Park Bench

In this tutorial, you will create the 3D model of a park bench, as shown in the image below, using standard primitives.

Creating the Project Folder

Create a new project folder with the name c02_tut2 at \Documents\3dsmax2017 and then save the file with the name c02tut2.
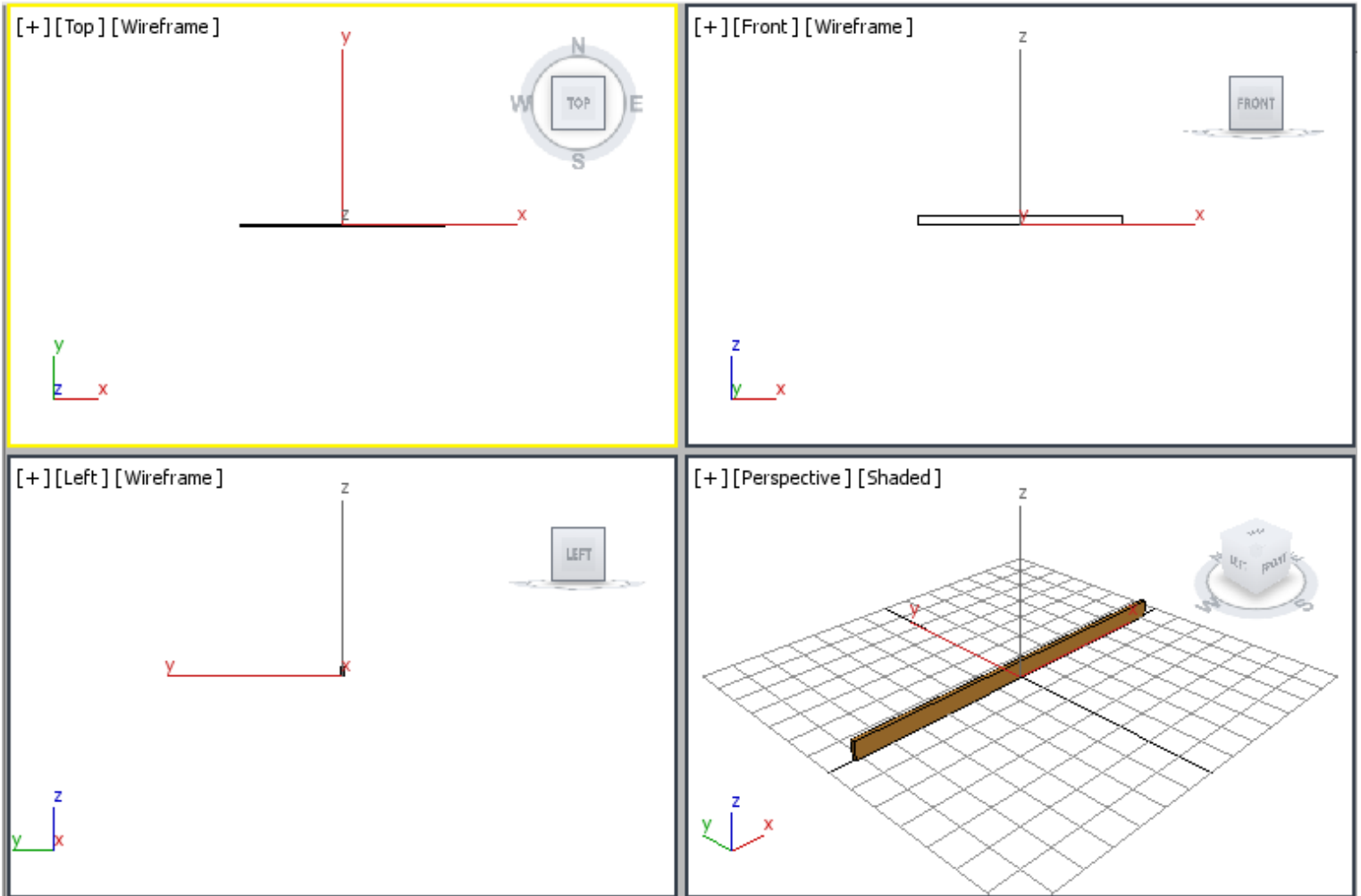
Creating Horizontal Back Supports

In this section, you need to create horizontal 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 **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**

3. Choose the **Create** button from the **Keyboard Entry** rollout; a box is created in viewports, refer to the image below.


4. In the **Name and Color** rollout, name the box as *horizontal back support001* and press the ENTER key.

5. 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 *horizontal back support001* to light brown. Choose the **OK** button to close the **Object Color** dialog box.

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

6. Activate the Front viewport. Choose the **Select and Move** tool from the **Main Toolbar** and make sure that *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 *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.

7. 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*.

8. Choose the **Zoom Extents All** tool from the viewport navigation controls; the horizontal back supports are displayed in viewports, as shown in the image below.
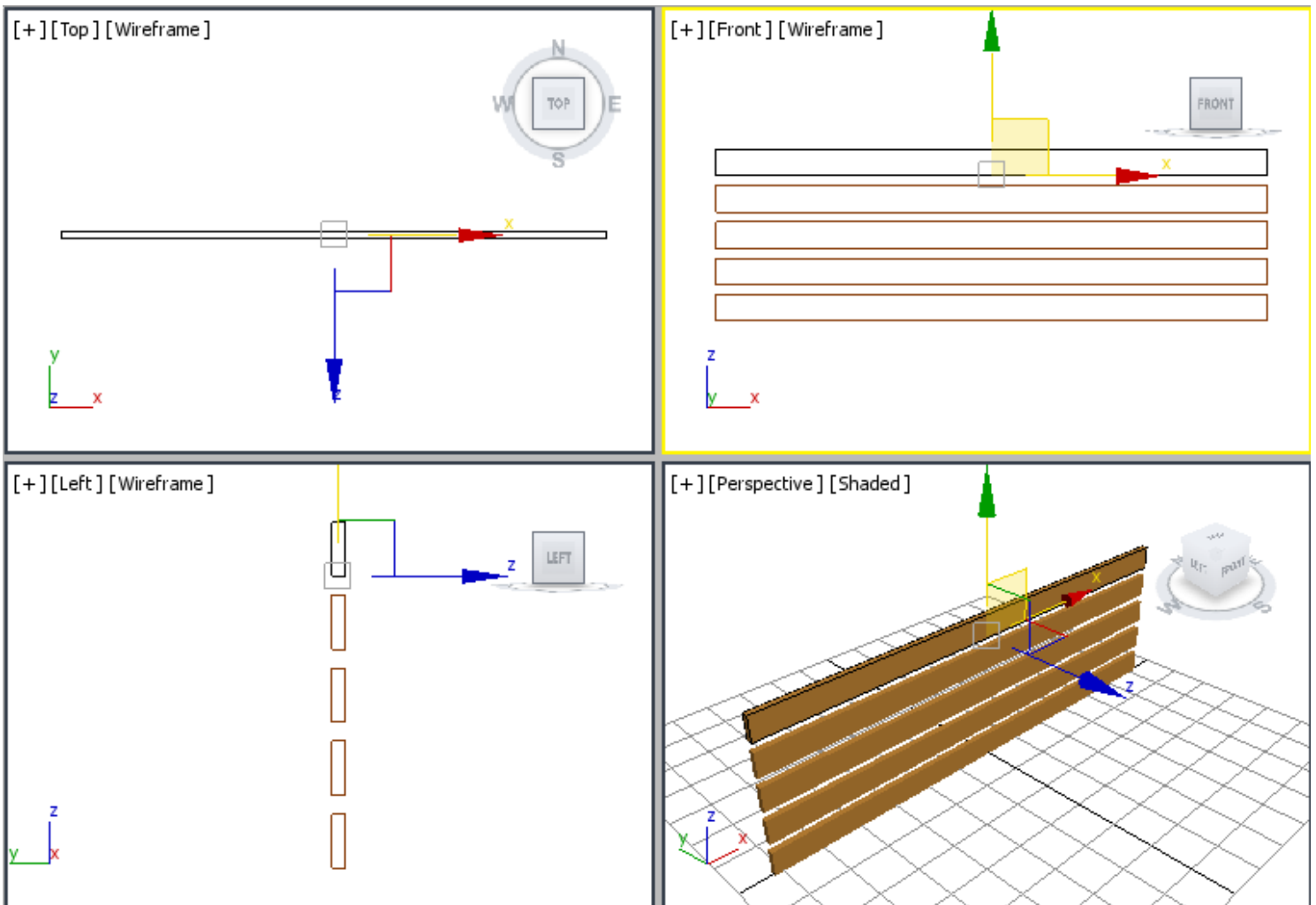

Next, you need to rotate *horizontal back support005*.

9. Activate the Left viewport and select *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.

10. In the **Absolute:World** area, set the value **-10** in the **X** spinner, as shown in the image below and then press the ENTER key.
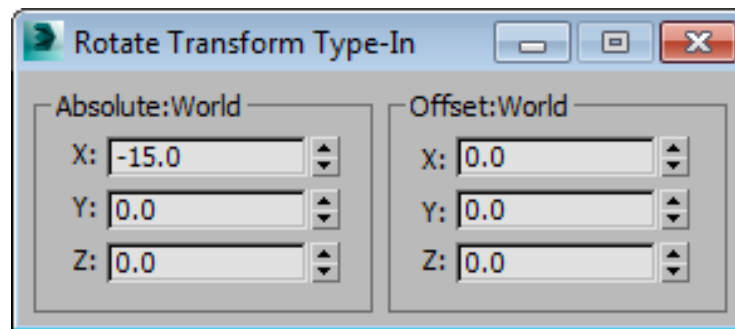
Horizontal back support005 gets rotated, refer to the image below. Now, close the **Rotate Transform Type-In** dialog box.
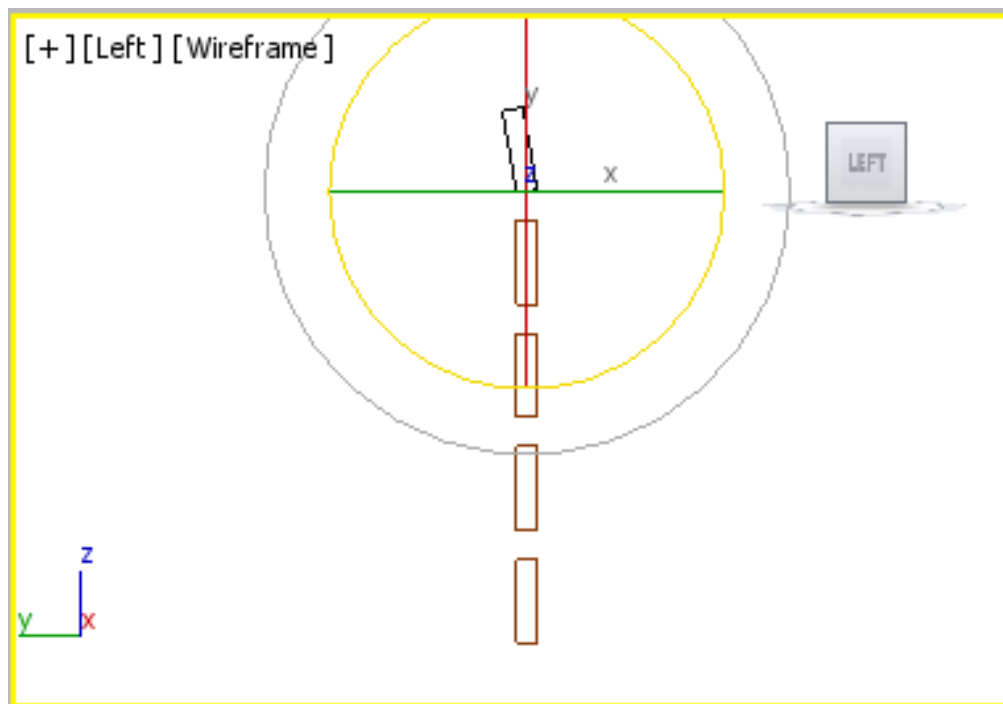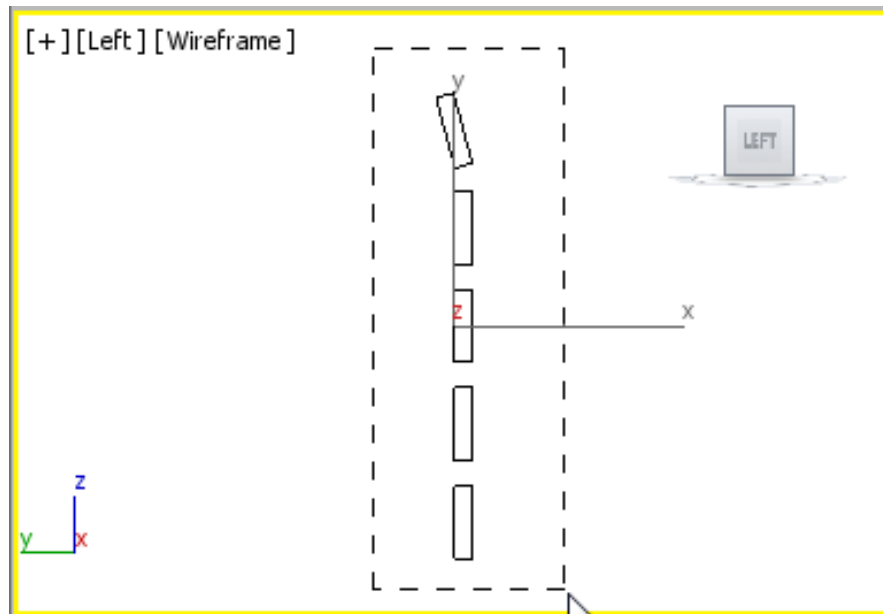

