

# 2

## Standard Primitives

### **Learning Objectives**

**After completing this chapter, you will be able to:**

- *Understand viewport navigation controls*
- *Understand selection techniques*
- *Create standard primitives*
- *Render a still image*
- *Change the background color of the scene*



## INTRODUCTION

In this chapter, you will learn to create the default 3D objects called Standard Primitives. These geometric primitives are parametric objects. Also, you will learn about the viewport navigation controls and selection techniques.

## VIEWPORT NAVIGATION CONTROLS

The tools at the lower right corner of the Autodesk 3ds Max screen are known as viewport navigation controls. These tools are used to control the display and navigation of the viewport.

To adjust the view of an object in a viewport, you need to be familiar with the tools in the viewport navigation controls area. Note that some of the tools mentioned below are available in a flyout which will be displayed when you click on the arrow on the lower right corner of the tool icon. These tools are discussed next.



The **Zoom** tool is used to increase or decrease the magnification in the active viewport. You can zoom in by pressing the left mouse button and dragging the cursor up. Similarly, you can zoom out by pressing the left mouse button and then dragging the cursor down.



The **Zoom All** tool is the same as the **Zoom** tool with the only difference that this tool zooms the display in all four viewports simultaneously.



The **Zoom Extents** tool is used to view all objects in the active viewport.



The **Zoom Extents Selected** tool is used to view all selected objects in the active viewport.



The **Zoom Extents All** tool is the same as the **Zoom Extents** tool with the only difference that this tool is used to view all objects in all viewports.



The **Zoom Extents All Selected** tool is the same as the **Zoom Extents Selected** tool with the only difference that this tool is used to view all selected objects in all viewports.



The **Zoom Region** tool is used to define the area to be magnified and viewed in the current viewport. The area to be magnified is specified by a rectangle created by dragging the cursor. The **Zoom Region** tool is not available in the Camera viewport.



The **Field-of-View** tool is available only in the Perspective and Camera viewports. It is used to change the field of view of the scene in these viewports. More the field of view of a camera, more will be the visibility of your scene, and vice-versa.



The **Pan View** tool is used to pan the scene in the viewport. This tool enables you to display the contents of the viewport that are outside the display area without changing the magnification of the current viewport.



The **Walk Through** tool is available in Perspective and Camera viewports only. It allows you to navigate through these viewports. On invoking this tool, the cursor changes into a circle with a dot at its center. Press and hold the left mouse button to navigate in the active viewport. Alternatively, choose this tool and then press the arrow keys to navigate through the viewport. On pressing the arrow keys, the cursor shows a directional arrow indicating the navigation direction.



The **Orbit** tool is used to rotate the viewport around its view center. This enables you to see the three-dimensional (3D) view of the objects in the Perspective viewport. You can also rotate the Top, Front, and Left viewports. But in such cases, the respective viewport becomes the Orthographic viewport.



The **Orbit Selected** tool is the same as the **Orbit** tool with the only difference that it is used to rotate the viewport around the center of the current selection.



The **Orbit SubObject** tool is the same as the **Orbit** tool with the only difference that it is used to rotate the viewport around the center of the current sub-object selection.



The **Maximize Viewport Toggle** tool is used to maximize the active viewport so that you can view only the active viewport instead of all the four viewports.

## SELECTION TECHNIQUES

In Autodesk 3ds Max, you can select objects using various tools such as **Select Object**, **Select by Name**, **Select and Move**, and so on. These tools are discussed next.

### Select Object Tool

**Quad Menu:** Select  
**Main Toolbar:** Select Object  
**Keyboard:** Q



The **Select Object** tool is used to select one or more objects in the viewport. To select an object, choose this tool and move the cursor over the object; the cursor will convert into a selection cursor. Next, press the left mouse button; the objects will be selected. To select more than one object at a time, hold the CTRL key and select the objects that you want to add to the selection. To remove an object from the selection set, hold the ALT key and select the object that you want to remove from the selection.

### Select by Name Tool

**Menu bar:** Edit > Select By > Name  
**Main Toolbar:** Select by Name  
**Keyboard:** H



The **Select by Name** tool is used to select an object from the list of objects in the scene. When you choose the **Select by Name** tool from the **Main Toolbar**, the **Select From Scene** dialog box will be displayed. If there are some components in the scene,

then those components will be displayed in this dialog box, as shown in Figure 2-1. Now, select an object in the list and choose the **OK** button. Alternatively, you can double-click on the object name in the list to select it. You can also select more than one object by holding the SHIFT or CTRL key. The buttons at the top of the dialog box are used to filter the objects in the list.

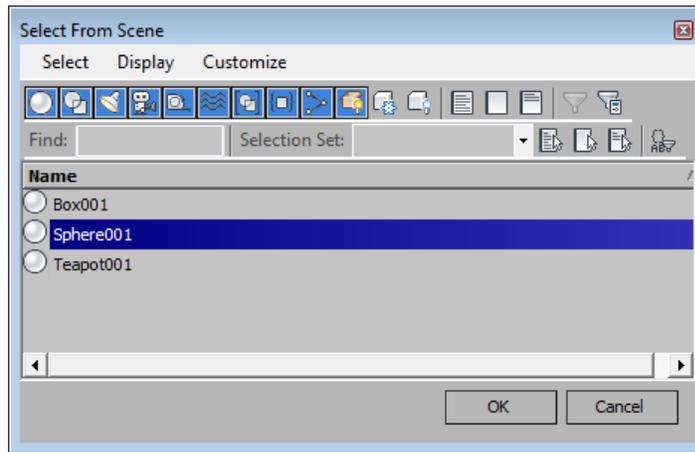


Figure 2-1 The *Select From Scene* dialog box

## Select and Move Tool

**Quad Menu:** Move  
**Main Toolbar:** Select and Move  
**Keyboard:** W



The **Select and Move** tool is used to select and move the objects in the viewports. You can move an object by selecting it and then dragging the mouse along the X, Y, or Z axis. You can also move the selected object in the XY, YZ, or ZX plane. To move the selected object along one of the axes, choose this tool and then select the object; the move gizmo will be displayed. Move the cursor over the axis along which you want to move the object, press the left mouse button, and then drag the cursor. Similarly, to move the object in one of the planes, move the cursor over the plane displayed between the two axes; the plane will be highlighted in yellow. Next, press the left mouse button and drag the cursor.

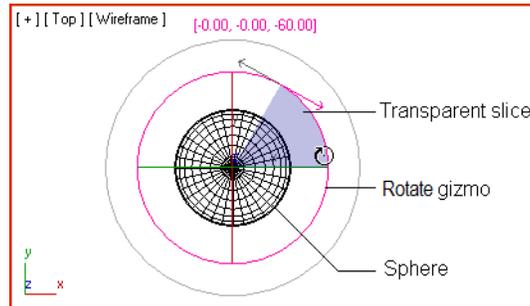
## Select and Rotate Tool

**Quad Menu:** Rotate  
**Main Toolbar:** Select and Rotate  
**Keyboard:** E



The **Select and Rotate** tool is used to rotate the objects in the viewport along the X, Y, or Z axis. To rotate the object along one of the axes, choose the **Select and Rotate** tool, and then select the object; a rotate gizmo will be displayed along with the X, Y, and Z axes. Next, move the cursor over the axes along which you want to rotate the object, press the left mouse button, and then drag the cursor. When you rotate the object, a transparent slice will be displayed which will provide a visual representation of the direction and the degree

of rotation, refer to Figure 2-2. Also, you can view the degree of rotation in the X, Y, and Z axes in the coordinates displayed in the Coordinate display area at the bottom of the screen.



*Figure 2-2 The circular gizmo in the Top viewport while rotating the object*

## Select and Scale Tools

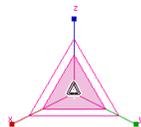
**Quad Menu:** Scale  
**Main Toolbar:** Select and Scale  
**Keyboard:** R

There are three types of tools that are used to scale an object. These tools are available in the **Select and Scale** flyout and are discussed next.

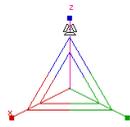
### Select and Uniform Scale



The **Select and Uniform Scale** tool is used to scale the objects proportionally along the three axes. To scale an object uniformly along all the three axes, choose the **Select and Uniform Scale** tool from the **Main Toolbar** and select the object; the scale gizmo will be displayed, as shown in Figure 2-3. Move the cursor to the center of the gizmo and make sure its central portion is highlighted, refer to Figure 2-3. Next, drag the cursor up or down to scale the selected object. You can also perform non-uniform scaling using this tool. To do so, move the cursor over the axis along which you want to scale the object, refer to Figure 2-4, and then drag the cursor. Similarly, you can perform non-uniform scaling along the XY, YZ, or ZX plane by selecting the required plane and then dragging that plane, refer to Figure 2-5.



*Figure 2-3 The scale gizmo for uniform scaling*



*Figure 2-4 Selecting the Z-axis for non-uniform scaling*



*Figure 2-5 Selecting the YZ plane for non-uniform scaling*

## Select and Non-uniform Scale Tool



The **Select and Non-uniform Scale** tool is used to scale an object along a particular axis or plane non-uniformly. To scale the object, choose the **Select and Non-uniform Scale** tool from the **Select and Scale** flyout, and then select the object. Move the cursor over the X, Y, or Z axes along which you want to scale the object and drag the cursor to modify the shape of the object. Similarly, you can perform the non-uniform scaling along the XY, YZ, or ZX plane. You can also perform uniform scaling in the same manner, as described in the **Select and Uniform Scale** tool.

## Select and Squash Tool



The **Select and Squash** tool is used to stretch and squash the object along the selected axis. To squash the object along one of the axes, choose the **Select and Squash** tool and select the object. Move the cursor over the axis along which you want to squash it. Next, drag the cursor. Similarly, you can squash the selected object along the XY, YZ, or ZX plane. To do so, move the cursor over the plane displayed between the two axes and drag the cursor to squash the object along that plane.



### Note

By default, the color of the X-axis, the Y-axis, and the Z-axis of the transform gizmos is red, green, and blue, respectively. When you move the cursor over any one of these axes, it gets activated and turns yellow. You can see the colors of these axes at the bottom left corner of each viewport or while selecting an object using the **Select and Move**, **Select and Rotate**, or **Select and Scale** tool. Figures 2-6, 2-7, and 2-8 show the move gizmo, rotate gizmo, and the scale gizmo, respectively.

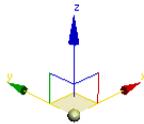


Figure 2-6 The move gizmo

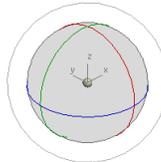


Figure 2-7 The rotate gizmo

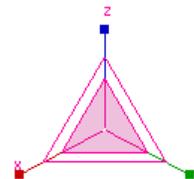


Figure 2-8 The scale gizmo

## AXIS CONSTRAINTS TOOLBAR

The buttons in the **Axis Constraints** toolbar are used to specify the axis or plane along which the transformation would take place. The transformation includes movement, rotation, and scaling of an object. The **Axis Constraints** toolbar is not displayed by default on the interface.

To display it, right-click in the blank area on the **Main Toolbar**; a shortcut menu will be displayed. Choose **Axis Constraints** from the shortcut menu; the toolbar will be displayed on the screen, as shown in Figure 2-9. Now, choose one of the buttons available in the **Axis Constraints** toolbar to perform the transformation along the selected axis. You can use the F5, F6, and F7 function keys to invoke the X, Y, and Z constraints, respectively. To toggle between the XY, YZ, and XZ axes, you can use the F8 function key.

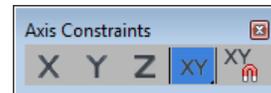


Figure 2-9 The Axis Constraints toolbar

## STANDARD PRIMITIVES

Autodesk 3ds Max has several basic three-dimensional geometric shapes which are known as standard primitives such as box, cone, sphere, cylinder, torus, tube, and so on. You can use these primitives to create simple 3D models such as a table, box, chair, and so on. All the standard primitives can be created dynamically using the mouse or by specifying the parameters in the **Keyboard Entry** rollout of the **Command Panel**.



To create the standard primitives, choose **Create > Geometry** in the **Command Panel**. By default, the **Standard Primitives** option is selected in the drop-down list below the **Geometry** button. Now, activate the viewport in which you want to create the primitives by clicking in it. Next, choose the corresponding tool from the **Object Type** rollout.



In the following section, you will learn to create and modify the standard primitives using various tools available in the **Object Type** rollout.

### Creating a Box

<b>Menu bar:</b>	Create > Standard Primitives > Box
<b>Command Panel:</b>	Create > Geometry > Standard Primitives > Object Type rollout > Box

To create a box, activate the viewport in which you want to create a box by clicking in it. Next, choose the **Box** tool from the **Object Type** rollout; the **Name and Color**, **Creation Method**, **Keyboard Entry**, and **Parameters** rollouts will be displayed, as shown in Figure 2-10. Press and hold the left mouse button in the viewport to specify the first corner of the box and then drag the cursor to define the length and width of the box. Release the left mouse button to get the desired length and width. Now, move the cursor up or down to define the height of the box. Click after you get the desired height; the box will be created, as shown in Figure 2-11.

Various rollouts used to create and modify the box are discussed next.



#### Note

1. To view all rollouts, position the cursor over any rollout until you see the pan icon (hand). Then, press the left mouse button and drag the cursor in the rollout.



2. The plus sign (+) on the left side of the rollout head indicates that the rollout is collapsed and the minus sign (-) indicates that the rollout is expanded.



**Tip:** If you are creating a standard primitive that requires multiple steps, now in Autodesk 3dsMax 2013, you can pan or orbit the viewport between the steps. To pan the viewport, drag the cursor with the middle-mouse button or mouse wheel held down. To rotate the viewport, press and hold the ALT key and then drag the cursor with middle-mouse button or mouse wheel held down.

### Name and Color Rollout

In Autodesk 3ds Max, a specific name and color is automatically assigned to the newly created box. To modify this name, expand the **Name and Color** rollout. Enter a new name in the **Name and Color** edit box and press ENTER. To change the color of the box, choose the color swatch on the right side of the name edit box; the **Object Color** dialog box will be displayed,

as shown in Figure 2-12. Choose a new color from this dialog box; the selected color will be displayed in the **Current Color** color swatch. Now, choose the **OK** button; the new color will be assigned to the box.

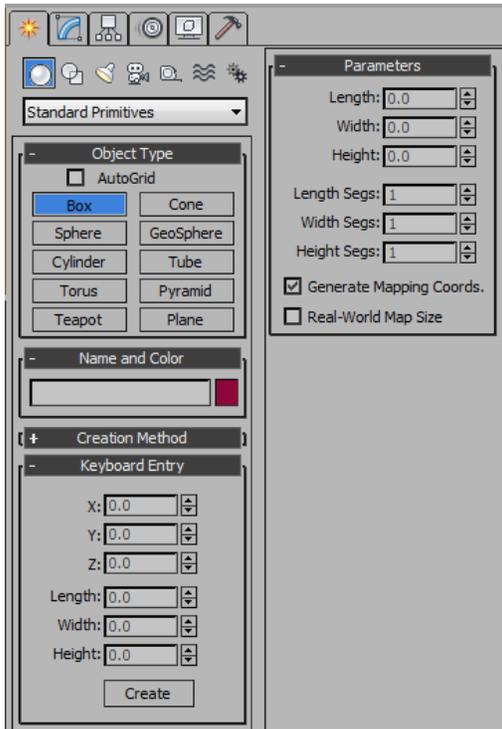


Figure 2-10 Various rollouts to create a box

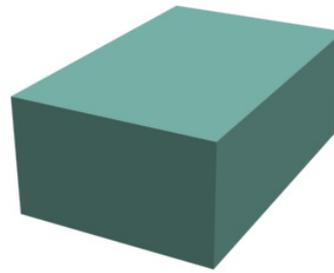


Figure 2-11 A box created in the viewport

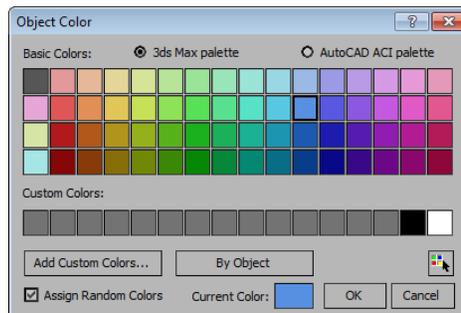


Figure 2-12 The *Object Color* dialog box

To customize the new color, choose the **Add Custom Colors** button in the **Object Color** dialog box; the **Color Selector: Add Color** dialog box will be displayed, as shown in Figure 2-13. Now, customize a new color in this dialog box and choose the **Add Color** button; the new color will be displayed in one of the color swatches in the **Custom Colors** area of the **Object Color** dialog box. Next, choose the **OK** button; the new color will be assigned to the box.

**Note**

The options in the **Name and Color** rollout are the same for all standard primitives.

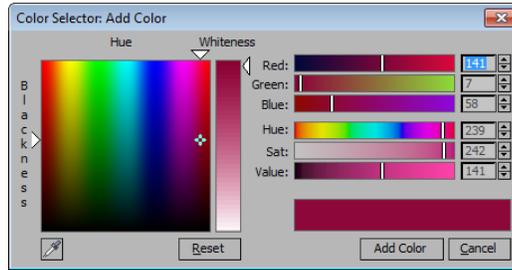


Figure 2-13 The **Color Selector: Add Color** dialog box

**Creation Method Rollout**

The options in this rollout are used for creating the box dynamically using the mouse. Select the **Cube** radio button to create a box of equal length, width, and height. Select the **Box** radio button to create a box having different length, width, and height.

**Keyboard Entry Rollout**

This rollout is used to create a box by entering the parameters in the **Keyboard Entry** rollout using the keyboard. To do so, expand the **Keyboard Entry** rollout and enter the values in the **Length**, **Width**, and **Height** spinners to specify the length, width, and height of the box, respectively. Also, enter the values in the **X**, **Y**, and **Z** spinners to specify the position of the box in the viewport along the axes of the home grid or a grid object. By default, the value in these spinners is 0, therefore, the object is created at the center of the home grid or a grid object in the viewport. Next, choose the **Create** button in the **Keyboard Entry** rollout; a box will be displayed with the specified dimensions in all viewports.

**Note**

The *grid object* is a type of helper object. It is a local grid other than the home grid that you can create yourself as per the requirement.

The **Keyboard Entry** rollout in all standard primitives is used to create the corresponding primitive by entering the parameters in this rollout. The method of creating all primitives is the same as discussed. The only difference is in the type and number of parameters of various standard primitives.

**Parameters Rollout**

After creating the box, you can modify its dimensions using the **Parameters** rollout. To do so, enter the new values of length, width, and height in the respective spinners in the **Parameters** rollout. Similarly, set the values in the **Length Segs**, **Width Segs**, and **Height Segs** spinners to define the number of divisions or segments along each axis of the object. Select the **Generate Mapping Coords.** check box to generate mapping coordinates for applying mapped material to the box.

**Note**

After creating a primitive in the viewport, if you right-click in the viewport to exit the tool, the **Parameters** rollout will disappear from the **Create** tab. In such a case, to modify the parameters of the primitive, select the primitive in the viewport and choose the **Modify** tab in the **Command Panel**; the **Parameters** rollout will appear again.

