4D consists of default predefined curves known as spline primitives. (T/F)

7. The **Render to Picture Viewer** tool is used to render a scene or model in a separate window. (T/F)

8. The **Picture Viewer** window is also known as the output window in CINEMA 4D. (T/F)

9. The default units of measurement in CINEMA 4D can be changed from the drop-down list located next to the **Project Scale** spinner in the **Project Settings** area. (T/F)

10. The ALT+G key combination is used to group objects in the Object Manager. (T/F)

Evaluation Copy. Do not reproduce. For information visit www.cadcim.com

EXERCISES

The rendered output of the model used in the following exercises can be accessed by downloading the *c02_cinema4d_r20_exr.zip* file from *www.cadcim.com*. The path of the file is as follows: *Textbooks > Animation and Visual Effects > MAXON CINEMA 4D > MAXON CINEMA 4D R20 Studio: A Tutorial Approach*

Exercise 1

Using various Generators and spline modeling tools, create the model of a chair, as shown in Figure 2-58. **(Expected time: 25 min)**

Exercise 2

Using various Generators and spline modeling tools, create the model of a table clock, as shown in Figure 2-59. **(Expected time: 45 min)**



Figure 2-58 *The model of a chair*



Figure 2-59 *The model of a table clock*

Evaluation Copy. Do not reproduce. For information visit www.cadcim.com

Answers to Self-Evaluation Test

1. b, **2.** c, **3.** c, **4. Boole**, **5. Configure**, **6. Object Properties**, **7.** T, **8.** T, **9.** F, **10.** F

Evaluation Copy. Do not reproduce. For information visit www.cadcim.com