Chapter 2
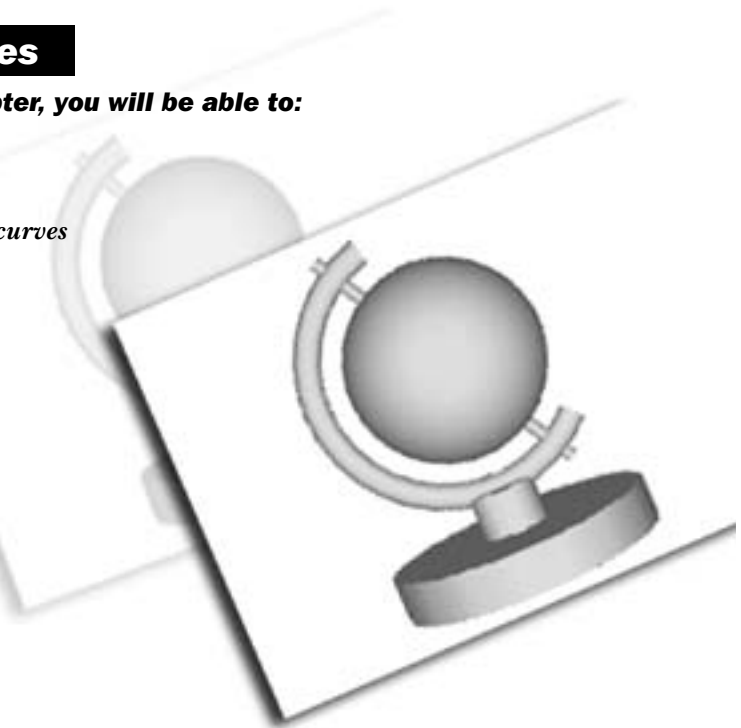
Working with Basic Tools

Learning Objectives

After completing this chapter, you will be able to:

- *Invoke tools*
- *Create keypoint curves*
- *Create text*
- *Understand the features of curves*
- *Create basic curves*
- *Create primitives*
- *Use different pick tools*
- *Use transform tools*
- *Shade objects*

INTRODUCTION TO BASIC TOOLS

In the previous chapter, you have learned about the Alias interface and the location of various tools. In this chapter, you will learn about the basic tools that are used to create the entities like curves, line, arcs, primitives, and so on. You will also learn about the tools that are used to transform and pick the entities created. The transform tools are used to move, rotate, and scale objects.

INVOKING TOOLS

The tools for creating sketched entities and surfaces, transforming surfaces, and editing the entities are available in the **Palette**, **Shelves** window, and **Control Panel**. The tools in the **Palette** are placed under different tabs. Choose a tab; the respective tools will be displayed. Then, left-click on the required tool; the tool will be invoked and enclosed in a red box in the **Palette**. Figure 2-1 shows the **Move** tool being invoked after expanding the **Transform** tab in the **Palette**. You can also invoke a tool without expanding the tab. To do so, right-click on the tab; a shortcut menu with all tools associated with the tab will be displayed, as shown in Figure 2-2. Left-click on the required tool to invoke it.

METHODS OF CREATING OBJECTS

In Alias, there are two methods to create an object. The first method is to create an object (curves, surfaces, and so on) with default parameters or settings. The second method is to first set the parameters of an object and then create it. In this chapter, the first method is discussed for creating these objects. The effect of changing the parameters of these objects is also discussed in this textbook.
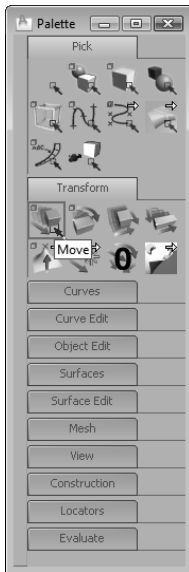

Figure 2-1 *Invoking the **Move** tool after expanding the **Transform** tab*
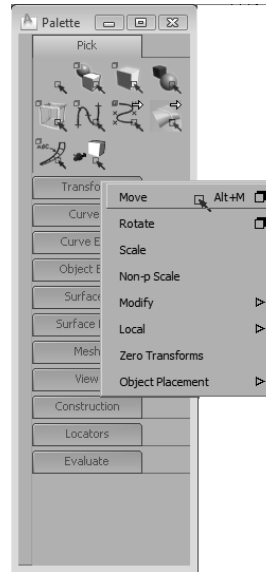
Figure 2-2 *Shortcut menu displayed on right-clicking on the **Transform** tab*

CREATING KEYPOINT CURVES

The curves that retain attribute information such as radius, sweep angle, and center point are known as keypoint curves. These curves retain constraints and relationships that can be used to edit them. To invoke any keypoint curve tool, choose the **Keypoint Curve Toolbox** tool from the **Curves** tab in the **Palette**; the **Keypoint Curve Toolbox** will be displayed, as shown in Figure 2-3. Next, invoke a tool from this window to create the corresponding keypoint curve. By default, guidelines are displayed when you create any keypoint curve. These guidelines help you align the curves with each other. You can turn off the display of these guidelines by choosing **WindowDisplay > Toggles > Guidelines**
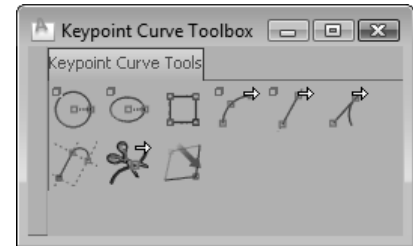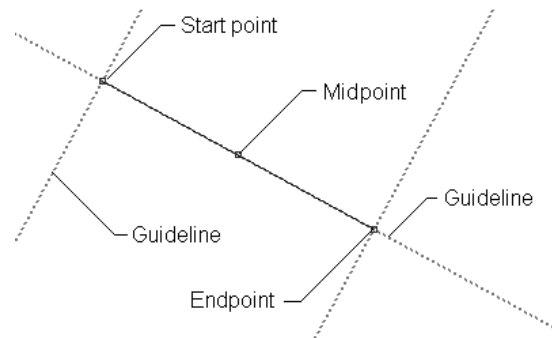

*Figure 2-3 The **Keypoint Curve Toolbox***

from the menu bar. Information retained by the keypoint curves can be viewed in the Information Window. You can modify the keypoint attributes by changing their values in this window. The different keypoint curves that can be created in Alias are discussed in next section.

Creating a Line

**Palette:**   Curves > Keypoint Curve Toolbox > Line

 To draw a line, choose the **Line** tool from the **Keypoint Curve Toolbox**; you will be prompted to specify the start point of the line. Specify the position by entering coordinates in the promptline. You can also specify the start point of the line by clicking in the active window. After specifying the start point, you will be prompted to specify the endpoint of the line. Specify the endpoint of the line; the line will be created in the active window with the start point, midpoint, endpoint, and the guidelines displayed on it, as shown in Figure 2-4. Note that the moment you click to specify the endpoint of the line, its linear

Figure 2-4 Line drawn in the active window

dimension will be displayed, as shown in Figure 2-5. But, after specifying the endpoint, the dimension will disappear. You can draw horizontal or vertical line using the steps given next.
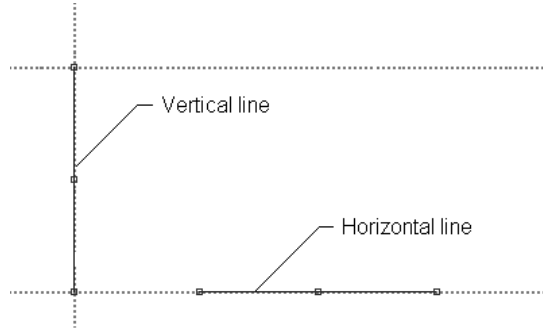
1. If you specify the endpoint of the line by using the middle mouse button; a horizontal keypoint line will be created, as shown in Figure 2-6.

2. If you specify the endpoint of the line by using the right mouse button; a vertical keypoint line will be created, refer to Figure 2-6.

To set the parameters of the **Line** tool, double-click on the **Line** tool; the **Line (2 Point) Options** dialog box will be displayed, as shown in Figure 2-7. The options in this dialog box are discussed next.
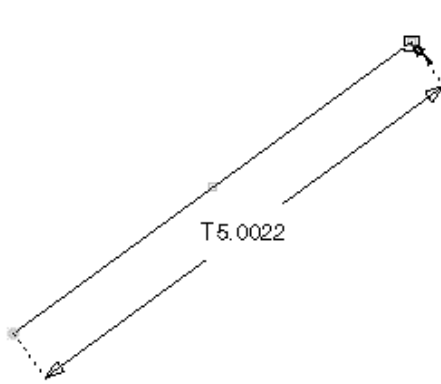
Figure 2-5   *Linear dimension displayed on the line*

Figure 2-6   *Vertical and horizontal keypoint lines created*

Tip: *To specify the length of the line dynamically, click and drag the cursor while specifying the endpoint of the line.*

Degree

This edit box is used to specify the degree of the line. The range of the degree is 1 to 7. By default, 1 is displayed in this edit box. You can also change the degree of the line by using the slider bar given on the right of this edit box.

Reset

This button is used to revert to the default settings or parameters of the **Line** tool.

Figure 2-7   *The **Line (2 Point) Options** dialog box*
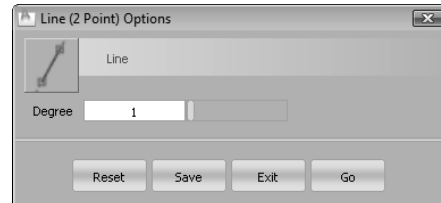
Save

This button is used to save the current parameter values in the **Line (2 Point) Options** dialog box. The next time when you invoke this dialog box for creating another line, the saved parameter values will be displayed in the dialog box again.

Exit

This button is used to exit the **Line (2 Point) Options** dialog box.

Go

Choose this button to draw the line with the modified parameter values. In this case, the values set will not be saved for the next line to be drawn.

After specifying all parameters of the line, choose the **Go** button to draw the line. Specify the start and the endpoint; the line with the specified settings will be created in the window.

To exit the **Line** tool, choose the **Pick object** button from the **Pick** tab in the **Palette**. The tools in the **Pick** tab of the **Palette** will be discussed in detail later in this chapter.

Creating Polylines

Palette: Curves > Keypoint Curve Toolbox > Line > Polyline

You can draw continuous lines by using the **Polyline** tool. While creating a polyline, the endpoint of the previous line becomes the start point of the next line and you need to specify only the endpoints of the successive lines. To create a polyline, press and hold the left mouse button on the **Line** tool from the **Keypoint Curve Toolbox**; a flyout will be displayed. Choose the **Polyline** tool from this flyout; the button will get enclosed within a red box, indicating that the tool is active. Also, you will be prompted to specify the start point of the line. Click in the active window or enter the coordinates in the promptline to specify the start point of the line and press ENTER. Next, you will be prompted to specify the endpoint of the line. Specify the endpoint of the first line segment of the polyline and continue specifying the endpoints of the successive line segments until you have created the polyline of required segments. Next, choose the **Pick object** tool from the **Pick** tab in the **Palette** to exit the **Polyline** tool. Figure 2-8 shows a three-segment polyline created by using the **Polyline** tool.

To set the parameters of the Polyline tool, double-click on the **Polyline** tool; the **Line Poly Options** dialog box will be displayed, as shown in Figure 2-9. The options in this dialog box are the same as those discussed in the Line tool.
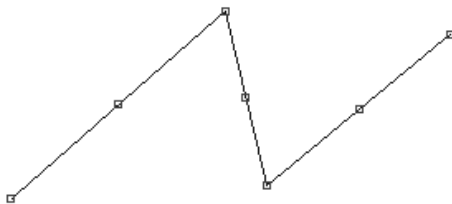
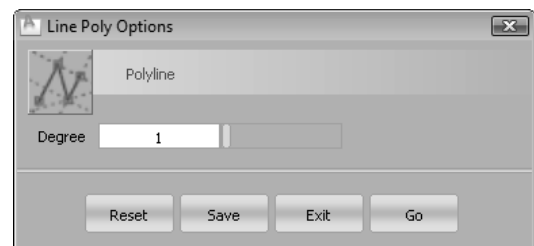

Figure 2-8 A three-segment polyline

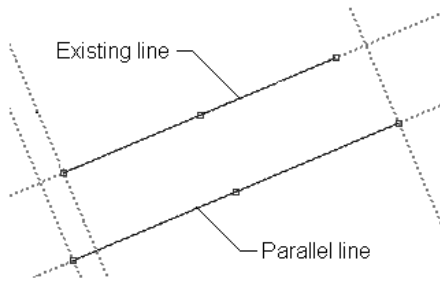*Figure 2-9 The **Line Poly Options** dialog box*

Creating a Parallel Line

Palette: Curves > Keypoint Curve Toolbox > Line > Parallel line

You can create a line parallel to an existing line or curve by using the **Parallel line** tool. Invoke the **Parallel line** tool from the **Line** flyout in a way similar to the **Polyline** tool. On doing so, you will be prompted to select a curve to which you need to draw the parallel line. Select the curve or the line from the active window; you will be prompted to

specify the start point of the line. Click in the active window or enter the coordinates in the promptline to specify the start point of the line. Next, you will be prompted to specify the endpoint of the line. Specify the endpoint; a line parallel to an existing line will be created, as shown in Figure 2-10. If you select a circle or an arc, a tangent line will be displayed and the line drawn will be parallel to this tangent line, as shown in Figure 2-11.

Figure 2-10 *Line parallel to the existing line*
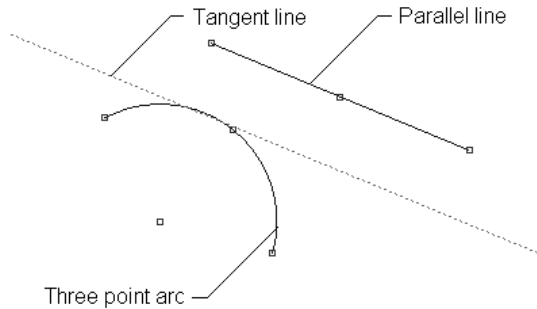
Figure 2-11 *Line parallel to the tangent line of a three point arc*

To set the parameters of the **Parallel line** tool, double-click on the **Parallel line** tool; the **Line Parallel Options** dialog box will be displayed. The options in this dialog box are the same as those discussed in the **Line** tool.

Note

When you click to specify the first point of the parallel line, the linear distance between the two lines is displayed momentarily between the two lines. Similarly, when you click to specify the endpoint of the parallel line, the linear dimension of the line is displayed momentarily on the line.

Creating a Line at Angle

Palette: Curves > Keypoint Curve Toolbox > Line > Line at angle

You can create a line at an angle to an existing line or a curve by using the **Line at angle** tool. Invoke the **Line at angle** tool from the **Line** flyout in a way similar to the **Polyline** tool; you will be prompted to select a curve to make the line inclined to. Select a curve or a line from the active window; you will be prompted to specify the endpoint of the line or the relative angle. Click in the active window or enter the angle in the promptline. If you click in the active window, a new line at an arbitrary angle value to the existing curve or line will be created, as shown in Figure 2-12. If you enter an angle in the promptline and then click in the active window to specify the endpoint; a new line at the specified angle in the clockwise direction to the existing curve will be created. In case of a curve, the new line will be created at an angle to the line that passes through the start point of the line and the endpoint of the curve, as shown in Figure 2-13. While specifying the endpoint of the line, drag the endpoint to display the angular dimension of the line. Note that this angular dimension will disappear after you specify the endpoint of the line.

To set the parameters of the **Line at angle** tool, double-click on the **Line at angle** tool; the **Line Angle Options** dialog box will be displayed. The options in this dialog box are the same as those discussed in the **Line** tool.
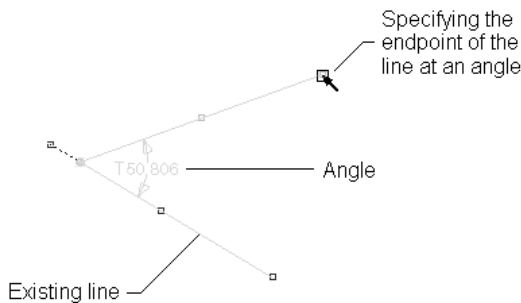
Figure 2-12 A new line created at an arbitrary angle to the existing line
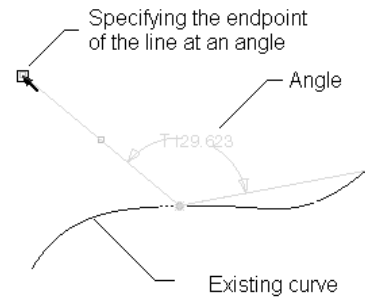
Figure 2-13 A line created at an arbitrary angle to the existing curve

Tip: *You can use the **Snap to CV/Edit Point** and **Snap to Curve** buttons on the right of the promptline to draw the lines (parallel, perpendicular, tangent, and so on) from/at a specific curve or a CV/edit point.*

Creating a Circular Arc

Palette: Curves > Keypoint Curve Toolbox > Circular arc

You can create a circular arc or circle by specifying its center point and a point on its circumference. You can do so by using the **Circular arc** tool. To draw a circular arc using this tool, choose the **Circular arc** tool from the **Keypoint Curve Toolbox**; you will be prompted to specify the center point of the circle. Click in the active window to specify the center point of the circle; you will be prompted to specify a point on the radius of the circle. Click in the active window at the required distance from the center point; a circle will be created, as shown in Figure 2-14. While specifying the location on the radius of the circle, the dimension is displayed momentarily in green on the screen. Note that the dimension varies as you drag the mouse and disappears after you specify the endpoint of the circle.

To set the parameters of the **Circular arc** tool, double-click on the **Circular arc** tool; the **Circle Options** dialog box will be displayed, as shown in Figure 2-15.

The options in this dialog box are discussed next.

Degree
This edit box is used to specify the degree of the circular arc. The range of the degree is 2 to 7. By default, 6 is displayed in this edit box. You can also change the degree of the arc by using the slider bar given on the right of this edit box.

Spans

This edit box is used to specify the number of spans of the circular arc. The range of spans is 1 to 14. By default, 1 is displayed in this edit box. You can also change the spans of the arc by using the slider bar given on the right of this edit box
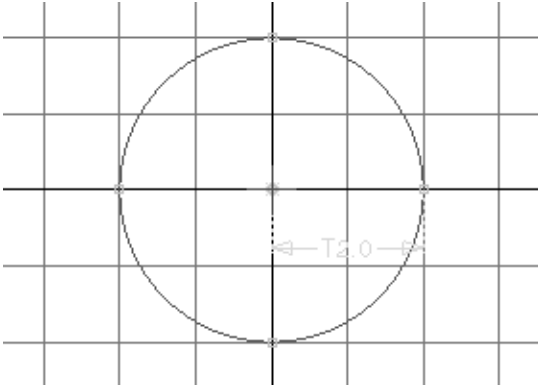
Figure 2-14   *Circle created using the* **Circular arc** *tool*
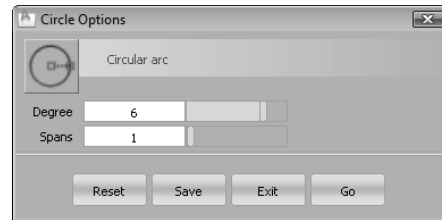
Figure 2-15   *The* **Circle Options** *dialog box*

Creating an Ellipse

Palette:	Curves > Keypoint Curve Toolbox > Ellipse

To create an ellipse, choose the **Ellipse** tool from the **Keypoint Curve Toolbox**; you will be prompted to specify the center of the ellipse. Click in the active window; you will be prompted to specify the endpoint for the ellipse major axis. Click in the active window; the ellipse will be created. Note that the major and minor radii of the ellipse will be displayed when you specify the endpoint for the ellipse. Also, the dimensions of both the axes keep changing as you drag the mouse.

To set the parameters of the **Ellipse** tool, double-click on the **Ellipse** tool; the **New Ellipse Options** dialog box will be displayed, as shown in Figure 2-16.
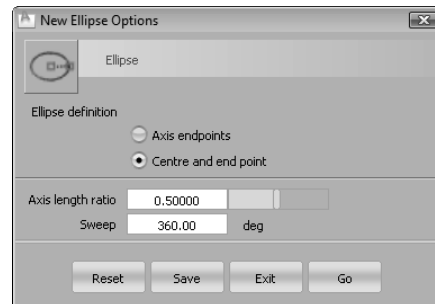
The options in the **New Ellipse Options** dialog box are discussed next.