## Creating a Sphere

<b>Menu bar:</b>	Create > Standard Primitives > Sphere
<b>Command Panel:</b>	Create > Geometry > Standard Primitives > Object Type rollout > Sphere

To create a sphere, activate a viewport by clicking in it and choose the **Sphere** tool from the **Object Type** rollout; the **Name and Color**, **Creation Method**, **Keyboard Entry**, and **Parameters** rollouts will be displayed, as shown in Figure 2-14. Press and hold the left mouse button to specify the center of the sphere and then drag the cursor to define the radius of the sphere. Release the left mouse button to get the desired radius; the sphere will be created, as shown in Figure 2-15. Note that the sphere will be displayed in all viewports.

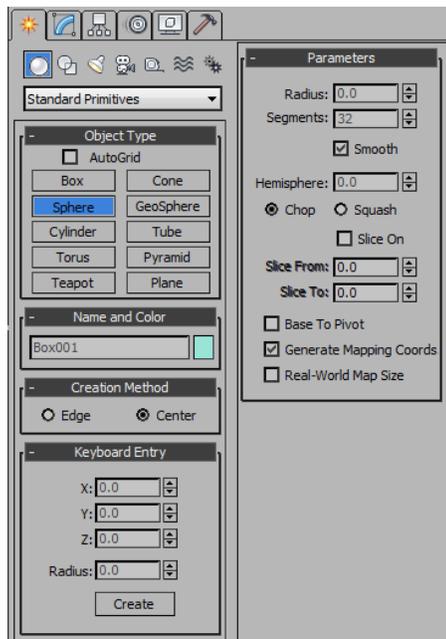


Figure 2-14 Various rollouts to create a sphere

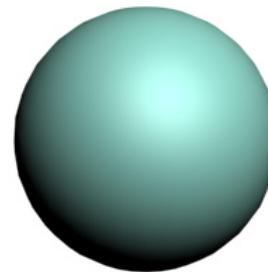


Figure 2-15 A sphere created in the viewport

Various rollouts used to create and modify the sphere are discussed next.

### Creation Method Rollout

The options in this rollout are used for creating a sphere dynamically. Select the **Edge** radio button to specify the first point on an edge at the surface of the sphere and then drag to

specify its diameter. Select the **Center** radio button to specify the first point at the center of the sphere and then drag to specify the radius.

### Parameters Rollout

The options in this rollout are used to modify the parameters of the sphere. To do so, enter a new value in the **Radius** spinner. By default, the **Smooth** check box is selected, therefore, the sphere appears smooth. If this check box is cleared, it will give a faceted appearance to the sphere. The **Hemisphere** spinner is used to create a partial sphere. To create a hemisphere, enter a value in the **Hemisphere** spinner. While creating a hemisphere, if you select the **Chop** radio button, then the number of vertices and faces in the hemisphere will be chopped or reduced. If you select the **Squash** radio button, the hemisphere will have the same number of vertices and faces as in the complete sphere. On selecting the **Slice On** check box, the **Slice From** and **Slice To** spinners will be enabled. Set the values in the **Slice From** and **Slice To** spinners to specify the start and end angle of the sphere around its local Z-axis. By default, the pivot point of the sphere is located at its center. If you select the **Base To Pivot** check box, then the pivot point of the sphere will shift toward its local Z-axis.

The pivot point represents the local center and the local coordinate system of an object. It is used as follows:

- Center of rotation and scaling
- Default location of a modifier center
- Transform origin for linked children
- Joint location for the IK

### Creating a GeoSphere

<b>Menu bar:</b>	Create > Standard Primitives > GeoSphere
<b>Command Panel:</b>	Create > Geometry > Standard Primitives > Object Type rollout > GeoSphere

The **GeoSphere** tool creates a more regular surface than the **Sphere** tool. To create a geosphere, activate the viewport by clicking in it and choose the **GeoSphere** tool from the **Object Type** rollout; the **Name and Color**, **Creation Method**, **Keyboard Entry**, and **Parameters** rollouts will be displayed, as shown in Figure 2-16. Press and hold the left mouse button to specify the center of the geosphere and then drag the cursor to define the radius of the geosphere. Release the left mouse button to get the desired radius; a geosphere will be created, as shown in Figure 2-17. Notice that the geosphere will be displayed in all viewports.

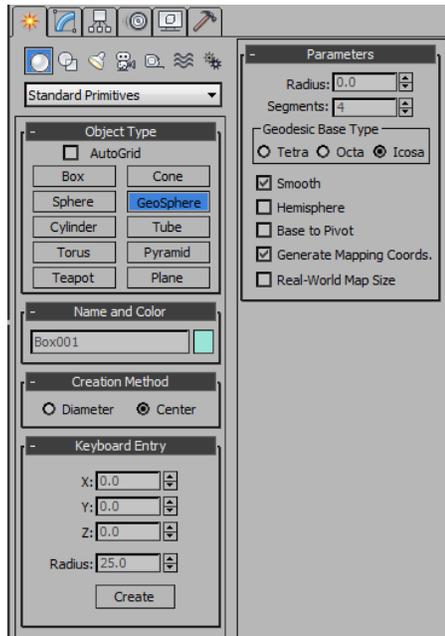
Various rollouts used to create and modify the geosphere are discussed next.

### Creation Method Rollout

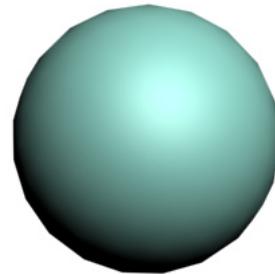
The options in this rollout are used for creating a geosphere dynamically. Select the **Diameter** radio button to specify the first point on an edge at the surface of the geosphere and then drag to specify the diameter. Select the **Center** radio button to specify the first point as the center of the geosphere and then drag to specify the radius.

## Parameters Rollout

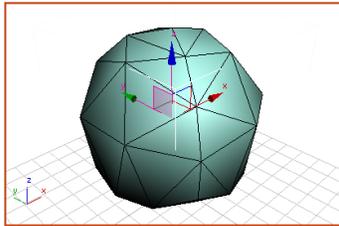
The options in this rollout are used to modify the geosphere. Set a new value in the **Radius** spinner. If you create a geosphere by selecting the **Tetra** radio button in the **Geodesic Base Type** area, the resulting surface will consist of tetrahedrons and triangular faces, as shown in Figure 2-18. Similarly, if you select the **Octa** radio button, you will get a surface consisting of octagons and triangular faces, as shown in Figure 2-19. Select the **Icosa** radio button to create a surface consisting of 20-sided polygons and equilateral triangles, as shown in Figure 2-20. By default, the **Smooth** check box is selected. It is used to make hemisphere smooth. On selecting the **Hemisphere** check box, one half of the geosphere will be created. If the **Base to Pivot** check box is selected, it will shift the pivot point of the geosphere toward the local Z-axis.



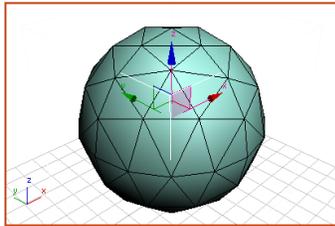
**Figure 2-16** Various rollouts to create a geosphere



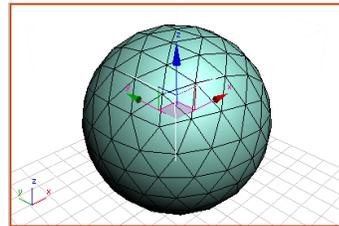
**Figure 2-17** A geosphere created in the viewport



**Figure 2-18** The geosphere created on selecting the **Tetra** radio button



**Figure 2-19** The geosphere created on selecting the **Octa** radio button



**Figure 2-20** The geosphere created on selecting the **Icosa** radio button

## Creating a Cylinder

<b>Menu bar:</b>	Create > Standard Primitives > Cylinder
<b>Command Panel:</b>	Create > Geometry > Standard Primitives > Object Type rollout > Cylinder

The **Cylinder** tool is used to create a cylinder that can be sliced along its major axis. To create a cylinder, activate the viewport by clicking in it and choose the **Cylinder** tool from the **Object Type** rollout; the **Name and Color**, **Creation Method**, **Keyboard Entry**, and **Parameters** rollouts will be displayed, as shown in Figure 2-21.

Press and hold the left mouse button to specify the center of the base of the cylinder and then drag the cursor to define the radius of the cylinder. Release the left mouse button. Next, move the cursor up or down to define the height of the cylinder. Click after you get the desired height; a cylinder will be created, as shown in Figure 2-22.

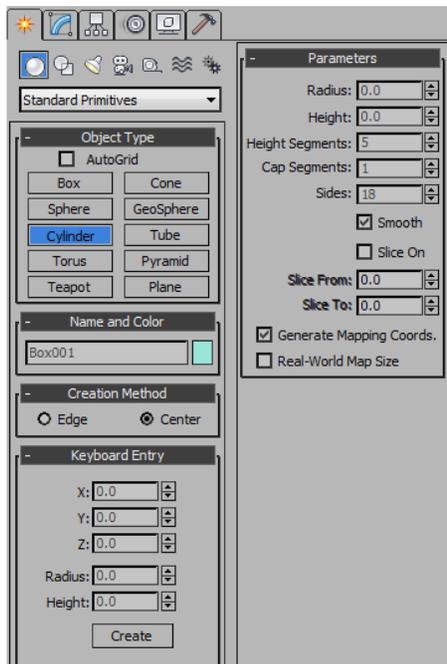


Figure 2-21 Various rollouts to create a cylinder

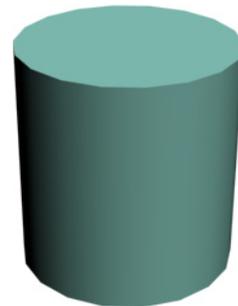


Figure 2-22 A cylinder created in the viewport

Various rollouts used to create and modify the cylinder are discussed next.

### Creation Method Rollout

The options in this rollout are the same as those discussed in the **Sphere** tool.

### Parameters Rollout

The options in this rollout are used to modify the cylinder. Enter a new value for the radius and height in the **Radius** and **Height** spinners, respectively. The value in the **Height Segments** spinner defines the number of segments along the height of the cylinder. The value in the **Cap Segments** spinner specifies the number of segments at the top and bottom of the cylinder. The

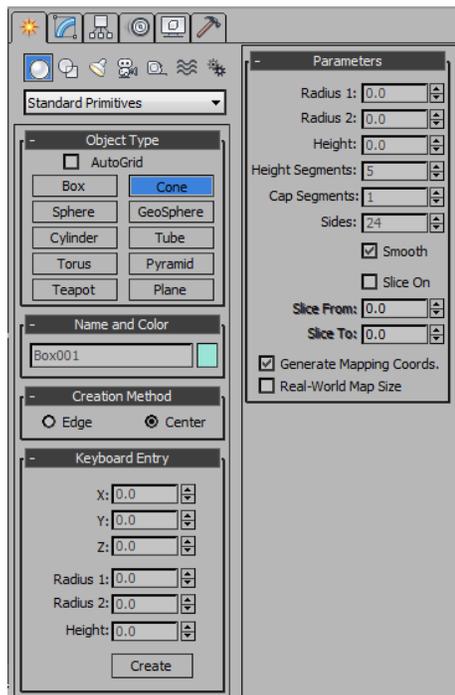
value in the **Sides** spinner specifies the number of sides on the cylinder. Different shapes of the cylinder can be created by entering different values in the **Sides** spinner. By default, the **Smooth** check box is selected, therefore, the cylinder appears smoother. The **Slice On** check box is the same as described in the **Sphere** tool.

## Creating a Cone

**Menu:** Create > Standard Primitives > Cone  
**Command Panel:** Create > Geometry > Standard Primitives > Object Type rollout > Cone

The **Cone** tool is used to create upright or inverted round cones. To create a cone, activate the viewport and then choose the **Cone** tool from the **Object Type** rollout; the **Name and Color**, **Creation Method**, **Keyboard Entry**, and **Parameters** rollouts will be displayed, as shown in Figure 2-23.

Press and hold the left mouse button to specify the center of the base of the cone and then, drag the cursor to define radius 1 of the cone. Release the left mouse button and move the cursor up or down to define the height of the cone. Next, click to get the desired height. Move the cursor up or down again and click to define radius 2 of the cone; a cone will be created, as shown in Figure 2-24.



**Figure 2-23** Various rollouts to create a cone



**Figure 2-24** A cone created in the viewport

Various rollouts used to create and modify the cone are discussed next.

## Creation Method Rollout

The options in this rollout are the same as those discussed in the **Sphere** tool.

## Parameters Rollout

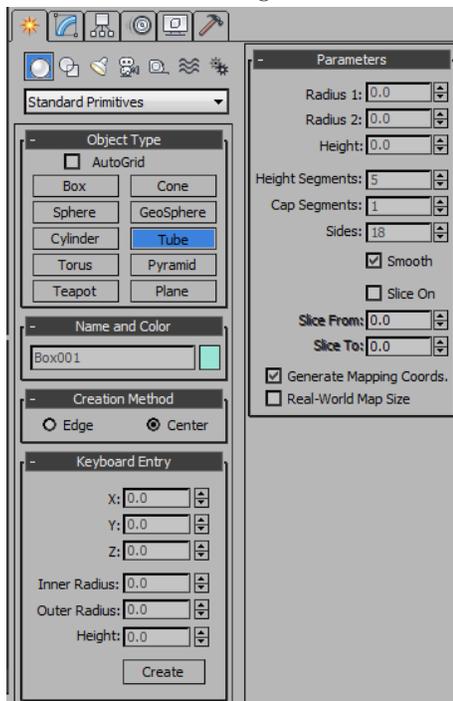
The options in this rollout are used to modify the cone. Enter the new values of first radius, second radius, and height in the **Radius 1**, **Radius 2**, and **Height** spinners, respectively. The other options in this rollout are the same as those described in the **Cylinder** tool.

## Creating a Tube

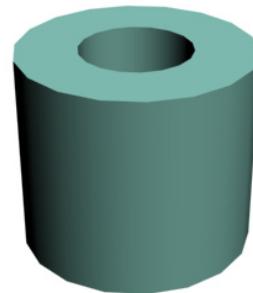
<b>Menu bar:</b>	Create > Standard Primitives > Tube
<b>Command Panel:</b>	Create > Geometry > Standard Primitives > Object Type rollout > Tube

The **Tube** tool is used to create round and prismatic tubes. The tube primitive is similar to the cylinder primitives with a hole in it. To create a tube, activate the viewport and choose the **Tube** tool from the **Object Type** rollout; the **Name and Color**, **Creation Method**, **Keyboard Entry**, and **Parameters** rollouts will be displayed, as shown in Figure 2-25.

Press and hold the left mouse button to specify the center of the tube and then drag the cursor to define the first radius of the tube. It can be the inner or the outer radius of the tube. Next, release the left mouse button, move the cursor, and then click to define the second radius. Next, move the cursor up or down and click to get the desired height of the tube; a tube will be created, as shown in Figure 2-26.



**Figure 2-25** Various rollouts to create a tube



**Figure 2-26** A tube created in the viewport

Various rollouts used to create and modify the tube are discussed next.

### Creation Method Rollout

The options in this rollout are the same as those discussed in the **Sphere** tool.

### Parameters Rollout

The options in this rollout are used to modify the tube. Enter new values in the **Radius 1**, **Radius 2**, and **Height** spinners. The other options in this rollout are the same as those described in the **Cylinder** tool.

### Creating a Torus

<b>Menu bar:</b>	Create > Standard Primitives > Torus
<b>Command Panel:</b>	Create > Geometry > Standard Primitives > Object Type rollout > Torus

The **Torus** tool is used to create doughnut like shapes. To create a torus, activate the viewport and choose the **Torus** tool from the **Object Type** rollout; the **Name and Color**, **Creation Method**, **Keyboard Entry**, and **Parameters** rollouts will be displayed, as shown in Figure 2-27.

Press and hold the left mouse button to specify the center of the torus and then drag the cursor to define the radius of the torus. Release the left mouse button and then drag the cursor to adjust the radius of the circular cross-section of the torus. Click to get the desired radius; a torus will be created, as shown in Figure 2-28.

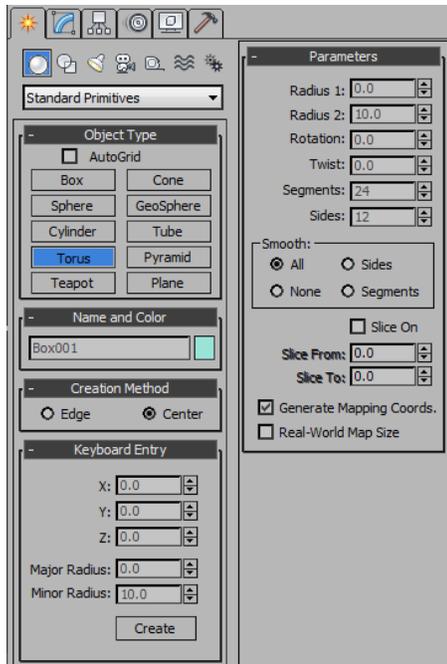


Figure 2-27 Various rollouts to create a torus

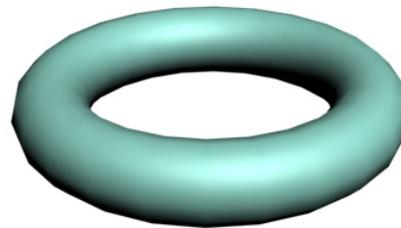


Figure 2-28 A torus created in the viewport

Various rollouts used to create and modify the torus are discussed next.

### Creation Method Rollout

The options in this rollout are the same as those discussed in the **Sphere** tool.

### Parameters Rollout

The options in this rollout are used to modify the torus. Enter new values in the respective spinners to modify the torus. The value in the **Rotation** spinner defines the degree of rotation of the circular cross-section of the torus. The value in the **Twist** spinner specifies how much the circular cross-section of the torus can be twisted. The **Segments** spinner defines the number of segments around the circumference of the torus. The **Sides** value specifies the number of sides in the circular cross-section of the torus. In the **Smooth** area of the **Parameters** rollout, there are four radio buttons. Select the **All** radio button to apply smoothness to all surfaces of the torus. Select the **Sides** radio button to apply smoothness between adjacent segments. Select the **Segments** radio button to apply smoothness to the segments individually. It results in the formation of ring-like segments along the torus. Select the **None** radio button, if you do not want to apply smoothness to the torus. The **Slice On** check box is the same as described in the **Sphere** tool.

### Creating a Pyramid

<b>Menu bar:</b>	Create > Standard Primitives > Pyramid
<b>Command Panel:</b>	Create > Geometry > Standard Primitives > Object Type rollout > Pyramid

To create a pyramid, activate the viewport and choose the **Pyramid** tool from the **Object Type** rollout; the **Name and Color**, **Creation Method**, **Keyboard Entry**, and **Parameters** rollouts will be displayed, as shown in Figure 2-29.

Press and hold the left mouse button to specify the first corner of the pyramid and then drag the cursor to define the width and depth of the pyramid. Release the left mouse button and drag the cursor upward. Click after you get the desired height; a pyramid will be created, as shown in Figure 2-30.

Various rollouts used to create and modify the pyramid are discussed next.

### Creation Method Rollout

The options in this rollout are used for creating a pyramid dynamically. Select the **Base/Apex** radio button to specify the first point as the first corner of the base of the pyramid. Select the **Center** radio button to specify the first point as the center of the base of the pyramid.

### Parameters Rollout

The options in this rollout are used to modify the pyramid. The values in the **Width Segs**, **Depth Segs**, and **Height Segs** spinners define the number of segments on the corresponding sides of the pyramid. Enter new values in the respective spinners to modify the pyramid.