11. Click anywhere in the viewport to deselect *horizontal back support005*.
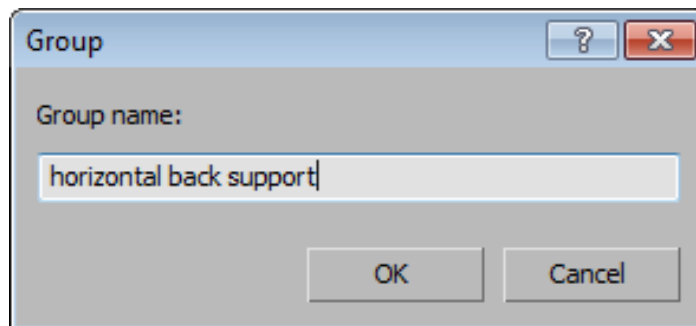
Grouping Horizontal Back Supports

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

1. 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 the image below.


2. Choose **Group > Group** from the menu bar; the **Group** dialog box is displayed.

3. In the **Group name** text box, enter **horizontal back support**, as shown in the image below and then choose the **OK** button; all horizontal back supports are grouped together.
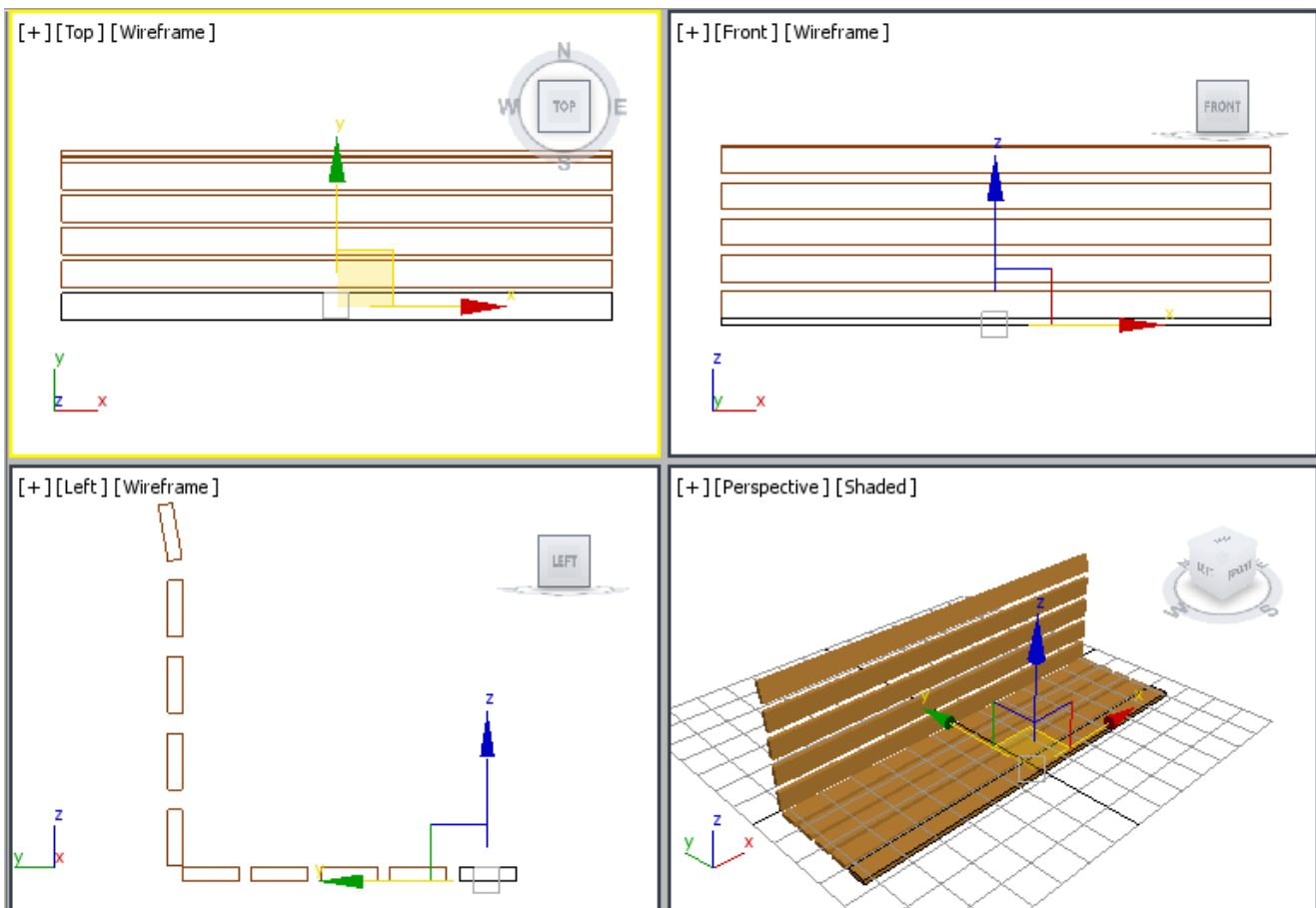
Creating Horizontal Seat Supports

In this section, you will create horizontal seat supports.

1. Activate the Top viewport and choose the **Box** tool from the **Object Type** rollout.

2. Expand the **Keyboard Entry** rollout and set the values as follows:

   Length: **6.03**　　　Width: **124**　　　Height: **1.5**

3. Choose the **Create** button from the **Keyboard Entry** rollout; a box is created in all viewports.

4. In the **Name and Color** rollout, name the box as *horizontal seat support001.*

5. Use the color swatch to assign the same color to *horizontal seat support001* that you assigned to *horizontal back support*.

6. Choose the **Select and Move** tool from the **Main Toolbar** and align *horizontal seat support001* with *horizontal back support* in viewports, refer to the image below.
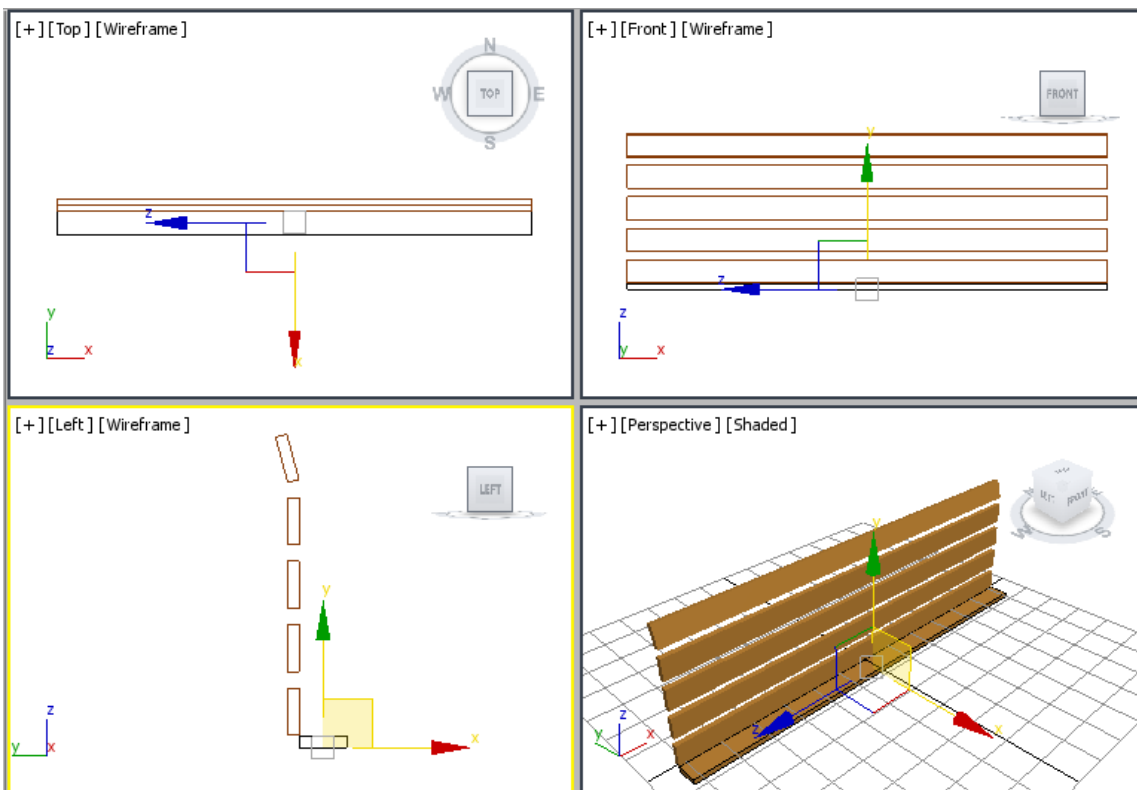
Next, you need to create four copies of *horizontal seat support001*.

7. Activate the Top viewport and make sure *horizontal seat support001* is selected. Next, place the cursor over the vertical axis. Press and hold the SHIFT key and drag *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 the viewports, as shown in the image below.

10. Click anywhere in the viewport to deselect the objects.

Grouping Horizontal Seat Supports

In this section, you will group all horizontal seat supports using the Scene Explorer.

1. Select all horizontal seat supports from the list displayed in the Scene Explorer using the CTRL key and then right-click; a quad menu is displayed.