Ellipse definition

The **Ellipse definition** area is used to specify the option for creating an ellipse. The two radio buttons in this area are discussed below:

Axis endpoints

Select this radio button to create an ellipse by specifying the endpoints of the major axis. On selecting this radio button, you will be prompted to specify the start point of the

*Figure 2-16*   *The* **New Ellipse Options** *dialog box*

major axis. You can specify the start point by entering the coordinates in the promptline or by clicking at the required location in the active window. After specifying the start point, you will be prompted to specify the endpoint of the major axis. The ellipse created using the **Axis endpoints** radio button is shown in Figure 2-17. To specify the endpoint, click on the screen; the dimensions will be displayed momentarily in green color. These dimensions will disappear after you specify the endpoint.

Centre and end point

The **Centre and end point** radio button is selected by default and is used to create an ellipse by specifying the center and the endpoint of the major axis. With this radio button selected, you need to specify the center point of the ellipse. Specify the center by entering the coordinates in the promptline or click at the required location in the active window. Next, you will be prompted to specify the endpoint of the major axis of the ellipse. The ellipse created by selecting the **Centre and end point** radio button is shown in Figure 2-18.
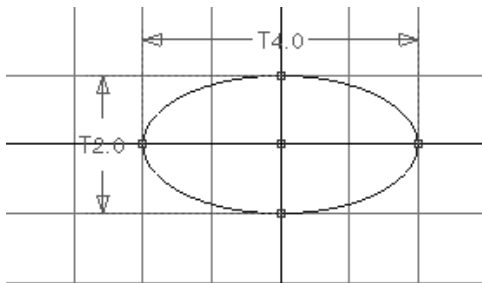
Figure 2-17 *Ellipse created on selecting the*
***Axis endpoints*** *radio button*
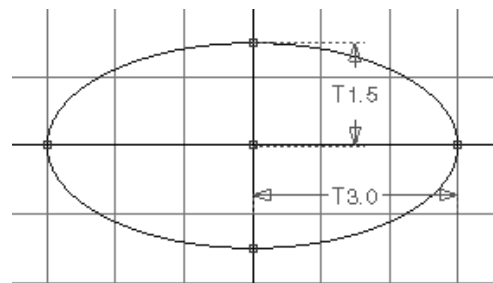
Figure 2-18 *Ellipse created on selecting the*
Centre and end point *radio button*

Axis length ratio
Axis length ratio is the ratio of the length of the minor axis to that of the major axis. You can specify this ratio by entering a value in the **Axis length ratio** edit box. You can also specify the value using the slider bar given on the right of this edit box. Figure 2-19 shows ellipses created with axis length ratios of 0.3 and 0.8.

Sweep
You can enter the value of the sweep angle of the ellipse in the **Sweep** edit box. By default, its value is 360 degrees. If you need to create an open ellipse, enter a value between 0 degree to 360 degrees. Figure 2-20 shows ellipses created with sweep angles 180 and 270 degrees.

Ellipse with Axis
length ratio of 0.3

Ellipse with Axis
length ratio of 0.8

Ellipse with sweep
angle 180

Ellipse with sweep
angle 270
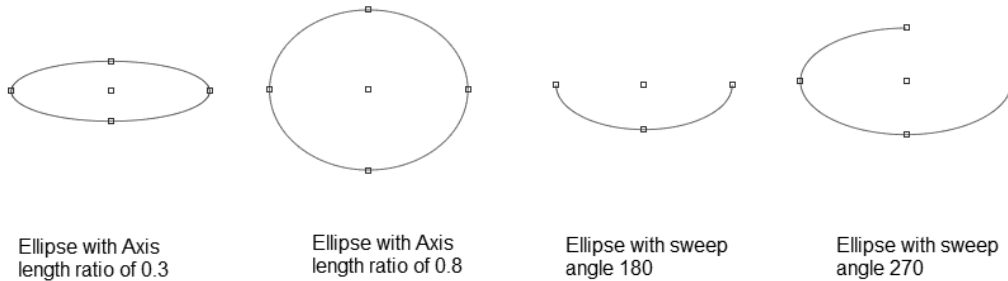
Figure 2-19 *Ellipses created with different axis length ratios*

Figure 2-20 *Ellipses created with different sweep angles*

Creating a Rectangle

Palette:	Curves > Keypoint Curve Toolbox > Rectangle

In Alias, you can create a rectangle by specifying the starting and ending positions of the rectangle. To do so, you can use the **Rectangle** tool. The starting and ending positions of the rectangle are its two diagonally opposite corners. To create a rectangle, choose the **Rectangle** tool from the **Keypoint Curve Toolbox**; you will be prompted to specify the starting position of the rectangle. You can specify the starting position by entering the coordinates in the promptline or by clicking at the required location in the active window. On specifying the starting position, you will be prompted to specify the ending position of the rectangle. Specify the ending position; the rectangle will be created, as shown in Figure 2-21.

Tip: *You can get the information such as transformation, pivot, bounding box, and curve geometry about any curve, whether a line or an arc, from the **Information Window** dialog box. To invoke this dialog box, first select the curve from the active window and then choose **Windows > Information > Information Window** from the menu bar. Alternatively, you can press CTRL+5 keys to display the **Information Window** dialog box.*

Creating a Three Point Arc

| Palette:	Curves > Keypoint Curve Toolbox > Arc (three point)

You can create an arc by specifying three points. You can do so by using the **Arc (three point)** tool. To create a three point arc, choose the **Arc (three point)** tool from the **Keypoint Curve Toolbox**; you will be prompted to specify the first point. Click in the active window or enter the coordinates in the promptline to specify the first point. Next, specify the second and third points of the arc; the three point arc will be created, as shown in Figure 2-22. You can specify the second and third point of the arc in three different ways by

using the three mouse buttons. Click in the active window with the middle mouse button; the point will be placed horizontally with respect to the previous point. If you specify the point with the right mouse button, the point will be placed vertically with respect to the previous point. If you specify the point with the left mouse button, the point will be placed freely. If you drag the mouse to specify the third point of the arc, the center point of the arc as well as its radius will change dynamically, as shown in Figure 2-23.
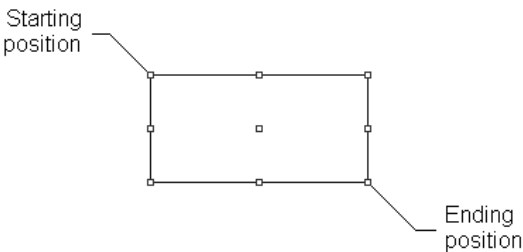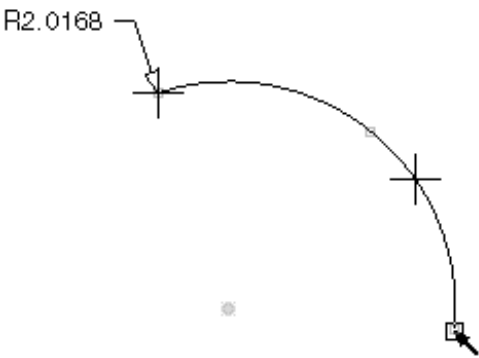
Figure 2-21 Rectangle created in the orthographic window

To set the parameters of the **Arc (three point)** tool, double-click on the **Arc (three point)** tool; the **Arc (3 Point) Options** dialog box will be displayed, as shown in Figure 2-24.
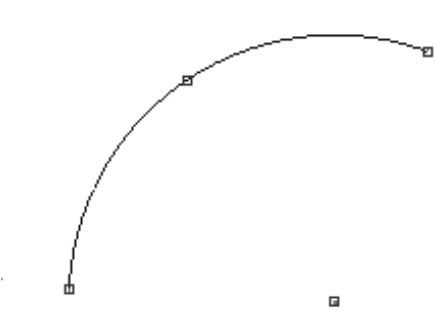
Figure 2-22 A three point arc

Figure 2-23 Radius displayed on the arc while dragging the endpoint

The options in this dialog box are discussed next.
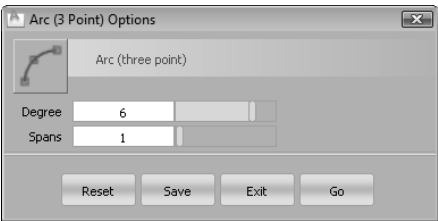
Degree
This edit box is used to specify the degree of the three point arc. The range of the degree is from 2 to 7. You can also change the degree of the arc by using the slider bar given on the right of this edit box.

Spans
This edit box is used to specify the spans of the three point arc. The range of the spans is from 1
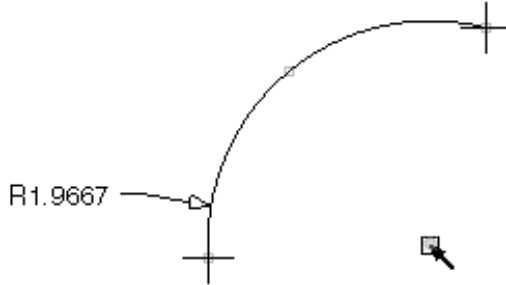
Figure 2-24 The Arc (3 Point) Options dialog box

to 14. By default, 1 is displayed in this edit box. You can also change the spans of the arc by using the slider bar given on the right of this edit box.

Creating a Two Point Arc

Palette:	Curves > Keypoint Curve Toolbox > Arc (three point) Arc (two point)

You can create an arc by specifying the two endpoints and the center point in succession. You can do so by using the **Arc (two point)** tool. To create a two point arc, press and hold the left mouse button on the **Arc (three point)** tool in the **Keypoint Curve Toolbox**; a flyout will be displayed. Choose the **Arc (two point)** tool from this flyout; you will be prompted to specify the start point of the arc. Click in the active window or enter the coordinates in the promptline to specify the start point; you will be prompted to specify the endpoint of the arc. Specify the endpoint; you will be prompted to specify the center or the radius of the arc. Click in the active window to specify the center/radius of the arc; the two point arc will be created. When you

Figure 2-25   Two point arc displaying the radius of the curve

click to specify the center/radius of the arc, the radius of the arc will be displayed momentarily in the active window, as shown in Figure 2-25. You can also enter radius of the arc in the promptline. On specifying the center/radius, you will notice that two possible curves that can be created are displayed. Click on the side where you need the arc. While specifying the endpoint of the arc, the three mouse buttons function in a way similar to the **Arc (three point)** tool.

To set the parameters of the **Arc (two point)** tool, double-click on the **Arc (two point)** tool; the **Arc (2 Point) Options** dialog box will be displayed. The options in this dialog box are the same as those discussed in the **Arc (three point)** tool.

Tip: *While specifying the endpoint of an arc, the mouse buttons function in the same way as in the **Arc (three point)** tool.*

Creating an Arc Tangent to a Curve

Palette:	Curves > Keypoint curve toolbox > Arc (three point) > Arc tangent to curve

The **Arc tangent to curve** tool is used to create an arc that is tangent to an existing curve or a line. To create an arc tangent to a curve, choose the **Arc tangent to curve** tool from the **Keypoint Curve Toolbox**; you will be prompted to select the location

on the curve from which the arc tangent to the curve will start. Select the existing curve or line at any point to start the tangent arc, you will be prompted to specify the endpoint of the tangent arc. Click in the active window or enter coordinates in the promptline to specify the endpoint; the arc tangent to the line will be created, as shown in Figure 2-26.

To set the parameters of the **Arc tangent to curve** tool, double-click on the **Arc tangent to curve** tool; the **Arc Tangent To Curve Options** dialog box will be displayed. The options in this dialog box are the same as those discussed in the **Arc (three point)** tool.
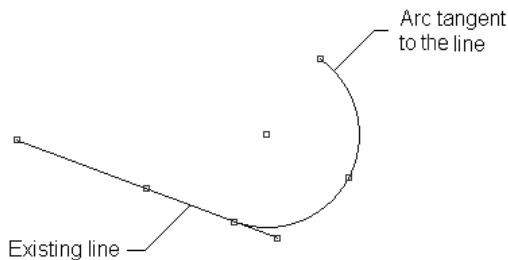
Creating a Concentric Arc

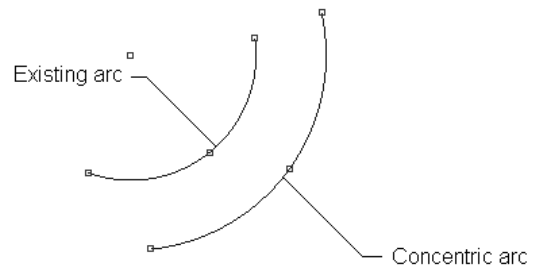**Palette:**   Curves > Keypoint Curve Toolbox > Arc (three point) > Concentric arc

You can create an arc that is concentric to an existing arc by using the **Concentric arc** tool. To create such an arc, choose the **Concentric arc** tool from the **Keypoint Curve Toolbox**; you will be prompted to select the arc to which the arc will be concentric. Select an existing arc; you will be prompted to specify the start point of the arc. Click in the active window or enter coordinates in the promptline to specify the start point. Next, you will be prompted to specify the endpoint of the arc. Specify the endpoint of the arc; the concentric arc will be created, as shown in Figure 2-27.

To set the parameters of the **Concentric arc** tool, double-click on the **Concentric arc** tool; the **Concentric Arc Options** dialog box will be displayed. The options in this dialog box are the same as those discussed in the **Arc (three point)** tool.

Figure 2-26 *Arc tangent to the line*

Figure 2-27 *Concentric arc*

Creating a Line Tangent to a Curve

Palette: Curves > Keypoint Curve Toolbox > Line tangent to curve

You can create a line tangent to an existing curve by using the **Line tangent to curve** tool. To draw a line tangent to a curve using this tool, choose the **Line tangent to curve** tool from the **Keypoint Curve Toolbox**; you will be prompted to specify the start point of the line. Click in the active window or enter the coordinates in the promptline to specify the start point of the line. Next, you will be prompted to select the curve to which

the line will be tangent. Select the existing curve from the active window; the line tangent to a curve will be created, as shown in Figure 2-28. If this line does not find any tangent, a prompt will be displayed showing the error message as well as the instruction to select the curve to which the line will be tangent. If there are more than one tangent, the line will be created to the nearest tangent.

Creating a Line Tangent from/to Curves

Palette:	Curves > Keypoint Curve Toolbox > Line tangent to curve >
	Line tangent from/to curves

You can create a line that is tangent to the two existing curves by using the **Line tangent from/to curves** tool. To invoke the **Line tangent from/to curves** tool, press and hold the left mouse button on the **Line tangent to curve** tool from the **Keypoint Curve Toolbox**; a flyout will be displayed. Choose the **Line tangent from/to curves** tool from this flyout; you will be prompted to select the curve from which the tangent line should start. Select one of the existing curves in the active window; you will be prompted to select the curve at which the tangent line should end. Select the second existing curve from the active window; a line tangent to the two selected curves will be created, as shown in Figure 2-29. If this line does not find any tangent, a prompt will be displayed showing the error message as well as the instruction to select the curve to which the line will be tangent. If there are more than one tangent, the line will be created at the nearest tangent.

Tip: *If there are two circles or circular arcs, then two possible tangent lines can be created. In such a case, you can click at the quadrant where you need to create a tangent line.*
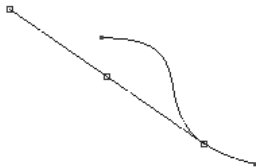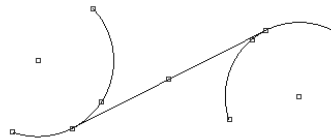
Figure 2-28 *Line tangent to curve*   **Figure 2-29** *Line tangent to two curves*

Creating a Line Perpendicular to a Curve

Palette:	Curves > Keypoint Curve Toolbox > Line tangent to curve >
	Line perpendicular

You can create a line perpendicular to an existing curve by using the **Line perpendicular** tool. The line is drawn perpendicular in such a way that it is normal to the apparent tangent of the curve. Choose the **Line perpendicular** tool from the **Keypoint Curve Toolbox**; you will be prompted to select the curve or the surface to which the line will be perpendicular. Also, six buttons namely, **True**, **Projected**, **From Curve**, **To Curve**, **Next**, and **Change Settings** will be displayed at the bottom of the active window. Select the curve or the

surface; you will be prompted to define the endpoint of the perpendicular line. Click at the required position on the active window; a line perpendicular to the curve will be created, as shown in Figure 2-30. Next, you will be prompted to change the length of the perpendicular line either by modifying the position of the points or by entering the length in the promptline. Modify the length by dragging the line or entering the value at the promptline. To create a new perpendicular line, choose the **Next** button from bottom of the active window.

You can create a line perpendicular to or from a curve with true or projected length. By default, the line created will be perpendicular to the curve in 3D space (as viewed from **Perspective** window). To change the default settings, choose the **Change Settings** button; all buttons will get activated and you can specify the new settings by choosing the required buttons. If you choose the **Projected** button from the active window, the line created will be perpendicular to the selected curve in the active orthographic window. With the **From Curve** button chosen, the start point of the perpendicular line will lie on the curve. If you choose the **To Curve** button, the endpoint of the perpendicular line will lie on the curve.

To set the parameters of the **Line perpendicular** tool, double-click on the **Line perpendicular** tool; the **Line Perpendicular Options** dialog box will be displayed, as shown in Figure 2-31.

The options in this dialog box are discussed next.

Degree
This edit box is used to specify the degree of the perpendicular line. The range of the degree is from 1 to 7. You can also change the degree of the arc by using the slider bar given on the right of this edit box.
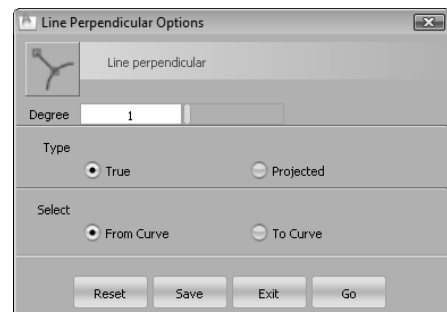
Type
This area can be used to specify the type of perpendicular line that will be created. The radio buttons in this area are discussed next.

True
This radio button is selected by default and creates a line perpendicular to the selected curve in 3D space (as viewed from **Perspective** window). When you specify the endpoint of the perpendicular line, the letter T will be displayed along with the length of the line momentarily.
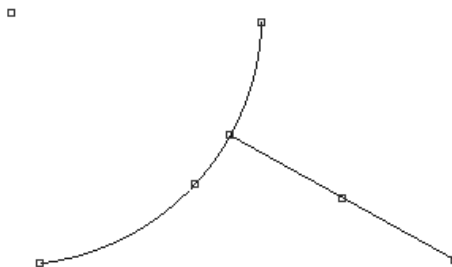
Figure 2-30 Line perpendicular to a curve

*Figure 2-31 The **Line Perpendicular** Options dialog box*

Projected

Select this radio button to create a line perpendicular to the selected curve in the active orthographic window.

Note

The true and projected length of the perpendicular lines can be distinguished by checking the prefixes that will be displayed along with the length when you specify its endpoint.

Select

This area can be used to specify whether the line will start from the curve or end at the curve. The radio buttons in this area are discussed next.

From Curve

This radio button is selected by default and creates the line perpendicular to the curve such that its start point lies on the curve. In this case, you need to specify the endpoint at any location in the active window.

To Curve

Select this radio button to create the perpendicular line such that the endpoint of the perpendicular line will lie on the curve. In this case, you need to specify the start point at any location in the active window.

Creating Linearcs

Palette: Curves > Keypoint Curve Toolbox > Line-arc

In Alias, you can create a set of alternate lines and arcs tangent to it. To create a set of alternate lines and tangent arcs, choose the **Line-arc** tool from the **Keypoint Curve Toolbox**; you will be prompted to specify the start point of the linearc. Click in the active window or enter the coordinates in the promptline; you will be prompted to specify the endpoint of the line. Specify the endpoint of the line; you will be prompted to specify the endpoint of the arc. Click in the active window or enter coordinates in the promptline. Repeat the process to   create a linearc, as shown in Figure 2-32. Note that the endpoint of the line becomes the start point of the arc.
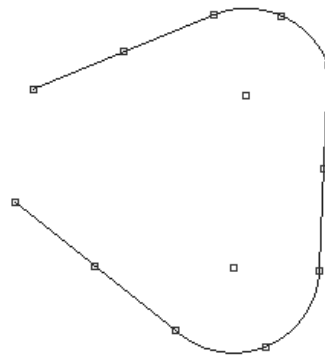
Figure 2-32 Linearc

You can specify the endpoint of the linearc in three different ways by using the three mouse buttons. Click in the active window with the middle mouse button to specify the endpoint of the line; the endpoint will be placed horizontally with respect to the previous point. If you specify the endpoint with the right mouse button, the endpoint will be placed vertically with respect to the previous point. If you specify the endpoint with the left mouse button, the

endpoint will be placed freely. Specify the endpoint of the arc in a way similar to the endpoint of the line. While specifying the endpoint of the line or the arc, drag the endpoint to display the dimension of the corresponding curve. Also, dragging the endpoint of the line or the arc changes the dimension of the corresponding curve.