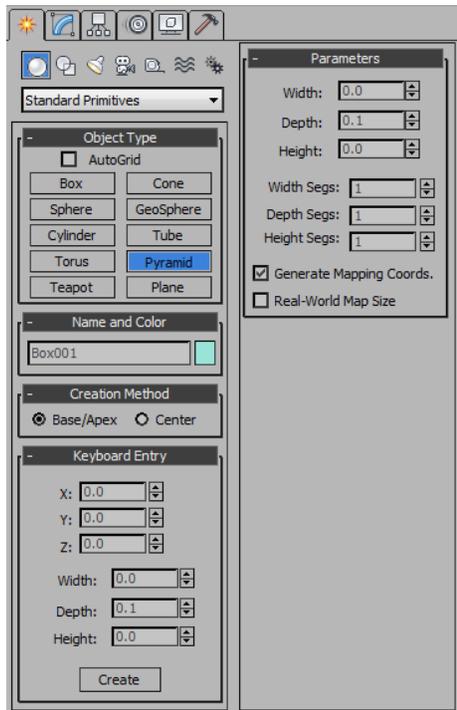


Figure 2-29 Various rollouts to create a pyramid



Figure 2-30 A pyramid created in the viewport

## Creating a Plane

**Menu bar:** Create > Standard Primitives > Plane  
**Command Panel:** Create > Geometry > Standard Primitives > Object Type rollout > Plane

To create a plane, activate the viewport by clicking in it and then choose the **Plane** tool from the **Object Type** rollout; the **Name and Color**, **Creation Method**, **Keyboard Entry**, and **Parameters** rollouts will be displayed, as shown in Figure 2-31.

Press and hold the left mouse button to specify the first corner of the plane and then drag the cursor to define the length and width of the plane. Release the left mouse button; a plane will be created, as shown in Figure 2-32.

Various rollouts used to create and modify the plane are discussed next.

### Creation Method Rollout

The options in this rollout are used for creating a plane dynamically. Select the **Rectangle** radio button to specify the first point as the corner of a rectangular plane. Select the **Square** radio button to specify the first point as the center of a square plane. Note that in the case of a square plane, the length and width of the plane will be equal.

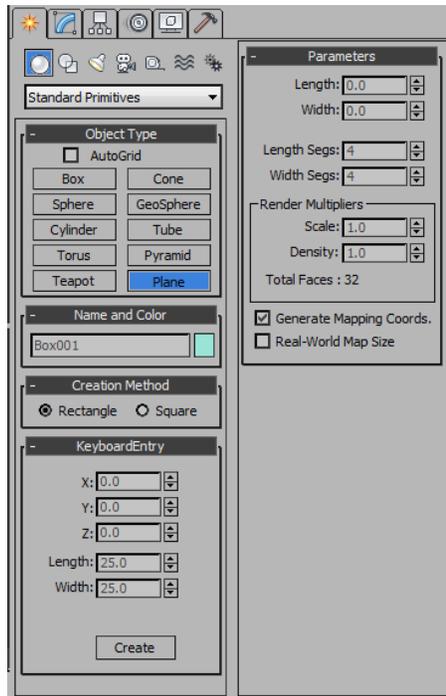


Figure 2-31 Various rollouts to create a plane

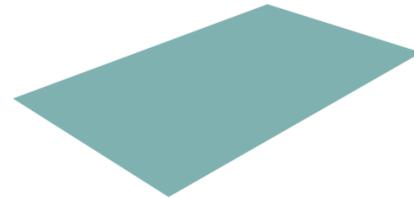


Figure 2-32 A plane created in the viewport

### Parameters Rollout

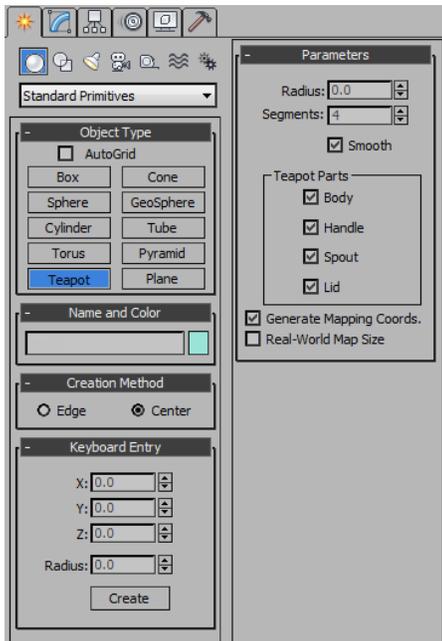
The options in this rollout are used to modify the plane. Enter the new values in the **Length** and **Width** spinners to modify the plane. The values in the **Length Segs** and **Width Segs** spinners define the number of segments along the length and width of the plane, respectively. The **Render Multipliers** area is used to set the multipliers for rendering. The **Scale** spinner is used to specify the value by which the length and width will be multiplied at rendering. The **Density** spinner is used to specify the value by which the number of segments along the length and width will be multiplied at rendering.

### Creating a Teapot

<b>Menu bar:</b>	Create > Standard Primitives > Teapot
<b>Command Panel:</b>	Create > Geometry > Standard Primitives > Object Type rollout > Teapot

To create a teapot, activate the viewport and choose the **Teapot** tool from the **Object Type** rollout; the **Name and Color**, **Creation Method**, **Keyboard Entry**, and **Parameters** rollouts will be displayed, as shown in Figure 2-33.

Press and hold the left mouse button to define the center of the bottom face and then drag the cursor to define the radius of the teapot. Release the left mouse button after you get the desired radius; a teapot will be created, as shown in Figure 2-34.



**Figure 2-33** Various rollouts to create a teapot



**Figure 2-34** A teapot created in the viewport

Various rollouts used to create and modify the teapot are discussed next.

### Creation Method Rollout

The options in this rollout are the same as those discussed in the **Sphere** tool.

### Parameters Rollout

The options in this rollout are used to modify the teapot. The value in the **Segments** spinner is used to specify the number of divisions in each quadrant of the body. By default, the **Smooth** check box is selected. Therefore, all parts of the teapot will be smoother. A teapot has four parts: body, handle, spout, and lid. If you want to remove any one of the parts, clear the check box corresponding to that part in the **Teapot Parts** area of the **Parameters** rollout. You can also use different parts of a teapot individually to make another object. For example, you can use the handle of the teapot for creating a coffee mug.

## RENDERING A STILL IMAGE

<b>Menu bar:</b>	Rendering > Render
<b>Toolbar:</b>	Main Toolbar > Render Production
<b>Keyboard:</b>	SHIFT + Q

Rendering is a process of generating a 2D image from a 3D scene. It shows the lighting effects, materials applied, background, and other settings that you have applied to the scene. The basic rendering for a still scene is discussed next while the advance rendering for the animated scenes will be discussed in the later chapters.



To render a still image, activate the viewport and choose the **Render Setup** tool from the **Main Toolbar**; the **Render Setup: Default Scanline Renderer** dialog box will be displayed. The **Common** tab is chosen by default in this dialog box. In the **Common Parameters** rollout, make sure that the **Single** radio button is selected in the **Time Output** area. This will enable you to render a single frame at a time. In the **Output Size** area, set the parameters or use the default ones and then choose the **Render** button at the lower right corner of the dialog box; the rendered image will be displayed in the **Perspective, frame 0, Display Gamma:2.2, RGBA Color16 Bits/Channel (1:1)** window, as shown in Figure 2-35.

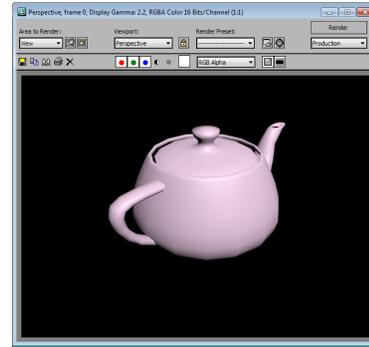


Figure 2-35 The *Perspective, frame 0, Display Gamma:2.2, RGBA Color16 Bits/Channel (1:1)* window

Here, **Perspective** refers to the name of the viewport that you have selected at rendering and **frame 0** refers to the number of frame that has been rendered.



#### Note

To render a view quickly, choose the **Render Production** tool from the **Main Toolbar** or press the **F9** key.



To save the rendered image, choose the **Save Image** button in the **Perspective, frame 0, RGBA Color 16 Bits/Channel (1:1)** dialog box; the **Save Image** dialog box will be displayed. Now, select the type of image format from the **Save as type** drop-down list and enter the name of the image in the **File name** text box. Next, browse to the folder where you want to save the scene and choose the **Save** button; a dialog box will be displayed. You can adjust the settings for the file format you have chosen in this dialog box. Use the default settings and choose the **OK** button; the image file will be saved at the selected location.



#### Note

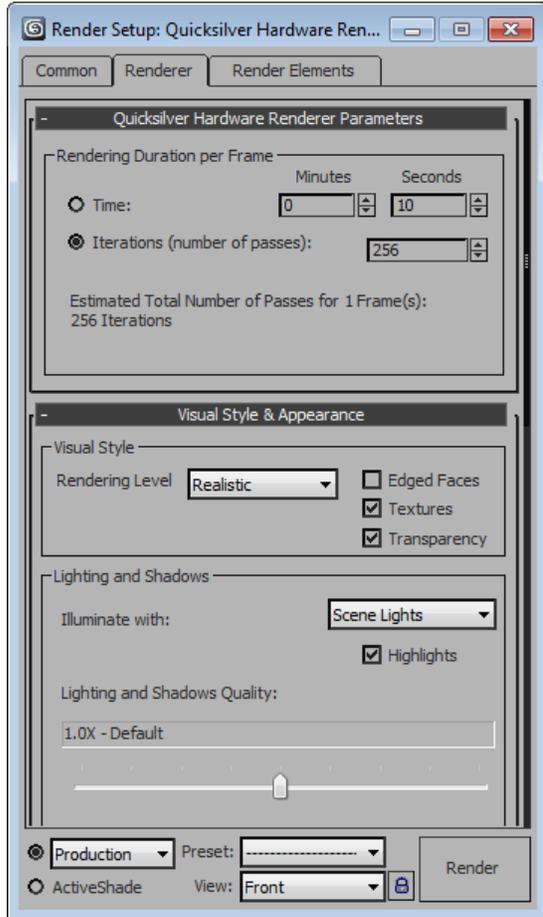
In the later chapters, the *Perspective, frame 0, Display Gamma:2.2, RGBA Color16 Bits/Channel (1:1)* window is referred to as **Rendered Frame** window.

## Non-Photorealistic Style Rendering

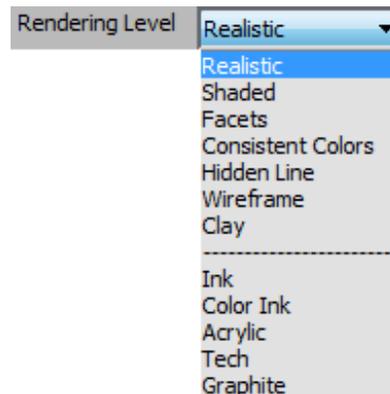
By default, a 3ds Max scene is rendered using the Scanline renderer. However, if you choose the Quicksilver hardware renderer, you can achieve non-photorealistic rendering. To do so, you need to follow the steps given next.

1. Activate any of the viewport and choose the **Render Setup** tool from the **Main Toolbar**; the **Render Setup: Default Scanline Renderer** dialog box will be displayed. The **Common** tab is chosen by default in this dialog box.
2. Collapse the **Common Parameters** rollout in this tab and expand the **Assign Renderer** rollout. In this rollout, choose the **Choose Renderer** button at the right of the **Production** text box; the **Choose Renderer** dialog box will be displayed. Select the **Quicksilver Hardware Renderer** option and choose the **OK** button to exit the **Choose Renderer** dialog box. Notice the change in the **Render Setup** dialog box, refer to Figure 2-36.

3. Choose the **Renderer** tab; various rollouts will be displayed, refer to Figure 2-36. In the **Visual Style** area of the **Visual Style & Appearance** rollout, various options are available in the **Rendering Level** drop-down list, as shown in Figure 2-37.



*Figure 2-36 The Render Setup: Quicksilver Hardware Renderer dialog box*



*Figure 2-37 The Rendering Level drop-down list*

4. To do non-photorealistic rendering, you can select the required option from the **Rendering Level** drop down list. Next, choose the **Render** button at the lower right corner of the dialog box; the rendered image will be displayed as per the option selected in the drop-down list.

## NVIDIA iray Renderer

The iray renderer was introduced in Autodesk 3ds Max 2012. In Autodesk 3ds Max 2013, it is known as NVIDIA iray renderer. This version of 3ds Max includes a large number of updates such as full support for Sky Portal objects, glossy reflections, translucency, and IOR. It can also render images of larger resolutions. The performance of the renderer



can be improved if the system is equipped with a graphics card having a CUDA (Compute Unified Device Architecture) enabled Graphic Processing Unit (GPU). The NVIDIA iray renderer creates physically accurate renderings by tracing the light paths.

When you change the current renderer to the NVIDIA iray renderer using the **Render Setup** dialog box, the **iray**, **Advanced Parameters**, **Hardware Resources**, and **Motion Blur** rollouts will be displayed. The procedure to change the renderer has been explained in detail in the previous section. Figure 2-38 shows the **iray** rollout in the **Render Setup** dialog box. It has three radio buttons namely: **Time**, **Iterations**, and **Unlimited**. By selecting the **Time** radio button, you can specify the duration of the rendering. By selecting the **Iterations** radio button, you can specify the number of iterations (passes) to be computed before showing the final render. If the **Unlimited** radio button is selected, rendering will continue for indefinite time and stopped when satisfactory quality of rendering is achieved. The rendering done by the iray renderer appears more grainy in the first few passes. The graininess decreases as you increase the number of passes. The NVIDIA iray renderer renders glossy reflections and self illuminating objects with much more precision as compared to the renderers. However, this renderer supports only certain materials, maps, and shader types.

## Changing the Background Color

**Menu bar:** Rendering > Environment  
**Keyboard:** 8

By default, the background color of the final output is black at the time of rendering. To change the background color, choose **Rendering > Environment** from the menu bar; the **Environment and Effects** dialog box will be displayed, as shown in Figure 2-39. In this dialog box, the **Environment** tab is chosen by default. The **Common Parameters**, **Exposure Control**, and **Atmosphere** rollouts will be displayed under this tab. In the **Common Parameters** rollout, the **Background**

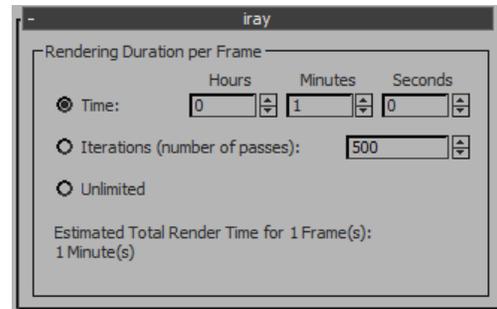


Figure 2-38 The **iray** rollout in the **Render Setup** dialog box

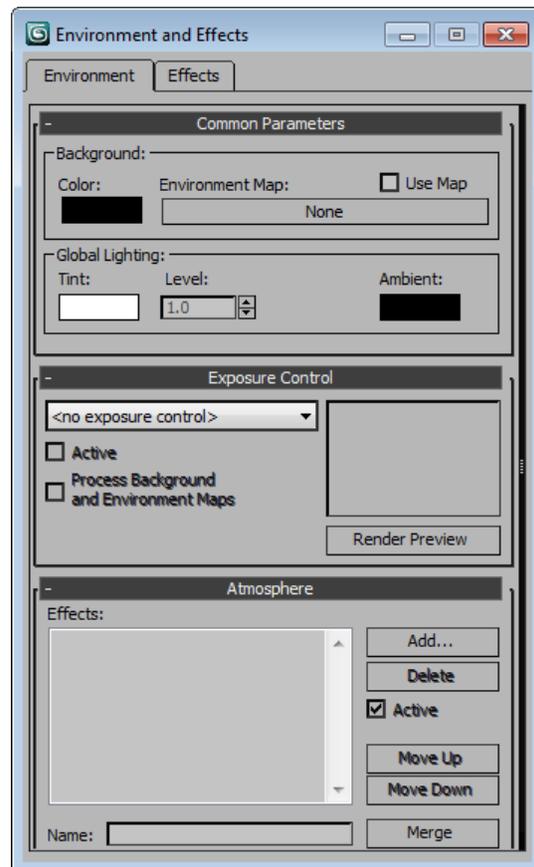


Figure 2-39 The **Environment and Effects** dialog box

area is used to change the background color of the scene on rendering. In the **Background** area, choose the color swatch; the **Color Selector: Background Color** dialog box will be displayed. Select a new color and choose the **OK** button. Next, close the **Environment and Effects** dialog box; the background will display the new color on rendering.

## TUTORIALS

### Tutorial 1

In this tutorial, you will create the 3D model of a table with drawers, as shown in Figure 2-40, by using the standard primitives. **(Expected time: 30 min)**



*Figure 2-40 The model of a table with drawers*

The following steps are required to complete this tutorial:

- a. Create the project folder.
- b. Create the left and right boxes of the table.
- c. Align the boxes.
- d. Create a drawer.
- e. Make clones of the drawer.
- f. Create the outer faces of the table.
- g. Create the knobs for the drawers of the table.
- h. Change the background color of the scene.
- i. Save and render the scene.

### Creating the Project Folder

Before starting a new scene, it is recommended that you create the project folder. Creating a project folder helps you keep all files of a project in an organized manner. Open the Windows Explorer and browse to the *Documents* folder. In this folder, create a new folder with the name *3dsmax2013*. The *3dsmax2013* folder will be the main folder and it will contain all the projects folders that you will create while doing tutorials of this textbook. Now, you will create first project folder for Tutorial 1 of this chapter. To do so, you need to follow the steps given next:

1. Start Autodesk 3ds Max 2013.

- If 3ds Max is already running, you need to reset it. To do so, choose **Reset** from the **Application** menu; the **3ds Max** message box is displayed. Choose the **Yes** button from the message box; a new screen is displayed with default settings.

**Note**

The **Reset** option is used to reset 3ds Max settings such as viewport configuration, snap settings, the **Material Editor** dialog box, background image, and so on. It also restores the startup defaults.

- Choose the **Application** button; the **Application** menu is displayed. Next, choose **Manage > Set Project Folder** from it; the **Browse For Folder** dialog box is displayed.
- In the **Browse For Folder** dialog box, navigate to `\Documents\3dsmax2013`. Next, choose the **Make New Folder** button to create a new folder with the name `c02_tut1`. Next, choose the **OK** button to close the **Browse For Folder** dialog box.
- Choose **Save** from the **Application** menu; the **Save File As** dialog box is displayed.

**Note**

The scenes created in 3ds Max are saved with the `.max` extension. As the project folder is already created, the path `\Documents\3dsmax2013\c02_tut1\scenes` is displayed in the **Save in** drop-down list of the **Save File As** dialog box.



**Tip:** After setting the project when you open or save a scene, 3ds Max uses the scenes folder inside the project folder by default.

- Enter `c02tut1` in the **File name** edit box and then choose the **Save** button to close the dialog box.

**Note**

1. When you start 3ds Max, the last project that you have worked with is opened and an empty scene is created with the name `Untitled`.

2. It is recommended that you frequently save the files while you are working on them by pressing the `CTRL+S` keys.

## Creating the Left and Right Boxes of the Table

You need to create the basic shape of the table. You will use the **Box** tool from standard primitives to create the shape.