2. Choose **Add Selected to > New Group** from this quad menu; the **Group** dialog box is displayed.

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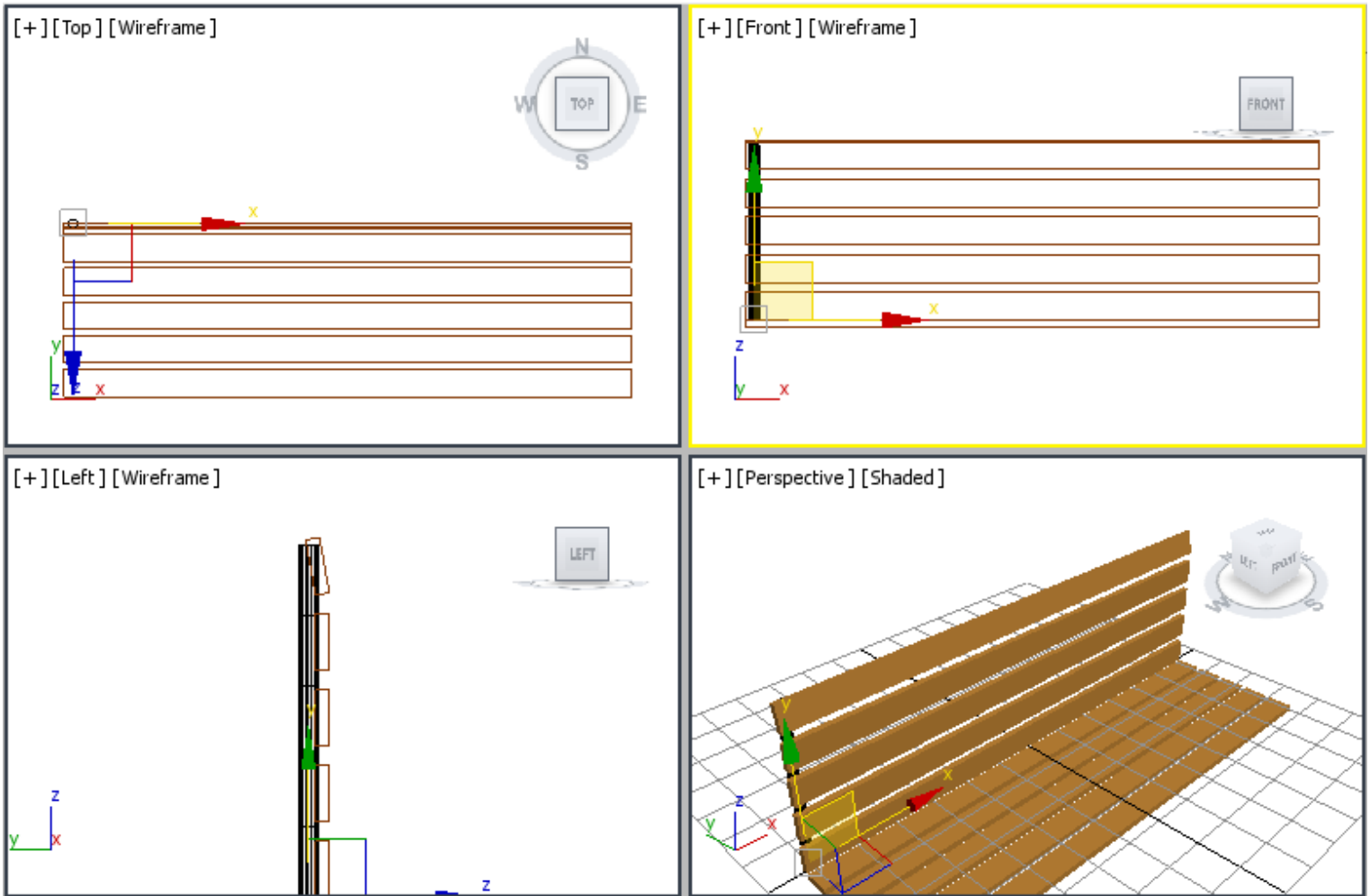
Creating Vertical Back Supports

In this section, you will create 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: **-60**　　　　　　Y: **1.5**　　　　　　Z: **0.0**
   Radius: **1.0**　　　　Height: **38.0**

3. Now, choose the **Create** button in the **Keyboard Entry** rollout; a cylinder is created in all viewports, as shown in the image below.

4. In the **Name and Color** rollout, name the cylinder as *vertical back support001* and press the ENTER key.

5. Change the color of *vertical back support001* to black.

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

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 *vertical back support001* to the right side to align it with the right side of *horizontal back support*, as shown in the image below. Release the left mouse button and the SHIFT key; the **Clone Options** dialog box is displayed.
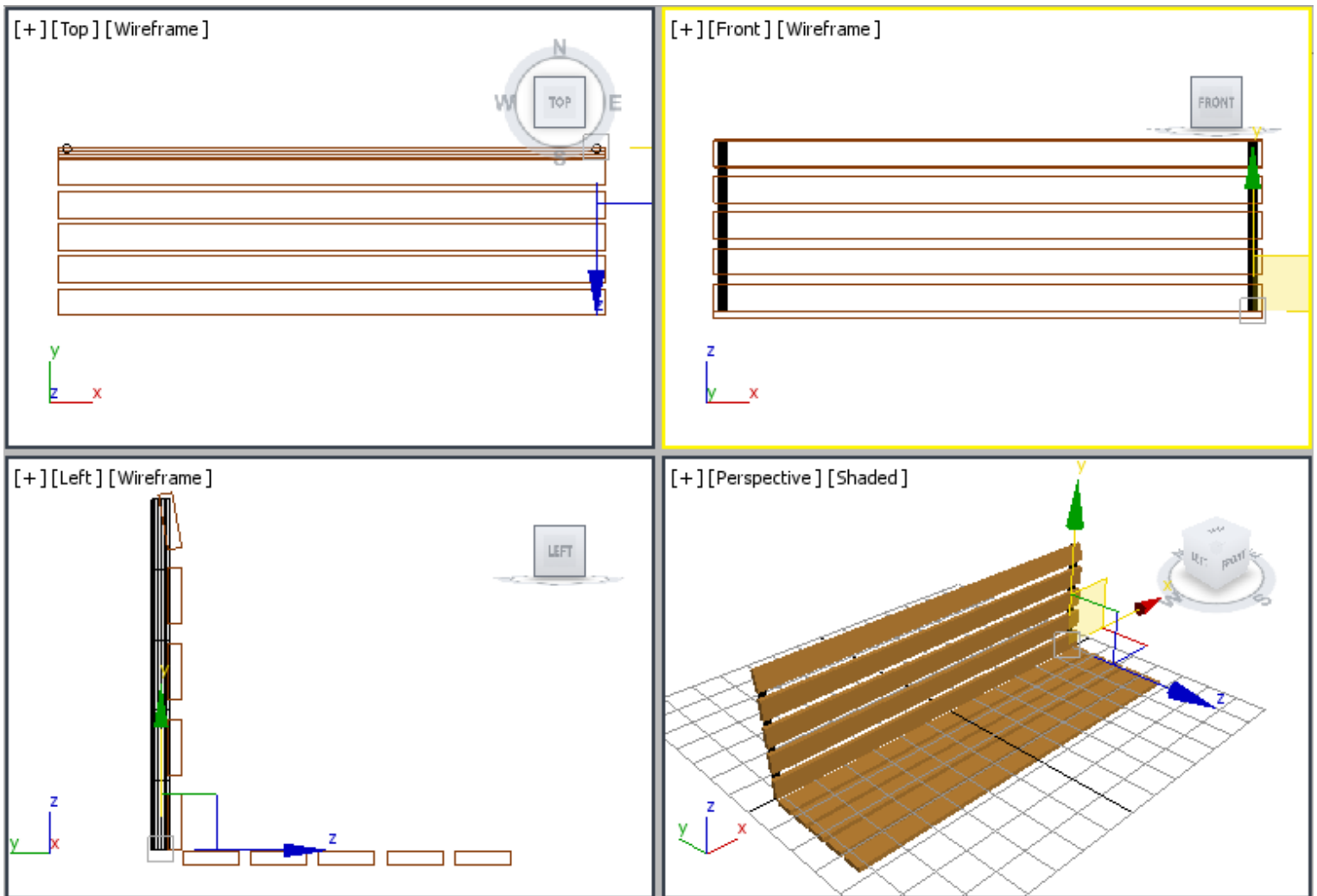
7. In the **Clone Options** dialog box, make sure the **Copy** radio button is selected. Set the value **1** in the **Number of Copies** spinner and choose the **OK** button; *vertical back support002* is created with the same dimensions as *vertical back support001*, refer to the image above.

8. Click anywhere in the viewport to deselect the objects.

Creating Rivets for 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.

3. In the **Parameters** rollout, make sure that the **Smooth** check box and the **Chop** radio button are selected. 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 and select *cap* and *body* simultaneously from the Scene Explorer by holding the CTRL key; *cap* and *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 *cap* and *body* of the rivet in the Left viewport using the **Select and Move** tool, as shown in the image below.
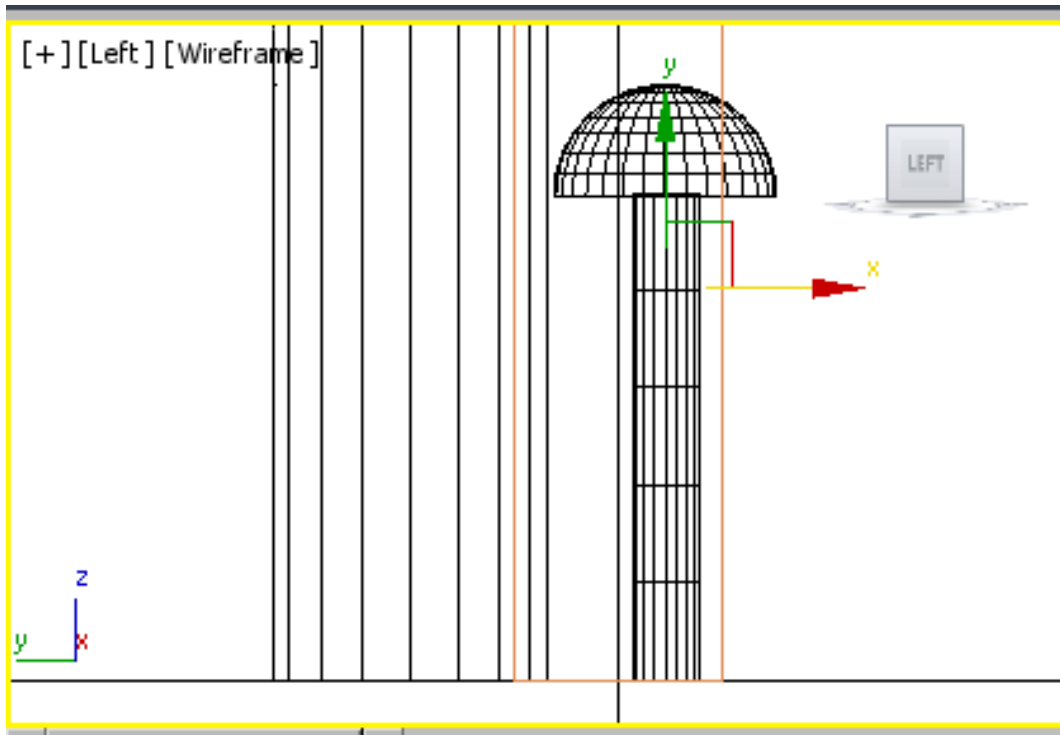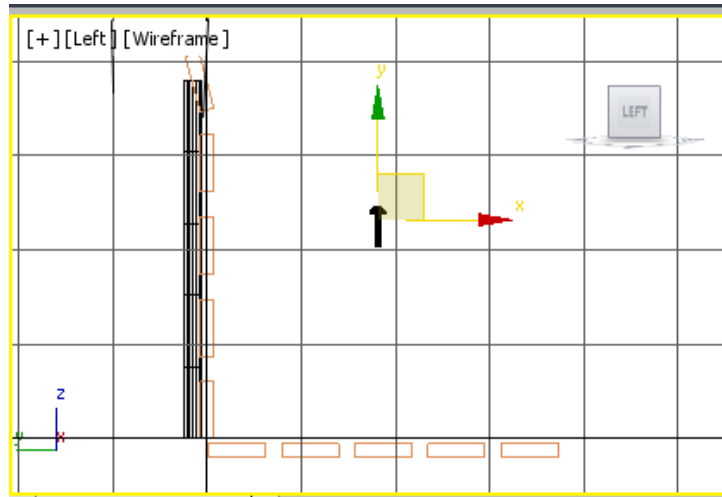

> **Note:** *You may need to use the **Zoom** and **Pan View** tools to align cap and body of the rivet.*

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

12. Select *cap* and *body* of the rivet in the Scene Explorer and group them as *rivet001*.

13. Choose the **Zoom Extents All** tool and move *rivet001* in the Left viewport to visualize it properly, as shown in the image below.