Note
The arc segment always projects forward from the previous line. This type of arc is known as the convex arc. The concave arc is an arc that projects backward. To create a concave arc, you need to edit the convex curve, about which you will learn in the later chapters. Also, if you want to create the same type of segment as the previous one, double-click when specifying the endpoint of the segment.

Creating Text

Palette: Curves > Text

You can create text in the active window by using the **Text** tool. To do so, choose the **Text** tool from the **Curves** tab in the **Palette**. Next, click in the active window to specify the start point of the text string; an arrowhead defining the start point will be displayed in the active window. Also, you will be prompted to enter the text string. Enter the text in the promptline; the text will be

Figure 2-33 Text created in the active window

created. This text acts as a single object, but it consists of a string of characters. You can separate characters from the text string into individual objects by ungrouping the text. You can also create multiple strings of text in the active window. To exit the **Text** tool, choose the **Pick object** tool from the **Pick** tab in the **Palette**. You can create surfaces from the text by using the **Set planar** tool, which will be discussed in Chapter 3. Figure 2-33 shows the text created in the active window.

Tip: *To ungroup the characters of a string, select the string and then choose **Edit > Ungroup** from the menu bar; the characters of the string will behave as individual objects. An individual character may consist of more than one curve. You can ungroup the characters in a way similar to the text string.*

To set the parameters of the **Text** tool, double-click on the **Text** tool; the **Text Options** dialog box will be displayed, as shown in Figure 2-34.

The options in the **Text Options** dialog box are discussed next.

Font
The **Font** area can be used to specify the font that is used to create text. By default, the **Arial** font is displayed in the **Font Name** display box. You can change font by choosing the required font from the font list given below the **Font Name** display box. Scroll down the font list to view all fonts. Note that the new settings will be applicable only to new entries.

Other Attributes

This area is used to specify the attributes such as the style and size of the text. The options in this area are discussed next.

Style

Press and hold the left mouse button on the **Regular** button located on the right of the **Style** area to display a flyout with four styles: **Bold**, **Bold Italic**, **Italic**, and **Regular**. The font styles will change with respect to the font selected in the font list.

Point Size

The **Point Size** edit box is used to specify the size of the text. By default, 24 is displayed in this edit box. You can change the text size by entering the new value in this edit box. You can also change the text size by using the slider bar given on the right of this edit box.
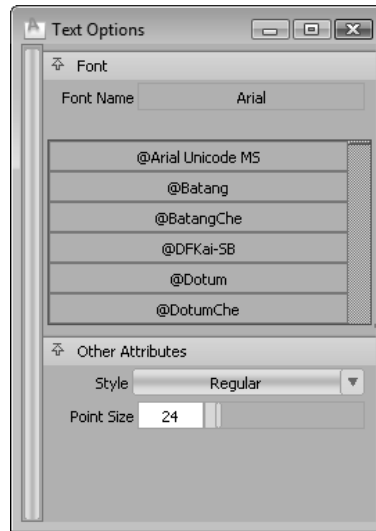
*Figure 2-34 The **Text Options** dialog box*

FEATURES OF A CURVE

Alias Design provides you with various tools to create a curve. Before creating curves, you need to know about the features that are associated with the curves. The features of a curve play an important role in its editing, modification, transformation, inspection, and so on. The features of a curve are discussed next.

Control Vertices

Control vertices (CVs) are the points in 3D space that define and control the creation of curves. You can edit curves by changing the position of their control vertices (CVs). The CVs of a curve at different points are indicated by different symbols. The first CV is indicated by a 'box' symbol; the second CV by 'u' symbol; and the other CVs by 'x' symbol, as shown in Figure 2-35.
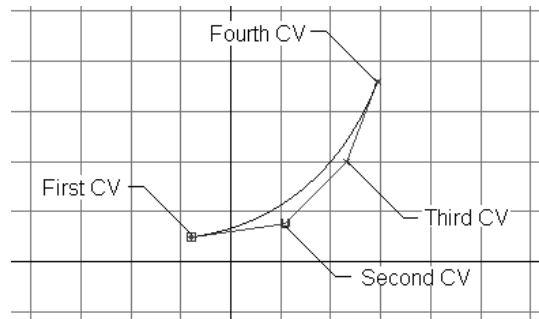
Figure 2-35 Curve with different CV symbols

Edit Points

The edit points allow you to create and edit curves. These edit points also determine the number of spans in a curve. The span is the length of the curve segment between two edit points. You can increase or decrease the number of edit points in a curve. Figure 2-36 shows the edit point of a curve.

Hulls

The lines joining the CVs of a curve are called hulls. The necessity of hulls arises when you increase the number of edit points and spans. Figure 2-37 shows the hull of a curve.

Note

*1. You can change the symbol of the CVs and the edit points of a curve by choosing the box icon given on the right of the **Draw Style** option. The **Draw Style** option can be invoked by choosing **ObjectDisplay > Draw Style** from the menu bar.*

2. While editing the curves with the edit points, the editing tool starts searching the new curve through which the edit points will pass. The calculations that are done to find the curve consume a lot of time. So, editing the curves with the edit points should be restricted to simple curves only.

CREATING CURVES

In Alias Design, you can create different types of curves using the tools in the **Curves** tab of the **Palette**. The methods of creating the curves are discussed next.
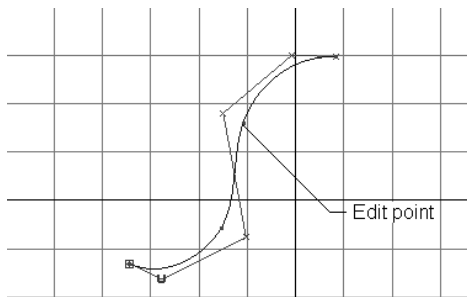
Figure 2-36 Edit point of a curve   *Figure 2-37 Hull of a curve*

Creating a Circle

Palette: Curves > Circle

To create a circle, choose the **Circle** tool from the **Curves** tab in the **Palette**; you will be prompted to specify the new circle position. Click in the active window; a circle will be created.

To set the parameters of the **Circle** tool, double-click on the **Circle** tool; the **Circle Options** dialog box will be displayed, as shown in Figure 2-38.

The options in the **Circle Options** dialog box are discussed next.

*Figure 2-38 The **Circle Options** dialog box*

Periodic Circle

This check box is selected by default and is used to create a circle with closed curves. The closed curves are periodic or cyclic in nature. In other words, the first and the last CVs of the circle overlap. If you clear this check box, a circle with open curves will be
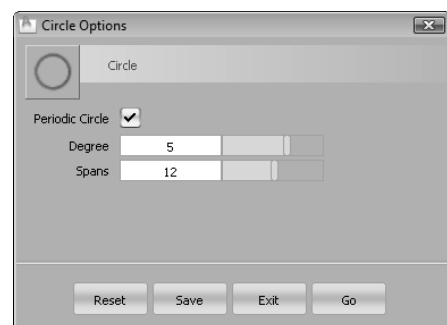
created. In this case, the first and the last CVs of this circle will only touch each other. There will be no overlapping of the spans.

Degree
The **Degree** edit box is used to specify the degree of the NURBS circle. By default, the **5** is displayed in the edit box.

Sweep Angle
This edit box will be available only when you clear the **Periodic Circle** check box. The sweep angle defines the degree of rotation of the circle around its center. Enter the sweep angle of the circle in the **Sweep Angle** edit box.
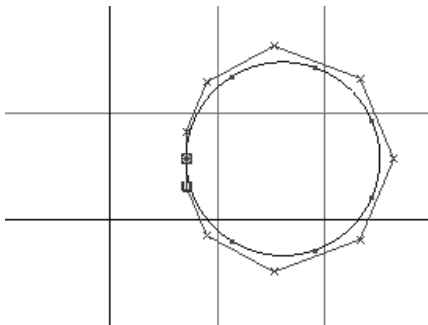
Spans
This edit box is used to specify the number of spans of the open curve circle. The range of arc degree is from 1 to 14. You can also change the arc degree by using the slider bar given on the right of the **Spans** edit box. Figure 2-39 shows a circle drawn with the values **4** and **7** entered in the **Degree** and **Spans** edit boxes, respectively. Figure 2-40 shows a circle drawn with the values of **250**, **5**, and **7** entered in the **Sweep Angle**, **Degree**, and **Spans** edit boxes, respectively.
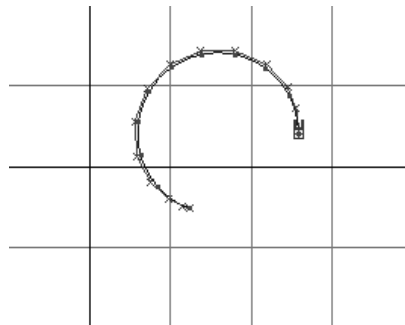
> **Note**
> *When you click in the active window to specify the position of the circle, a manipulator will be displayed at the center of the circle. The manipulator will be discussed in the later chapters.*

*Figure 2-39 Circle drawn with the values **4** and **7** entered in the **Degree** and **Spans** edit boxes, respectively*

*Figure 2-40 Circle drawn with the values **250**, **5**, and **7** entered in the **Sweep Angle**, **Degree**, and **Spans** edit boxes, respectively*
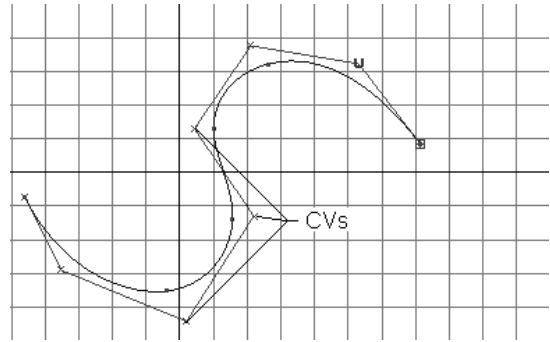
Creating a CV Curve

Palette: Curves > New Curves > New CV curve

A curve created by defining specific points that do not lie on the curve is known as CV curve. The specific points on a CV curve act as control vertices for the curve. To create a CV curve, choose the **New CV curve** tool from the **New Curves** flyout of the **Curves** tab in the **Palette**; you will be prompted to enter the new position of the CV. Click at the required location in the active window or enter the coordinates in the promptline to

specify the position of the first CV; the CV will be placed in the active window. Next, you will be prompted again to specify the new position of the CV. Click in the active window or enter coordinates in the promptline to specify the new position. Similarly, specify other points to create the curve, as shown in Figure 2-41.

To set the parameters of the **New CV curve** tool, double-click on the **New CV curve** tool; the **New CV Curve Options** dialog box will be displayed, as shown in Figure 2-42.

Figure 2-41 *Curve created using the **New CV curve** tool*

The options in the **New CV Curve Options** dialog box are discussed next.
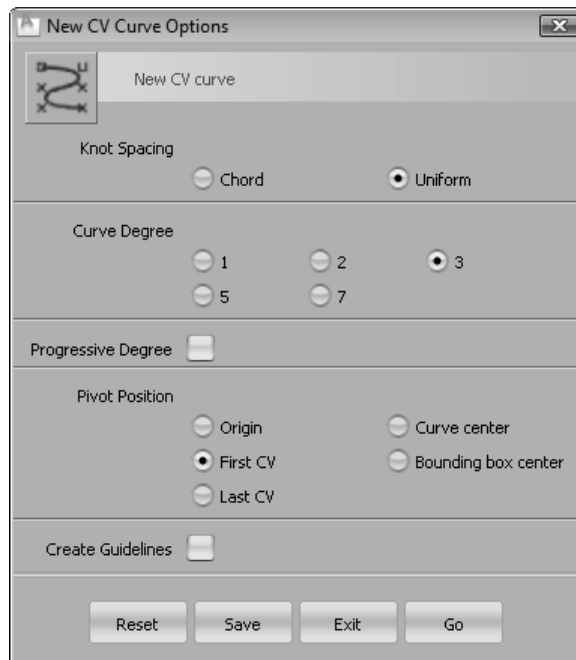
Figure 2-42 *The **New CV Curve Options** dialog box*

Knot Spacing

The **Knot Spacing** area is used to specify the parameters for the edit points. The two radio buttons in the **Knot Spacing** area are discussed next.

Chord

Select this radio button to create the curve such that the edit points are parameterized by the chord length, that is, the cumulative distance between the two edit points. The

starting point parameter value will be 0 and the endpoint parameter value of the curve will be equal to the chord length of the curve.

Uniform
This radio button is selected by default. With this option, the edit points of the curve will have the parameter value in the integer system. The first edit point parameter value will be 0 and the next edit point parameter value will be equal to 1 and so on.

Curve Degree
The **Curve Degree** area is used to specify the degree of the curve. The curve created will satisfy the linear, quadratic, cubic, and other equations depending on the radio button selected. There are five radio buttons in this area, **1**, **2**, **3**, **5**, and **7**. The curve of degree of 1, 2, or 3 will create linear, quadratic, or cubic curves, respectively. By default, the **3** radio button is selected.

Progressive Degree
If the degree of a curve is 'n', you need to specify 'n+1' CVs to display the curve. If you select the **Progressive Degree** check box, the curve will be displayed after specifying the second CV irrespective of the degree of the curve. With this check box selected, you can view the degree and span changing in the **Control Panel**. However, the degree of the curve will increase up to the curve degree specified in the **New CV Curve Options** dialog box.

Pivot Position
This area is used to specify the position of the pivot points (rotation and scaling pivots) on the drawn curve. The radio buttons in this area are discussed next.

Origin
This radio button is selected to position the pivot points at the origin (0,0,0).

Curve center
This radio button is selected to position the pivot points at the center of the curve being drawn.

First CV
This radio button is selected by default. As a result, the pivot points will be positioned at the first CV.

Bounding box center
This radio button is selected to position the pivot points at the center of the bounding box of the curve being drawn.

Last CV
This radio button is selected to position the pivot points at the last CV of the curve being drawn.

Create Guidelines

This check box allows you to create two guidelines perpendicular to each other every time you place a CV. Make sure the display of guidelines is turned on. You can do so by choosing **WindowDisplay > Toggles > Guidelines** from the menu bar.

Note
*You can change the number of guidelines displayed by using the **General Preferences** dialog box that has been discussed in Chapter 1.*

Creating an Edit Point Curve

Palette: Curves > New Curves > New CV curve > New Edit Point curve

A curve created by defining specific points, which lie on the curve, is known as an edit point curve. These specific points on an edit point curve are known as edit points. To create an edit point curve, hold the left mouse button on the **New CV curve** tool from the **New Curve** flyout of the **Curves** tab in the **Palette**; a flyout will be displayed. Next, choose the **New Edit Point curve** tool from the flyout; you will be prompted to enter the position of the edit point. Click anywhere in the active window or enter coordinates in the promptline to specify the position of the first edit point; the edit point will be placed in the active window. You will be prompted again to specify the new edit point position. Click in the active window or enter coordinates in the promptline to specify the new edit point position. When you create a curve using the **New Edit Point Curve** tool, you can define spans and view the curve after specifying the second point. The curve created using the **New Edit Point curve** tool is shown in Figure 2-43.
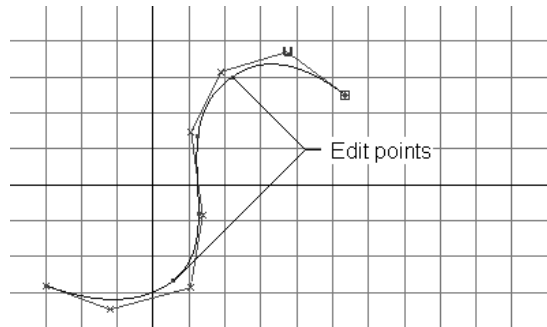
*Figure 2-43 Curve created using the **New Edit Point curve** tool*

To set the parameters of the **New Edit Point curve** tool, double-click on the **New Edit Point curve** tool; the **New Edit Point curve Options** dialog box will be displayed. The options in this dialog box are the same as explained earlier in the **New CV Curve Options** dialog box.

Creating a Freeform Curve

Palette: Curves > New Curve > New CV curve > New Sketch curve

In Alias Design, a curve can also be created without specifying the CVs or edit points. You can create a freeform curve by dragging the mouse. However, CVs and edit points will be created automatically. To create a freeform curve, choose the **New Sketch curve** tool from the **New Curve** flyout of the **New CV curve** tool in the **Curves** tab in the **Palette**; you will be prompted to sketch a curve. Press and hold the left mouse button and then drag the cursor in the active window; a freeform curve will be created.

To set the parameters of the **New Sketch curve** tool, double-click on the **New Sketch curve** tool; the **New Sketch Curve Options** dialog box will be displayed, as shown in Figure 2-44.

The **Curve Degree** option in this dialog box is the same as discussed earlier in the **New CV Curve Options** dialog box. The rest of the options in this dialog box are discussed next.
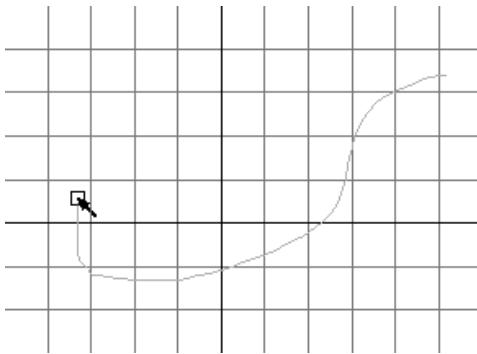

Figure 2-44 *The **New Sketch Curve Options** dialog box*

Tolerance

This edit box is used to specify the closeness of the curve created with the path defined by dragging the cursor. By default, 3 is displayed in this edit box. You can change this value by entering a new value in this edit box. Alternatively, you can change the tolerance by using the slider bar given on the right of this edit box.

Maximum Spans

This edit box is used to specify the number of spans for the sketched curve. The number of spans works in coordination with the degrees of the curve to decide the number of points that will be used to generate the curve.
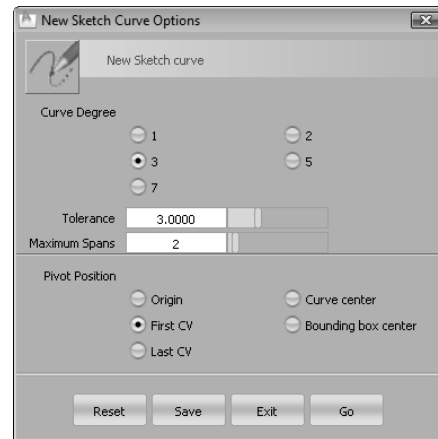
Figure 2-45 shows the path created by dragging the cursor and Figure 2-46 shows the curve created on this path.

Figure 2-45 *Path created by dragging the cursor*
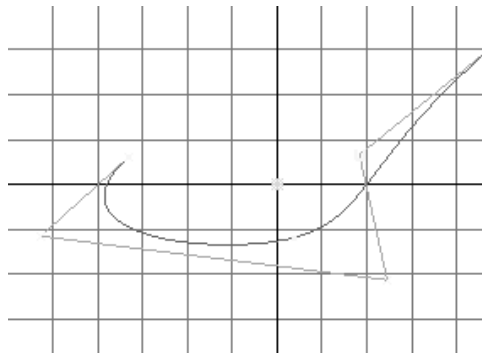
Figure 2-46 *Curve created on the path*

CREATING PRIMITIVES

The primitives are the building blocks that consist of a single surface or a group of surfaces. The primitive tools can be invoked from the **Surfaces** tab in the **Palette** or from the **Surface Tools** tab of the **Shelves** window. The primitives form the first tool of the **Surfaces** tab. There are six primitives in Alias. These are sphere, torus, cylinder, cone, cube, and plane, as

shown in Figure 2-47. Besides these, circle is also considered as a primitive. The procedure of creating a circle primitive has already been discussed and the procedure of creating rest of the primitives are discussed next.

*Figure 2-47 The **Primitives** flyout of the **Surfaces** tab*

Creating a Sphere

**Palette:**   Surfaces > Primitives > Sphere

To create a sphere, choose the **Sphere** tool from the **Primitives** flyout of the **Surfaces** tab in the **Palette**; you will be prompted to specify the position of the sphere. Click in the active window; a sphere will be created, as shown in Figure 2-48. To set the parameters of the **Sphere** tool, double-click on the **Sphere** tool; the **Sphere Options** dialog box will be displayed, as shown in Figure 2-49. The options in the **Sphere Options** dialog box are discussed next.