- Choose **Create > Geometry** in the **Command Panel**; **Standard Primitives** is displayed in the drop-down list below the **Geometry** button. Also, the **Object Type** rollout is displayed in the **Command Panel**. Next, choose the **Box** tool from the **Object Type** rollout.
- Activate the Top viewport by clicking in it. Press and hold the left mouse button at the upper left corner of the viewport, drag the cursor to the lower right corner and then release the left mouse button to set the length and width of the box. Next, move the mouse in the upward direction and click in the viewport to set the height of the box.

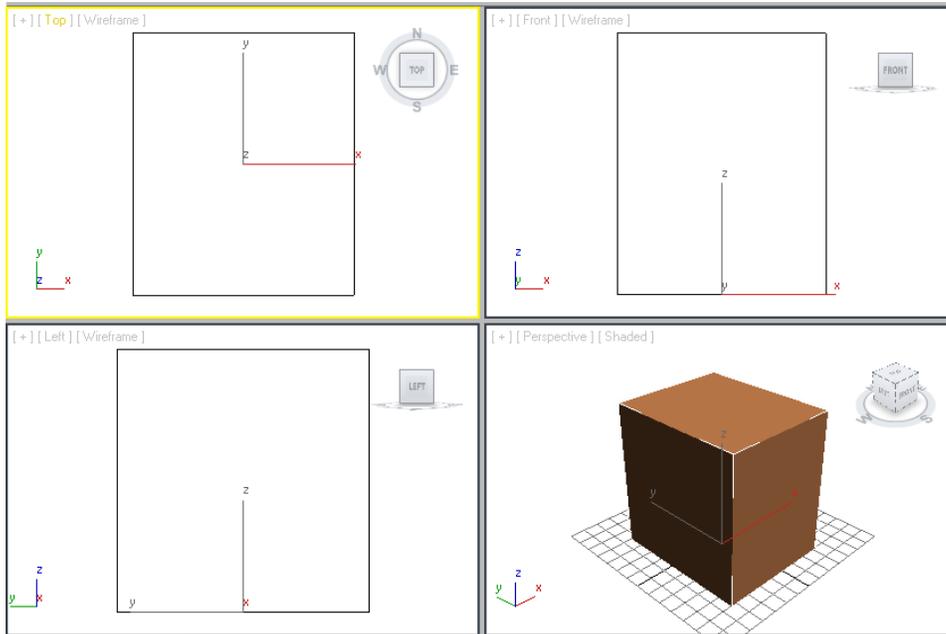
3. In the **Parameters** rollout, enter the values as given below:

Length: **90**

Width: **75**

Height: **95**

4. Choose the **Zoom Extents All** tool from the viewport navigation controls to view the box; the box is displayed in all viewports, as shown in Figure 2-41. Alternatively, press the Z key to see the box properly in all viewports.



**Figure 2-41** The box displayed in all viewports

5. In the **Name and Color** rollout, enter **left box** and press ENTER; the object is named as *left box*.
6. Choose the color swatch in the **Name and Color** rollout to change the color of the *left box*; the **Object Color** dialog box is displayed. Choose the **Add Custom Colors** button from this dialog box; the **Color Selector: Add Color** dialog box is displayed. In this dialog box, enter the values as given next:

Red: **224**

Green: **143**

Blue: **87**

7. Choose the **Add Color** button in the **Color Selector: Add Color** dialog box; the selected color is displayed in one of the color boxes in the **Custom Colors** area of the **Object Color** dialog box. Choose the **OK** button to apply the color to the *left box*.

8. Create another box in the Top viewport by using the methods described earlier. Enter the following values in the **Parameters** rollout:

Length: **90**Width: **80**Height: **25**

9. In the **Name and Color** rollout, enter **right box** and press ENTER; the object is named as *right box*. Also, assign the same color to the right box that you assigned to the left box, refer to steps 6 and 7.

## Aligning the Boxes

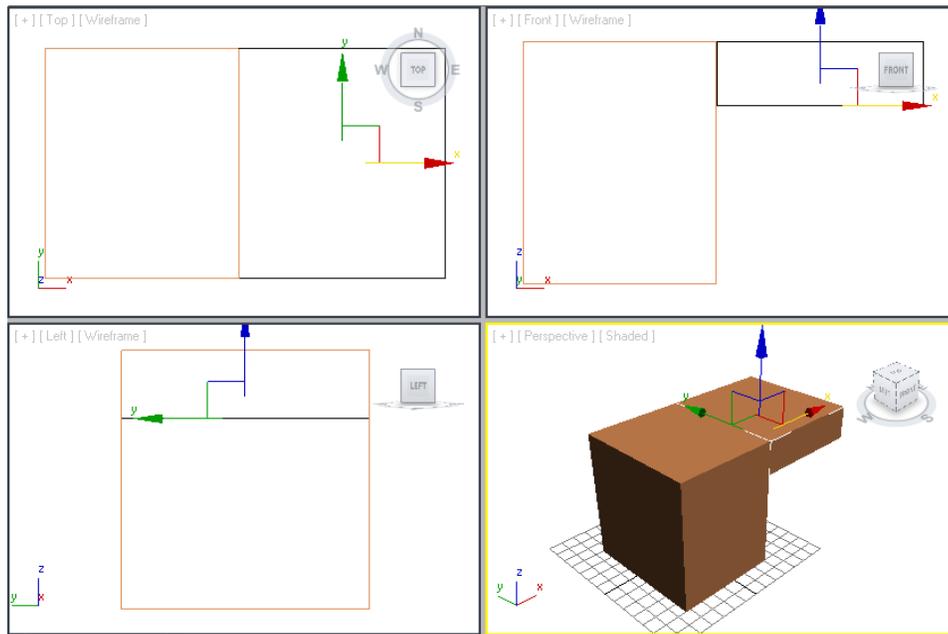
In this section, you will align the left and right boxes together.

1. Choose the **Select and Move** tool and make sure the *right box* is selected. Move the *right box* along the X, Y, and Z axes in all viewports to align it with the *left box*, as shown in Figure 2-42. Click in the viewport and press the Z key to view the box in all viewports, refer to Figure 2-42.



### Note

*While aligning the objects, you need to make sure that the objects are aligned properly in all viewports.*



**Figure 2-42** Alignment of the left box with the right box in all viewports

## Creating the Drawer

In this section, you will create the drawers of the table and then clone the drawers.

1. Create another box in the Top viewport and enter the following values in the **Parameters** rollout:

Length: **90**

Width: **55**

Height: **25**

2. In the **Name and Color** rollout, enter **drawer001** and press ENTER; the object is renamed. Choose the color swatch to change the color of the *drawer001*; the **Object Color** dialog box is displayed. Choose the **Add Custom Colors** button; the **Color Selector: Add Color** dialog box is displayed. In this dialog box, specify the values as given below:

Red: **177**

Green: **88**

Blue: **27**

3. Choose the **Add Color** button from the **Color Selector: Add Color** dialog box to add the selected color. The color is displayed in one of the **Custom Color** boxes in the **Object Color** dialog box. Choose the **OK** button; the new color is assigned to the *drawer001*.
4. Align the *drawer001* with the *left box* in all viewports using the **Select and Move** tool, as shown in Figure 2-43.

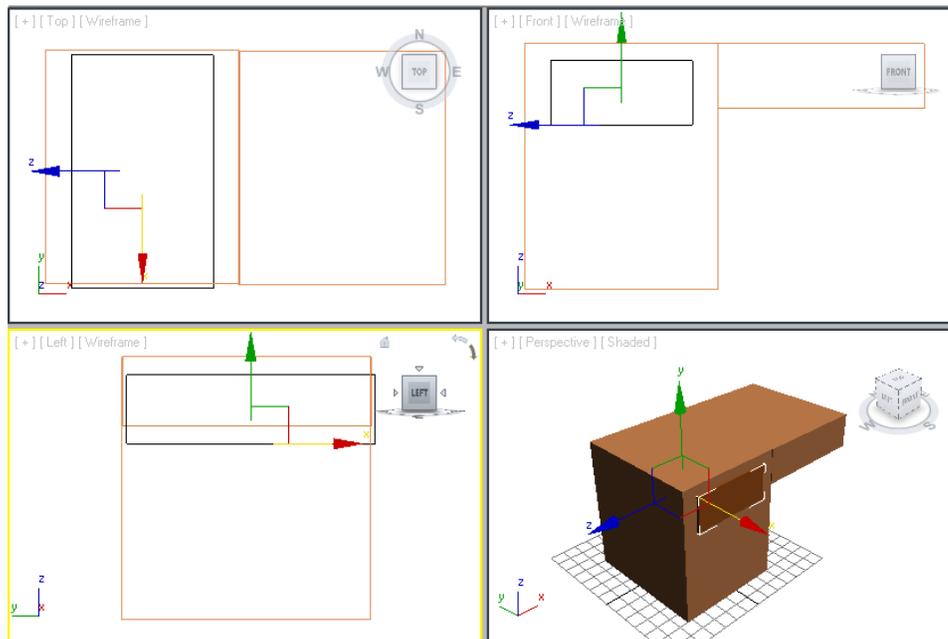


Figure 2-43 Alignment of the *drawer001* with the *left box*

## Making Clones of the Drawer

In this section, you will create copies of the *drawer001*.

1. Activate the Front viewport by middle-clicking in it and make sure the *drawer001* is selected. Next, move the cursor over the Y axis, press and hold the SHIFT key, and drag the *drawer001* downward until the value in the Y spinner of the Coordinate display at the bottom of the screen becomes around **-29**. Release the left mouse button and the SHIFT key; the **Clone Options** dialog box is displayed, as shown in Figure 2-44.

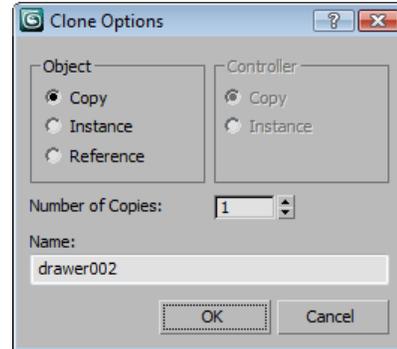


Figure 2-44 The Clone Options dialog box

2. Make sure the **Copy** radio button is selected in the **Object** area of the **Clone Options** dialog box. In the **Number of Copies** spinner, enter **2** to create two copies of the *drawer001*. Then, choose the **OK** button; two drawers with same dimensions are created, as shown in Figure 2-45.



### Note

The cloned objects are automatically named sequentially as *drawer002* and *drawer003*, based on the name of the original object. You can also clone an object by holding the SHIFT key while rotating or scaling it.

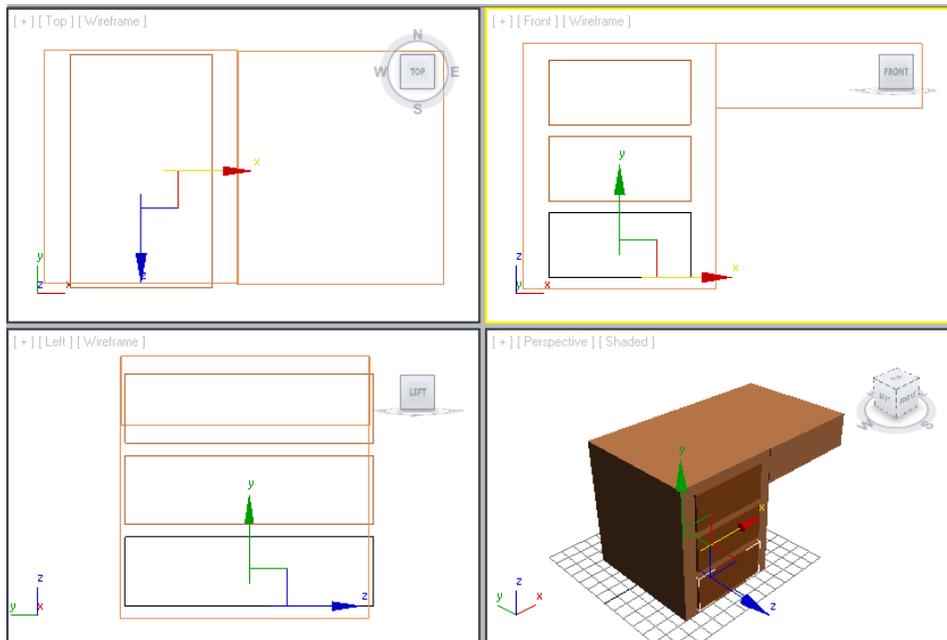


Figure 2-45 The *drawer002* and *drawer003* created after cloning the *drawer001*

3. Create another box in the Top viewport using the values as follows:

Length: **90**

Width: **70**

Height: **17**

4. Name the newly created box as *drawer004* and change its color as you did for the drawers created previously.
5. Align the *drawer004* with the right side of the box in all viewports, as shown in Figure 2-46.

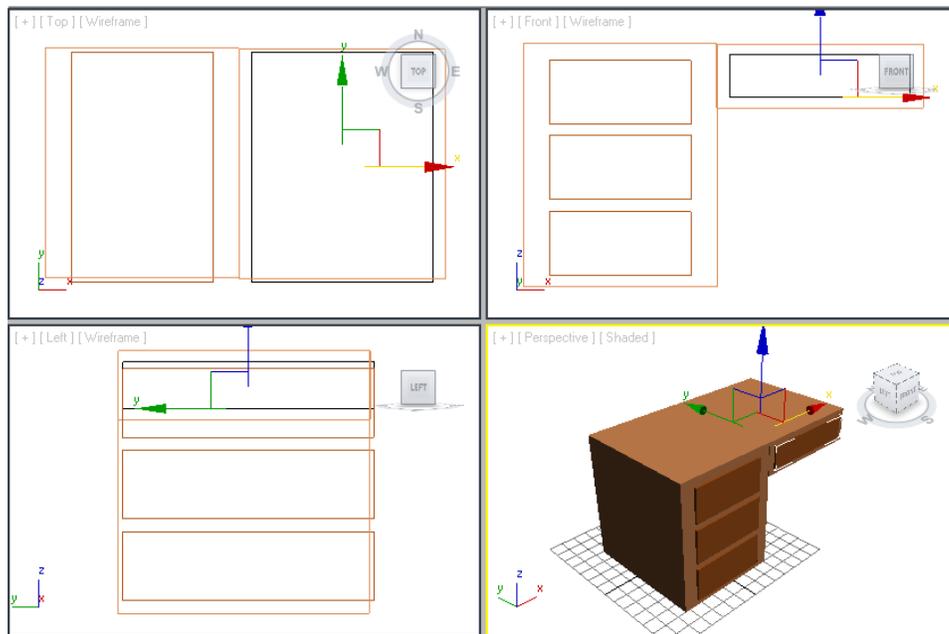


Figure 2-46 The *drawer004* aligned in all viewports

## Creating the Outer Faces of the Table

In this section, you will create the outer faces of the table to make it appear more realistic.

1. Create a box in the Left viewport using the values given below:

Length: **95.5**

Width: **90**

Height: **1.5**

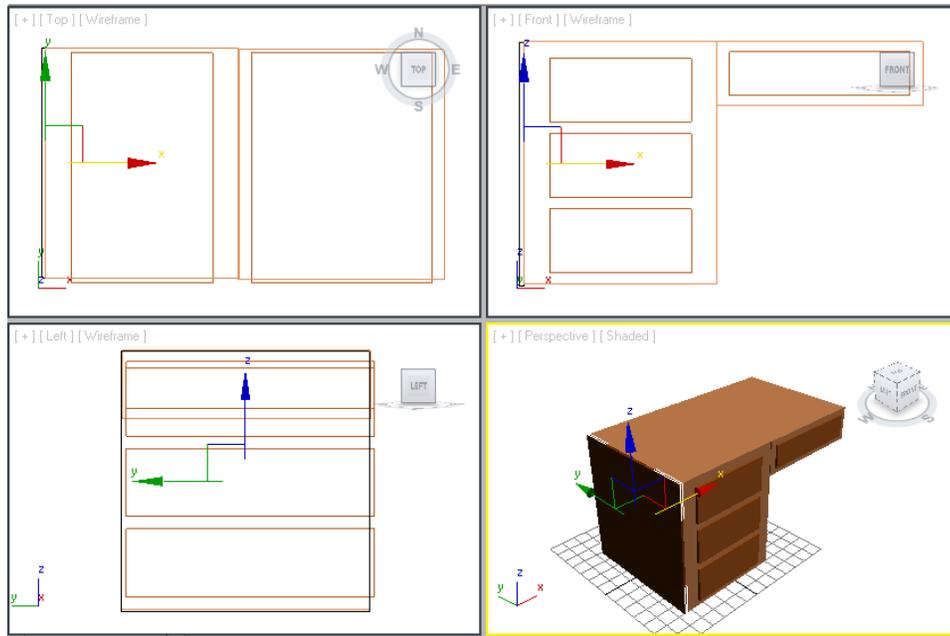
2. In the **Name and Color** rollout, enter **left face001** and press ENTER; the box is named as *left face001*. Choose the color swatch to change the color of the *left face001*; the **Object Color** dialog box is displayed. Choose the **Add Custom Colors** button from this dialog box; the **Color Selector: Add Color** dialog box is displayed. Enter the following values in the dialog box:

Red: **134**

Green: **59**

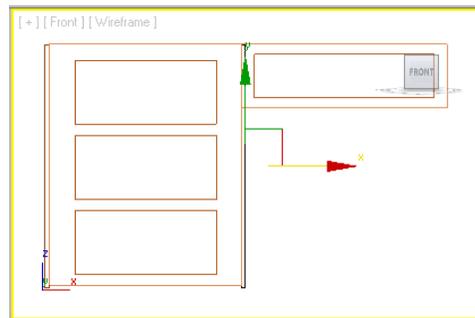
Blue: **8**

3. In all viewports, align the *left face001* with the left side of the *left box* using the **Select and Move** tool, as shown in Figure 2-47.



**Figure 2-47** Alignment of the *left face001* with the left side of the *left box*

4. In the Front viewport, copy the *left face001* by using the **Clone Options** dialog box as described earlier; a new face is created with the name *left face002*. Now, align it with the other side of the *left box*, as shown in Figure 2-48.