## *Aligning Rivets*

In this section, you will align 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; *rivet001* gets rotated, as shown in the image below. Now, close the **Rotate Transform Type-In** dialog box.
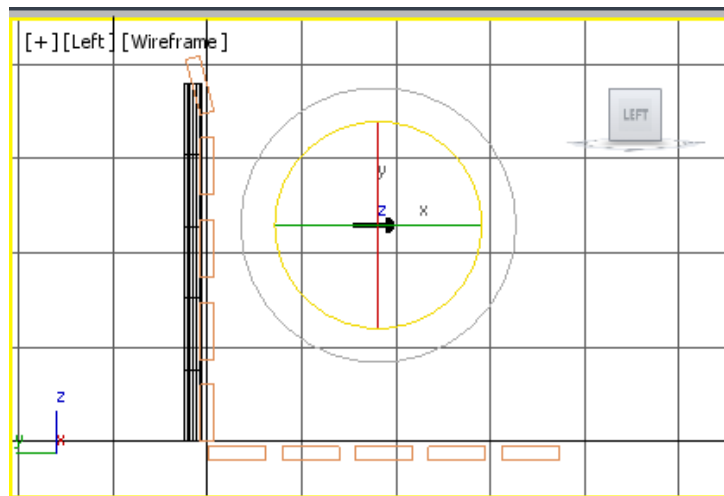
3. Choose the **Select and Move** tool and align *rivet001* with *horizontal back support* in all viewports, as shown in the image below.
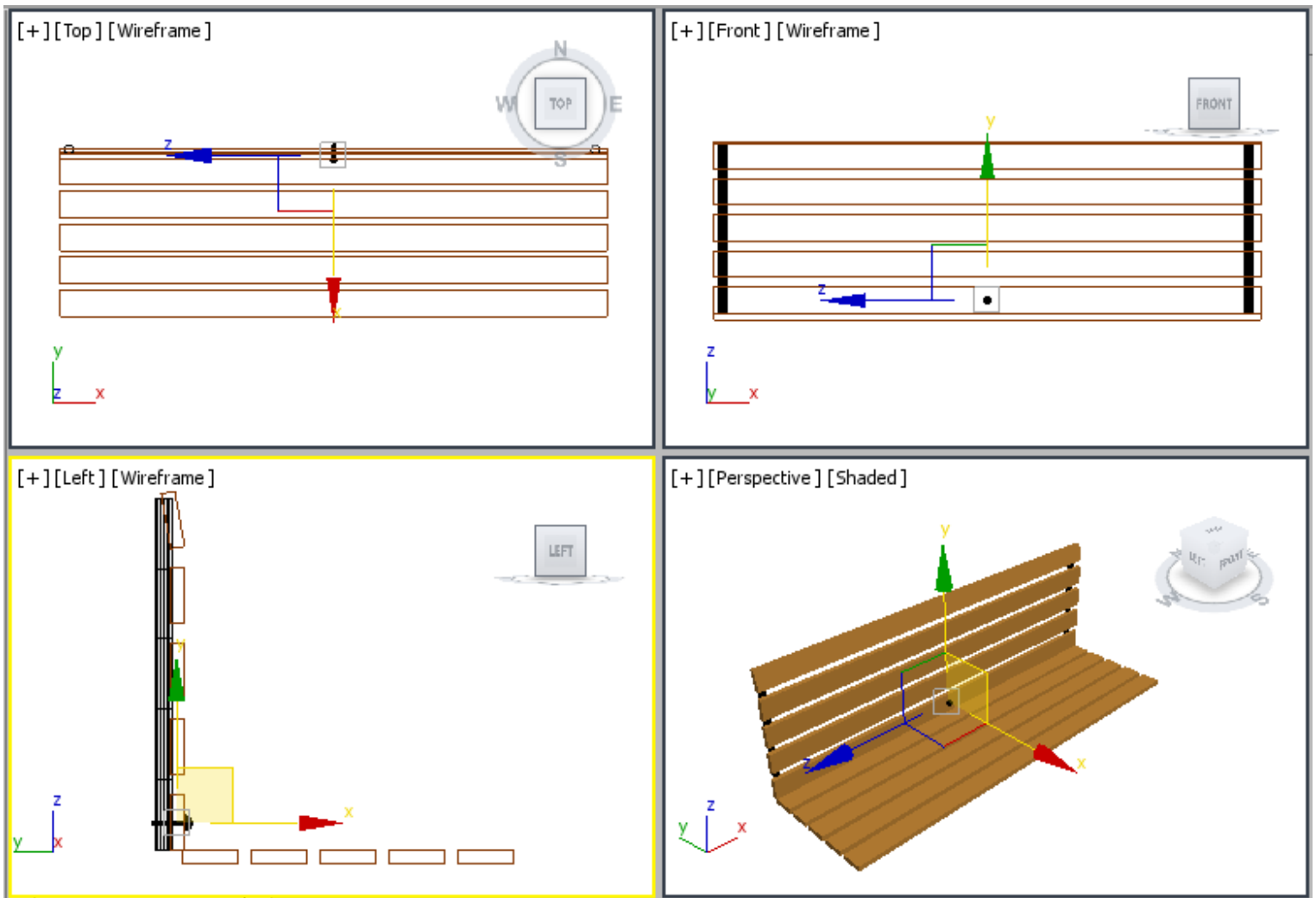
4. In the Left viewport, select *rivet001* using the **Select and Move** tool and move the cursor over the vertical axis. Now, create 4 copies of *rivet001.* These copies are automatically named as *rivet002*, *rivet003*, *rivet004*, and *rivet005*. Align them in the Left viewport, refer to the image below.
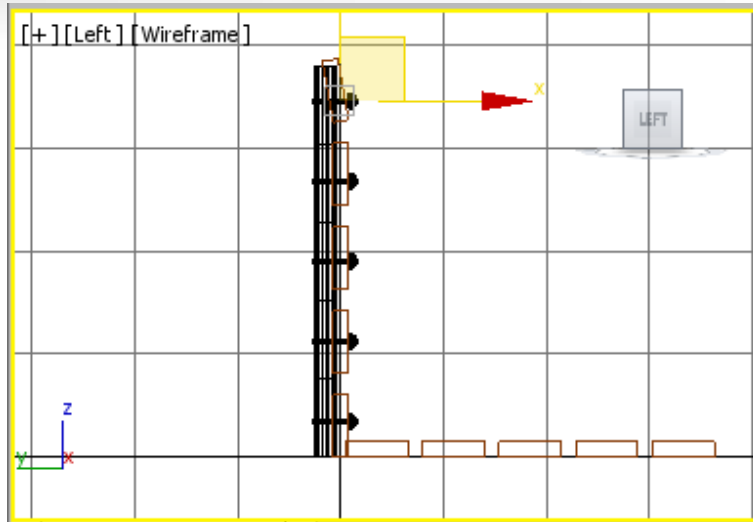
5. Select the uppermost rivet and choose the **Select and Rotate** tool. Now, rotate the uppermost rivet by using the outermost ring of the **Select and Rotate** tool in the counterclockwise direction until the value in the **X** spinner in the coordinate display becomes -**15**, refer to the image below. Next, align it using the **Select and Move** tool.
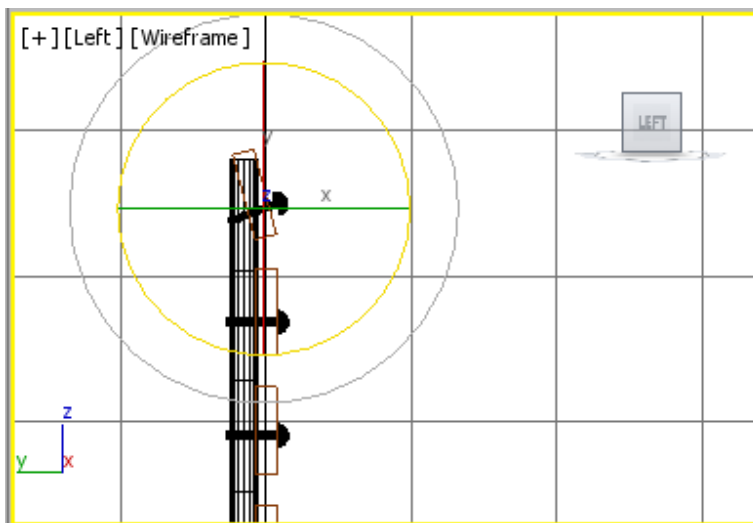

6. Press and hold the CTRL key and select all rivets from the Scene Explorer and group them as *left side rivets*. Click anywhere in the viewport to deselect the objects.

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

Creating Right Side Rivets

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

1. Select *left side rivets* in the Front viewport using the **Select and Move** tool and move the cursor over the horizontal axis. Next, 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 *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** text box, enter **right side rivets** to modify the name of the group and choose **OK**; *right side rivets* group is displayed, as shown in the image below.
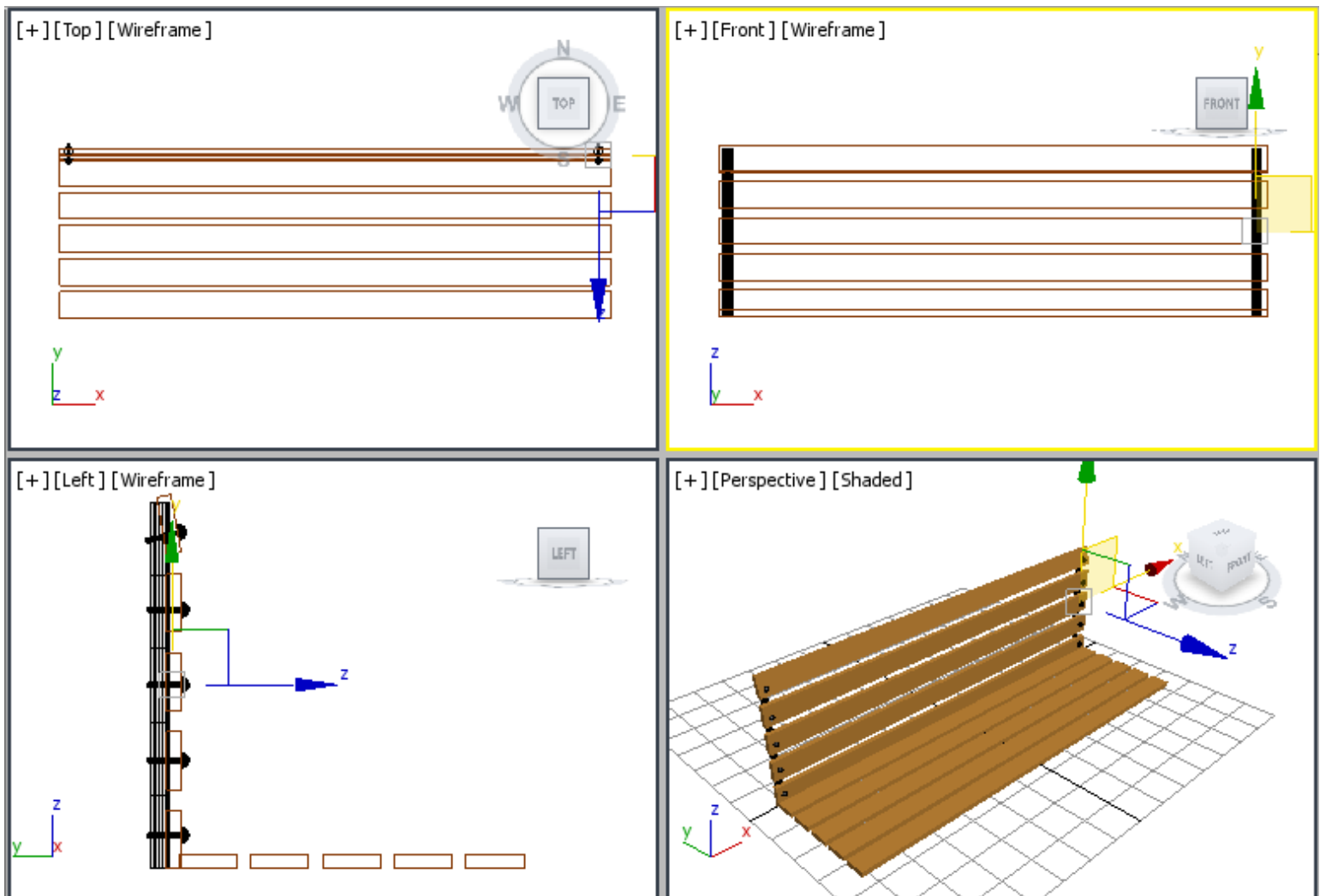
Now, you need to select *horizontal back support*, *vertical back support001*, *vertical back support002, left side rivets,* and *right side rivets*.