Sphere Type
The **Sphere Type** area enables you to select the type of sphere. The radio buttons in this area are **Surface**, **Shell Tennis ball**, and **Shell No-Pole**. The **Surface** radio button is selected by default. When you select the **Shell Tennis ball** radio button, the sphere with the tennis ball profile will be created, as shown in Figure 2-50. Select the **Shell No-Pole** radio button to create a sphere without poles, as shown in Figure 2-51.
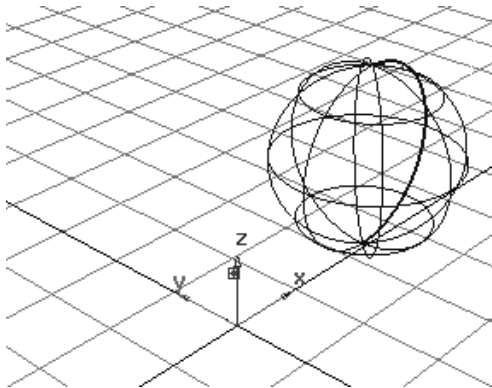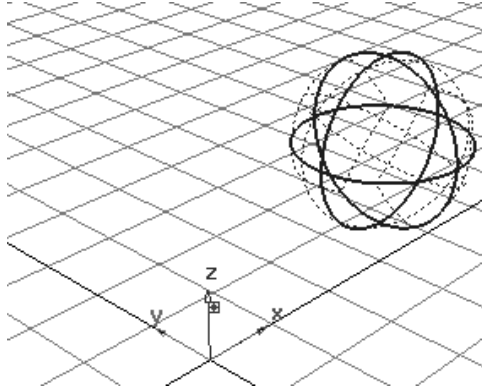

*Figure 2-48 Sphere placed in the **Perspective** window*
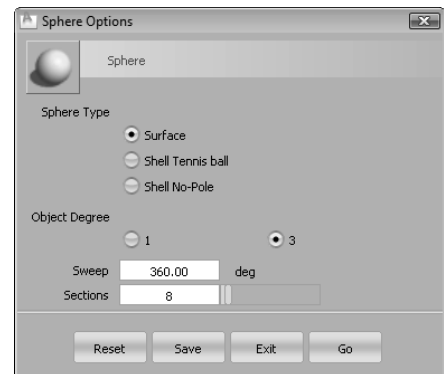
*Figure 2-49 The **Sphere Options** dialog box*
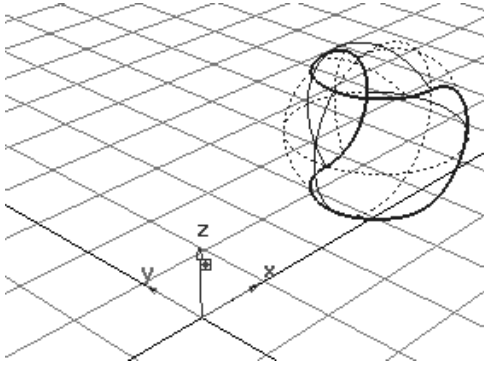
*Figure 2-50 Shell tennis ball sphere placed in the **Perspective** window*

*Figure 2-51 Shell no-pole sphere placed in the **Perspective** window*
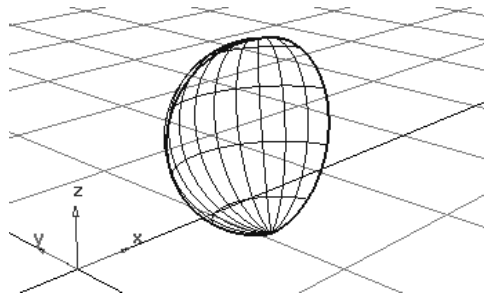
Object Degree

The **Object Degree** area is used to select the degrees of the sphere. By default, the **3** radio button is selected. As a result, a sphere with smooth profile will be created. If you select the **1** radio button, a sphere with a rough profile will be created.

Sweep

You can enter the value of sweep angle of the sphere in the **Sweep** edit box.

Sections

The **Sections** edit box allows you to specify the number of sections in the sphere. You can also change the number of sections by using the slider bar given on right of the **Sections** edit box. Figure 2-52 shows the sphere with a sweep angle of 150 degrees and 10 sections.

Note

*The **Object Degree**, **Sweep**, and **Sections** areas will be available only when you select the **Surface** radio button in the **Sphere Type** area.*

Figure 2-52 Sphere with a sweep angle of 150 degrees and 10 sections

Creating a Torus

**Palette:**   Surfaces > Primitives > Torus

To create a torus, choose the **Torus** tool from the **Primitives** flyout of the **Surfaces** tab in the **Pallete**; you will be prompted to specify the position of the torus. Click in the active window; a torus will be created, as shown in Figure 2-53.

To set the parameters of the **Torus** tool, double-click on the **Torus** tool; the **New Torus Options** dialog box will be displayed, as shown in Figure 2-54. The options in the **New Torus Options** dialog box are discussed next.
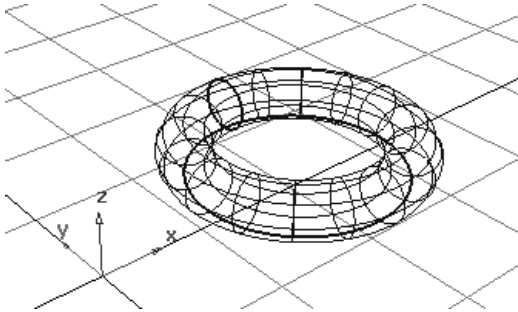
Figure 2-53 *Torus placed in the **Perspective** window*
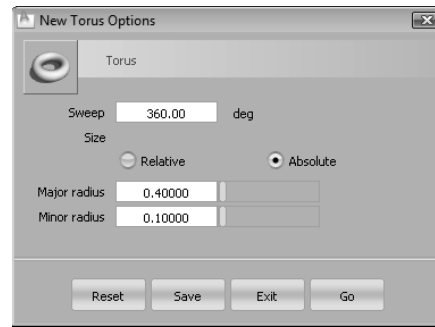
Figure 2-54 *The **New Torus Options** dialog box*

Sweep
You can enter the sweep angle for the torus in the **Sweep** edit box.

Size
This area enables you to specify the size of the torus. The radio buttons available in this area are discussed next.

Absolute
This radio button is selected by default. With this radio button selected, two edit boxes will be available that are discussed next.

Major radius
This edit box is used to enter the value of the major radius of the torus. The major radius is the distance between the center and the neutral axis of the torus. You can change the major radius by using the slider bar given on the right of the **Major radius** edit box.

Minor radius
This edit box is used to enter the value of the minor radius of the torus. The minor radius is the radius of the cross-section of the torus. You can change the minor radius by using the slider bar given on the right of the **Minor radius** edit box.

Relative

If you select this radio button, the **Ring thickness** edit box will be displayed in the dialog box, as shown in Figure 2-55.

Ring thickness

This edit box is used to enter the ring thickness of the torus. The ring thickness is the ratio of the diameter of the cross-section to the diameter of the torus. You can change the value of the ring thickness by using the slider bar given on the right of the **Ring thickness** edit box. The ring thickness value varies from 0.00001 to 0.5. If the value is 0.5, the torus will be displayed without a hole at the center.
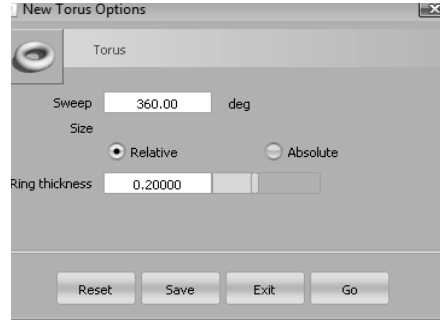
*Figure 2-55 The **New Torus Options** dialog box with the **Relative** radio button selected*

Note

*When you work on a tool, the options in the **Control Panel** change depending upon the tool being used.*

Creating a Cylinder

**Palette:**   Surfaces > Sphere > Cylinder

To create a cylinder, choose the **Cylinder** tool from the **Primitives** flyout of the **Surfaces** tab in the **Pallete**; you will be prompted to specify the cylinder position. Click in the active window; a cylinder will be created, as shown in Figure 2-56.

To set the parameters of the **Cylinder** tool, double-click on the **Cylinder** tool; the **Cylinder Options** dialog box will be displayed, as shown in Figure 2-57.
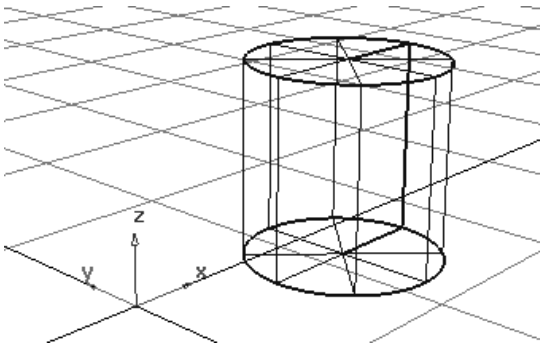
*Figure 2-56 Cylinder created in the **Perspective** window*
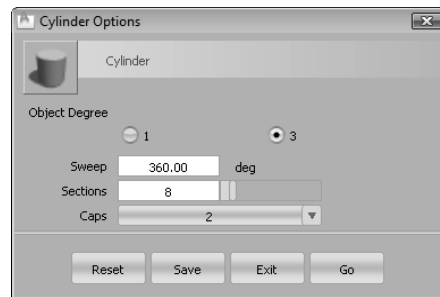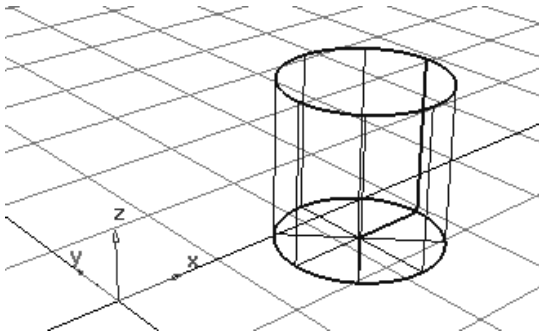

*Figure 2-57   The **Cylinder Options** dialog box*

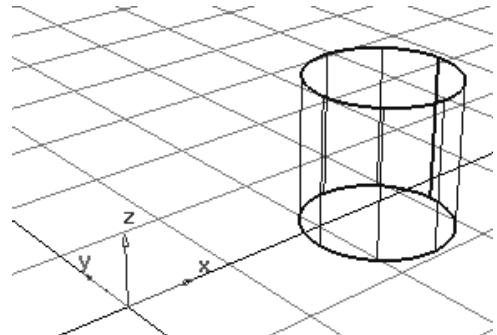The options in the **Cylinder Options** dialog box are discussed next.

Object Degree

This area is used to specify the degrees of the cylinder.

Caps

The **Caps** drop-down list is used to specify the number of caps or faces that will close a cylinder. Choose the **2** option from this drop-down list to create a cylinder with both ends closed, refer to Figure 2-56. Choose the **1** option from this drop-down to create a cylinder with one end closed, as shown in Figure 2-58. Choose the **0** option from this drop-down list to create a cylinder with both ends opened, as shown in Figure 2-59.

Figure 2-58 Cylinder with a cap at the base

Figure 2-59 Cylinder with no caps at the ends

The other options in the dialog box are the same as discussed in the **Sphere Options** dialog box.
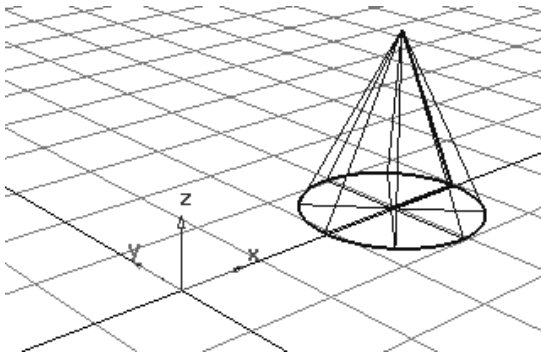
Creating a Cone

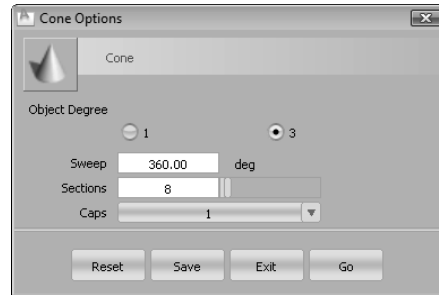| Palette:	Surfaces > Primitives > Cone

To create a cone, choose the **Cone** tool from the **Primitives** flyout of the **Surfaces** tab in the **Pallete**; you will be prompted to specify the position of the cone. Click in the active window; a cone will be created, as shown in Figure 2-60.

To set the parameters of the **Cone** tool, double-click on the **Cone** tool; the **Cone Options** dialog box will be displayed, as shown in Figure 2-61.

The options in this dialog box are the same as those discussed in the **Cylinder Options** dialog box. By default, the **1** option is chosen in the **Caps** drop-down. Consequently, the cone with the closed base will be placed in the active window, as shown in Figure 2-60. If you choose the **0** option from this drop-down list, the cone with the opened base will be placed in the active window.

Figure 2-60 *Cone with the closed base created in the **Perspective** window*

Figure 2-61 *The **Cone Options** dialog box*

Creating a Cube

Palette: Surfaces > Primitives > Cube

To create a cube, choose the **Cube** tool from the **Primitives** flyout of the **Surfaces** tab in the **Pallete**; you will be prompted to enter the new position of the cone. Click at the required location to specify the point or enter coordinates in the promptline; a cube will be created in the window, as shown in Figure 2-62.

To set the parameters of the **Cube** tool, double-click on the **Cube** tool; the **Cube Options** dialog box will be displayed, as shown in Figure 2-63. The options in this dialog box are the same as those discussed earlier in the **Cylinder Options** dialog box.
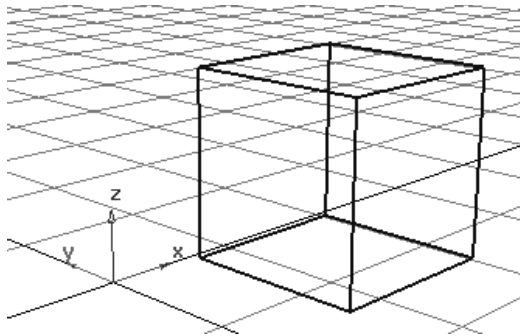
Figure 2-62 *Cube created in the **Perspective** window*

Figure 2-63 *The **Cube Options** dialog box*

Creating a Plane

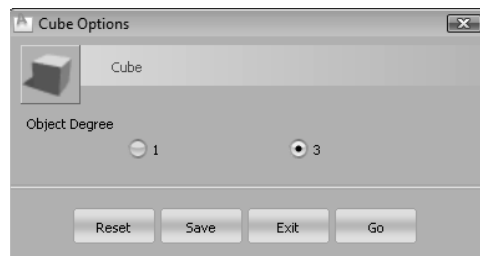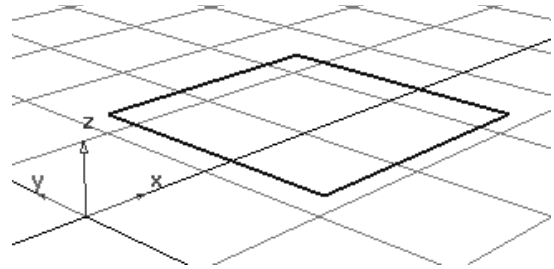**Palette:** Surfaces > Primitives > Plane

The **Plane** tool is used to create a square NURBS surface. When you invoke this tool from the **Primitives** flyout of the **Surfaces** tab in the **Palette**, you will be prompted to enter the new position of plane. Click in the active window; a plane will be created in the window at the specified location, as shown in Figure 2-64.

*Figure 2-64   Plane created in the **Perspective** window*

To set the parameters of the **Plane** tool, double-click on the **Plane** tool; the **Plane Options** dialog box will be displayed. The options in the dialog box are the same as those discussed earlier in the **Cylinder Options** dialog box.

PICK TOOLS

Picking and unpicking of objects play an important role in modeling and editing in Alias Design. The tools in the **Pick** tab are used to select an entity or exit an active tool. There are different tools to pick and unpick specific components from the active window. You can pick an object by clicking on it or by dragging a pick box around it after choosing the required pick tool from the **Pick** tab. The different pick tools are discussed next.

Picking Objects

Palette: Pick > Pick object

You can select an entity drawn in the active window. To do so, choose the **Pick object** tool from the **Pick** tab in the **Palette**; you will be prompted to use the mouse or to enter the name of the item to pick. To pick an object, left-click on the particular entity; the picked object will be highlighted. Alternatively, drag the mouse to define a pick box around the objects to be picked; the objects lying inside and crossing the pick box will be selected.

To set the parameters of the **Pick object** tool, double-click on the **Pick object** tool; the **Pick Object Options** dialog box will be displayed, as shown in Figure 2-65.

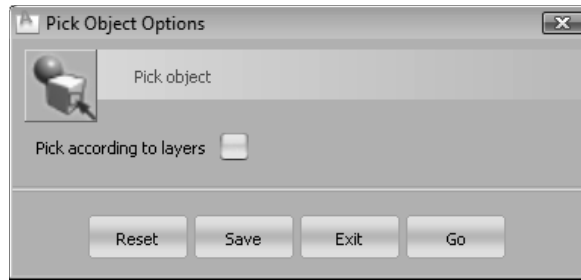The option in this dialog box is discussed next.

*Figure 2-65 The **Pick Object Options** dialog box*

Pick according to layers

The use of the **Pick according to layers** check box is significant in the case of grouped objects. The grouping of objects will be discussed in detail in Chapter 5. To view the usage of this check box, group some objects and then assign the individual groups to different layers. Set some layers to inactive state. With the **Pick according to layers** check box selected, you can select the active layer objects individually from the active window but you cannot pick the inactive layer objects. If you clear this check box, you can select the whole group. However, you cannot select the active layer objects individually. This check box behaves in the same way as the reference layers.

Note

*You can also invoke some pick tools from the **Marking menus** that was discussed in the previous chapter.*

Tip: *To analyze the significance of the **Pick according to layers** check box, select some objects and then choose **Edit > Group** from the menu bar. You need to group these objects under a single node and assign different objects to different layers. Next, press and hold the left mouse button on any layer from the layer bar; a flyout will be displayed. From this flyout, choose **Set state > Inactive**; the layer chosen will get inactivated. Similarly, set some more layers to the inactive state.*

Picking Components

Palette: Pick > Pick component

You can pick the components individually by using the **Pick component** tool. An object consists of many components. For example, a cube has six faces. To pick a single entity, invoke the **Pick component** tool from the **Palette** and select the required entity from the model in the active window; the selected entity will be highlighted. On invoking the **Pick component** tool, the component filter
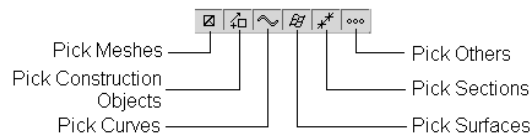

Figure 2-66 The component filter buttons

tools will be displayed on the left of the promptline history, as shown in Figure 2-66. By default, all filter tools are displayed in active mode, indicating that all these components can be picked.

If you do not want to pick a particular component, choose the corresponding filter tool. While picking a component from a set of multiple components, the **Pick chooser** menu is displayed. The **Pick chooser** menu lists all the components near the selection point. Choose the required component from it.

To set the parameters of the **Pick component** tool, double-click on the **Pick component** tool; the **Pick Component Options** dialog box will be displayed, as shown in Figure 2-67. The options in this dialog box are discussed next.

All
The **All** area is used to select or clear all the components of an object. The radio buttons in this area are discussed next.

On
This radio button is selected by default and all component check boxes will be selected. As a result, all the components of an object can be picked.

Off
Select the **Off** radio button to deselect all the components of an object. After clearing all the check boxes, you can manually select the individual check boxes to pick the components.

Curves
This check box is selected by default and is used to pick curves from an object.

Surfaces
This check box is used to pick surfaces from an object.

Meshes
This check box is used to pick meshed components from an object.

Sections
This check box is used to pick sectioned components from an object.
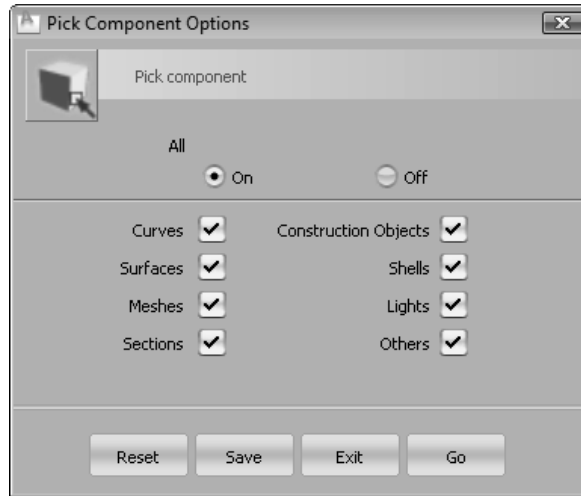
Construction Objects
This check box is used to pick the construction objects such as points, vectors, construction planes, and so on from an object.