**Figure 2-48** Alignment of the *left face002*

5. To create the upper face of the table, create another box in the Top viewport using the values given below:

Length: **90.5**

Width: **156.5**

Height: **1.5**

6. Name the box as *upper face* and assign the same color to it as assigned to the other faces.

7. Align the *upper face* with the top of the table, as shown in Figure 2-49.

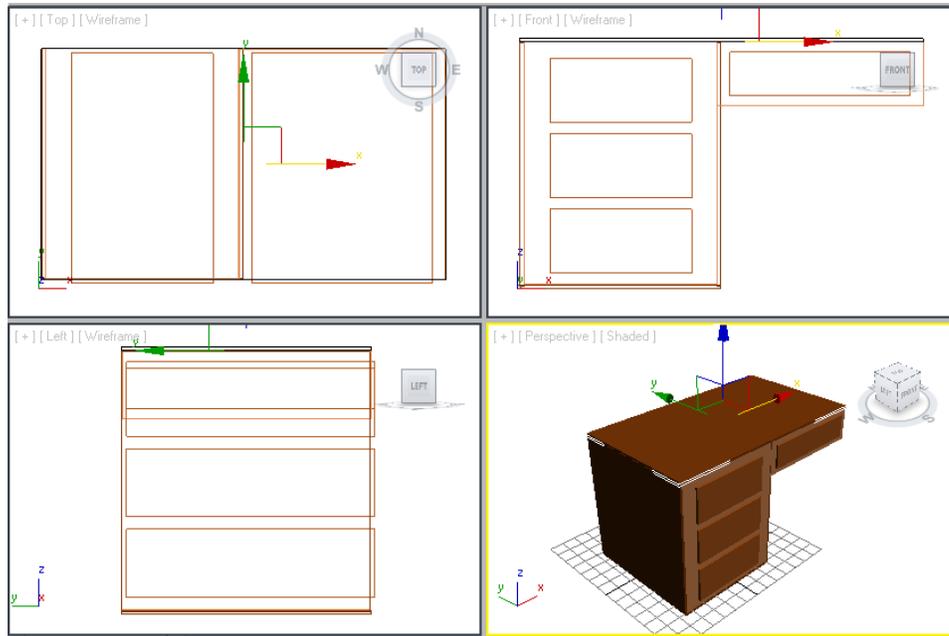


Figure 2-49 Alignment of the upper face with the top of the table

8. Create one more box in the Top viewport using the values given below:
- Length: **90.5**                      Width: **77.5**                      Height: **1.5**
9. Name the box as *lower face* and assign the same color to it as assigned to other faces.
10. Align the *lower face* with the bottom of the *left box*, as shown in Figure 2-50.
11. Create a box for the lower face of the *right box* in the Top viewport using the following dimensions:
- Length: **90.5**                      Width: **79**                      Height: **1.5**
12. Name the box as the *right lower face* and assign the same color to it as assigned to the other faces.
13. Align the *right lower face* to the bottom of the *right box*, as shown in Figure 2-51.
14. Create a box for the right face of the *right box* in the Left viewport using the following dimensions:
- Length: **26.931**                      Width: **90**                      Height: **1.5**

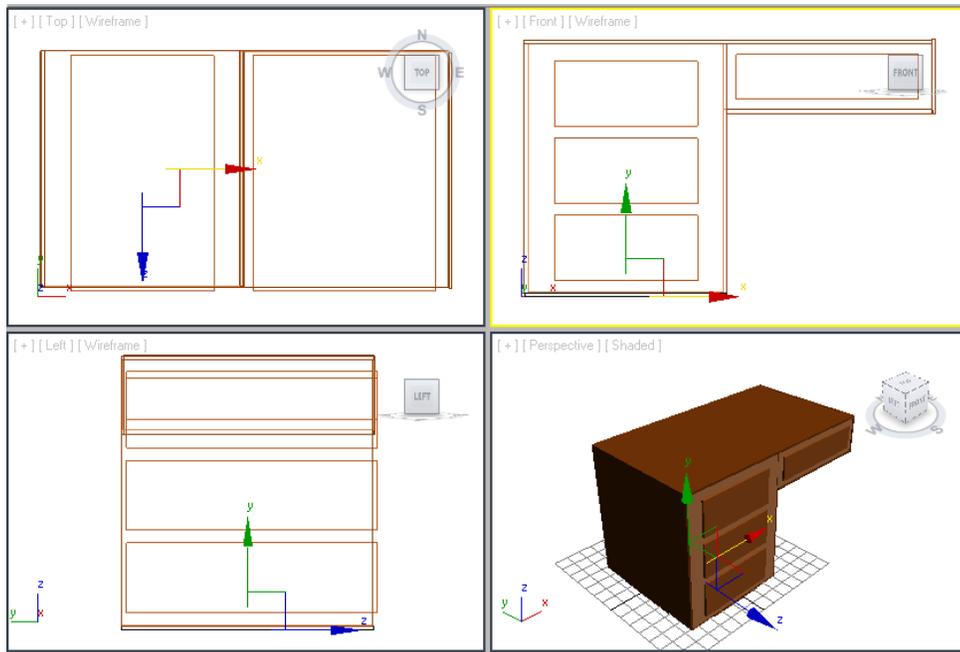


Figure 2-50 Alignment of the lower face with the bottom of the left box

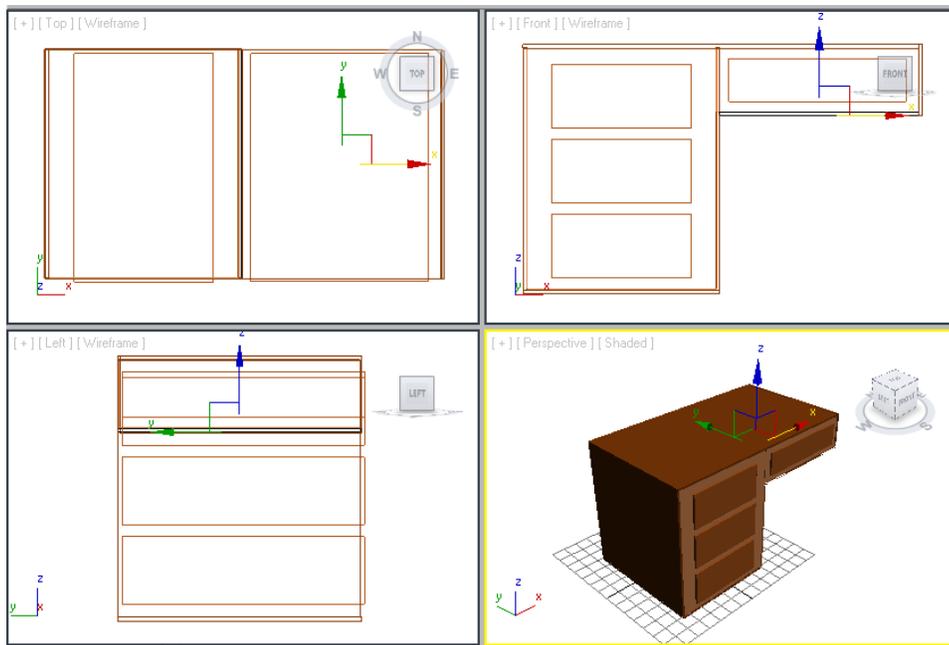


Figure 2-51 Alignment of the right lower face to the bottom of the right box of the table

15. Name the box as the *right face* and assign the same color to it as assigned to the other faces.

16. Align the *right face* with the right side of the *right box*, as shown in Figure 2-52.

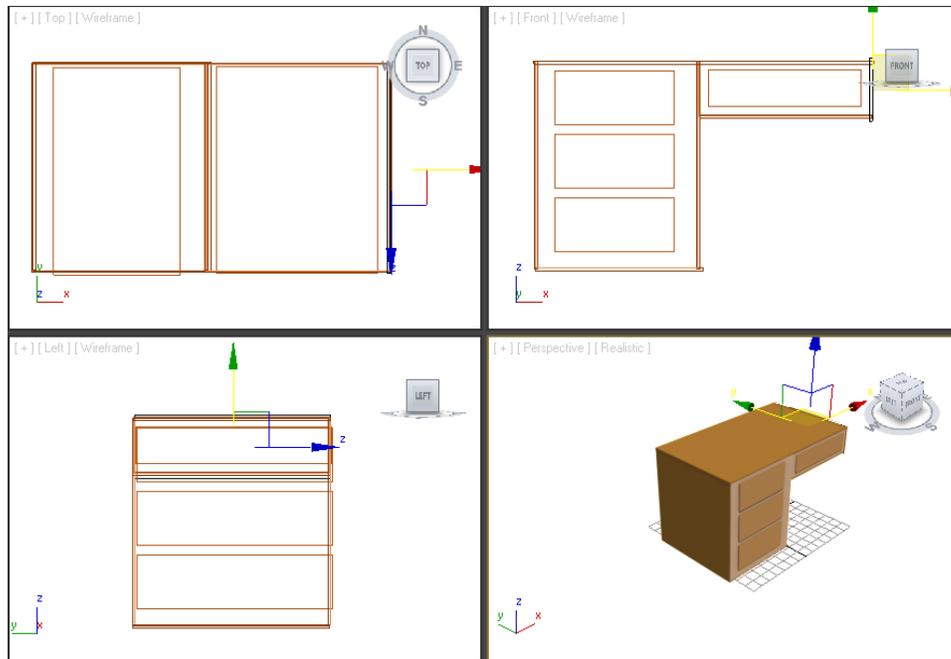


Figure 2-52 Alignment of the right face with the right side of the right box of the table

## Creating Knobs for the Drawers of the Table

In this section, you will create a knob for one drawer. Then, you can copy the knob for the other drawers.

1. Choose the **Sphere** tool from **Create > Geometry > Standard Primitives > Object Type** rollout of the **Command Panel**.
2. Create a sphere in the Front viewport. In the **Parameters** rollout, enter **2.3** in the **Radius** spinner. Also, make sure the **Smooth** and **Generate Mapping Coords** check boxes and the **Chop** radio button are selected in this rollout.
3. Name the sphere as *knob001* and use the color swatch to change its color to white.
4. Align *knob001* with *drawer001* in all viewports using the **Select and Move** tool, as shown in Figure 2-53.
5. Activate the Front viewport by middle-clicking in it and then create three copies of *knob001* by using the **Clone Options** dialog box as described earlier. The newly created copies are automatically named as *knob002*, *knob003*, and *knob004*. Next, align them in all viewports, as shown in Figure 2-54.

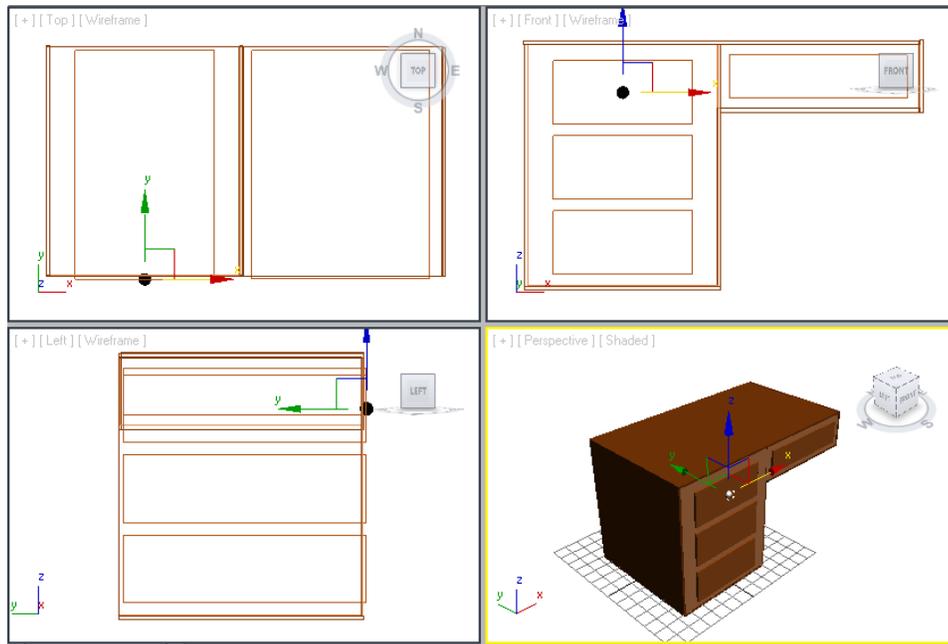


Figure 2-53 Alignment of knob001 with drawer001

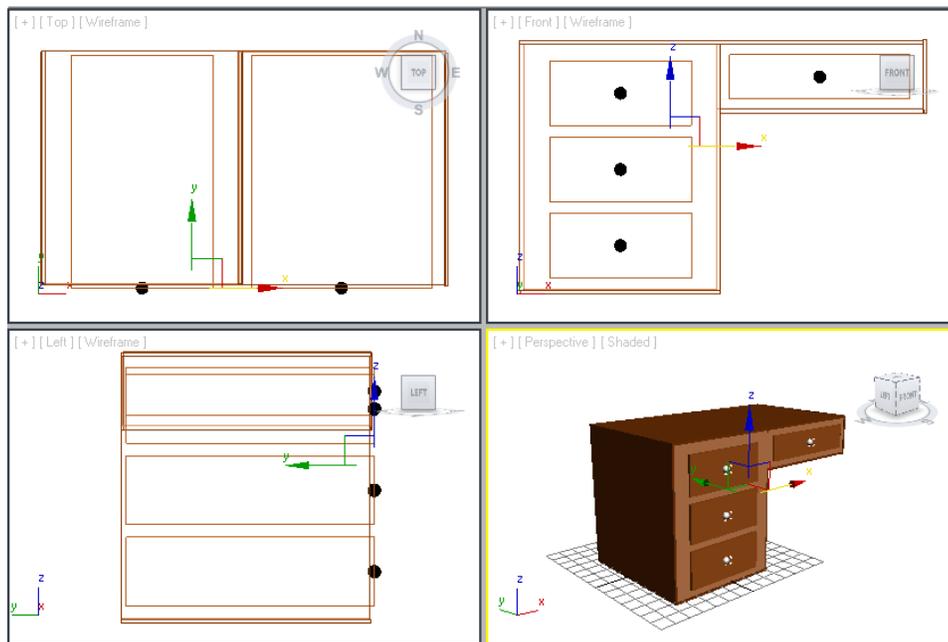


Figure 2-54 Alignment of knobs in all viewports

- Set the view of the table in the Perspective viewport using the **Orbit** tool from the viewport navigation controls.



## Changing the Background Color of the Scene

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

1. Choose **Rendering > Environment** from the menu bar; the **Environment and Effects** dialog box is displayed with the **Environment** tab chosen by default in this dialog box.
2. In the **Background** area of the **Common Parameters** rollout, choose the color swatch corresponding to the **Color** parameter; the **Color Selector: Background Color** dialog box is displayed. Select the white color and choose the **OK** button.
3. Close the **Environment and Effects** dialog box.

## Saving and Rendering the Scene

In this section, you will save the scene that you have created and then render it. You can also view the final rendered image of this model by downloading the *c02\_3dsmax\_2013\_rndr.zip* file from <http://www.cadcim.com>. The path of the file is as follows:

*Textbooks > Animation and Visual Effects > 3ds Max > Autodesk 3ds Max 2013: A Comprehensive Guide*

1. Choose **Save** from the **Application** menu.
2. Activate the Perspective viewport. Next, choose the **Render Production** tool from the main toolbar; the **Rendered Frame** window is displayed with the final output of the table, as shown in Figure 2-55.



*Figure 2-55 The final output after rendering*

## Tutorial 2

In this tutorial, you will create the 3D model of a park bench, as shown in Figure 2-56, using the standard primitives. **(Expected time: 90 min)**



*Figure 2-56 The model of a park bench*

The following steps are required to complete this tutorial:

- a. Create the project folder.
- b. Create the horizontal back supports.
- c. Create the horizontal seat supports.
- d. Create the vertical back supports.
- e. Create rivets for the horizontal back support.
- f. Create leg supports.
- g. Create the legs of the park bench.
- h. Save and render the scene.

### Creating the Project Folder

Create a new project folder with the name `c02_tut2` at `\Documents\3dsmax2013` and then save the file with the name `c02tut2`, as discussed in Tutorial 1.

### Creating the Horizontal Back Supports

In this section, you need to create the horizontal back supports of the park bench.

1. Activate the Top viewport by middle-clicking in it. Choose **Create > Geometry** in the **Command Panel**; **Standard Primitives** is displayed in the drop-down list. Next, choose the **Box** tool from the **Object Type** rollout; various rollouts are displayed in the **Command Panel**.
2. Expand the **Keyboard Entry** rollout and set the values as given below:

Length: **1.5**

Width: **124**

Height: **6.03**

- Choose the **Create** button from the **Keyboard Entry** rollout; a box is created in all viewports, refer to Figure 2-57.

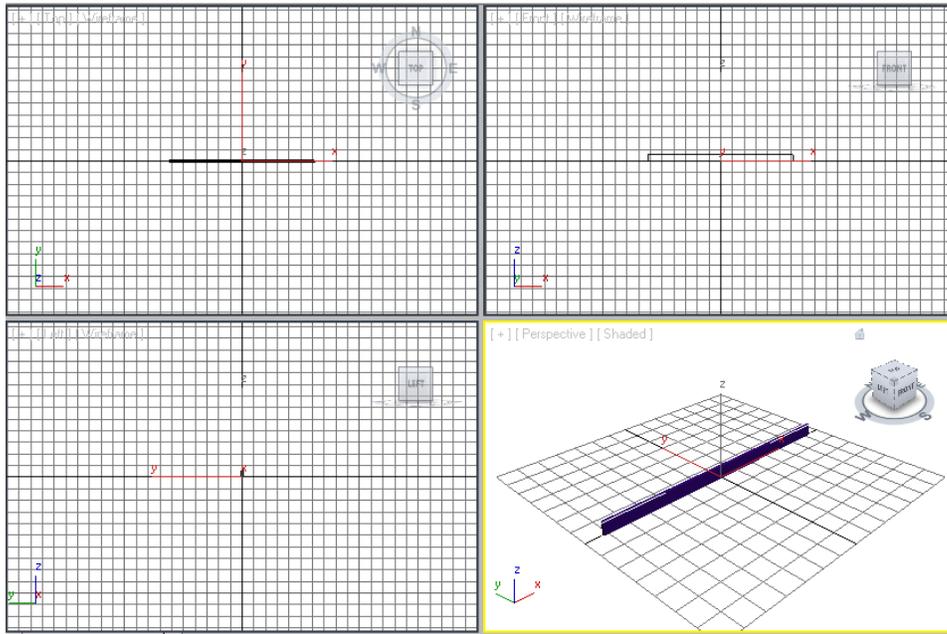


Figure 2-57 A box created in all viewports

- In the **Name and Color** rollout, name the box as *horizontal back support001* and press the ENTER key.
- Choose the color swatch from the **Name and Color** rollout; the **Object Color** dialog box is displayed. Now, using this dialog box, modify the color of the *horizontal back support001* to light brown. Choose the **OK** button to close the **Object Color** dialog box.

Next, you need to create copies of the *horizontal back support001*.

- Activate the Front viewport by middle-clicking in it. Choose the **Select and Move** tool from the **Main Toolbar** and make sure that the *horizontal back support001* is selected. Next, move the cursor over the Y axis. Press and hold the SHIFT key and the left mouse button. Now, drag the *horizontal back support001* upward until the value in the Y spinner in the Coordinate display becomes around **8.0**. Release the left mouse button and the SHIFT key; the **Clone Options** dialog box is displayed. 
- In the **Clone Options** dialog box, make sure the **Copy** radio button is selected. Set the value in the **Number of Copies** spinner to **4**. Choose the **OK** button; four boxes with the same dimensions are displayed and they are automatically named as *horizontal back support002*, *horizontal back support003*, *horizontal back support004*, and *horizontal back support005*.

- Choose the **Zoom Extents All** tool from the viewport navigation controls; the horizontal back supports are displayed in all viewports, as shown in Figure 2-58.