3. Select *horizontal back support*, *vertical back support001*, *vertical back support002, left side rivets*, and *right side rivets* using the CTRL key from the Scene Explorer 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 *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 around **10**. Release the left mouse button; the *back support* group is rotated, as shown in the image below.
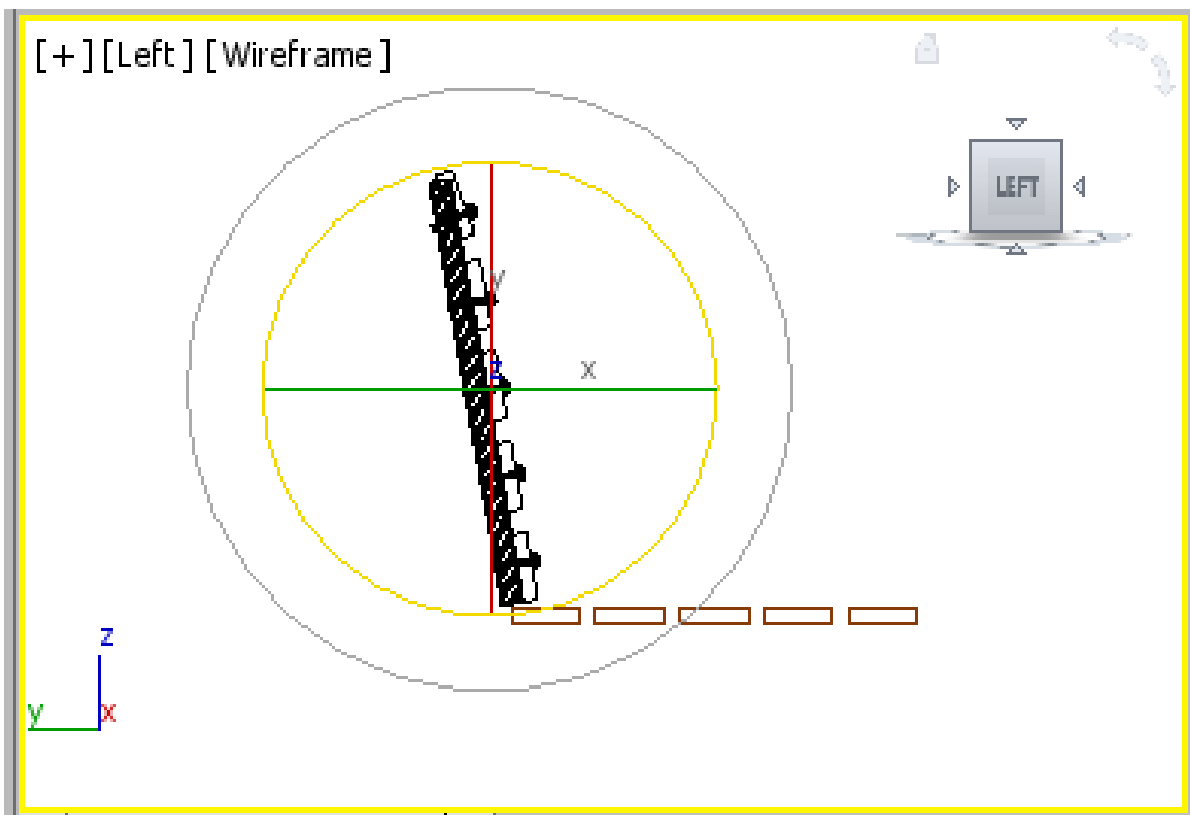
3. Choose the **Select and Move** tool and align *back support* with *horizontal seat support*, as shown in the image below.
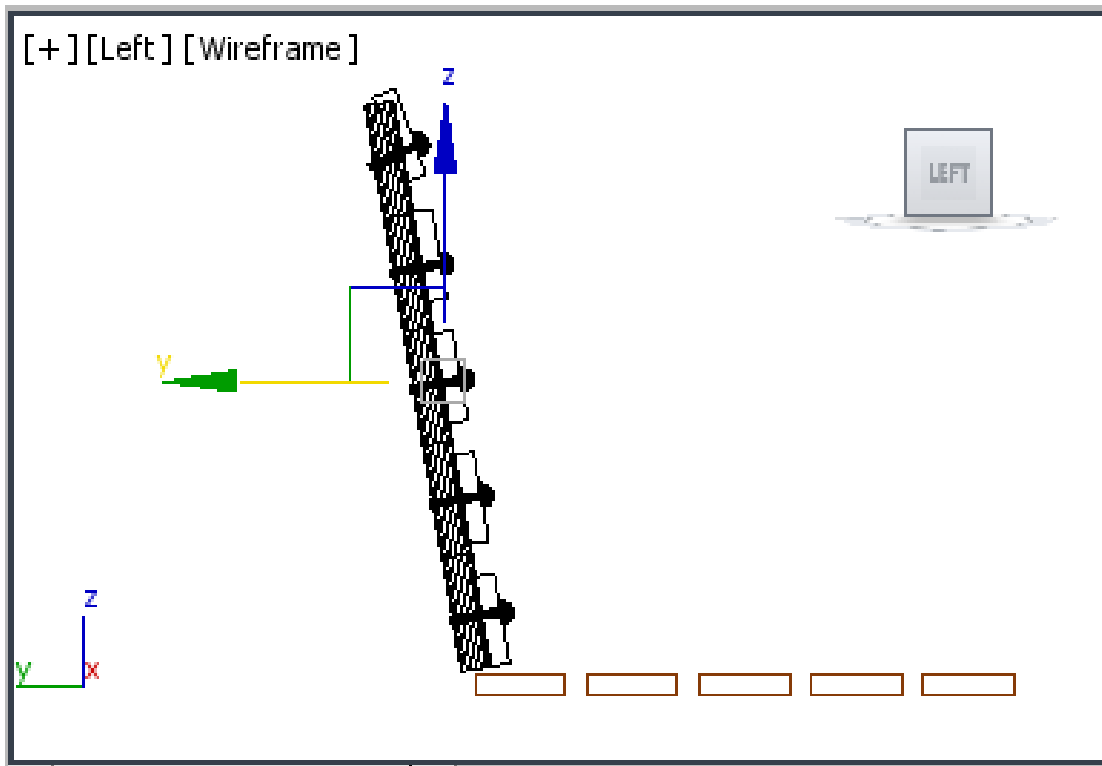

Creating Leg Supports

Now, you will create leg support.

1. Activate the Top viewport and choose **Create > Geometry** in the **Command Panel**; the **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: **36.677**   Width: **9.0**   Height: **2.8**

3. Choose the **Create** button from the **Keyboard Entry** rollout; the box is created.
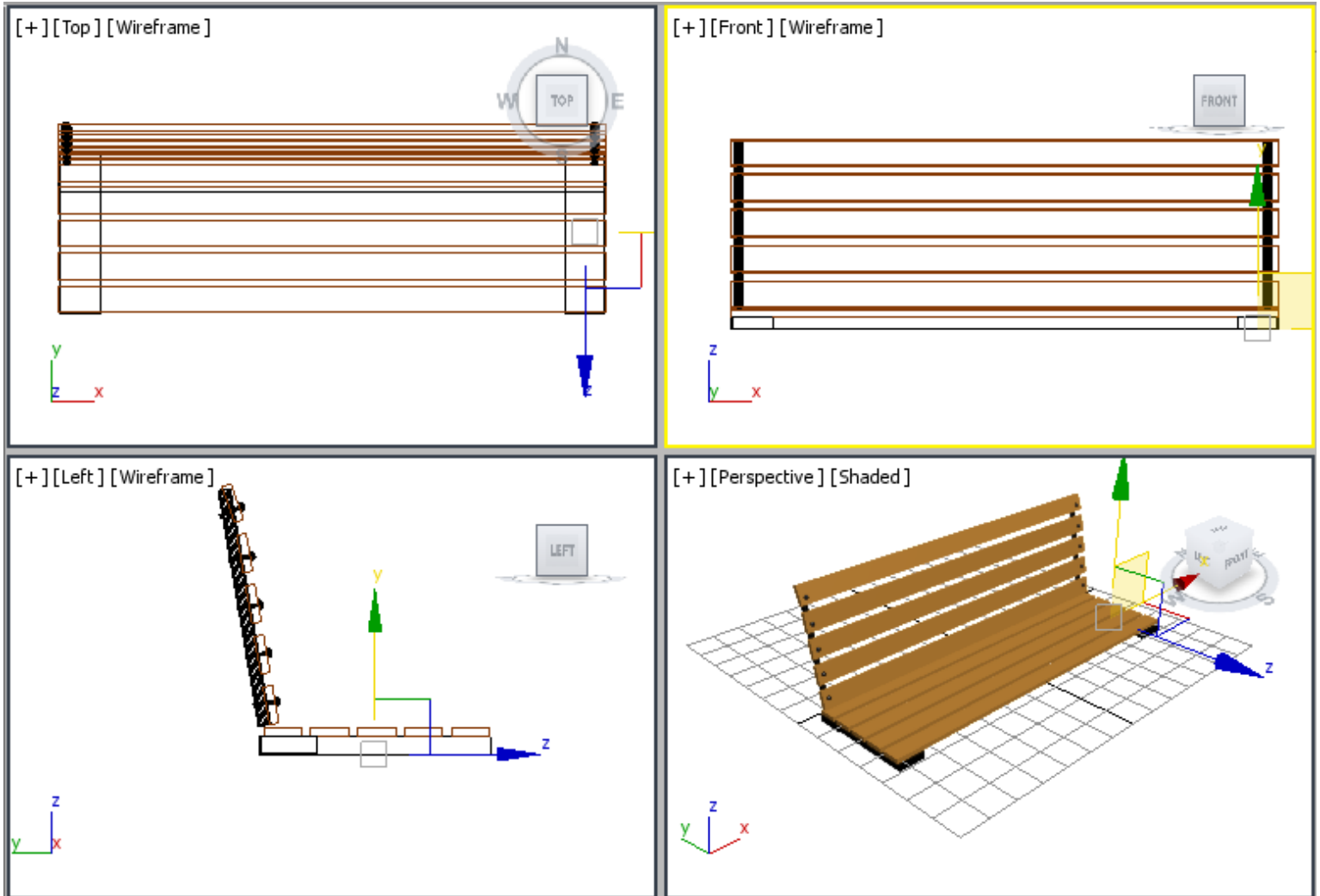
4. Name the box as *leg support001* and change its color to black.