Shells
This check box is used to pick shelled components from an object.

Lights
This check box is used to pick lights from an object.

*Figure 2-67 The **Pick Component Options** dialog box*

Others

This check box is used to pick the components such as camera, textures, and so on from the object.

Note

You will learn more about the meshes, sections, construction objects, shells, and other components in the later chapters.

Picking Templates

Palette: Pick > Pick template

The **Pick template** tool is used to pick a template from the active window. If you do not want some objects to be modified while modifying other objects, convert them into templates. You can convert selected objects into templates by choosing **ObjectDisplay > Template** from the menu bar. The templates are displayed in gray color, and when picked, the color changes to pink.

Picking Edit Points

Palette: Pick > Pick edit point

A curve or a surface consists of number of edit points. The **Pick edit point** tool is used to pick the edit points of a curve, surface, and so on. Choose the **Pick edit point** tool from the **Pick** tab in the **Palette** and then select the required edit point; the picked edit point will be highlighted in yellow in the window.

To set the parameters of the **Pick edit point** tool, double-click on the **Pick edit point** tool; the **Pick Edit Point Options** dialog box will be displayed, as shown in Figure 2-68. The option in this dialog box is discussed next.

Use Lasso

A lasso is a freeform curve that is drawn by dragging the mouse. Select the **Use Lasso** check box and draw a freeform curve using the left mouse button around the CVs that you need to pick. Note that you cannot pick the edit point by clicking on it if the **Use Lasso** check box is selected. If you clear this check box, you can pick the component by clicking on it or dragging a box around it.
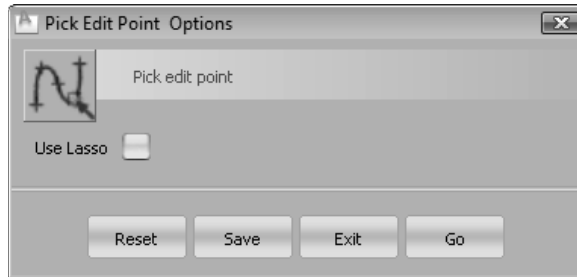
*Figure 2-68 The **Pick Edit Point Options** dialog box*

Picking CVs

Palette: Pick > Pick CV

The control vertices are displayed on the hull of the curves and the surfaces. The **Pick CV** tool is used to pick the control vertices of the curves, surfaces, and other components of a model. To pick the CV, invoke the **Pick CV** tool and select the required CV from the active window; the picked CV will be highlighted in yellow in the window. To set the parameters of the **Pick CV** tool, double-click on the **Pick CV** tool; the **Pick CV Options** dialog box will be displayed. The **Use Lasso** option in this dialog box is the same as discussed in the **Pick Edit Point Options** dialog box.

Picking Hulls

Palette: Pick > Pick CV > Pick hull

You can pick lines connecting all CVs of a curve, surface, and so on by using the **Pick hull** tool. Choose the **Pick hull** tool from the **Pick** tab in the **Palette** and click on the hull; the picked hull will be highlighted in light brown in the active window. To view the hulls of a surface, select them from the window and then select the **CV/Hull** check box from the **Display** area of the **Control Panel**.
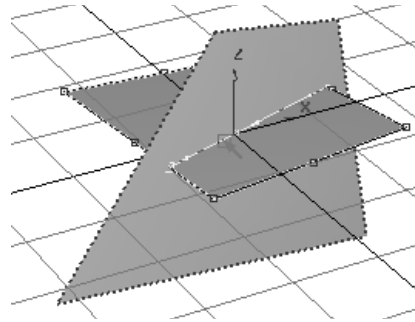
Picking Curves-on-surface

Palette: Pick > Pick curve-on-surface

The curve-on-surface is a curve that does not have any CV. You can create curves-on-surface by intersecting the two surfaces, by projecting a curve on a surface, or by using the **New curve-on-surface** tool from the **Curves** tab in the **Palette**. To pick these curves, choose the **Pick curve-on-surface** tool and select the curve-on-surface from the active window. This curve can be used to trim the surfaces. Figure 2-69 shows a curve-on-surface picked using the **Pick curve-on-surface** tool.

Note
*To create curve on a surface using the **New curve-on-surface** tool, first select the surface and then start creating the curve on it.*

Picking all Objects

Palette:	Pick > Pick curve-on-surface > Pick all obj/lights

You can select all objects from the active window by using the **Pick all obj/lights** tool. To do so, choose the **Pick all obj/**

*Figure 2-69 Curve-on-surface picked using the **Pick curve-on-surface** tool*

lights tool from the **Pick** tab in the **Palette**; all objects (curves, surfaces, lights, cameras, templates, meshes, shells, and so on) in the window will be selected automatically. The **Pick all obj/lights** tool will be available only in the **Default** workflow. To invoke this workflow, choose **Preferences > Workflows > Default** from the menu bar or press CTRL+1 keys.

Picking Objects by Shaders

Palette:	Pick > Pick curve-on-surface > Pick by Shader

You can also select the objects by using shaders. This is significant when you need to select/pick the objects that have been assigned the same shades. To assign different shades to the objects, first invoke the **Visualize** workflow by choosing **Preferences > Workflows > Visualize** from the menu bar or press CTRL+4 keys. Choose one of the tabs (**Metals**, **Glass**, **Fabric**, and so on) from the **Shader Library** area of the **Control Panel**; different shaders will be displayed. Double-click on the desired shader from the tab such that the shader gets displayed in the **Resident Shaders** tab of the **Control Panel**. Next, select the object from the window and then choose the **Assign Current Shader** tool from the **Control Panel**; the shader will be assigned to the selected object. Similarly, assign other shaders to other objects in the window and then invoke the **Modeling** workflow by choosing **Preferences > Workflows > Modeling** from the menu bar or by pressing CTRL+3 keys. To pick the object using the **Pick by shader** tool, first select the object with the desired shader and then choose the **Pick by shader** tool from the **Pick** tab in the **Palette**; all the objects having the same shader will be picked automatically. If you invoke this tool and then select the object with the required shader; all other objects with the same shader will be selected automatically.

Picking Locators

Palette:	Pick > Pick locator

The locators act as the reference points for measuring the dimensions, deviations, annotation, and so on. These locators can be created by using different locator tools from the **Locators** tab in the **Palette**. These locators can be assigned to different layers, and can be picked from the active window by using the **Pick locator** tool. You can pick annotation, dimension, and deviation locators using this tool. These locators will be discussed in the later chapters.

To set the parameters of the **Pick locator** tool, double-click on the **Pick locator** tool; the **Pick Locator Options** dialog box will be displayed, as shown in Figure 2-70. The options in this dialog box are discussed next.
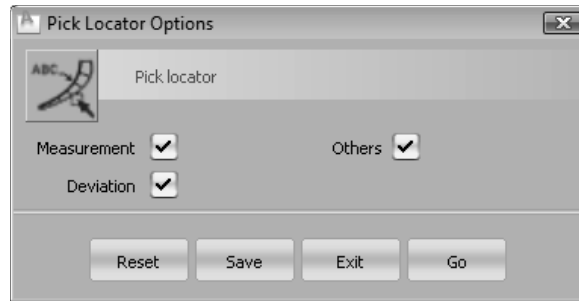

*Figure 2-70   The **Pick Locator Options** dialog box*

Measurement
This check box is selected by default and is used to pick the locators that measure distance, angle, radius, and diameter.

Deviation
This check box is also selected by default and is used to pick the locators that determine the close point deviation, deviation between curves, deviation between surfaces, deviations between a curve and a surface, and deviation between a mesh and a surface.

Others
This check box is also selected by default and is used to pick the locators that determine the arc length and the curvature of a curve.

Picking Visible Objects

Palette:	Pick > Pick Visible

You can use the **Pick Visible** tool to pick the surface that is hardware or diagnostic shaded. When the object is not shaded, this tool does not work. Select the shaded surface and then invoke the **Pick Visible** tool; the surface will get highlighted.

Unpicking Objects

Palette:	Pick > Pick nothing

Sometimes you may want to unpick an object that you no longer need. In such cases, you can use the **Pick nothing** tool to unpick the picked object. Choose the **Pick nothing** tool from the **Pick** tab in the **Palette**; the picked objects will be unpicked and the tool that was used before invoking the **Pick nothing** tool will be activated.

Note
*You can also unpick a picked object by selecting it again.*

TRANSFORM TOOLS

The transform tools are used to dynamically control the shape and development of the final model. The transform tools are available in the **Transform** tab of the **Palette**. The primary transform tools such as **Move**, **Rotate**, and **Scale** are also available in the **Shelves** window and the **Marking Menus**. You can use the transform tools freely in the orthographic window. In the **Perspective** window, you can use these tools normal to the X, Y, and Z-axes only. The various transform tools are discussed next.
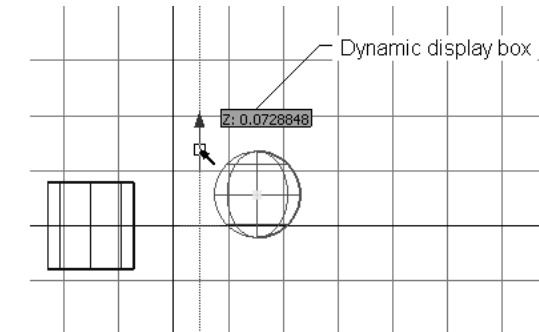
Moving an Object

Palette:	Transform > Move

You can dynamically move or translate an object to the desired position by using the **Move** tool. You can pick the object before or after invoking this tool. On invoking this tool, you will be prompted to specify the new position in relative or absolute units in the promptline. Enter the new position in the promptline or drag the object to move it dynamically to a new position. While moving the object in the **Perspective** window, the left, middle, and right mouse buttons are used to move the object in the X, Y, and Z directions, respectively. The dynamic display boxes showing the current position of the object in the corresponding direction will be displayed in all windows. This position keeps changing as you drag the cursor in the corresponding direction. In orthographic windows, these dynamic display boxes will be displayed only when you drag the cursor with the middle and the right mouse buttons. In orthographic windows, the left mouse button is used to move the object in desired direction, while the middle and right mouse buttons are used to move the object in horizontal and vertical directions, respectively. Figure 2-71 shows a cylinder and a sphere in the **Front** window and Figure 2-72 shows the sphere moved vertically upward in the same window.
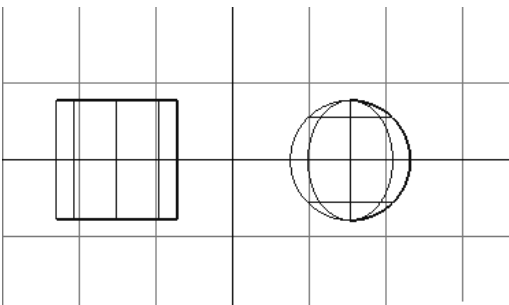
Figure 2-71 *A cylinder and a sphere in the* ***Front*** *window*

Figure 2-72 *Sphere moved vertically upward*

Note
While using a transform tool, keep the cursor away from the objects to prevent the selection of wrong entities.

Tip: *While moving an object, if you press the ALT key, the cursor will snap to the grids.*

To set the parameters of the **Move** tool, double-click on the **Move** tool; the **Move Options** dialog box will be displayed, as shown in Figure 2-73. The options in the **Move Options** dialog box are discussed next.

Type
This area is used to specify the coordinate system for moving an object. The two radio buttons in this area are discussed next.

Global
This radio button is selected by default and is used to move an object in the global X, Y, and Z coordinate system.

Local
Select this radio button to move an object in the local X, Y, and Z coordinate system. The local coordinate system of the object is located at its pivot point. If there are more than one object in the scene, you can move the selected object with respect to its local coordinate system. Figure 2-74 shows the circle moved with respect to its local coordinate system.
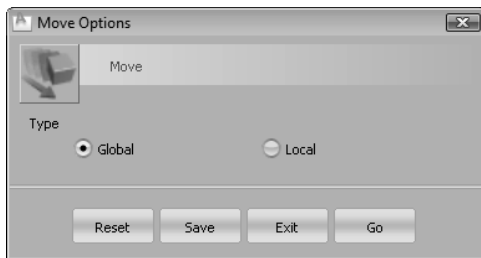

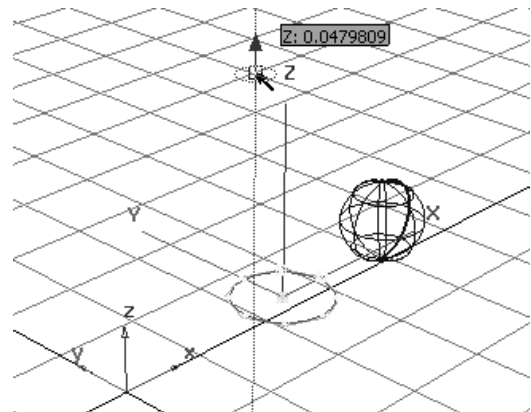*Figure 2-73 The **Move Options** dialog box*

*Figure 2-74 Circle moved in the local coordinate system*

Rotating Objects

**Palette:**   Transform > Rotate

You can rotate an object dynamically around the pivot point by using the **Rotate** tool. You can pick the object before or after invoking this tool. On invoking this tool, you will be prompted to specify the rotation angle. Enter the rotation angle in the promptline or rotate the object dynamically in the window. Use the left, middle, and right mouse buttons to rotate the object around the X, Y, and Z axes in any window, respectively.

Figure 2-75 shows a cube before rotation and Figure 2-76 shows the same cube rotated about the X-axis.
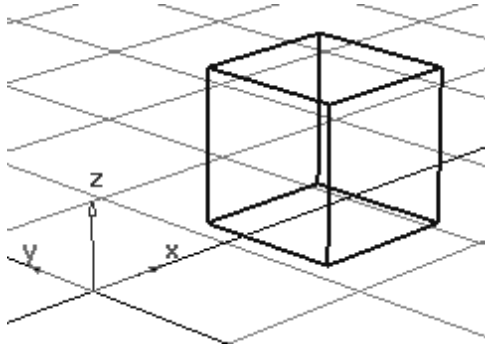
Figure 2-75 *Cube before rotation*
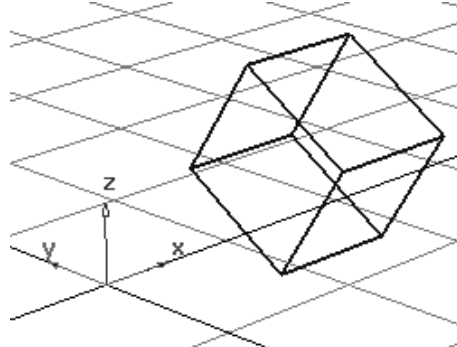
Figure 2-76 *Cube rotated about the X axis*

To set the parameters of the **Rotate** tool, double-click on the **Rotate** tool; the **Rotate Options** dialog box will be displayed, as shown in Figure 2-77.

The options in the **Rotate Options** dialog box are discussed next.

Type
This area is used to specify the type of coordinate system for rotating an object. The three radio buttons in this area are discussed next.

Figure 2-77 *The* **Rotate Options** *dialog box*

Global
This radio button is selected by default and is used to rotate the object by incrementing its Euler rotation angles. The Euler rotation angles are used to specify the orientation of the rigid bodies. In this type of rotation, the rotation is first done to Z, then to Y, and finally to X. In this way, the rotation about the X-axis depend on the rotation about the Y and Z axes.

Local
Select this radio button to rotate the object about the local X, Y, and Z coordinate system. The local coordinate system of the object is located at its pivot point. If there are more than one object in the window, you can rotate the selected object with respect to its local coordinate system.

Universe
Select the **Universe** radio button to rotate the object about the world X, Y, and Z coordinate system.

Scaling an Object

Palette: Transform > Scale

You can dynamically scale the object uniformly or non-uniformly along the axes by using the **Scale** tool. You can pick the object before or after invoking this tool. On invoking this tool, you will be prompted to enter the scale. Enter the scale in the promptline or drag the mouse to scale the object dynamically in the window. To scale the object uniformly, drag the cursor with the left mouse button in the orthographic or the **Perspective** window. The use of different mouse buttons in different windows for scaling the objects is listed in the table given next.

Mouse button	Window	Direction of scaling
Left	**Top**, **Left**, **Back** and **Perspective**	Uniformly along the X, Y, and Z axes
Middle	**Top** and **Left**	X-axis
	Back	Y-axis
	Perspective	Uniformly along the X, Y, and Z axes
Right	**Left** and **Back**	Z-axis
	Top	Y-axis
	Perspective	Uniformly along the X, Y, and Z axes

Scaling Objects Non proportionally

Palette: Transform > Non proportional scale

You can scale the object non-proportionally along the three axes by using the **Non proportional scale** tool. You can pick the object before or after invoking this tool. On invoking this tool, you will be prompted to specify the scale factor along the X, Y, and Z directions. Enter the scale factors in the promptline or drag the mouse buttons to scale the object dynamically in the window. The use of different mouse buttons for scaling the objects non-proportionally is given in the following table.

Mouse button	Window	Direction of scaling
Left	**Top**	X and Y axes
	Back	Y and Z axes
	Left	X and Z axes
	Perspective	X-axis

Middle	Top and Left	X-axis
	Back and Perspective	Y-axis
Right	Top	Y-axis
	Left, Back, and Perspective	Z-axis

Figure 2-78 shows a cube before scaling and Figure 2-79 shows the same cube scaled non-proportionally along the X-axis.
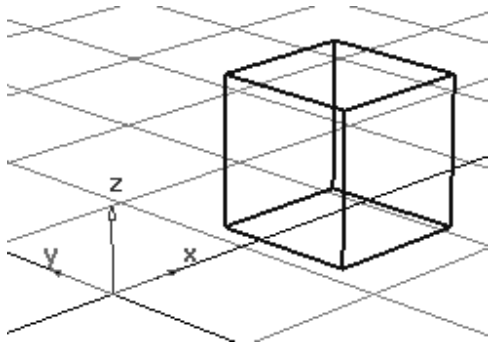
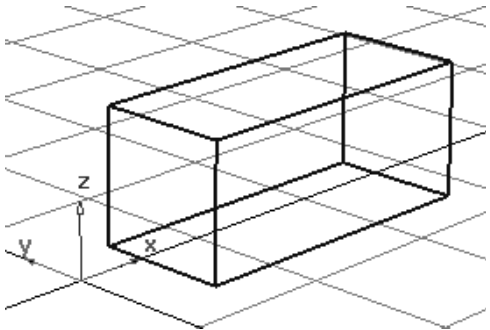

Figure 2-78 *Cube before scaling*

Figure 2-79 *Cube scaled non-proportionally along the X-axis*

Setting the Pivot Point

Palette: Transform > Local > Set pivot

The pivot point plays an important role in various transforming operations such as moving, rotating, scaling, and so on. When you change the position of a pivot point, the transform operations will start about the new position of the pivot point. The new position of the pivot point will act as the starting point for any transform operation. The **Set pivot** tool is used to change the position of the pivot point of the picked object. When you pick an object, the pivot point will be highlighted 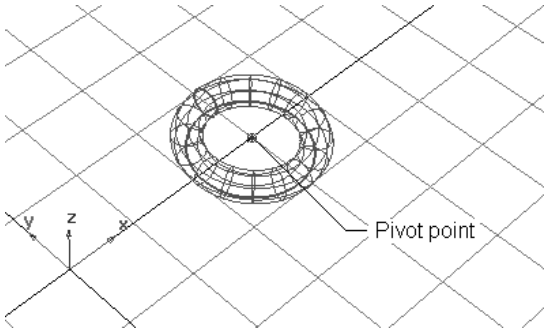in green, as shown in Figure 2-80. When you choose the **Set pivot** button, you will be prompted to enter a new position of the pivot point. Once you enter the new position, the pivot point will shift to it. You can also specify a new position for the pivot point by dragging the cursor in the active window. For example, a cylinder with the pivot point placed at the center is shown in Figure 2-81. You can change the position of the pivot point from the center to the top cap of the cylinder using the **Set pivot** tool, as shown in Figure 2-82.