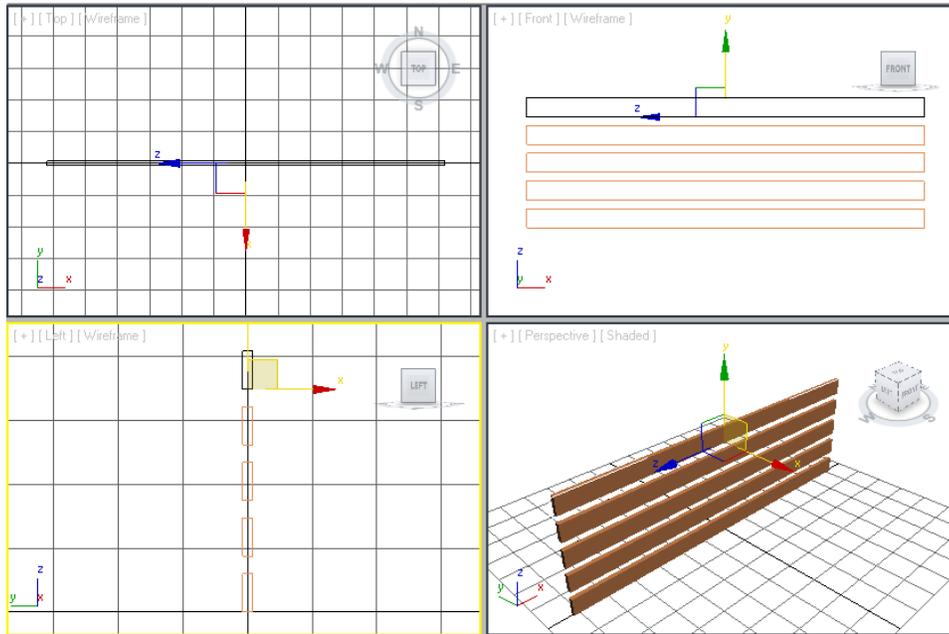


Figure 2-58 Horizontal back supports displayed in all viewports

Next, you need to rotate the *horizontal back support005*.

- Activate the Left viewport and select the *horizontal back support005*. Next, right-click on the **Select and Rotate** tool in the **Main Toolbar**; the **Rotate Transform Type-In** dialog box is displayed.
- In the **Absolute:World** area, set the value **-15** in the **X** spinner, as shown in Figure 2-59 and then press the ENTER key; the *horizontal back support005* gets rotated, refer to Figure 2-60. Now, close the **Rotate Transform Type-In** dialog box.

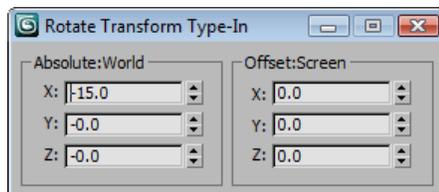


Figure 2-59 The Rotate Transform Type-In dialog box

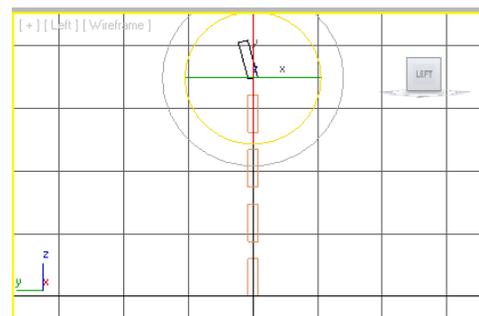


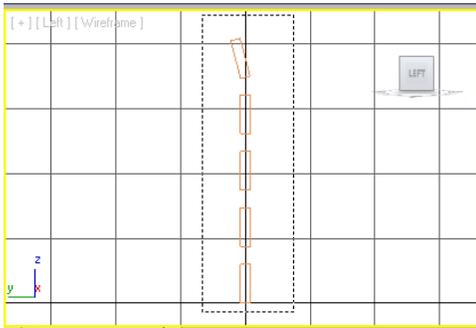
Figure 2-60 The horizontal back support005 after rotating in the Left viewport

- Click anywhere in the viewport to deselect the *horizontal back support005*.

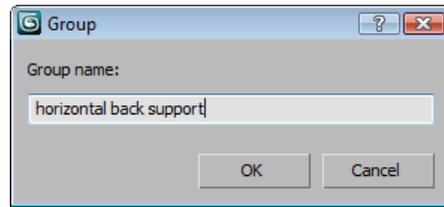
## Grouping Horizontal Back Supports

In this section, you will group all horizontal seat supports.

- Activate the Left viewport and choose the **Select Object** tool. Now, select all horizontal back supports by dragging a selection box around them, refer to Figure 2-61. 
- Choose **Group > Group** from the menu bar; the **Group** dialog box is displayed.
- In the **Group name** edit box, enter **horizontal back support**, as shown in Figure 2-62 and then choose the **OK** button; all horizontal back supports are grouped together.



**Figure 2-61** All horizontal back supports selected simultaneously



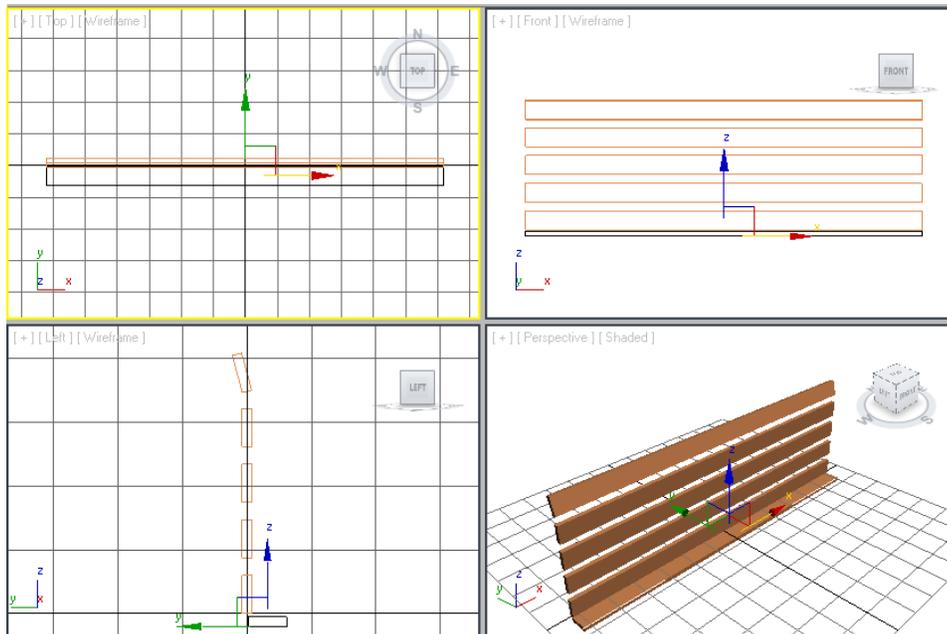
**Figure 2-62** The **Group** dialog box

## Creating the Horizontal Seat Supports

In this section, you will create the horizontal seat supports.

- Activate the Top viewport and choose the **Box** tool from the **Object Type** rollout.
- Expand the **Keyboard Entry** rollout and set the values as follows:
 

Length: <b>6.03</b>	Width: <b>124</b>	Height: <b>1.5</b>
---------------------	-------------------	--------------------
- Choose the **Create** button from the **Keyboard Entry** rollout; a box is created in all viewports.
- In the **Name and Color** rollout, name the box as *horizontal seat support001*.
- Use the color swatch to assign the same color to the *horizontal seat support001* that you assigned to the *horizontal back support*.
- Choose the **Select and Move** tool from the **Main Toolbar** and align the *horizontal seat support001* with the *horizontal back support* in all viewports, refer to Figure 2-63.



**Figure 2-63** Alignment of the horizontal seat support001 in all viewports

Next, you need to create four copies of the *horizontal seat support001*.

7. Activate the Top viewport by middle-clicking in it and make sure the *horizontal seat support001* is selected. Next, place the cursor over the vertical axis. Press and hold the SHIFT key and drag the *horizontal seat support001* downward until the value in the Y spinner in the Coordinate display becomes around **-7.5**. Release the left mouse button and the SHIFT key; the **Clone Options** dialog box is displayed.
8. In the **Clone Options** dialog box, make sure the **Copy** radio button is selected. Set the value in the **Number of Copies** spinner to **4** and choose the **OK** button; four boxes with the same dimensions are displayed and they are automatically named as *horizontal seat support002*, *horizontal seat support003*, *horizontal seat support004*, and *horizontal seat support005*.
9. Choose the **Zoom Extents All** tool; all objects are displayed in all viewports, as shown in Figure 2-64. 
10. Click anywhere in the viewport to deselect the objects.

### Grouping Horizontal Seat Supports

In this section, you will group all horizontal seat supports.

1. Choose the **Select Object** tool and select all horizontal seat supports by dragging a selection box around them in any viewport. 
2. Choose **Group > Group** from the menu bar; the **Group** dialog box is displayed.

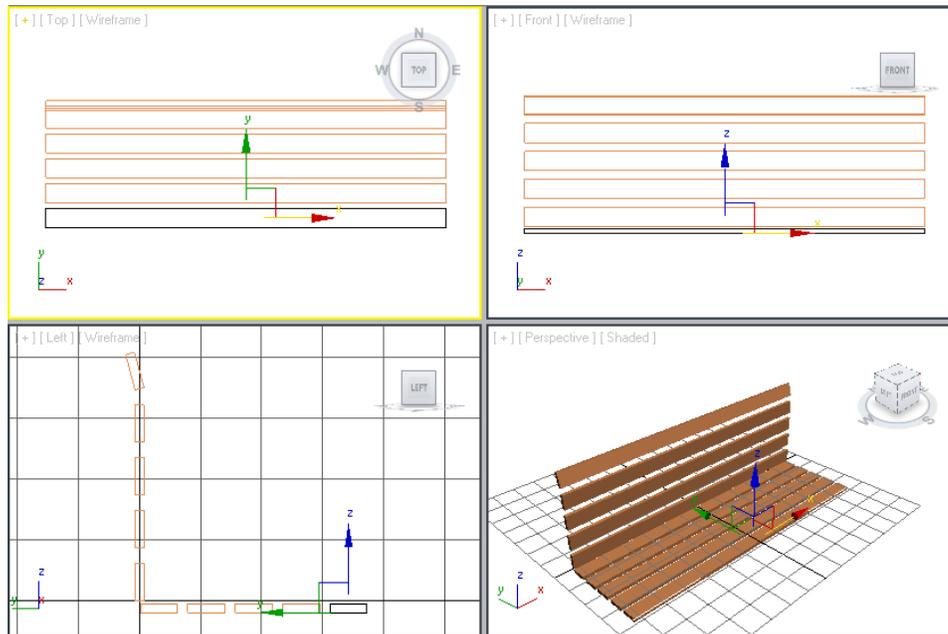


Figure 2-64 Horizontal seat supports displayed in all viewports

3. In the **Group name** text box, enter **horizontal seat support** and then choose the **OK** button.

## Creating the Vertical Back Supports

In this section, you will create the vertical back supports of the park bench.

1. Activate the Top viewport. Choose **Create > Geometry** in the **Command Panel**; **Standard Primitives** is displayed in the drop-down list. Next, choose the **Cylinder** tool in the **Object Type** rollout.
2. In the **Keyboard Entry** rollout, set the values as follows:
 

X: <b>-60</b>	Y: <b>1.5</b>	Z: <b>0.0</b>
Radius: <b>1.0</b>	Height: <b>38.0</b>	
3. Now, choose the **Create** button in the **Keyboard Entry** rollout; a cylinder is created in all viewports, as shown in Figure 2-65.
4. In the **Name and Color** rollout, name the cylinder as *vertical back support001* and press the ENTER key.
5. Change the color of the *vertical back support001* to black.

Next, you need to create a copy of the *vertical back support001*.

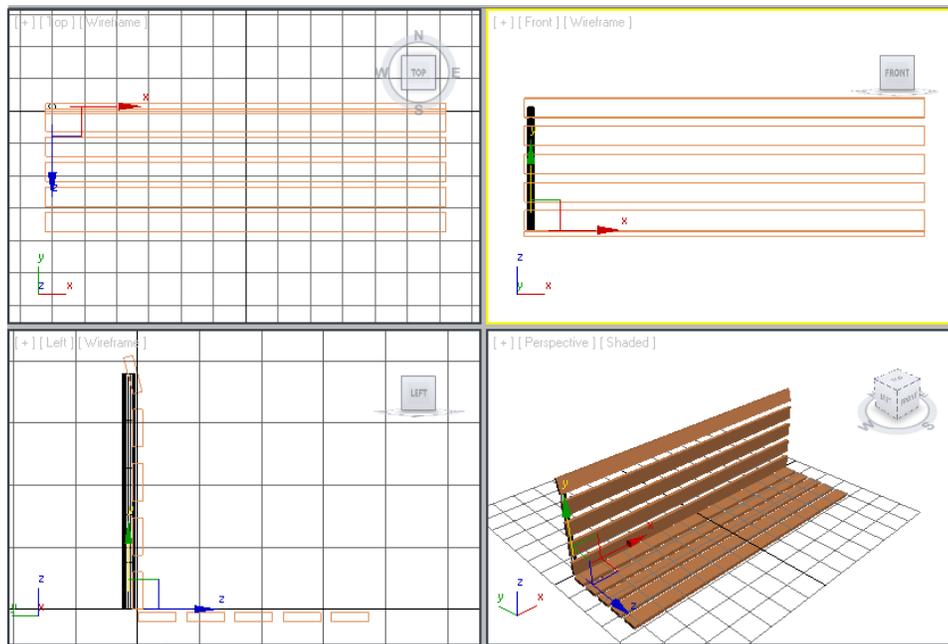


Figure 2-65 The vertical back support001 in all viewpoints

6. Activate the Front viewport by middle-clicking in it. Choose the **Select and Move** tool and move the cursor over the horizontal axis. Press and hold the SHIFT key and the left mouse button, and then drag the *vertical back support001* to the right side to align it with the right side of the *horizontal back support*, as shown in Figure 2-66. Release the left mouse button and the SHIFT key; the **Clone Options** dialog box is displayed. 
7. In the **Clone Options** dialog box, make sure the **Copy** radio button is selected. Set the value **1** in the **Number of Copies** spinner and choose the **OK** button; the *vertical back support002* is created with the same dimensions as the *vertical back support001*, refer to Figure 2-66.
8. Click anywhere in the viewport to deselect the objects.

## Creating Rivets for the Horizontal Back Support

In this section, you will create a sphere and a cylinder to create the cap and the body of rivet, respectively.

1. Activate the Top viewport and choose **Create > Geometry** in the **Command Panel**; **Standard Primitives** is displayed in the drop-down list. Next, choose the **Sphere** tool in the **Object Type** rollout.
2. In the **Keyboard Entry** rollout, set the value **0.8** in the **Radius** spinner and choose the **Create** button; a sphere is created.

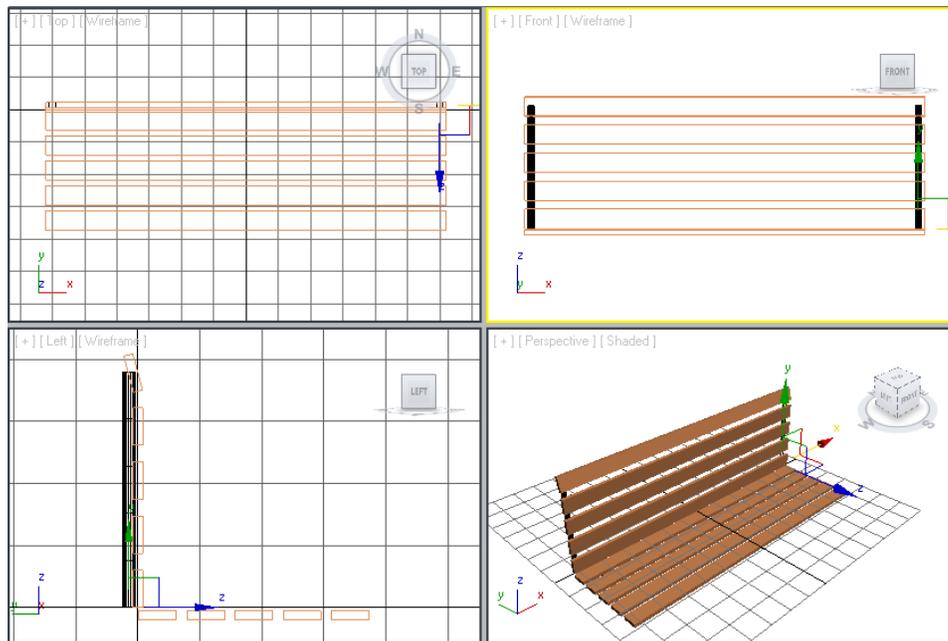


Figure 2-66 The vertical back support002 in all viewports

3. In the **Parameters** rollout, make sure that the **Smooth** check box and the **Chop** radio button are selected. Also, in the **Hemisphere** spinner, enter the value **0.5**.

4. Name the sphere as **cap** and assign black color to it.

Next, you need to create a cylinder for the body of the rivet.

5. In the **Command Panel**, choose **Create > Geometry > Standard Primitives > Object Type** rollout > **Cylinder**.

6. In the **Keyboard Entry** rollout, set the values as follows:

X: 0	Y: 0	Z: 0
Radius: 0.241	Height: 3.5	

7. Choose the **Create** button from the **Keyboard Entry** rollout; a cylinder is created.

8. Name the cylinder as **body** and assign black color to it.

9. Activate the Left viewport by middle-clicking in it and choose the **Select by Name** tool; the **Select From Scene** dialog box is displayed. Select the *cap* and the *body* simultaneously by holding the CTRL key. Choose the **OK** button; the *cap* and the *body* are selected in the viewports.



10. Choose the **Zoom Extents All Selected** tool to increase the magnification of the selected objects in all viewports. 
11. Next, align the *cap* and the *body* of the rivet in the Left viewport using the **Select and Move** tool, as shown in Figure 2-67.

**Note**

You may need to use the **Zoom** and **Pan View** tools to align the *cap* and the *body* of the rivet.

Next, you need to group the *body* and the *cap* to create the rivet.

12. Select the *cap* and the *body* of the rivet in any viewport and group them as *rivet001*.
13. Choose the **Zoom Extents All** tool and move the *rivet001* in the Left viewport to visualize it properly, as shown in Figure 2-68.

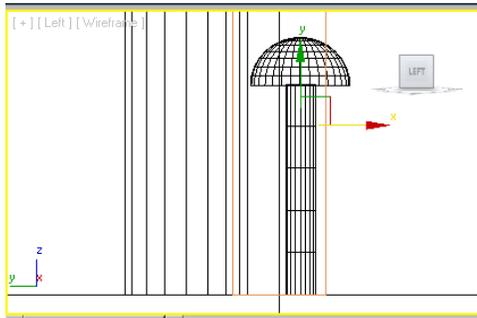


Figure 2-67 Alignment of the cap and the body

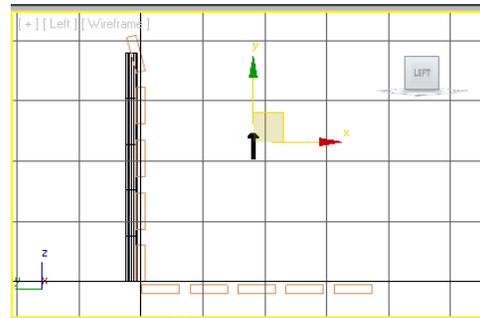
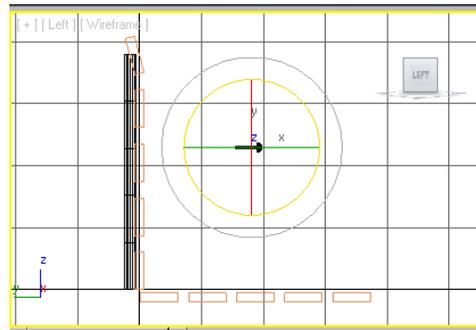


Figure 2-68 The rivet001 in the Left viewport

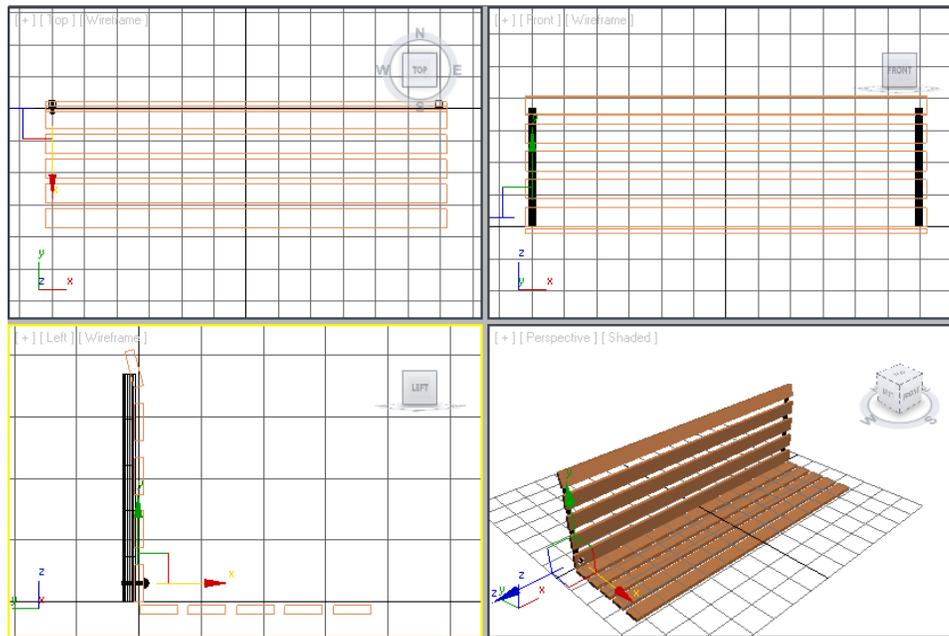
### Aligning the Rivets

In this section, you will align the rivets.