5. Choose the **Select and Move** tool and align *leg support001* to the extreme left and below *horizontal seat support* in all viewports, refer to the image below.
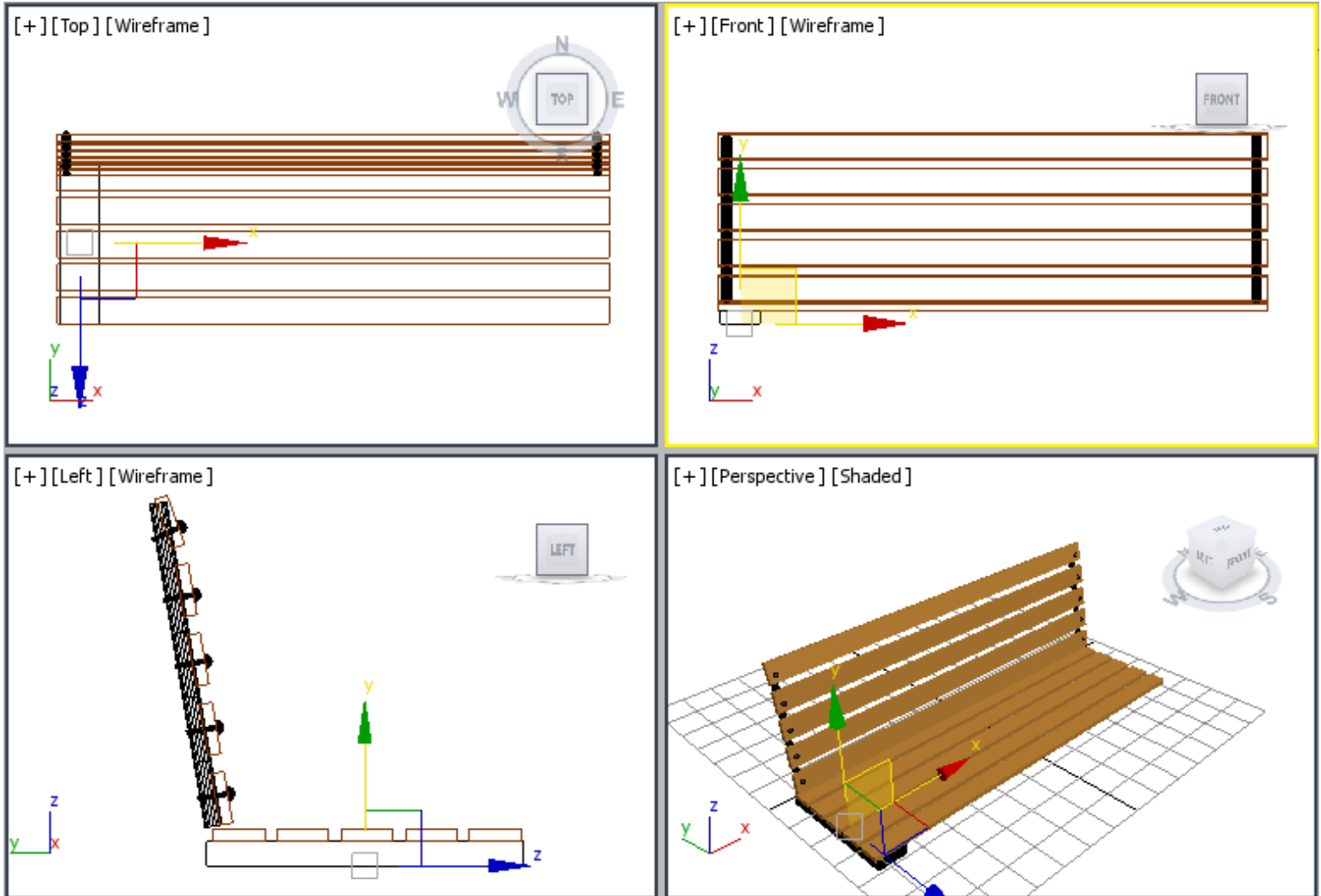
Next, you need to copy *leg support001* to create the leg support on the right side of *horizontal seat support*.

6. Activate the Top viewport by middle-clicking in it and create a copy of *leg support001* as described earlier. It is automatically named as *leg support002*.

7. Choose the **Select and Move** tool and align *leg support002* to *horizontal seat support* in all viewports, as shown in the image below.

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:
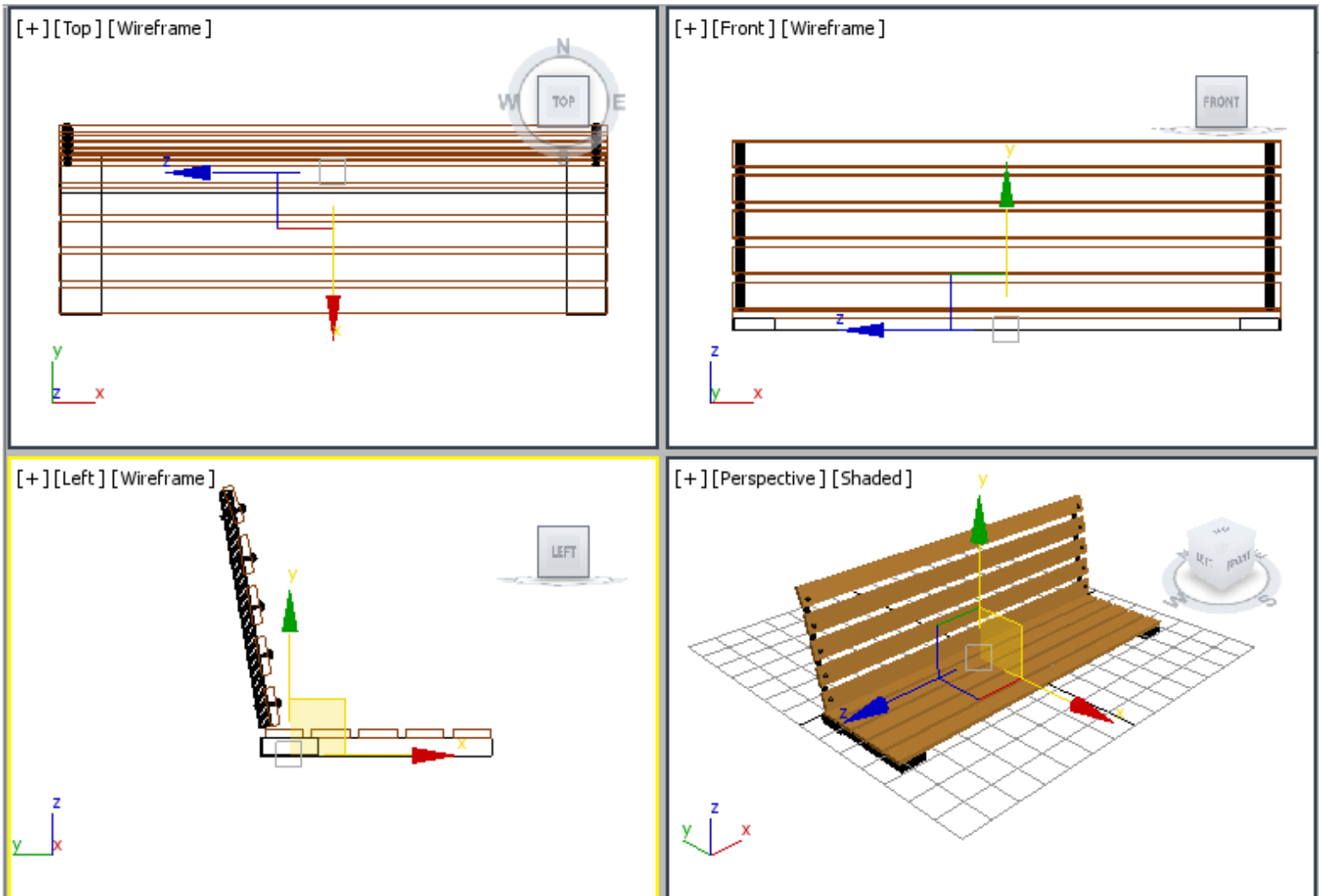
   Length: **9.0**   Width: **124**   Height: **2.8**

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 *leg support003* with *horizontal seat support* in all viewports, as shown in the image below.

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

11. Create a copy of *leg support003* in the Top viewport; it is automatically named as *leg support004*.

12. Choose the **Select and Move** tool and align *leg support004* with *horizontal seat support* in all viewports, refer to the image below.
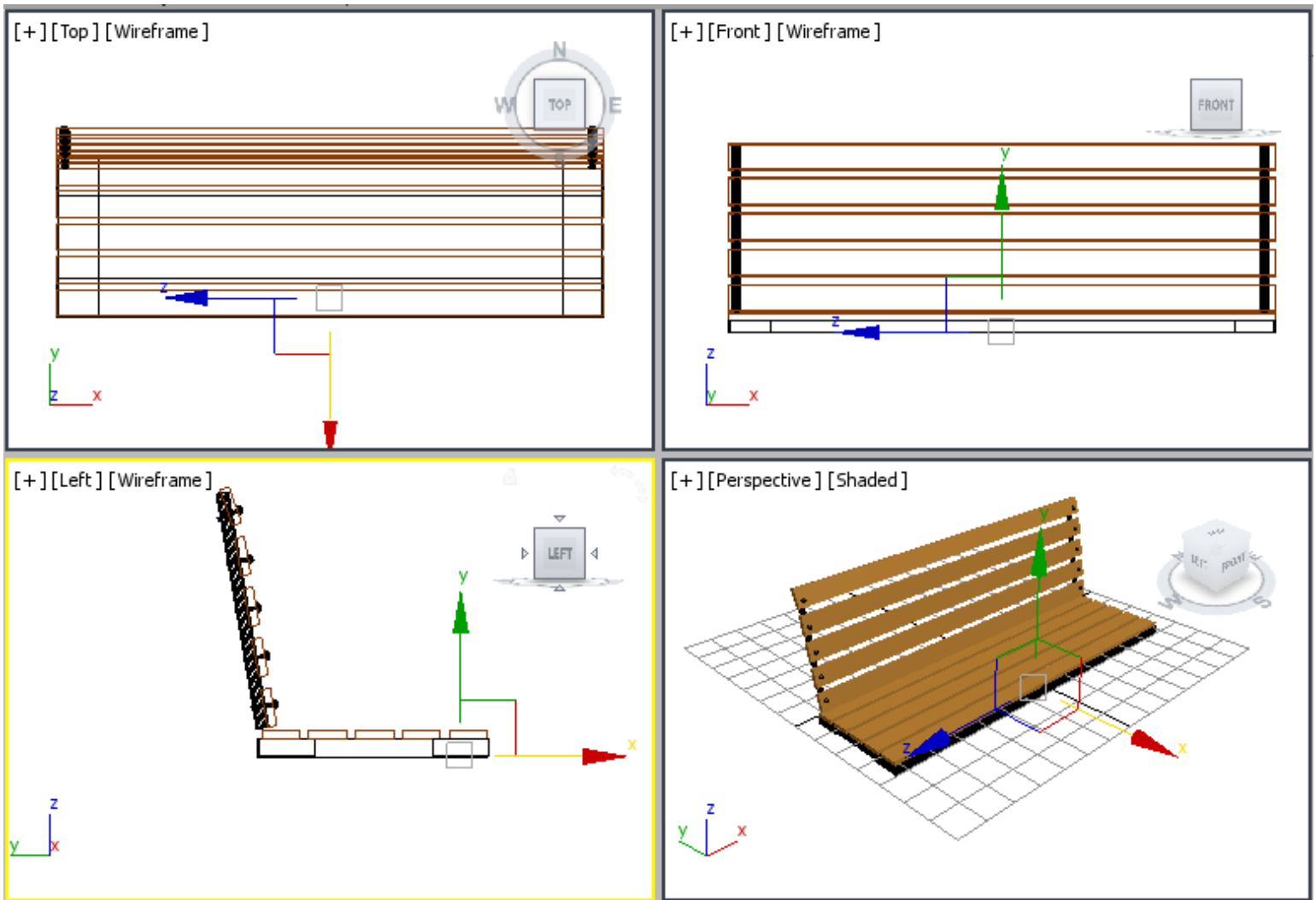
Creating Rivets for the Seat Support