Figure 2-80 *Torus showing the pivot point*

The functions of different mouse buttons in changing the position of the pivot point is given in the following table:
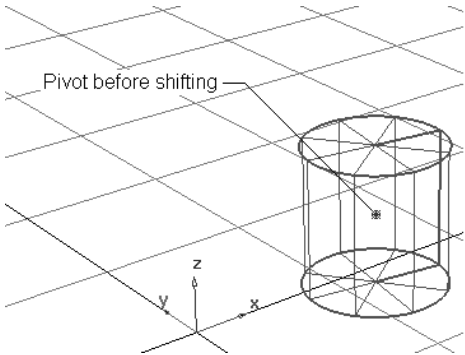
Figure 2-81 *Pivot point at center of the cylinder*
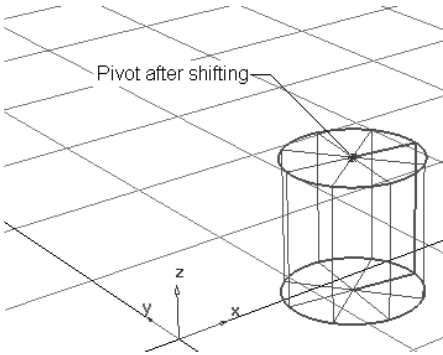
Figure 2-82 *Pivot point shifted to the top cap*

| Mouse button	Window	Movement direction
Left	**Top**, **Left**, and **Back**	Free to move in any direction
	Perspective	X-axis
Middle	**Top** and **Left**	X-axis
	Back and **Perspective**	Y-axis
Right	**Left**, **Back**, and **Perspective**	Z-axis
	Top	Y-axis

To set the parameters of the pivot point, double-click on the **Set pivot** tool; the **Set Pivot Options** dialog box will be displayed, as shown in Figure 2-83.

There are two types of pivots in an object, rotation and scaling. The rotation pivot is displayed as a circle with a dot at the center and the scaling pivot is displayed as an asterisk (*). If you pick an object, these pivots will be displayed together. You can separate these pivots by changing the parameters in the **Set Pivot Options** dialog box. Figure 2-84 shows a sphere with the rotation and scaling pivots separated from each other.
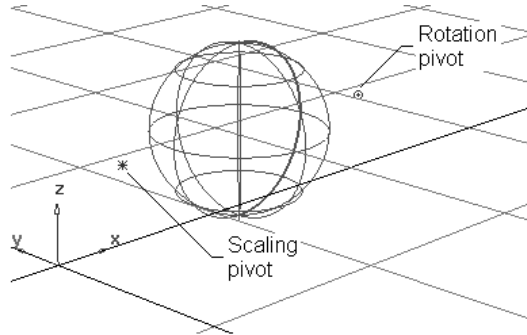
The options in the **Set Pivot Options** dialog box are discussed next.

Rotation
This check box is selected by default and is used to change the position of the rotation pivot. To change the position of the rotation pivot without affecting the scaling pivot, clear the **Scaling** check box. Next, choose the **Go** button; you will be prompted to specify the new position of the pivot point. Enter the new position in the promptline or drag the cursor to the required position; the rotation pivot will be shifted to the new position.
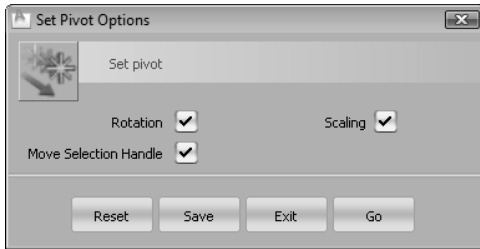
*Figure 2-83 The **Set Pivot Options** dialog box*

Figure 2-84 Sphere showing the rotation and scaling pivots separated from each other

Scaling

This check box is also selected by default and is used to change the position of the scaling pivot. To change the position of the scaling pivot without affecting the rotation pivot, select the **Scaling** check box and clear the **Rotation** check box. Next, choose the **Go** button; you will be prompted to enter the new position of the pivot point. Enter the new position in the promptline or drag the cursor to the required position; the scaling pivot will be shifted to the new position.
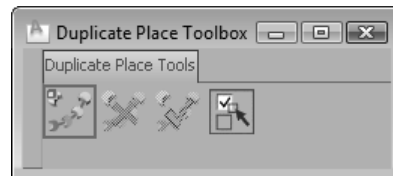
Move Selection Handle

The **Move Selection Handle** check box is selected by default and allows you to move the selection handle and the pivot point simultaneously. This check box will be available only when you select the **Rotation** check box. If you clear the **Move Selection Handle** check box, you can move the pivot point and the selection handle separately. Moving the selection handle separately is significant in case the objects need to be selected, but, at the same time rotated or scaled about the center of mass or the pivot point.

Duplicating an Object Along a Curve or a Surface

Palette: Transform > Object Placement > Duplicate Place Toolbox

In Alias Design, you can create duplicate copies of an object along a curve by using the **Duplicate Place Toolbox** tool. The curve can be a free curve, isoparametric curve, curve-on-surface, edge of surface, and patch precision curve. To create duplicate copies, choose the **Duplicate Place Toolbox** tool from the **Object Placement** flyout of the **Transform** tab in the **Palette**; the **Duplicate Place Toolbox** will be displayed; as shown in Figure 2-85. Also, you will be prompted to select the geometry and the **Accept Targets** tool in the inactive state will be displayed. Select the object to be duplicated from the active window; the **Accept Targets** button will be activated. Choose the **Accept Targets**

*Figure 2-85 The **Duplicate Place Toolbox***

button; you will be prompted to select the curves or locator points. Also, the **Accept Duplicate**

Place Destination button in the inactive state will be displayed in the active window. Select the curve from the active window; the **Accept Duplicate Place Destination** button will be activated. Choose this button; the preview of the duplicate object will be attached to the curve and the **Translate**, **Rotate**, and **Elevate** buttons will be displayed in the active window.

If you choose the **Translate** tool, you can move the duplicate object along the curve. If you choose the **Rotate** button, you can rotate the duplicate object about the curve. If you choose the **Elevate** button, you can move the duplicate object above or below the curve. After choosing the required button from the active window, choose the **Commit** button from the **Duplicate Place Toolbox**; the **confirm** message box will be displayed. Choose the **Yes** button from this message box; the duplicate copy of the object will be created. Figure 2-86 shows the target geometry and the destination curve. Figure 2-87 shows the duplicate copy of the target geometry placed along the curve after translation.

If you have selected a wrong curve or target object for duplicating an object, choose the **Revert** button from the **Duplicate Place Toolbox** to restore the initial conditions. Next, specify the correct curve or target to create the duplicate copy of the object.

You can set different parameters of the **Duplicate Place Toolbox** tool by choosing the **Accept Targets** button that is displayed when you select an object for creating its duplicate copy. Next, double-click on the **Duplicate place** button in the **Duplicate Place Toolbox**; the **Duplicate Place Options** dialog box will be displayed, as shown in Figure 2-88.
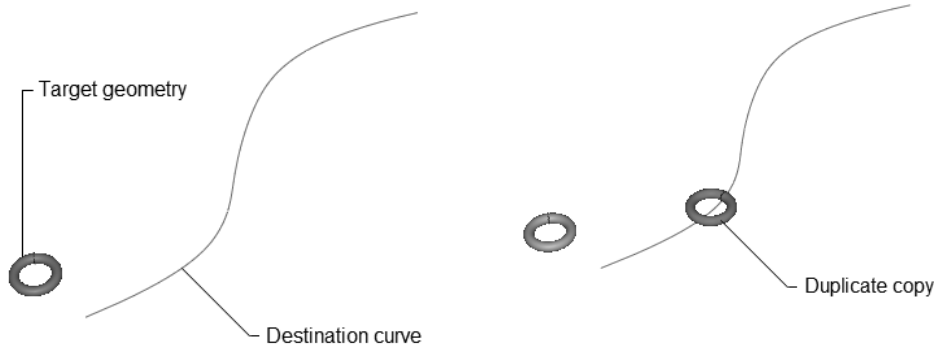
Figure 2-86 Target geometry and destination curve   *Figure 2-87   Duplicate copy of target geometry placed along the curve after translation*
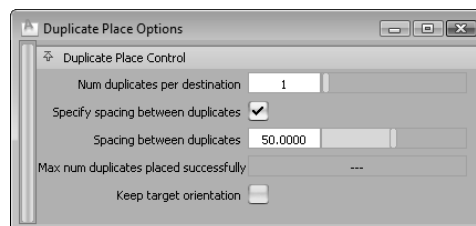
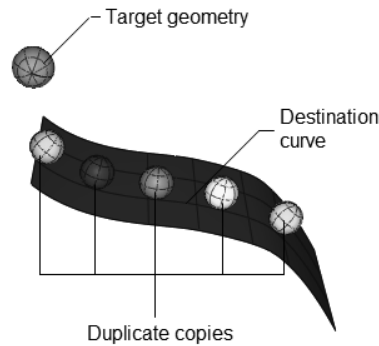*Figure 2-88 The **Duplicate Place Options** dialog box*

The options in this dialog box are discussed next.

Duplicate Place Control
The options in this area used to specify the number of duplicate objects, spacing between the duplicate objects, and so on. These options are discussed next.

Num duplicates per destination
This edit box is used to specify the number of duplicate copies to be created. Alternatively, you can specify the number of duplicate copies by using the slider bar given on right of the **Num duplicates per destination** edit box. Figure 2-89 shows five duplicate copies placed along a surface.

Specify spacing between duplicates
When you select this check box, the **Spacing between duplicates** edit box will be displayed in the **Duplicate Place Options** dialog box.

Figure 2-89   Five duplicate copies placed on the curve

Spacing between duplicates
This edit box is used to specify the spacing between the duplicate copies of an object if the number of duplicate objects is more than one.

Max num duplicates placed successfully
This display box displays the maximum number of duplicate objects that are created successfully on the curve. In other words, this display box informs about the number of duplicate objects that fit on the destination curve.

Keep target orientation
This check box is cleared by default. As a result, the duplicate objects orient according to the profile of the surface such that they match the destination surface or curve. If you select this check box, the duplicate objects retain the orientation with respect to the original or target object. As a result, the duplicate objects do not rotate to match with the destination surface or curve.

Duplicate place
This tool is chosen by default and prompts you to select the object or geometry to be duplicated.

Revert
The **Revert** tool is used to delete the duplicate copies of the target geometry and remove the construction history of the duplicate objects.

Commit

Choose this tool to create the duplicate copies of the target object and delete the construction history. Note that after choosing this tool, you cannot change the duplicate geometry by changing the options in the **Duplicate Place Toolbox** dialog box.

Show Pick Mask

The **Show Pick Mask** tool is used to filter out different geometries for the target or destination. If you invoke the **Duplicate Place Toolbox** tool and then select the geometry; the targets such as surfaces, meshes, and curves will be selected by default. If you choose the **Show Pick Mask** tool before selecting the geometry, you can filter targets and pick the required targets only. On choosing this tool, the **Duplicate Place Pick Mask** dialog box will be displayed, as shown in Figure 2-90.

The title bar of this dialog box changes according to the geometry selected. If you choose the **Show Pick Mask** tool before selecting the target geometry, the **Duplicate Place Pick Mask : Add Target Group Mode** dialog box will be displayed, refer to Figure 2-90. If you choose the **Show Pick Mask** tool from the **Duplicate Place Toolbox** before selecting the destination curve or geometry, the **Duplicate Place Pick Mask : Add Destination Group Mode** dialog box will be displayed. The **Show Pick Mask** tool will be activated only when you invoke the **Duplicate Place Toolbox** tool. Select or clear the check boxes in the **Duplicate Place Toolbox** dialog box to pick or unpick the corresponding geometries of the target or the destination objects.
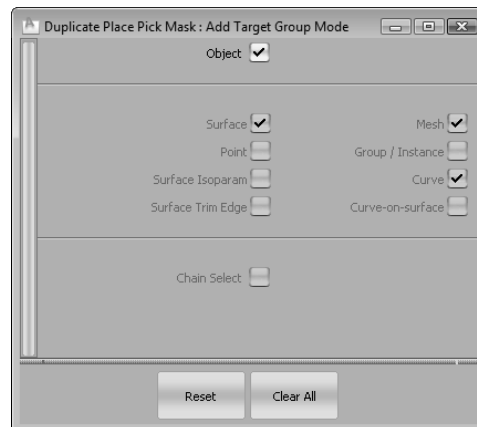
*Figure 2-90 The **Duplicate Place Pick Mask : Add Target Group Mode** dialog box*

Setting the Pivot Point at the Center

Palette: Transform > Local > Center pivot

Sometimes, you may need to position the pivot point at center of an object. This can be done by using the **Center pivot** tool. To place the pivot point at the center, select the object from the active window. Next, hold the left mouse button on the **Set pivot** tool; a flyout will be displayed. Choose the **Center pivot** tool from this flyout; the pivot point

will be placed at the center of the object. This tool does not effect the position of the selection handle.

To set the parameters of the **Center pivot** tool, double-click on the Center pivot tool; the **Center Pivot Options** dialog box will be displayed, as shown in Figure 2-91. The **Rotation** and the **Scaling** check boxes are selected by default and they allow you to place the rotation and scaling pivots at

*Figure 2-91 The **Centre Pivot Options** dialog box*

the center of the object simultaneously. If you clear the **Rotation** check box, only the scaling pivot will be placed at the center of the object. If you clear the **Scaling** check box, only the rotation pivot will be placed at the center of the object. You cannot clear both check boxes simultaneously.
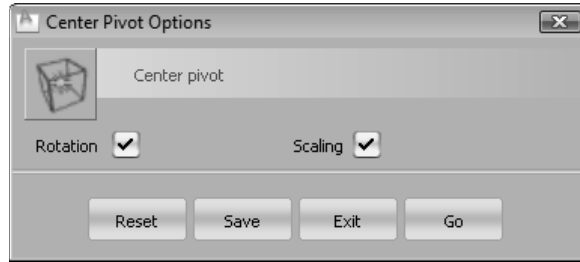
Rotating the local axes of the object

Palette: Transform > Local > Set local axes

You can set (rotate) the local axes of an object. To rotate the local axes of an object, select an object and then choose the **Set local axes** tool from the **Local** flyout of the **Transform** tab in the **Palette**; the local axes will be displayed on the selected object. Next, drag the cursor to any of the windows to rotate the local axis. The direction of rotation depends on the active window in which you are dragging the cursor. Figures 2-92 shows the local axes of a cube and Figure 2-93 shows the rotated local axes.
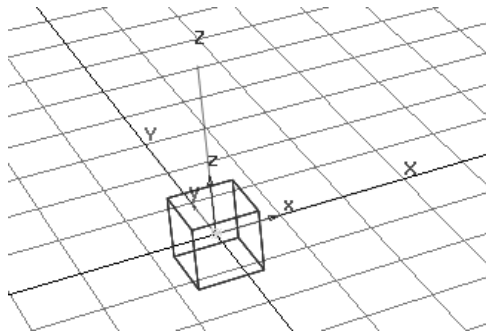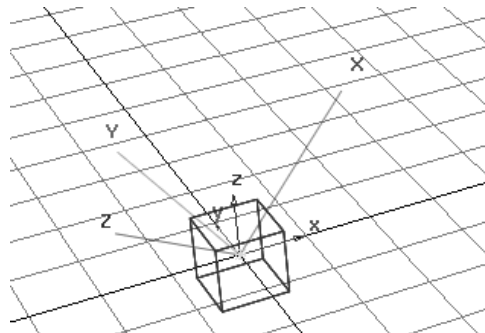

Figure 2-92 Local axes of a cube

Figure 2-93 Rotated local axes of a cube

To set the parameters of the **Set local axes** tool, double-click on the **Set local axes** tool; the **Set Local Axes Options** dialog box will be displayed, as shown in Figure 2-94. The options in this dialog box are discussed next.

Method

The options in this area are used to specify the ways in which you can set local axes. These options are discussed next.

Interactive

This radio button is selected by default. As a result, you can drag the local axes of the object(s) to rotate the local axes relative to the world axes.

Object

This radio button is used to match the local axes of an object with the local axes of another object. While using this radio button, you need to select the object to which you want the selected object's local axes to be matched with.
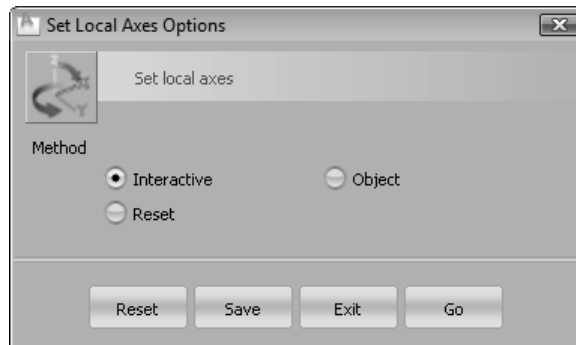

Figure 2-94 The Set Local Axes Options dialog box

Resetting the Transformation of Objects

Palette:	Transform > Zero transforms

Sometimes, you may need to reset the transformation (translation, scaling, or rotation) of the objects such that the new position of the objects become their origin or zero points. After resetting the transformation, the objects lose or forget their transformation information. To reset the transformation of the object, choose the **Zero transforms** button from the **Transform** tab in the **Palette**; the transformations applied to the selected object will be reset. To view the effect of the **Zero transforms** tool, select the component and then invoke the **Information Window** dialog box before and after resetting the transformation. You will notice that the transformations such as translation, rotation, and scale will be reset to their original values after applying the zero transformation.

Note

*If you apply zero transformation to lights, camera, and 3D textures, the objects will be rendered incorrectly.*

SHADING OBJECTS IN VIEW WINDOWS

After creating a model in Alias Design, you can shade it to give more realistic look. There are two methods to apply shades to the model. These methods are discussed next.

Diagnostic Shading

You can give a realistic look to a model by using diagnostic shading. Shading an object depends a lot on tessellation. Tessellation is the subdivision of geometry into regular or irregular

non-overlapping polygons. Polygons form a pattern that enables you to render an object with more accuracy as well as shade it easily. More the number of subdivisions of geometry (tessellation), better will be shade of the object. Some natural examples of tessellation are honeycomb, scales of fish, snake, pineapple, and so on. To shade an object, choose **ObjectDisplay > Diagnostic Shading** from the menu bar; the **Diagnostic Shading** dialog box will be displayed, as shown in Figure 2-95. Next, select the object and then choose the required tool from the **Diagnostic Shading** dialog box to shade the object. You can also shade an object by using the options of the **Shading** area displayed in the **Control Panel**. The options in the **Diagnostic Shading** dialog box are discussed next.
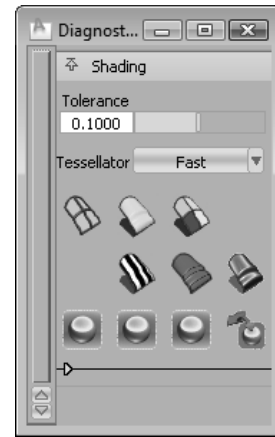
*Figure 2-95   The **Diagnostic Shading** dialog box*

Tolerance

This edit box is used to control the accuracy of surface tessellation when you choose the **Fast** option from the **Tessellator** area.

Tessellator

This area is used to specify the method of tessellation. By default, the **Fast** button is chosen in this area. As a result, the object will be tessellated more quickly but with less accuracy. To make an object tessellate accurately, press and hold the left mouse button on the **Fast** button; a flyout will be displayed. Choose the **Accurate** button from the flyout; the object will tessellate slowly but accurately.

Shading Off

Choose this tool to turn off the shading. On choosing this tool, the object will be displayed in the wire frame mode.

Multi Color

Choose this tool to shade the object with a specific color. You can specify the color by choosing this tool and then picking a color from the **Color** swatch box that is displayed at the bottom of **Diagnostic Shading** dialog box. You can also change the specularity (reflectivity), transparency, light intensity, and so on.

Random Color

Choose this tool to shade the objects with different colors randomly. You can control color saturation, specularity, transparency, and light intensity of shaded objects by choosing this tool and then selecting the options that are displayed at the bottom of the **Diagnostic Shading** dialog box.

Horizontal/Vertical

Choose this button to display the horizontal and vertical highlights while shading objects. Highlights allow you to find the surface flaws, mismatched tangency between the surfaces, and so on. You can display the highlights horizontally or vertically by

choosing this tool and then selecting the required options that are displayed at the bottom of the **Diagnostic Shading** dialog box. You can specify the rate at which the highlights, horizontal or vertical, will repeat themselves. You can also specify the transparency of the highlights.

Surface Evaluation

Choose this tool to shade the object in terms of surface evaluation options such as deviation map, deviation ramp, draft angle, and contact analysis. The surface evaluation tools will be discussed in Chapter 13.

User-defined texture

Choose this tool to shade an object with your own defined map textures. You can specify the mapping texture by choosing this tool and then selecting the required options displayed at the bottom of the **Diagnostic Shading** dialog box. You can also specify the rate at which the texture repeats itself as well as the transparency of the texture.