1. In the Left viewport, select *rivet001* and right-click on the **Select and Rotate** tool; the **Rotate Transform Type-In** dialog box is displayed. Also, a circular gizmo along with the X, Y, and Z axes is displayed. 
2. In the **Offset:Screen** area of the **Rotate Transform Type-In** dialog box, enter **-90** in the **Z** spinner and press ENTER; the *rivet001* gets rotated, as shown in Figure 2-69. Now, close the **Rotate Transform Type-In** dialog box.
3. Choose the **Select and Move** tool and align *rivet001* with the *horizontal back support* in all viewports, as shown in Figure 2-70.
4. In the Left viewport, select *rivet001* using the **Select and Move** tool and move the cursor over the vertical axis. Now, create 4 copies of *rivet001*. These copies are automatically named as *rivet002*, *rivet003*, *rivet004*, and *rivet005*. Align them in the Left viewport, refer to Figure 2-71. 



**Figure 2-69** Rotating rivet001 in the Left viewport



**Figure 2-70** Alignment of rivet001 with the horizontal back support

5. Select the uppermost rivet and choose the **Select and Rotate** tool. Now, rotate the uppermost rivet by using the outermost ring of the **Select and Rotate** tool in the counterclockwise direction until the value in the **X** spinner in the coordinate display becomes **-20**, refer to Figure 2-72. 
6. Press and hold the CTRL key and select all rivets in the Left viewport and group them as the *left side rivets*. Click anywhere in the viewport to deselect the objects.



**Note**

To change the viewport without deselecting the objects, middle-click in that viewport; the objects will remain selected.

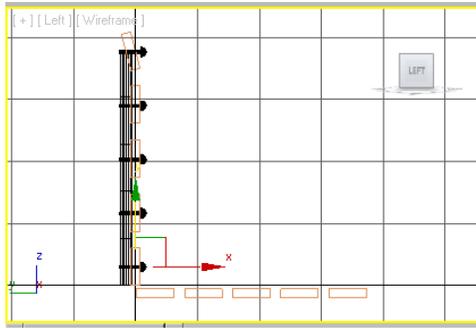


Figure 2-71 Alignment of rivets in the Left viewport

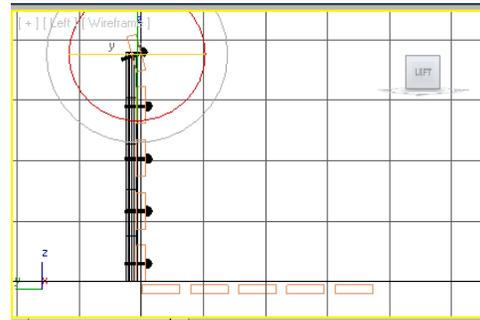


Figure 2-72 Rotating the uppermost rivet

### Creating the Right Side Rivets

In this section, you will copy the *left side rivets* for creating the right side rivets.

1. Select the *left side rivets* in the Front viewport using the **Select and Move** tool. Next, move the cursor over the horizontal axis, press and hold the SHIFT key and the left mouse button, and then drag the mouse toward the right side. Release the left mouse button and the SHIFT key exactly over the *vertical back support002* on the right side; the **Clone Options** dialog box is displayed.
2. In the **Clone Options** dialog box, make sure the **Copy** radio button is selected. In the **Name** edit box, enter **right side rivets** to modify the name of the group and choose **OK**; the *right side rivets* group is displayed, as shown in Figure 2-73.

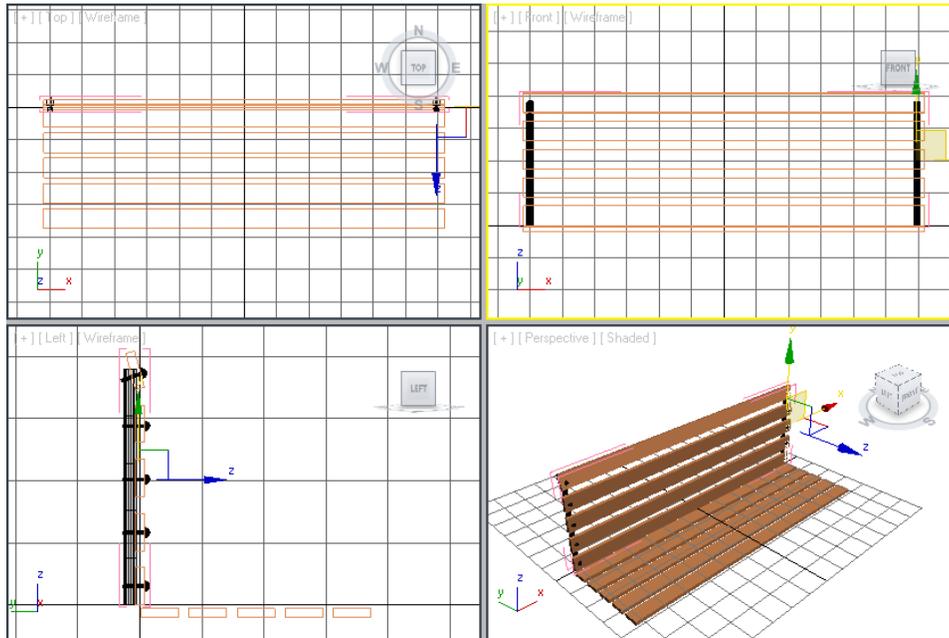


Figure 2-73 The right side rivets displayed in all viewports

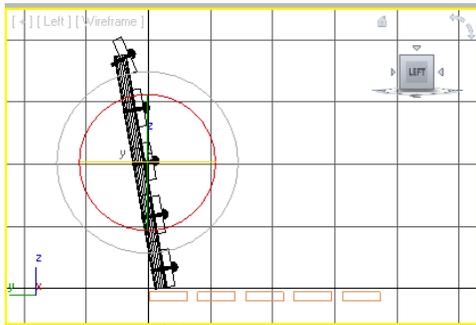
Now, you need to select the *horizontal back support*, *vertical back support001*, *vertical back support002*, *left side rivets*, and *right side rivets*.

3. Choose the **Select Object** tool and activate the Left viewport. Drag a selection box around the *horizontal back support*, *vertical back support001*, *vertical back support002*, *left side rivets*, and *right side rivets* to select them simultaneously, and then group them as *back support* as described earlier.

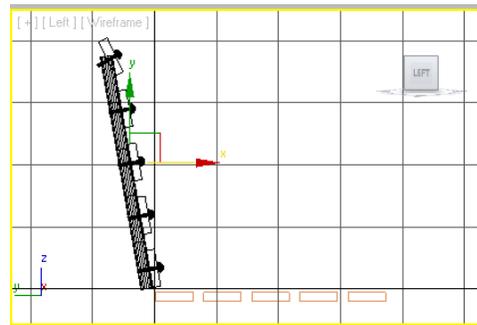
### Rotating the Back Support

In this section, you will rotate the back support.

1. Select the *back support* in the Left viewport and choose the **Select and Rotate** tool; a circular gizmo is displayed.
2. Move the cursor over the Z-axis, which is blue in color; the Z-axis turns yellow and becomes active. Now, press the left mouse button and drag the cursor counterclockwise to rotate the back support until the value in the **Z** spinner in the coordinate display becomes **10**. Release the left mouse button. The *back support* is rotated, as shown in Figure 2-74.
3. Choose the **Select and Move** tool and align the *back support* with the *horizontal seat support*, as shown in Figure 2-75.



**Figure 2-74** Rotating the back support in the Left viewport



**Figure 2-75** Alignment of the back support in the Left viewport

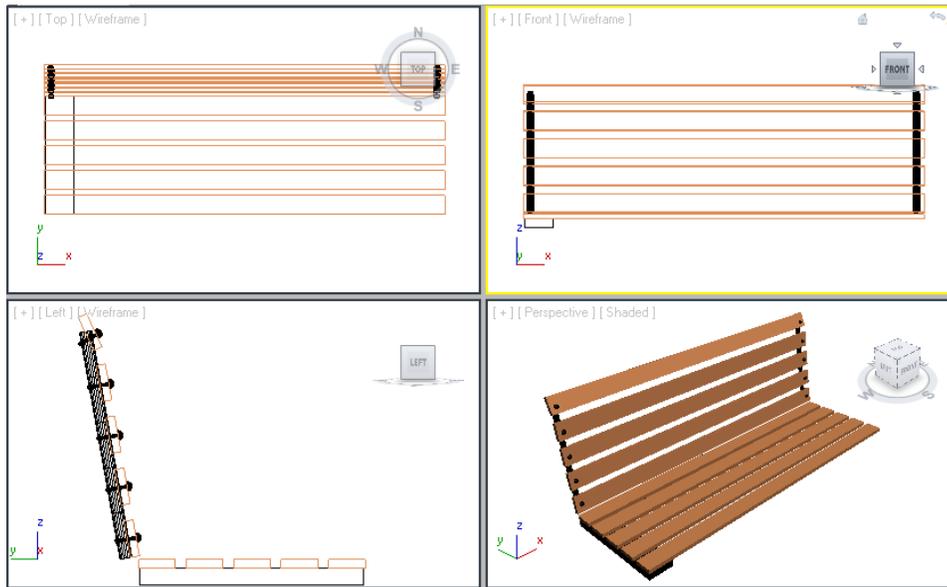
### Creating the Leg Supports

Now, you will create the leg support.

1. Activate the Top viewport and choose **Create > Geometry** in the **Command Panel**; **Standard Primitives** is displayed in the drop-down list. Next, choose the **Box** tool in the **Object Type** rollout.
2. In the **Keyboard Entry** rollout, set the parameters as follows:
 

Length: <b>36.677</b>	Width: <b>9.0</b>	Height: <b>2.8</b>
-----------------------	-------------------	--------------------
3. Choose the **Create** button from the **Keyboard Entry** rollout; the box is created.

4. Name the box as *leg support001* and change its color to black.
5. Choose the **Select and Move** tool and align the *leg support001* to the extreme left and below the *horizontal seat support* in all viewports, refer to Figure 2-76.



**Figure 2-76** Alignment of the *leg support001* with the *horizontal seat support*

Next, you need to copy the *leg support001* to create the leg support on the right side of the *horizontal seat support*.

6. Activate the Top viewport by middle-clicking in it and create a copy of the *leg support001* as described earlier. It is automatically named as *leg support002*.
7. Choose the **Select and Move** tool and align the *leg support002* to the *horizontal seat support* in all viewports, as shown in Figure 2-77.

Next, you need to create another box for other leg supports.

8. Activate the Top viewport and create a box using the values as follows:

Length: **9.0**

Width: **124**

Height: **2.8**

9. In the **Name and Color** rollout, name the box as *leg support003* and change its color to black.
10. Choose the **Select and Move** tool and align the *leg support003* with the *horizontal seat support* in all viewports, as shown in Figure 2-78.

Evaluation Copy. Do not reproduce. For information visit [www.cadcam.com](http://www.cadcam.com)

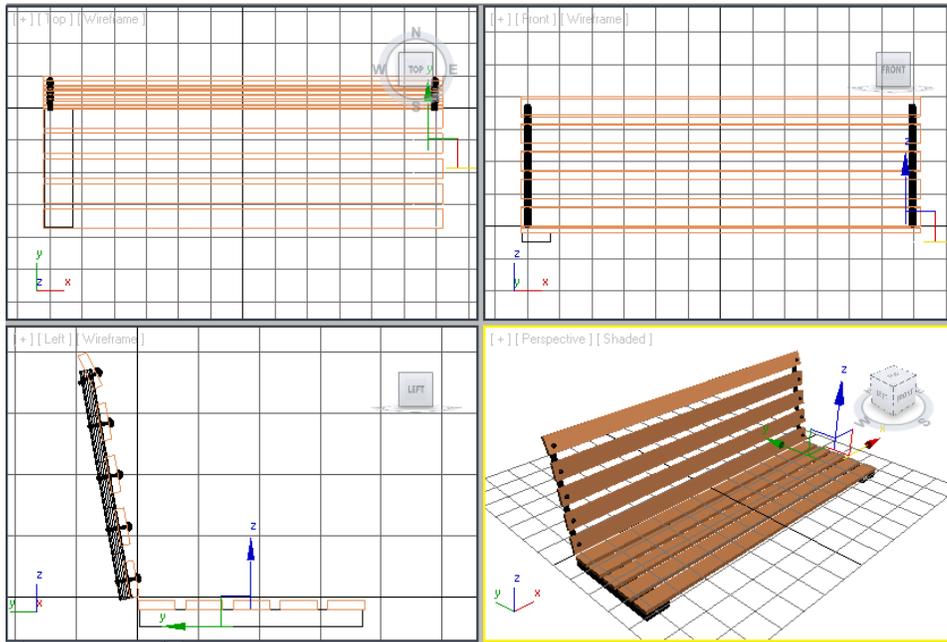


Figure 2-77 Alignment of the leg support002 with the horizontal seat support

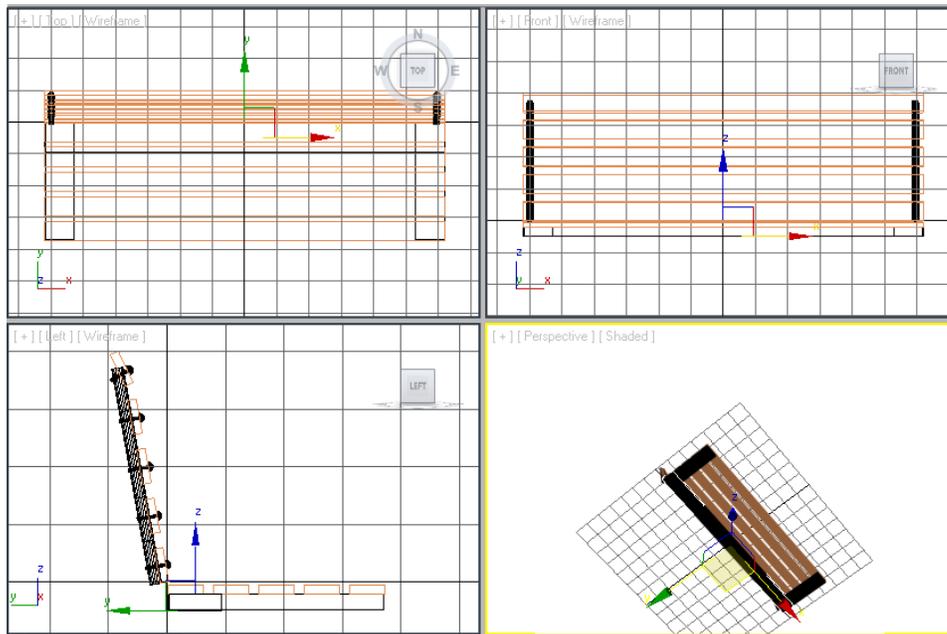


Figure 2-78 Alignment of the leg support003 with the horizontal seat support in all viewports

**Note**

You need to use the **Arc Rotate** tool to view the *leg support003* properly in the *Perspective* viewport.



11. Create a copy of the *leg support003* in the *Top* viewport; it is automatically named as *leg support004*.
12. Choose the **Select and Move** tool and align the *leg support004* with the *horizontal seat support* in all viewports, refer to Figure 2-79.

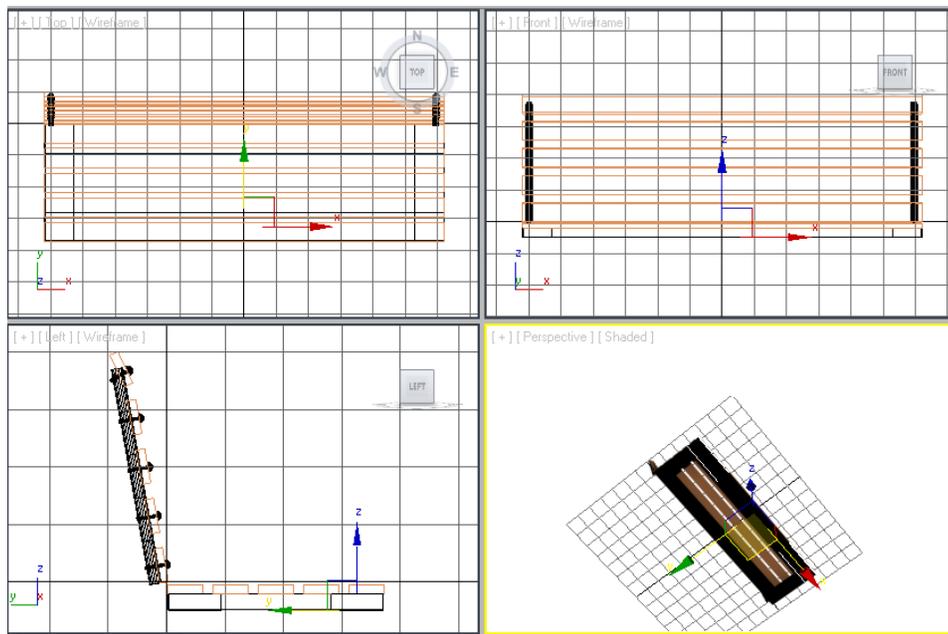
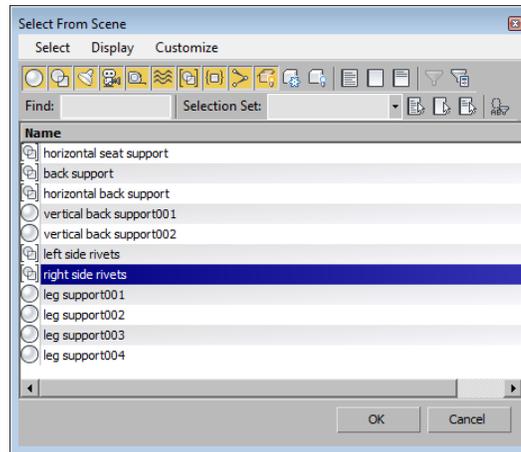


Figure 2-79 Alignment of the *leg support004* in all viewports

### Creating Rivets for the Seat Support

To create the rivets for the *horizontal seat support*, you need to copy the *right side rivets*. As you already know that the *right side rivets* are grouped under *back support*, therefore first you need to open this group to access them independently. After opening, the *back support* group will be ungrouped temporarily and you can transform the objects within it independently.