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

1. Activate the Left viewport and select *back support*.

2. Choose **Group > Open** from the menu bar; *back support* is now ungrouped temporarily. Also, a pink colored bounding box is displayed around *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 *right side rivets* and choose the **OK** button, refer to the image below.
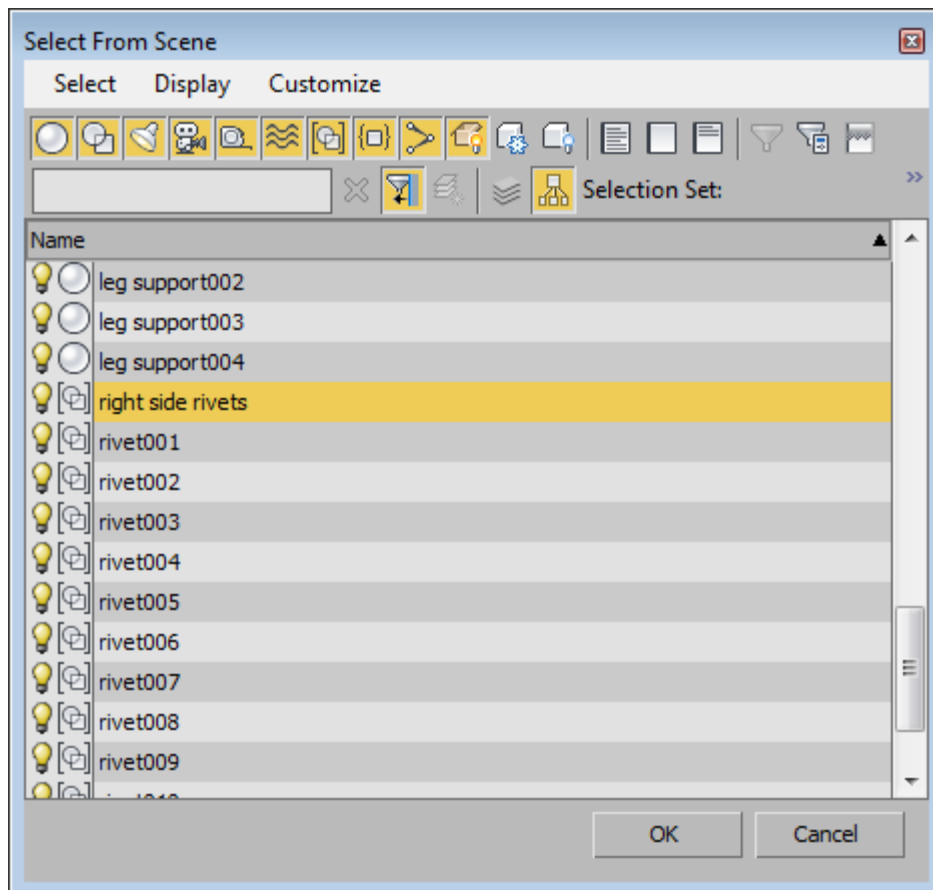
5. Make sure *right side rivets* group is still selected. Now, create a copy of *right side rivets* and name it as *right side seat rivets*, as shown in the image below.
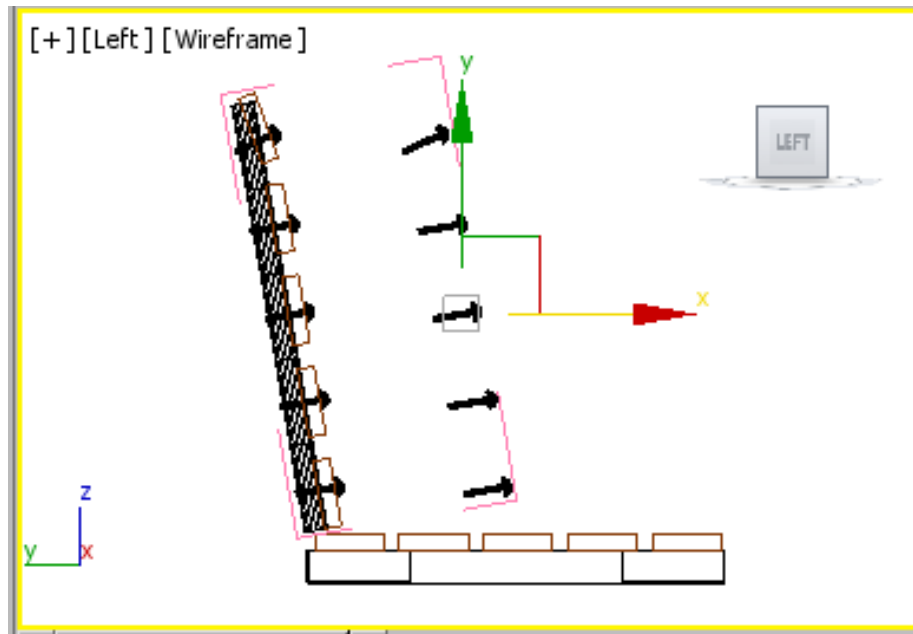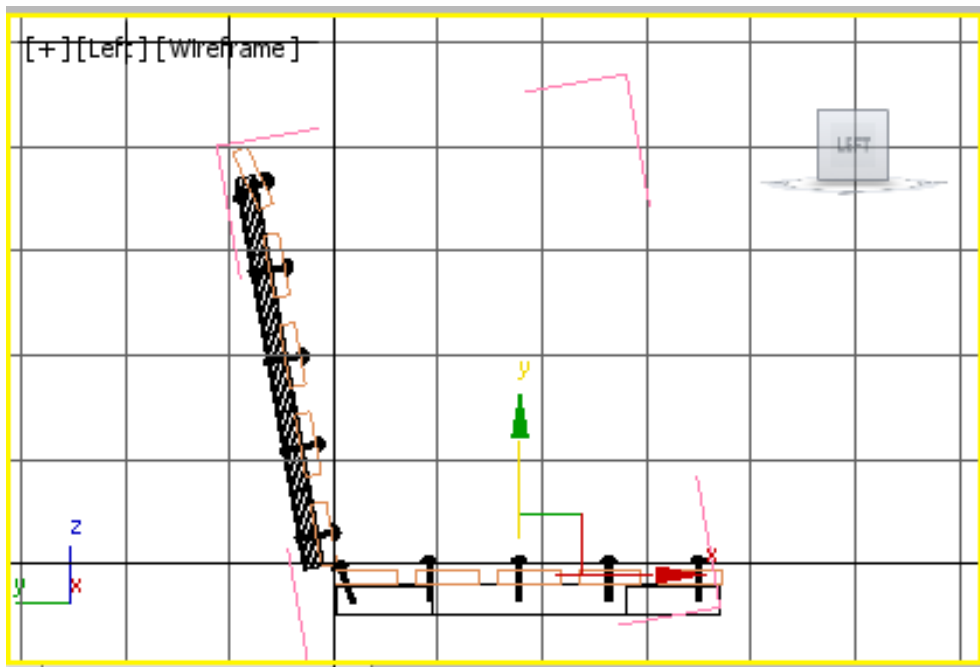

6. Make sure that *right side seat rivets* group is selected and choose **Group > Detach** from the menu bar; *right side seat rivets* group is detached from *back support* group.

7. Select the pink colored gizmo of *back support* group and choose **Group > Close** from the menu bar to group them again.

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

8. Choose the **Select and Rotate** tool and select *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 *right side seat rivets* until the angle of rotation in the **Z** spinner becomes **80**, refer to the image below.
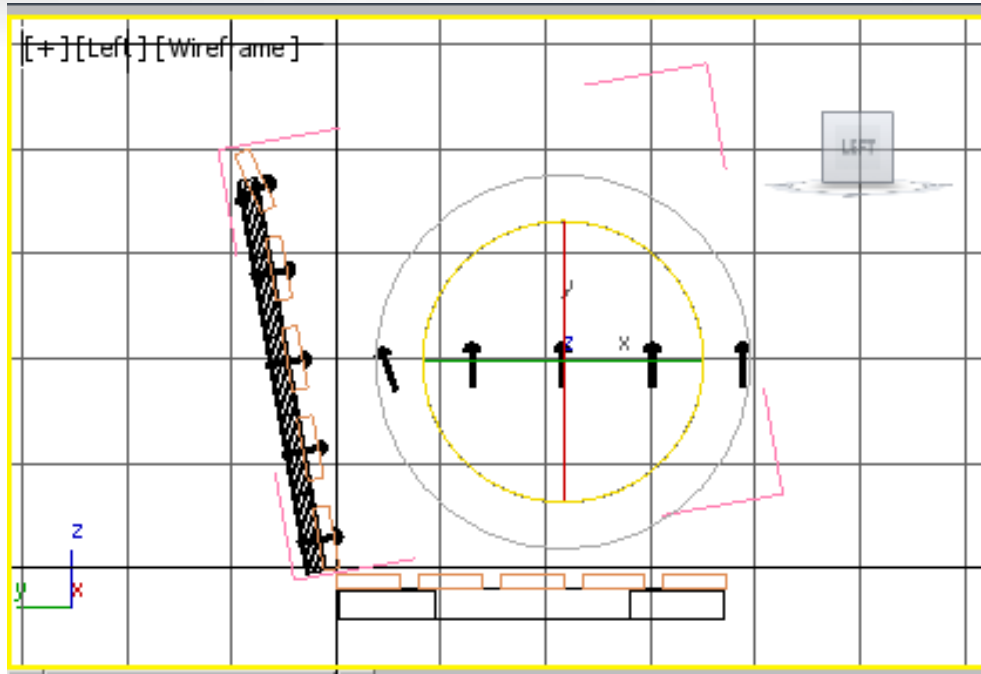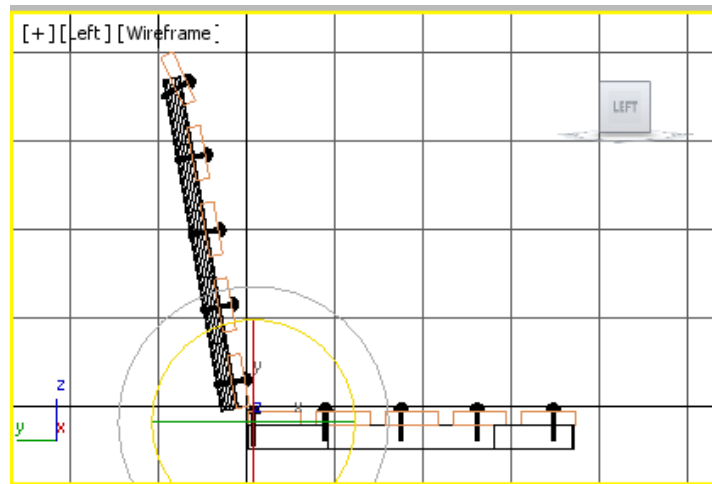
9. Choose the **Select and Move** tool. Now, move the cursor over the vertical axis and then drag the mouse downward to align *right side seat rivets* with *horizontal seat support*, as shown in the image below.

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

10. Make sure *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 *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 around **-15**, refer to the image below.


12. Choose the **Select and Move** tool and align all rivets of *right side seat rivets* group with *horizontal seat support*, as shown in the image below.
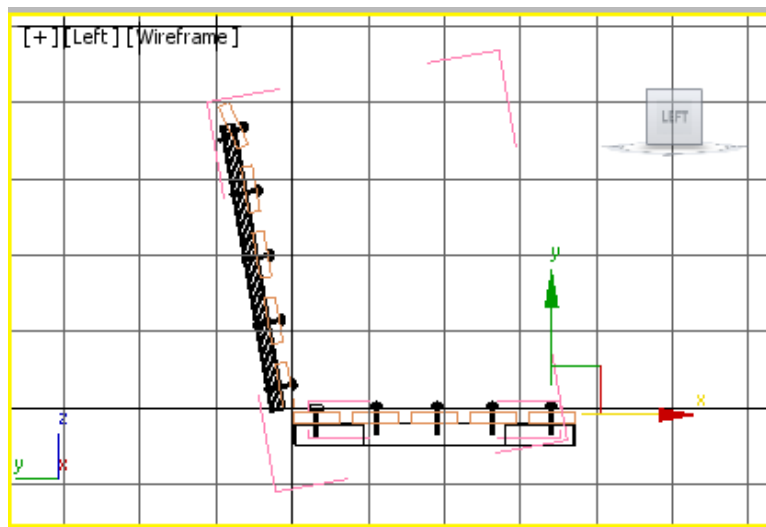
13. Make sure that one of the rivets of *right side seat rivets* group is selected and choose **Group > Close** from the menu bar to group them again.

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

14. Activate the Top viewport and create a copy of *right side seat rivets.* Name the new group as *left side seat rivets*.