Apart from the tools discussed above, the **Diagnostic Shading** dialog box has three more tools; **Visual State 1**, **Visual State 2**, **Visual State 3**, and **File State**. You can create shading with these tools and then save them to user-preferences. Later on, you can retrieve those visual states. You can specify the shading settings to be assigned to a visual state tool for an object in the view window. To do so, select the object and then choose a visual state tool. Next, click on the arrow given below the visual state tools; the different options corresponding to the tool chosen will be displayed. The **Shade Setting** and **Environment Editor** options allow you to change the hardware shading and environment settings of the objects, respectively. You can also save a setting to user preferences by choosing the **Save To Prefs** option. If you choose the **File State** tool, the **Save To Prefs** tool will not be available. You can retrieve the settings of the last active environment by choosing the **File State** tool.

Hardware Shading

Hardware shading is used to shade objects to make them appear more realistic. You can even render the models that are shaded by using hardware shading. Hardware shading also enables you to toggle between the wireframe mode and the render preview views of the model. To shade objects with hardware shading, choose **WindowDisplay > Hardware Shade** from the menu bar; the objects will be shaded with the default hardware shade. You can also set the options for hardware shading. To do so, click on the box on the right of the **Hardware Shade** option; the **Hardware Shade** dialog box will be displayed, as shown in Figure 2-96. The options in this dialog box are discussed next.

Use Embedded File Settings

Select this check box to shade the objects with the hardware shade settings that were saved with the earlier file.

All Windows

This check box is selected by default and is used to shade the objects in all view windows.

Figure 2-96 *The* **Hardware Shade** *dialog box*

All Geometry

This check box is also selected by default and is used to shade all geometry in the view windows. Clear this check box to shade the active (selected) objects only.

Shading Method

The **Shading method** area is used to specify the shading method used for shading the objects. By default, the **Per vertex** tool is chosen in this area, which helps in fast approximation of the surface at the time of modeling. If you choose the **Per pixel** tool from the **Shading method** area, the objects will be shaded as they obtain with Raycaster rendering. Raycaster rendering will be discussed in Chapter 12. To shade the model or object with the **Per pixel** tool chosen, you need to meet the graphic card requirement.

Tessellator

This area is used to specify the method of tessellation. The options in this area are the same as those discussed in the **Tessellator** area of the **Diagnostic Shading** dialog box.

Quality

This area is used to control the accuracy of tessellation while shading the surfaces. You can specify the quality of tessellation as high, low, or medium by choosing the corresponding button from the **Quality** area. You can also specify a user-defined tessellation for shading by choosing the **USER DEFINED** button from this area. In this case, you need to specify the tolerance manually.

Texture Resolution

If you are using textures in shading the objects, you can use the **Texture Resolution** area to speed up the calculations in hardware rendering. You can specify 128, 256, 512, 1024, and 2048 as the texture resolution by choosing the corresponding button from this area. You can turn off the texture resolution while rendering the object by choosing the **Off** button from this area. If you specify the texture resolution as 512, the texture will be rendered approximately to 512 x 512 pixels square. Note that the size of texture map should not be greater than the rendered texture.

Light source

The **Light source** area can be used to specify the source of light that will be used in shading the objects. You can use all lights, default lights, selected lights, and so on in the view window by choosing the corresponding button from this area.

Self Shadows

Select this check box to add additional information about the spatial relationships between the objects when they cast shadow on themselves. These self shadows appear different with different buttons of the **Light source** area.

Auto update

This check box is selected by default and is used to automatically update the modifications done in the view windows.

Enable Environment Effects

This area can be used to specify the parameters related to the environment. The different options in this area are discussed next.

Use Environment

This check box is selected by default and enables you to use the environment in the background. The environments will be available in the **environments** tab that will be displayed if you invoke the **Visualize** workflow. These environments help you apply reflection of model in the environments.

Show Background

Select this check box to display the background while shading the object.

Ground Plane

Select this check box to display the ground plane, ground plane shadow, and ground plane reflections in the view window.

Shader Glow

Select this check box to self-illuminate the objects. The shader glows illuminate the objects which they are assigned without affecting the environment or other surrounding objects. Shader glows cannot be viewed in reflections or ground planes.

Edit Environment

Choose this tool to invoke the **Environment** editor that can be used to edit the environment used to shade the objects.

Optimize during Tumble

This area can be used to optimize certain parameters related to the object during hardware shading. The options in this area can be used to optimize self shadows, shader glows, and ground plane reflections of the objects while doing camera operations such as track, tumble, and dolly. When you select a check box, the respective parameters of the object get approximated and are updated when you release the mouse.

Shade Off

Choose this tool to turn off the hardware shading of the objects.

Shade On

Choose this tool to turn on the hardware shading of the objects.

Note

*1. You will learn how to shade objects in the tutorials of the later chapters. In some tutorials, you will shade models by using the **Diagnostic Shading** option, and in others, you will use the **Hardware shading** option.*

*2. An alternative method of invoking the **Hardware Shade** dialog box is by choosing the **Shade Setting** option from the options available on choosing any of the visual states or the **File State** buttons.*

TUTORIALS

Tutorial 1

In this tutorial, you will create the 3D model of a globe, as shown in Figure 2-97. After creating the model, you will shade it for giving it a realistic look.   **(Expected time: 30 min)**

The following steps are required to complete this tutorial:

a. Start Alias and then start a new wire file.
b. Change the grid settings of the window.
c. Create the base of the globe by using the **Cylinder** tool.
d. Scale the base of the globe by using the **Non proportional scale** tool.
e. Create the stand of the globe by using the **Cylinder** tool.
f. Scale the stand of the globe by using the **Non proportional scale** tool.
g. Create the ring of the globe by using the **Torus** tool and change its parameters.
h. Create the globe by using the **Sphere** tool.
i. Create the axial rod by using the **Cylinder** tool.
j. Rotate the axial rod by using the **Rotate** tool.

k. Shade the model by using the **Diagnostic Shading** option.

l. Save the model and exit.
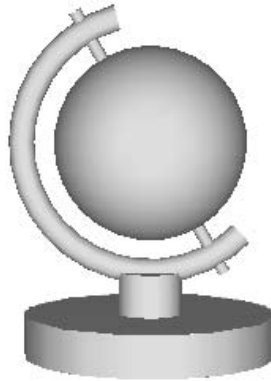
Figure 2-97 3D model of a globe

Starting a New Wire File

1. Choose **Start > All Programs > Autodesk > Alias Design 2012 > Alias Design 2012** from the taskbar; the Autodesk Alias Design 2012 window informing about the start of the software is displayed. Alternatively, you can start Alias Design 2012 by double-clicking on the its icon on the desktop of your system.

   As Alias Design 2012 gets started, the **Essential Skills Movies** window is displayed. This window enables you to view the short movie clips related to the basic commands used in Alias Design. The commands include creating objects such as curves, surfaces and primitives, transforming objects, selecting objects, exploring the user interface, and so on.

2. Select the **Don't show again** check box from the **Essential Skills Movies** window and close the window. As a result, next time when you start a new session of Alias Design, this window does not open automatically. However, you can invoke this window manually by choosing **Help > Essential Skills** from the menu bar.

   By default, four windows are displayed on the screen when you start Alias Design. You can change the display of these windows by choosing the **Layouts** menu from the menu bar and then selecting the required window. In this tutorial, you will use all these windows for modeling.

Changing Grid Settings

Next, you need to change the units and grid settings of the windows. From this tutorial onwards, set units to millimeters and the grid spacing to 1 unit.

1. Choose **Preferences > Construction Options** from the menu bar; the **Construction Options** dialog box is displayed.

2. Click on the down-arrow on the left of the **Units** option; the different types of units are displayed. Click on the **Linear** down-arrow; various options are displayed.

3. Set **mm** in the **Main Units** option, if not set already. Close the **Construction Options** dialog box.

4. Choose **Windows > Palette** from the menu bar, if the **Palette** is not displayed by default . Choose the **Construction** tab from the **Palette**; various tools in the tab are displayed.

5. Double-click on the **Grid preset** tool from the **Construction** tab in the **Palette**; the **Preset Grid Options** dialog box is displayed.

6. Enter **100** and **3200** in the **Grid Spacing** and **Perspective Grid Extent** edit boxes, respectively. Next, choose the **Go** button; the grid spacing is set to **100** units.

Creating the Base of the Model

You need to create the base of the model using the **Cylinder** tool.

1. Choose **Primitives > Cylinder** from the **Surfaces** tab in the **Palette**; you are prompted to enter the position of the cylinder.

2. Enter **0, 0, 25** in the promptline and press ENTER; the cylinder is created, as shown in Figure 2-98.

3. Exit the **Cylinder** tool by choosing the **Pick object** tool from the **Pick** tab in the **Palette**.
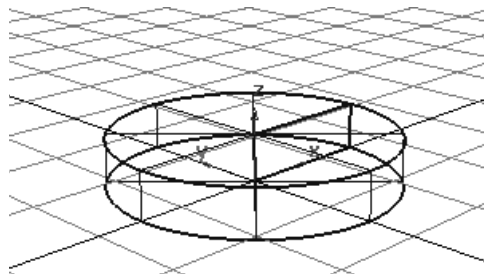
Scaling the Base

The cylinder created may not be of the required shape and size. So, you need to scale it using the **Transform** tools.

1. Select the cylinder from the window and choose the **Non proportional scale** tool from the **Transform** tab in the **Palette**; you are prompted to enter the scale factors along the X, Y, and Z axes.

2. Enter **300, 300, 50** in the promptline and press ENTER; the base is scaled, as shown in Figure 2-99.
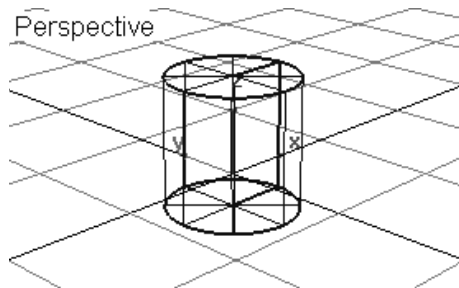
Figure 2-98 Cylinder created for the base of the model

Figure 2-99 Base of the model after scaling

Creating the Stand of the Globe

After creating and scaling the base, you need to create the stand of the globe using the **Cylinder** tool.

1. Choose the **Cylinder** tool from the **Primitives** flyout of the **Surfaces** tab in the **Palette**; you are prompted to enter the position of the cylinder.

2. Enter **0, 0, 75** in the promptline and press ENTER; the stand of the model is created, as shown in Figure 2-100.
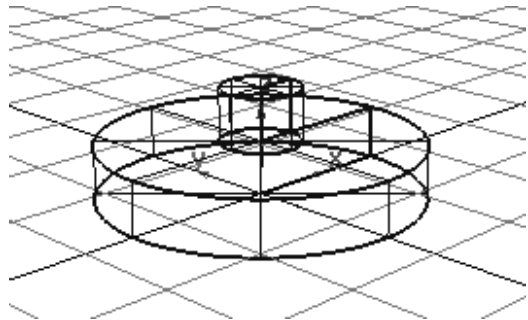
Scaling the Stand

The stand of the model can be scaled in a way similar to the scaling of the base, using the **Transform** tools.

1. Choose the **Non proportional scale** tool from the **Transform** tab in the **Palette**; you are prompted to enter the scale factors along the X, Y, and Z axes.

2. Enter **75, 75, 50** in the promptline; the stand is scaled, as shown in Figure 2-101.
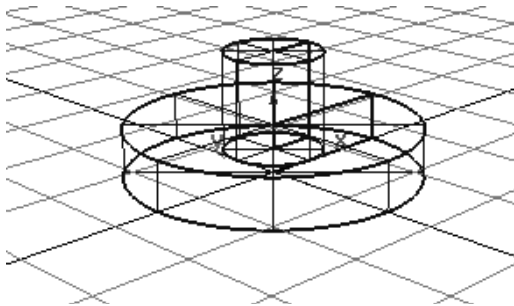
Figure 2-100 *Stand created for the model*

Figure 2-101 *Model after scaling the stand*

Creating the Ring of the Globe

Next, you need to create the ring of the globe using the **Torus** tool. Before invoking the **Torus** tool, you need to set the parameters of the torus. After changing the parameters of the ring, rotate it to get the desired position.

1. Choose **Primitives > Torus** from the **Surfaces** tab in the **Palette** and then double-click on the **Torus** tool; the **New Torus Options** dialog box is displayed.

2. In the **Size** area of this dialog box, select the **Absolute** radio button.

3. Enter **210**, **1.5**, **0.15** in the **Sweep**, **Major radius** and **Minor radius** edit boxes, respectively, and then choose the **Go** button.

4. Enter **0, 0, 250** in the promptline and press ENTER; the ring is created in the window, as shown in Figure 2-102.
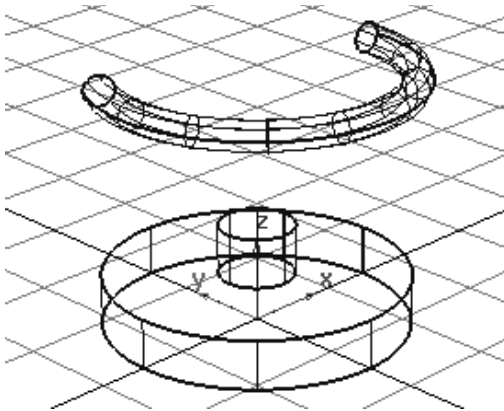
5.   Choose the **Rotate** tool from the **Transform** tab in the **Palette**; you are prompted to enter the rotation angle about the X, Y and Z axes.

6.   Enter **90, 45, 0** in the promptline and press ENTER; the ring is rotated about the X and Y axes, as shown in Figure 2-103.
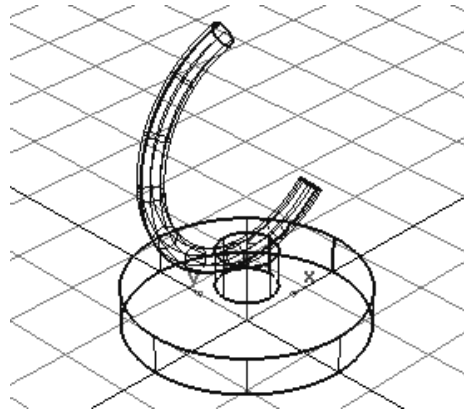
Creating the Globe

Next, you need to create the globe using the **Sphere** tool.

1.   Choose **Torus > Sphere** from the **Surfaces** tab in the **Palette**; you are prompted to enter the position of the sphere.

*Figure 2-102 Torus created for the ring of the globe*   *Figure 2-103 Model after rotating the ring*

2.   Enter **0, 0, 250** in the promptline and press ENTER; the globe is created in the window, as shown in Figure 2-104.
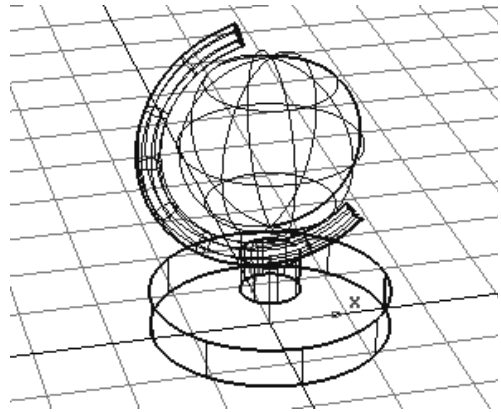
Scaling the Globe

Next, you need to scale the globe using the **Scale** tool from the **Transform** tab.

1.   Choose the **Scale** tool from the **Transform** tab in the **Palette**; you are prompted to enter the scale factor.

2.   Enter **225** in the promptline and press ENTER; the globe is scaled uniformly along the X, Y, and Z axes, as shown in Figure 2-105.
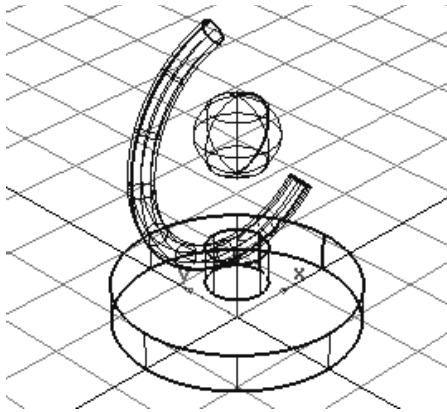
Figure 2-104 Sphere created for the globe

Figure 2-105 Globe created after scaling the sphere

Creating the Axial Rod

After creating the globe, you need to create an axial rod around which the globe will be rotated. This rod needs to be created by using the **Cylinder** tool. Later, you need to rotate and scale this cylinder to get the required position and size of the rod.

1. Choose **Primitives > Cylinder** from the **Surfaces** tab in the **Palette**; you are prompted to enter the position of the cylinder.

2. Enter **0, 0, 250** in the promptline and press ENTER; the axial rod is created, as shown in Figure 2-106.
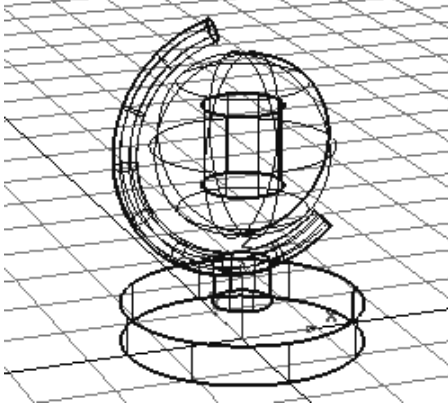
### Scaling and Rotating the Axial Rod

Next, you need to scale and rotate the axial rod using the **Scale** and **Rotate** tools of the **Transform** tab.

1. Choose the **Non proportional scale** tool from the **Transform** tab in the **Palette**; you are prompted to enter the scale factors along the X, Y, and Z axes.

2. Enter **15, 15, 350** in the promptline and press ENTER; the axial rod is scaled, as shown in Figure 2-107.

3. Next, choose the **Rotate** tool from the **Transform** tab in the **Palette**; you are prompted to enter the rotation angle about the X, Y and Z axes.

4. Enter **0, -30, 0** in the promptline and press ENTER; the ring is rotated about the Y-axis, as shown in Figure 2-108.

5. Choose the **Pick nothing** tool from the **Pick** tab in the **Palette** to exit the **Rotate** tool.

Figure 2-106 *Model after creating the cylinder for the axial rod*
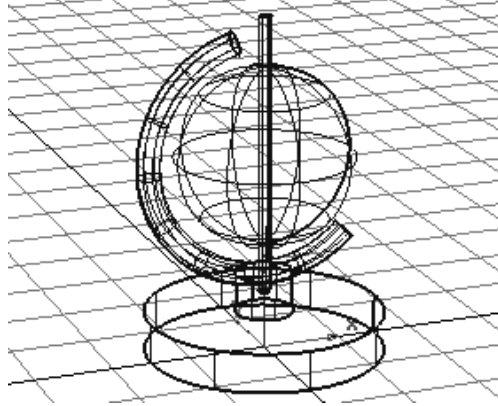
Figure 2-107 *Model after scaling the axial rod*

Applying the Diagnostic Shading to the Model

The model you have created is in the wireframe mode. For a better view, you need to shade the model.

1. Choose **ObjectDisplay > Diagnostic Shading** from the menu bar; the **Diagnostic Shading** dialog box is displayed.

2. Choose the **Multi Color** tool in the **Shading** area; the model is shaded. You can choose the other tools in this area to get the required shades.

3. Next, close the **Diagnostic Shading** dialog box.

4. Select the entire model and then clear the **Isoparm U** and **V** check boxes in the **Display** area of the **Control Panel**; the isoparametric curves in the model are hidden. The model after hiding the isoparametric curves is displayed, as shown in Figure 2-109.

Note

*You can improve the quality of the display of the model by selecting the **Accurate** option from the **Tessellator** area of the **Control Panel**.*
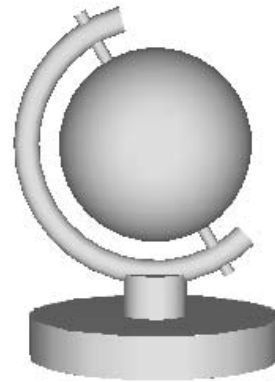
Saving the File

To save the above model, create a new project directory *c02_tutorials*. The new directory helps in storing all files efficiently.

1. Choose **File > Save** from the menu bar; the **Save Wire** dialog box is displayed. You can also invoke this dialog box by pressing the ALT+S keys.
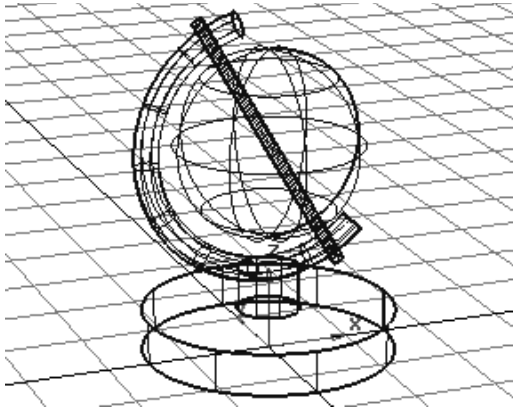
Figure 2-108 *Model after rotating the axial rod*

Figure 2-109 *Model after hiding the isoparametric curves*

2.   Click on the down arrow next to the **Project** field and then select the **New Project** option from the drop-down list; the new project is displayed in the **Save in** drop-down list.