1. Activate the *Left* viewport and select the *back support*.
2. Choose **Group > Open** from the menu bar; the *back support* is now ungrouped temporarily. Also, a pink colored bounding box is displayed around the *back support*.
3. Choose the **Select By Name** tool; the **Select From Scene** dialog box is displayed.
4. In the **Select From Scene** dialog box, select the *right side rivets* and choose the **OK** button, refer to Figure 2-80.

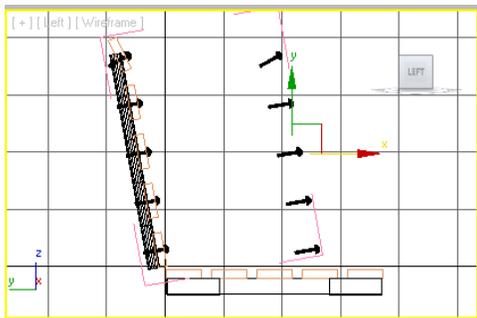


**Figure 2-80** The right side rivets selected in the **Select From Scene** dialog box

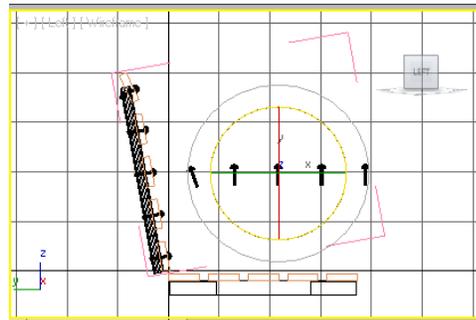
5. Make sure the *right side rivets* group is still selected. Then, create a copy of the *right side rivets* and name them as *right side seat rivets*, as shown in Figure 2-81.
6. Make sure that the *right side seat rivets* group is selected and choose **Group > Detach** from the menu bar; the *right side seat rivets* group is detached from the *back support* group.
7. Select the pink colored gizmo of the *back support* group and choose **Group > Close** from the menu bar to group them again.

Next, you need to align the *right side seat rivets* group.

8. Choose the **Select and Rotate** tool and select the *right side seat rivets* in the Left viewport. Then, move the cursor over the Z-axis. Now, press the left mouse button and drag the cursor in the counterclockwise direction to rotate *rivet001* until the angle of rotation in the **Z** spinner becomes **80**, refer to Figure 2-82.



**Figure 2-81** The right side seat rivets in the Left viewport

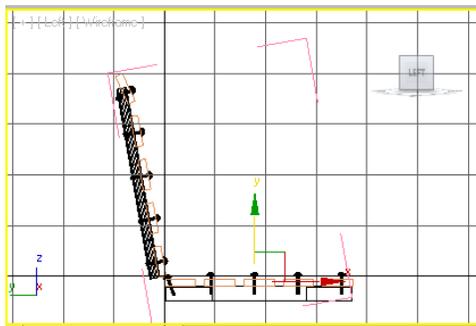


**Figure 2-82** Rotating the right side seat rivets in the Left viewport

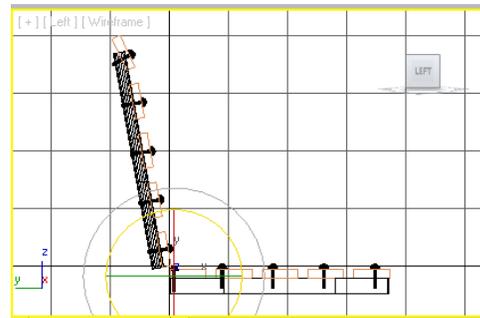
9. Choose the **Select and Move** tool. Now, move the cursor over the vertical axis and then drag the mouse downward to align the *right side seat rivets* with the *horizontal seat support*, as shown in Figure 2-83.

Next, you need to align the rivet (which is near the horizontal back support) to the horizontal seat support.

10. Make sure the *right side seat rivets* group is selected and choose **Group > Open** from the menu bar to ungroup them temporarily.
11. Select the rivet which is near the *horizontal back support* and choose the **Select and Rotate** tool. Move the cursor over the Z-axis. Now, press the left mouse button and drag the cursor in the clockwise direction to rotate it until the angle of rotation in the Z spinner in the coordinate display becomes **-20**, refer to Figure 2-84.

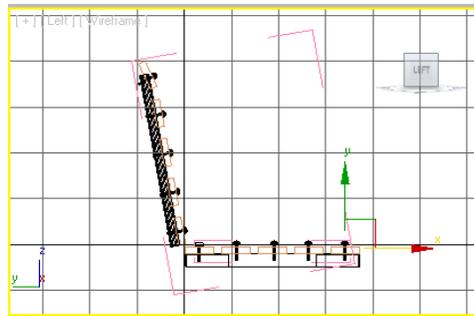


**Figure 2-83** Alignment of the right side seat rivets in the Left viewport



**Figure 2-84** Rotating the rivet in the Left viewport

12. Choose the **Select and Move** tool and align all rivets of the *right side seat rivets* group with the *horizontal seat support*, as shown in Figure 2-85.



**Figure 2-85** Alignment of the right side seat rivets in the Left viewport

13. Make sure that one of the rivets of the *right side seat rivets* group is selected and choose **Group > Close** from the menu bar to group them again.

Next, you need to copy the *right side seat rivets* to create rivets on the left side of the *horizontal seat support*.

14. Activate the Top viewport and create a copy of the *right side seat rivets*. Name the new group as *left side seat rivets*.
15. Align the *left side seat rivets* using the **Select and Move** tool in all viewports, as shown in Figure 2-86.

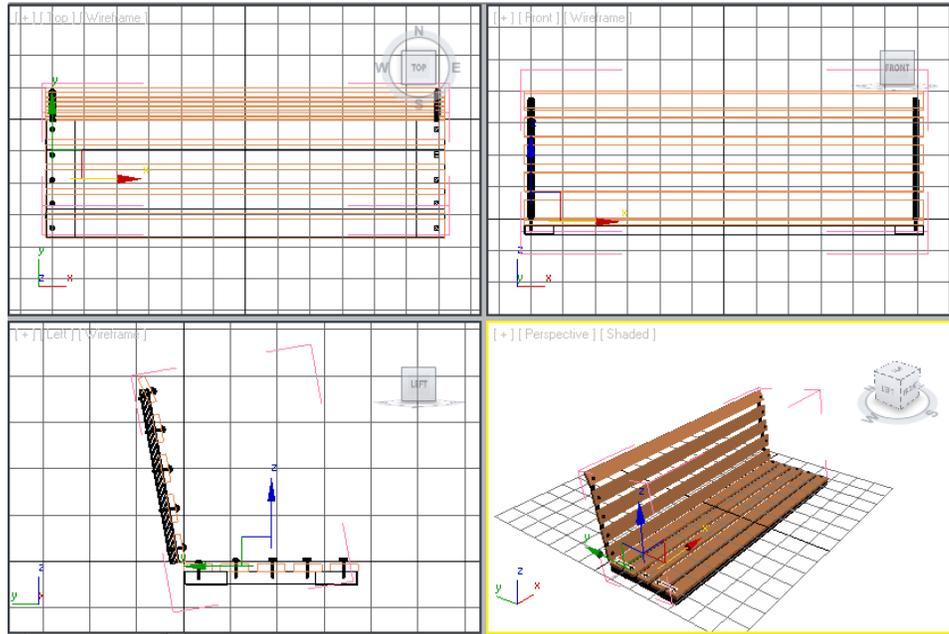


Figure 2-86 Alignment of the left side seat rivets in all viewports

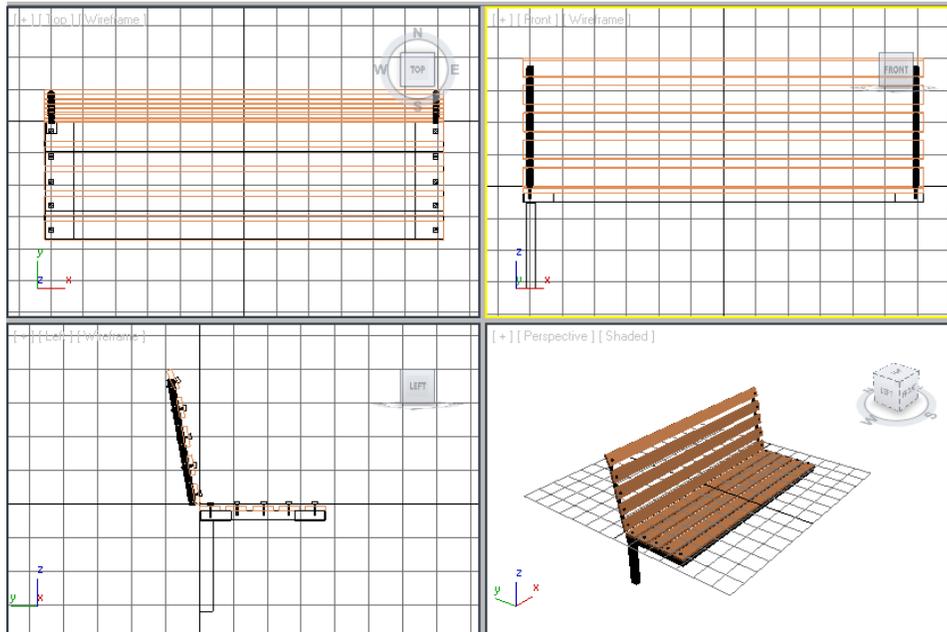
## Creating the Legs of the Park Bench

In this section, you will create the legs of the park bench.

1. Activate the Top viewport and choose **Create > Geometry** in the **Command Panel**; **Standard Primitives** is displayed in the drop-down list. Next, choose the **Box** tool in the **Object Type** rollout.
2. In the **Keyboard Entry** rollout, set the values as follows:
 

Length: <b>4.0</b>	Width: <b>3.0</b>	Height: <b>26.88</b>
--------------------	-------------------	----------------------
3. Choose the **Create** button from the **Keyboard Entry** rollout; a box is created.
4. In the **Name and Color** rollout, name the box as *leg001*. Also, change its color to black.

- Choose the **Select and Move** tool and align the *leg001* with the *leg support001* in all viewports, refer to Figure 2-87. You need to adjust the viewport to display all objects properly using the **Zoom** and **Pan View** tools.



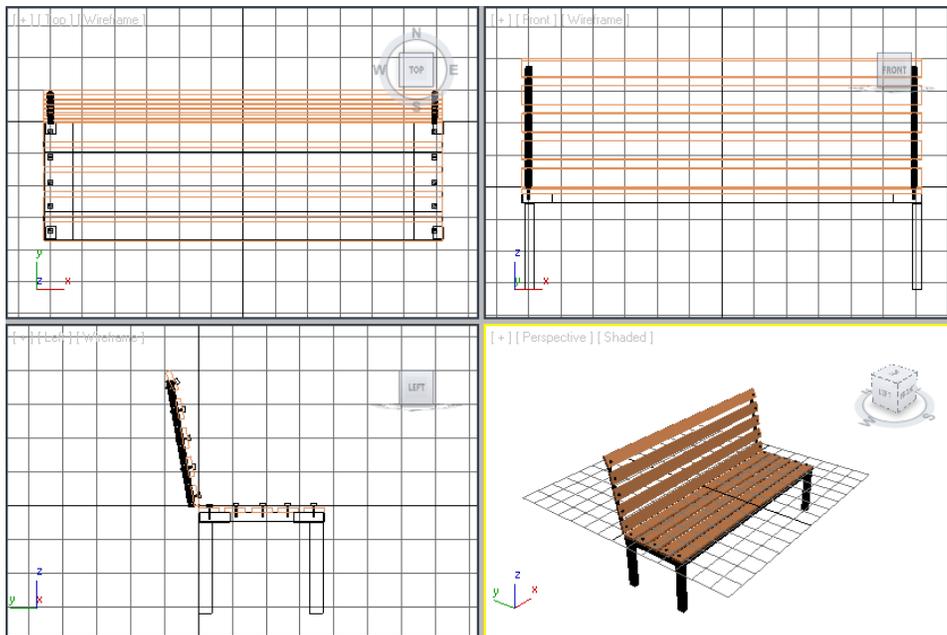
*Figure 2-87 Alignment of the leg001 in all viewports*

- Create three copies of the *leg001* to create three more legs. These are automatically named as *leg002*, *leg003*, and *leg004*.
- Choose the **Select and Move** tool and align the *leg002*, *leg003*, and *leg004* at the corners of the *leg support002*, *leg support003*, and *leg support004*, respectively in all viewports.
- Choose the **Select and Move** tool and align the *leg002*, *leg003*, and *leg004* at the corners of the *leg support002*, *leg support003*, and *leg support004*, respectively in all viewports, as shown in Figure 2-88.
- Choose the **Zoom Extents All** tool and modify the view in the Perspective viewport using the **Orbit** tool.

## Saving and Rendering the Scene

In this section, you will save and render the scene. You can also view the final rendered image of this scene by downloading the *c02\_3dsmax\_2013\_rndr.zip* file from <http://www.cadcam.com>. The path of the file is as follows:

*Textbooks > Animation and Visual Effects > 3ds Max > Autodesk 3ds Max 2013: A Comprehensive Guide*



*Figure 2-88 Alignment of the legs in all viewports*

1. Change the background color of the scene to white as discussed in Tutorial 1.
2. Choose **Save** from the **Application** menu.

As the project folder is already set, the path `\Documents\3dsmax2013\c02_tut2\scenes` is displayed in the **Save in** drop-down list of the **Save File As** dialog box.

3. Activate the Perspective viewport. Next, choose the **Render Production** tool from the **Main Toolbar**; the **Rendered Frame** window is displayed. This window shows the final output of the scene, refer to Figure 2-89.



*Figure 2-89 The final output after rendering*

**Self-Evaluation Test**

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

1. Which of the following tools is used to rotate an object in the active viewport?
  - (a) **Zoom Extents All**
  - (b) **Orbit**
  - (c) **Pan**
  - (d) All of these
  
2. Which of the following tools is used to select an object by its name from the list of objects that are currently present in the scene?
  - (a) **Select Object**
  - (b) **Select and Move**
  - (c) **Select by Name**
  - (d) **Select and Rotate**
  
3. Which of the following rollouts is available when you choose the **Box** tool?
  - (a) **Name and Color**
  - (b) **Creation Method**
  - (c) **Parameters**
  - (d) All of these
  
4. Which of the following objects is not a standard primitive?
  - (a) Pyramid
  - (b) Geosphere
  - (c) Torus Knot
  - (d) Torus
  
5. On starting Autodesk 3ds Max, a screen with three viewports will be displayed. (T/F)
  
6. You can create any standard primitive dynamically as well as by entering the parameters in the **Keyboard Entry** rollout. (T/F)
  
7. The options in the **Creation Method** rollout are used only when you create an object using the keyboard. (T/F)
  
8. To stretch and squash an object, you need to choose the \_\_\_\_\_ tool from the **Main Toolbar**.
  
9. To change the name and color of an object, use the \_\_\_\_\_ rollout.
  
10. To modify the dimensions of an object, you need to use the \_\_\_\_\_ rollout.
  
11. The \_\_\_\_\_ tool is used to move through the viewport.

## Review Questions

Answer the following questions:

- Which of the following tools is used to display all objects in all viewports?
  - Zoom**
  - Pan**
  - Zoom Extents All**
  - Orbit**
- Which of the following tools is used to move an object along the X, Y, or Z axis?
  - Select Object**
  - Select and Move**
  - Select by Name**
  - All of these
- While creating the clone of an object, you need to hold the CTRL key and drag the object. (T/F)
- To change the background color of a scene, you need to choose **Rendering > Environment** from the menu bar. (T/F)
- A geosphere is smoother than a sphere and has more regular surfaces. (T/F)
- The **Zoom Region** tool is used to adjust the view of all objects in all viewports to display them properly. (T/F)
- To render a view without using the **Render Setup** dialog box, you need to choose the **Render Production** tool from the **Main Toolbar**. (T/F)
- You can use different parts of the teapot individually to make a new object. (T/F)
- You can choose **Reset** from the **Application** menu to reset all settings of Autodesk 3ds Max. (T/F)
- To select more than one object simultaneously in a viewport, you need to choose the \_\_\_\_\_ tool and press and hold the \_\_\_\_\_ key.

## EXERCISES

### Exercise 1

Start Autodesk 3ds Max 2013 and then perform the following operations:

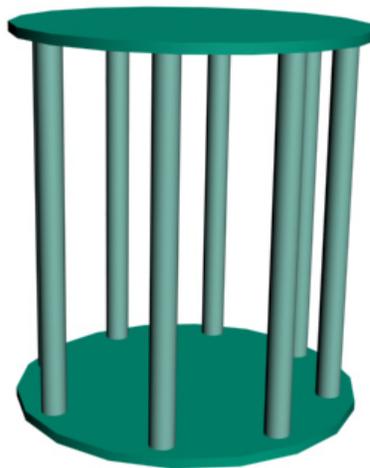
- Choose **Create > Geometry** in the **Command Panel**; **Standard Primitives** will be displayed in the drop-down list. Now, choose different tools in the **Object Type** rollout and create the objects in the viewport dynamically or by entering the values in the **Keyboard Entry** rollout and notice the difference.
- Create the objects dynamically using the options in the **Creation Method** rollout and notice the difference.

3. Change the name and color of the objects using the **Name and Color** rollout.
4. Modify the dimensions of the object using the **Parameters** rollout in the **Modify** tab.
5. Add more than one object to the scene and use different navigation controls to view their effects.
6. Select more than one object simultaneously by holding the CTRL key.
7. Use various tools in the **Main Toolbar** to modify the scene by moving, rotating, and scaling the objects.
8. Create a copy of any object.
9. Render the image to display its output and try to change the color of the background.
10. Reset Autodesk 3ds Max without saving the file.

## Exercise 2

Create the model shown in Figure 2-90 using your own dimensions. You can view the final rendered image of this model by downloading the *c02\_3dsmax\_2013\_exr.zip* file from <http://www.cadcam.com>. The path of the file is as follows:

*Textbooks > Animation and Visual Effects > 3ds Max > Autodesk 3ds Max 2013: A Comprehensive Guide*  
(Expected time: 15 min)



**Figure 2-90** The model to be created in Exercise 2

### Exercise 3

Create the nut model shown in Figures 2-91 and 2-92 using your own dimensions. You can view the final rendered image of this model by downloading the *c02\_3dsmax\_2013\_exr.zip* file from <http://www.cadcim.com>. The path of the file is mentioned in Exercise 2.

(Expected time: 15 min)



*Figure 2-91 The nut model (view 1)*



*Figure 2-92 The nut model (view 2)*

### Exercise 4

Create the model of a table shown in Figure 2-93 using your own dimensions. You can view the final rendered image of this model by downloading the *c02\_3dsmax\_2013\_exr.zip* file from <http://www.cadcim.com>. The path of the file is mentioned in Exercise 2.

(Expected time: 15 min)



*Figure 2-93 The table model*

#### Answers to Self-Evaluation Test

1. b, 2. c, 3. d, 4. c, 5. F, 6. T, 7. F, 8. Select and Squash, 9. Name and Color, 10. Parameters
11. Walk Through