15. Align *left side seat rivets* using the **Select and Move** tool in viewports, as shown in the image below.
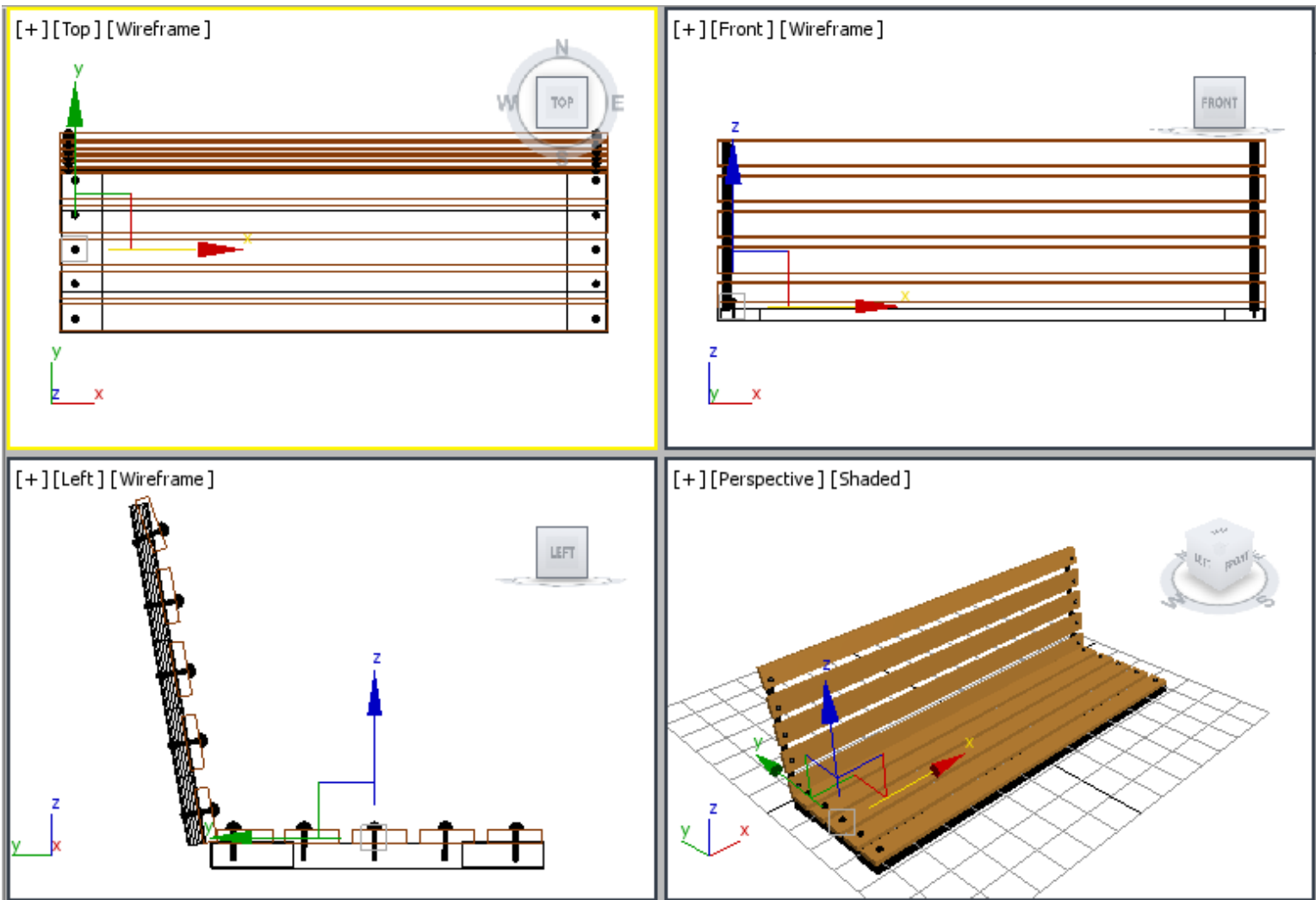
Creating Legs of the Park Bench

In this section, you will create 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: **4.0**   Width: **3.0**   Height: **26.88**

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.

5. Choose the **Select and Move** tool and align *leg001* with *leg support001* in viewports, refer to the image below. You need to adjust the viewport to display all objects properly using the **Zoom** and **Pan View** tools.
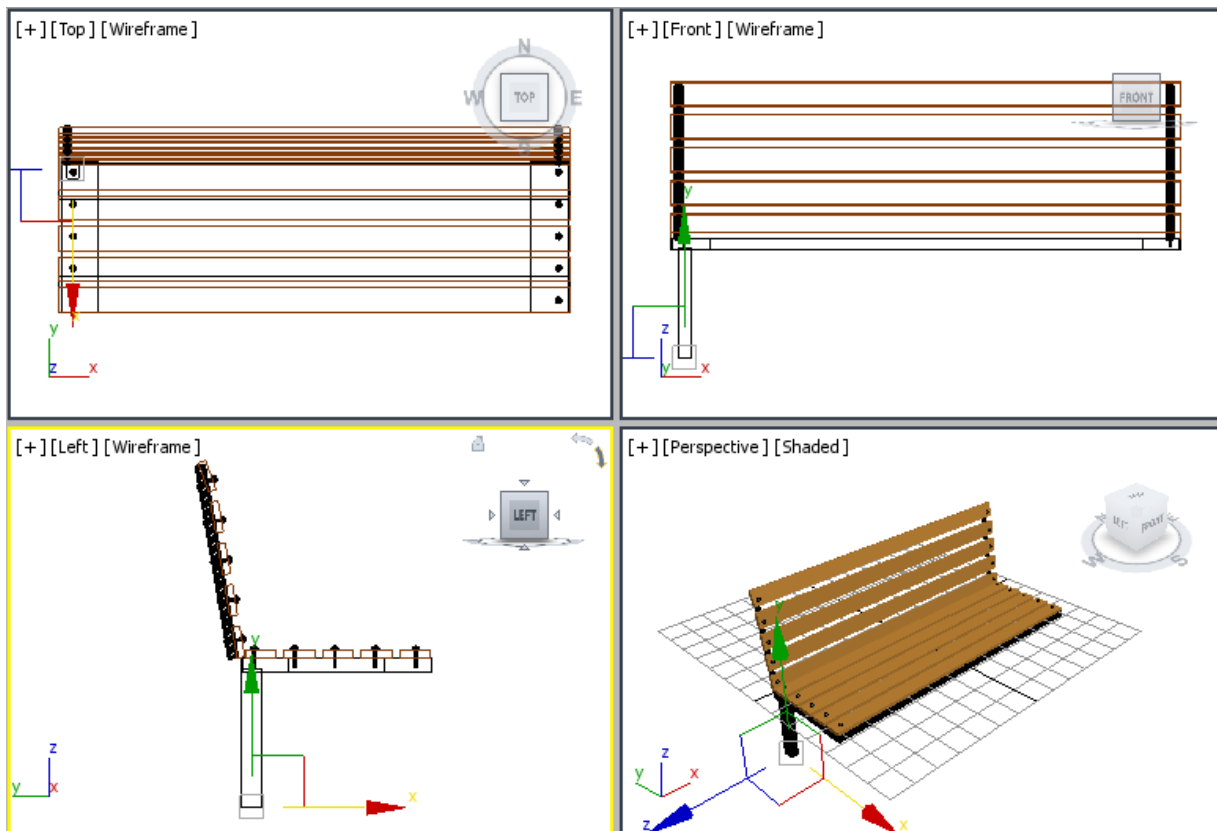
6. Create three copies of *leg001* to create three more legs. These are automatically named as *leg002*, *leg003*, and *leg004*.

7. Choose the **Select and Move** tool and align *leg002*, *leg003*, and *leg004* in all viewports, as shown in the image below.
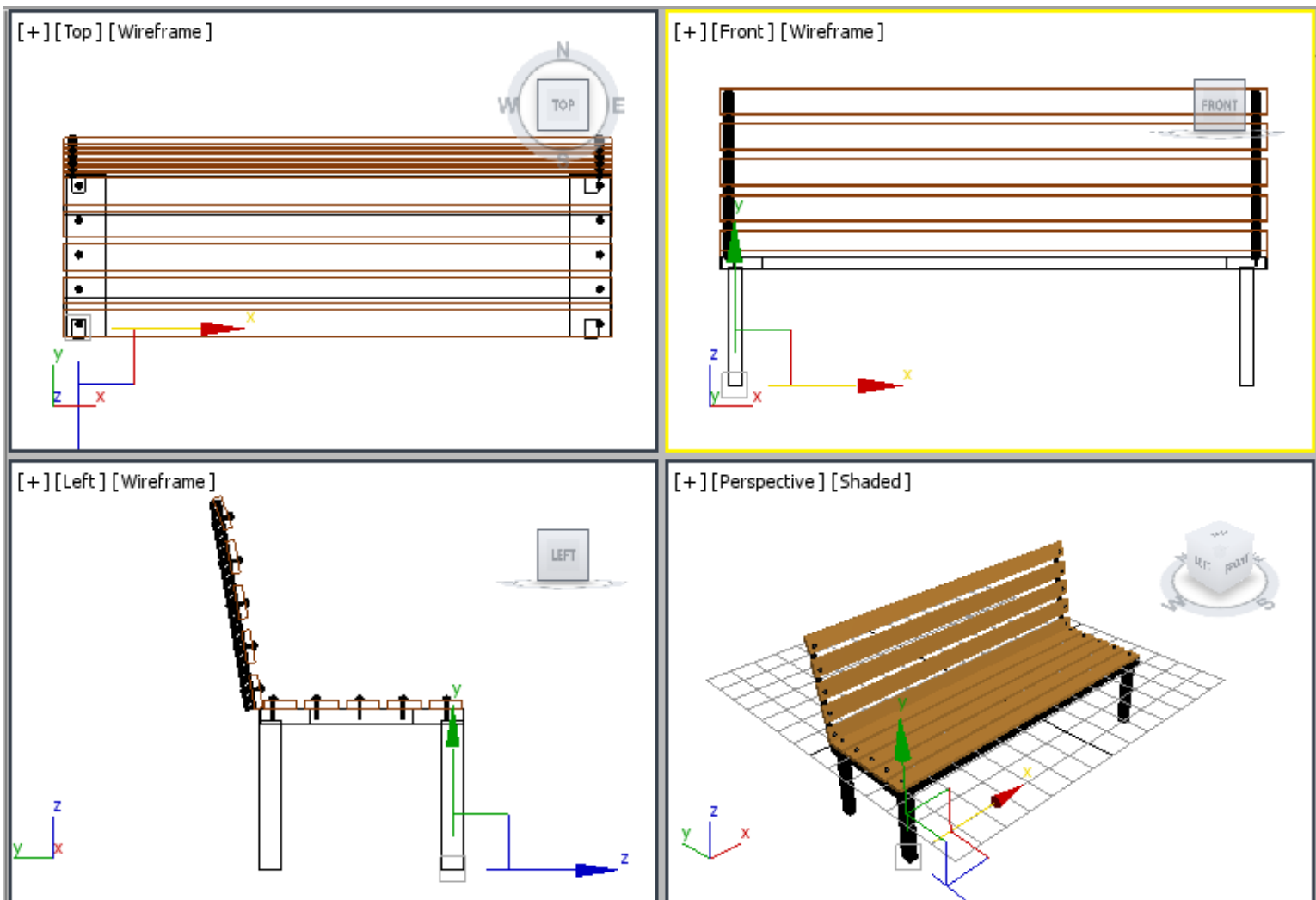
8. Choose the **Zoom Extents All** tool and modify the view in the Perspective viewport using the **Orbit** tool.

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_2017_rndr.zip* file from *www.cadcim.com.* The path of the file is as follows: *Textbooks > Animation and Visual Effects > 3ds Max > Autodesk 3ds Max 2017: A Comprehensive Guide*

1. Change the background color of the scene to white as discussed in Tutorial 1.

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

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 the image below.