3.   Browse to the *aliasdesign_2012* folder in the **Save in** drop-down list; all files and folders are displayed in the list box.

4.   Choose the **Create New Folder** tool from the **Save Wire** dialog box and name the new folder as *c02_tutorials*.

5.   Double-click on the *c02_tutorials* folder to display it in the **Save in** drop-down list.

6.   Next, choose the **Set Current** option from the **Project** field; the **Confirm** message box is displayed.

7.   Choose **OK** from the **Confirm** message box and then enter **c02_tut01** in the **Object name** edit box.

8.   Choose the **Save** button; Alias Design saves the file as *c02_tut01.wire*. The location of this file is given below:

    \aliasdesign_2012\c02_tutorials\c02_tut01.wire

9.   Choose **File > Exit** from the menu bar; the **confirm** message box is displayed.

10. Choose the **Don't Save** button from the message box to exit the application.

Tutorial 2

In this tutorial, you will create a pencil, as shown in Figure 2-110. After creating the model, you will shade it to give it a realistic look.   **(Expected time: 45 min)**

The following steps are required to complete this tutorial:

a.   Start Alias Design and then start a new wire file.
b.   Create the base feature of the pencil by using the **Cylinder** tool.
c.   Change the pivot point of the base feature by using the **Set pivot** tool.
d.   Scale the base feature by using the **Non proportional scale** tool.
e.   Create the tip of the pencil by using the **Cone** tool.
f.   Rotate and scale the tip of the pencil by using the **Transform** tab.
g.   Create the eraser holder of the pencil by using the **Cylinder** tool.
h.   Scale the eraser holder by using the **Non proportional scale** tool.
i.   Create the base of the eraser by using the **Cylinder** tool.
j.   Change the pivot point of the eraser holder by using the **Set pivot** tool and then scale it
     by using the **Non proportional scale** tool.
k.   Create the top part of the eraser by using the **Sphere** tool.
l.   Rotate the top part of the eraser by using the **Rotate** tool.
m. Shade the pencil by using the **Diagnostic Shading** option.
n.   Save the file and exit.

Figure 2-110 *3D model of the pencil*

Starting a New Wire File

1.   Choose **Start > All Programs > Autodesk > Alias Design 2012 > Alias Design 2012**
     from taskbar; the Autodesk Alias Design 2012 window is displayed.

     As you have selected the **Don't show again** check box from the **Essential Skills Movies**
     window in the previous tutorial, the **Essential Skills Movies** window in not displayed. You
     can change the display of the windows by choosing the **Layouts** option from the menu bar
     and then selecting the required window. In this tutorial, you will use these four windows
     for modeling.

Creating the Base Feature

As you have specified the grid and unit settings in Tutorial 1 of this chapter, you need not specify them again. With the settings in the previous tutorial, you need to create the base feature using the **Cylinder** tool.

1. Choose **Primitives > Cylinder** from the **Surfaces** tab in the **Palette**; you are prompted to enter the position of the cylinder.

2. Enter **0, 0, 200** in the promptline and press ENTER; the base feature is created, as shown in Figure 2-111.

Changing the Pivot Point

The transform operations such as move, rotate, and scale are performed on objects with respect to their pivot points. In other words, these operations are done toward or away from the pivot points along all directions. In order to scale the base feature in the upward direction, you need to change the location of the pivot point from the center to the bottom of the cylinder.

1. Choose the **Set pivot** tool from the **Transform** tab in the **Palette**; you are prompted to enter the new pivot position.

2. Enter **0, 0, 150** in the promptline and press ENTER; the pivot point is shifted to the bottom of the base feature.

Scaling the Base Feature

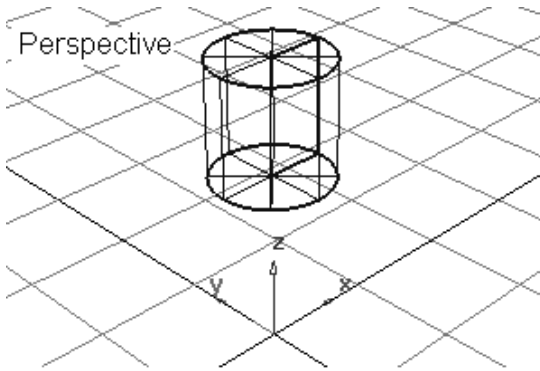Next, you need to scale the base feature using the **Non proportional scale** tool.

1. Choose the **Non proportional scale** tool from the **Transform** tab in the **Palette**; you are prompted to enter the scale factors along the X, Y, and Z axes.

2. Enter **100, 100, 800** in the promptline and press ENTER; the base feature is scaled non-uniformly along the X, Y, and Z axes, as shown in Figure 2-112.
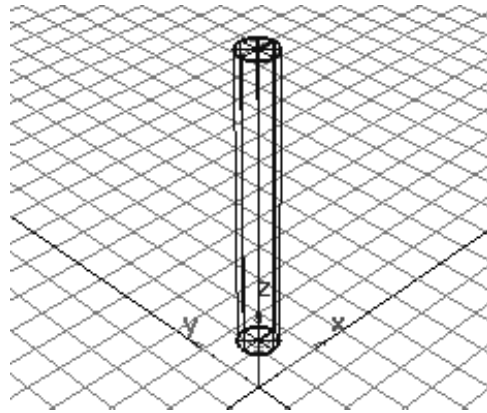
Creating the Tip of the Pencil

After creating the base feature, you need to create the tip of the pencil by using the **Cone** tool.

1. Choose **Primitives > Cone** from the **Surfaces** tab in the **Palette**; you are prompted to enter the position of the cone in the promptline.
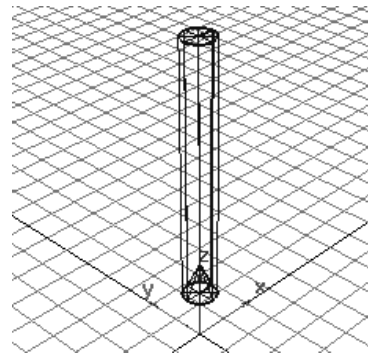
Figure 2-111 Base feature

Figure 2-112 Base feature scaled

2. Enter **0, 0, 150** in the promptline and press ENTER; the tip of the pencil is created, as shown in Figure 2-113.

Scaling and Rotating the Tip of the Pencil

Next, you need to scale and rotate the tip of the pencil by using the **Scale** and **Rotate** tools in the **Transform** tab.

1. Choose the **Non proportional scale** tool from the **Transform** tab in the **Palette**; you are prompted to enter the scale factors along the X, Y, and Z axes.

Figure 2-113 Model after creating the tip of the pencil

2. Enter **100, 100, 150** in the promptline and press ENTER; the tip of the pencil is scaled, as shown in Figure 2-114.

3. Choose the **Rotate** tool from the **Transform** tab in the **Palette**; you are prompted to enter the rotation angle about the X, Y and Z axes.

4. Enter **180, 0, 0** in the promptline and press ENTER; the tip is rotated about the X-axis, as shown in Figure 2-115.
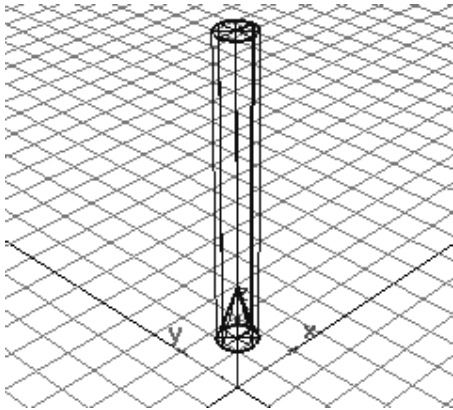
Creating the Eraser Holder

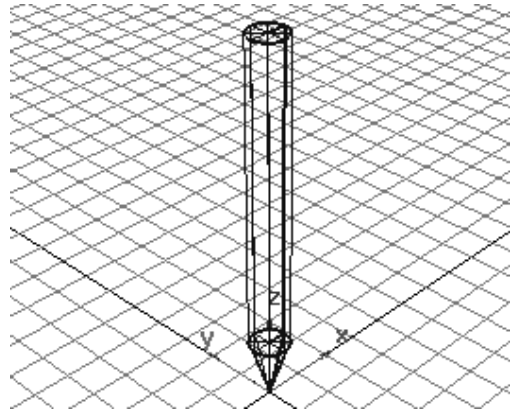Next, you need to create the eraser holder by using the **Cylinder** tool.

1. Choose **Primitives > Cylinder** from the **Surfaces** tab in the **Palette**. Next, double-click on the **Cylinder** tool; the **Cylinder Options** dialog box is displayed.

2. Choose the **0** tool from the **Caps** area.
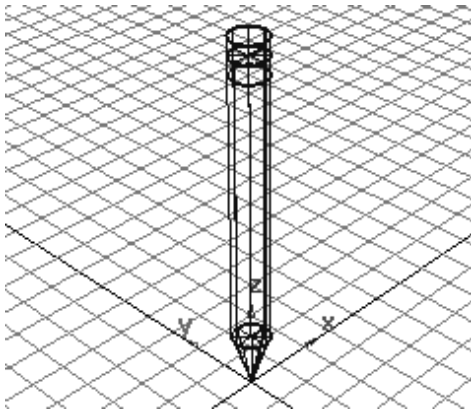
Figure 2-114 *Model after scaling the tip*

Figure 2-115 *Model after rotating the tip*

3. Next, choose the **Go** button to exit the **Cylinder Options** dialog box; you are prompted to enter the position of the cylinder.

4. Enter **0, 0, 950** in the promptline and press ENTER; the eraser holder is created in the window, as shown in Figure 2-116.
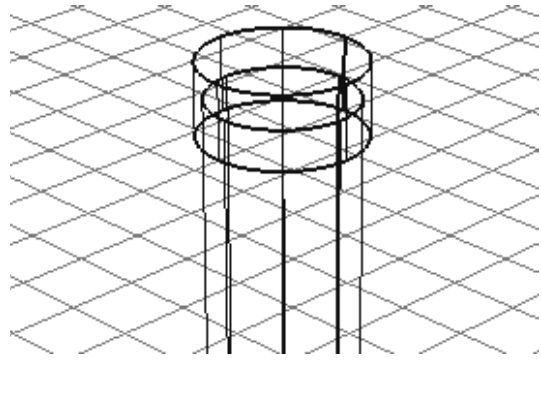
Scaling the Eraser Holder

Next, you need to scale the eraser holder non-proportionally by using the **Transform** tab.

1. Choose the **Non proportional scale** tool from the **Transform** tab in the **Palette**; you are prompted to enter the scale factors along the X, Y, and Z axes.

2. Enter **110, 110, 50** in the promptline and press ENTER; the eraser holder is scaled, as shown in Figure 2-117.

Figure 2-116 *Model after creating the eraser holder*

Figure 2-117 *Model after scaling the eraser holder*

Creating the Base of the Eraser

After creating the eraser holder, you need to create the base of the eraser using the **Cylinder** tool.

1. Choose the **Cylinder** tool from the **Primitives** flyout of the **Surfaces** tab in the **Palette**; you are prompted to enter the position of the cylinder.

2. Enter **0, 0, 1000** in the promptline and press ENTER; the base of the eraser is created, as shown in Figure 2-118.

Changing the Pivot Point and Scaling the Bottom Part of the Eraser

You need to change the position of the pivot point from the center to the bottom of the eraser and then scale it with respect to the new position of the pivot point.

1. Choose the **Set pivot** tool from the **Local** flyout of the **Transform** tab in the **Palette**; you are prompted to enter the new pivot position.

2. Enter **0, 0, 950** in the promptline and press ENTER; the pivot point is shifted to the bottom of the eraser, that is, the top of the base feature.

3. Choose the **Non proportional scale** tool from the **Transform** tab in the **Palette**; you are prompted to enter the scale factors along the X, Y, and Z axes.

4. Enter **100, 100, 50** in the promptline and press ENTER; the base of the eraser is scaled, as shown in Figure 2-119.
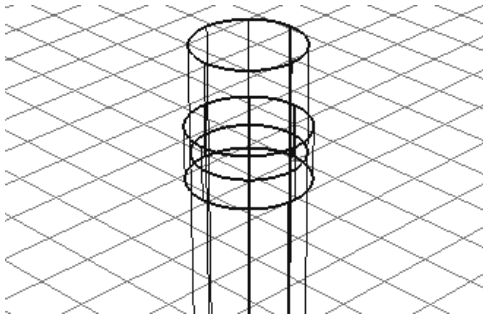
Figure 2-118   Model after creating the base of the eraser
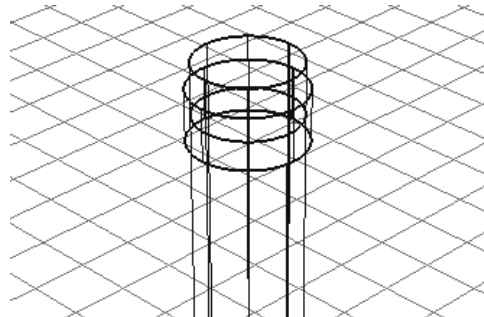
Figure 2-119   Model after scaling the base of the eraser

Creating the Top Part of the Eraser

After creating and scaling the bottom part of the eraser, you need to create the hemispherical top part of the eraser by using the **Sphere** tool.

1. Choose **Primitives > Sphere** from the **Surfaces** tab in the **Palette** and then double-click on it; the **Sphere Options** dialog box is displayed.

2. Enter the value **180** in the **Sweep** edit box and press ENTER.

3. Choose the **Go** button to exit the **Sphere Options** dialog box.

4. Enter **0, 0, 1000** in the promptline and press ENTER; the hemispherical top part is created in the window, as shown in Figure 2-120.

Rotating the Top Part of the Eraser

Next, you need to rotate the hemispherical top part of the eraser about the X-axis using the **Transform** tab.

1. Choose the **Rotate** tool from the **Transform** tab in the **Palette**; you are prompted to enter the rotation angle about the X, Y, and Z-axes.

2. Enter **90, 0, 0** in the promptline and press ENTER; the hemispherical top part is rotated about the X-axis, as shown in Figure 2-121.
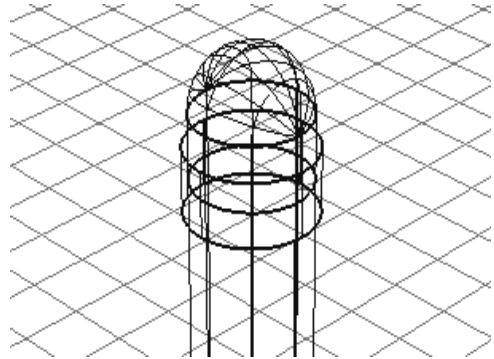
Applying the Diagnostic Shading to the Model

The model that you have created is in the wireframe mode. For a better view, you need to shade the model.

1. Choose **ObjectDisplay > Diagnostic Shading** from the menu bar; the **Diagnostic Shading** dialog box is displayed.
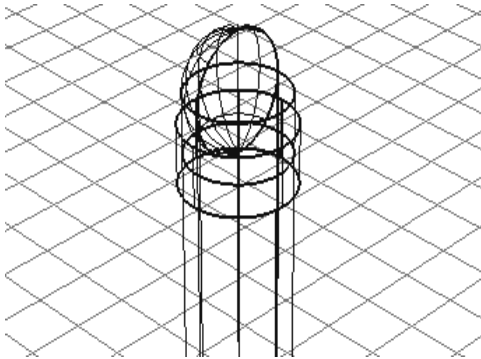
Figure 2-120 Model after creating the hemispherical top part of the eraser

Figure 2-121 Model after rotating the top part of the eraser about X-axis

2. Choose the **Multi Color** tool from the **Shading** area; the model is shaded. You can also choose the other tools from this area to get different shades.

3. Select the entire model and then clear the **Isoparm U** and **V** check boxes in the **Display** area of the **Control Panel**; the isoparametric curves in the model are hidden. The model after hiding the isoparametric curves is displayed, as shown in Figure 2-122.

Figure 2-122 Model after hiding the isoparametric curves

Saving the File

You need to save the model created in the *c02_tutorials* folder with the name *c02_tut02*. As you have created the *c02_tutorials* folder in Tutorial 1 and set it as the current project, you need not to create a new folder.

1. Choose **File > Save As** from the menu bar; the **Save Wire** dialog box is displayed. You can also invoke this dialog box by pressing the ALT+S keys.

2. Click on the down arrow given on the right of the **Go** field to display the list and select **Current Project** from this list.

3. Enter **c02_tut02** in the **Object name** edit box and then choose the **Save** button; Alias Design saves the file as *c02_tut02.wire*.

   The location of this file is given below:

   \aliasdesign_2012\c02_tutorials\c02_tut02.wire

4. Choose **File > Exit** from the menu bar; the **confirm** message box is displayed.

5. Choose the **Don't Save** button from the message box to exit the application.

Self-Evaluation Test

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

1. You can invoke a tool from the shortcut menu that is displayed when you right-click on a particular tab in the **Palette**. (T/F)

2. The curve-on-surface displays CVs when it is created. (T/F)

3. You can change the parameters of a primitive by double-clicking on its tool. (T/F)

4. In the **Cylinder Options** dialog box, **1** is selected as the default degree. (T/F)

5. In Alias, a circle is considered as a primitive. (T/F)

6. A line joining the CVs of a curve is known as _____.

7. There are _____ options in the **Ellipse definition** area that are used to create an ellipse.

8. The _____ area is used to specify parameters for edit points while working on the **New CV curve** tool.

9. While working with curves, you can view the changing degrees in the _____.

10. You can enter coordinates in the _____ to specify the position of the primitives such as sphere, cylinder, cone, and so on.

Review Questions

Answer the following questions:

1. The _____ tab is used to invoke the **Move** tool from the **Palette** or the **Shelves** window.

2. Which of the following pick tools is used to pick a single entity from a group of entities?

   (a) **Pick object**   (b) **Pick component**
   (c) **Pick template**   (d) **Pick CV**

3. How many primitives are available in the **Transform** tab of the **Palette**?

   (a) 2   (b) 4
   (c) 6   (d) 7

4. Which of the following options is not available in the **Caps** area of the **Cylinder Options** dialog box?

   (a) **0**   (b) **1**
   (c) **2**   (d) **3**

5. Which of the following is not a CV symbol?

   (a) Box   (b) u
   (c) x   (d) *

6. Span is the length of a curve segment between two edit points. (T/F)

7. Axis length ratio is the ratio of the minor axis to the length of the major axis of an ellipse. (T/F)

8. If you create a curve with uniform knot spacing, the first and last edit point parameter values of the curve will be equal to 0 and chord length, respectively. (T/F)

9. While working on curves using the _____ option, you can increase the degree of the curve progressively up to the final degree.

10. CVs are preferred over edit points for editing a curve. (T/F)

Exercises

Exercise 1

Create a table and a tennis ball, as shown in Figure 2-123. After creating the model, you need to shade it to give it a realistic look.   **(Expected time: 45 min)**
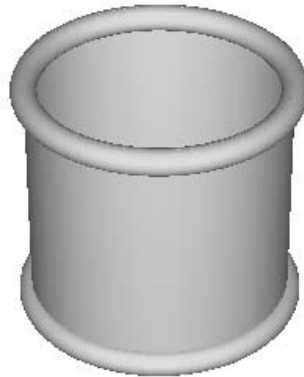
Hint

Use the **Cube** tool for creating the legs of the table. After creating the legs, scale them non-uniformly and rotate them 45-degree about two axes.

Exercise 2

Create a pen stand, as shown in Figure 2-124. After creating the model, you need to shade it to give it a realistic look.   **(Expected time: 30 min)**
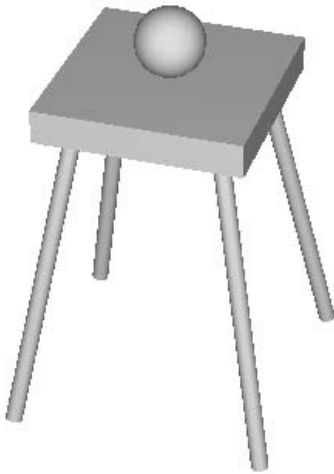
Figure 2-123   *Model for Exercise 1*

Figure 2-124   *Model for Exercise 2*

Answers to Self-Evaluation Test
1. T, **2.** F, **3.** T, **4.** F, **5.** T, **6.** hull, **7.** two, **8. Knot Spacing**, **9. Control Panel**, **10.** promptline