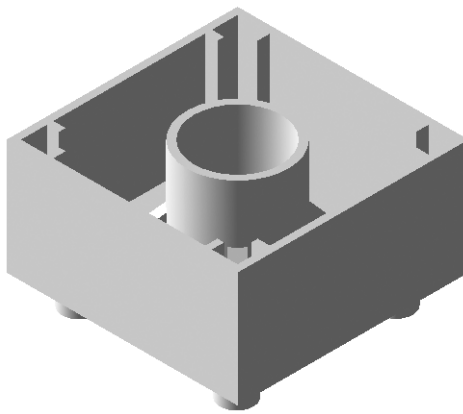


Creating Protrusions and Ribs

This tutorial covers the basics of creating protrusions and ribs by creating a 3D toy block.



Getting Started

This tutorial uses an existing base file.

1. Select **File > Open**.

The Open dialog box opens.

2. Navigate to [VectorWorks 10.5]\VWHelp\Tutorial Files\ToyBlock.mcd, and then click **Open**.

This file is in 2D layout and contains the following:

- one square
- four circles
- three rectangles

10

In this Chapter:

- Getting Started
- Setting Up the Modeling Units
- Organizing Objects
- Creating Guide Lines
- Creating the Base Protrusion
- Creating More Protrusions
- Creating the 3D Wireframe
- Mirroring the Protrusion
- Creating Ribs
- Mirroring the Ribs
- Adding the Solids
- Creating Slanted Ribs
- Mirroring the Slanted Ribs

Organizing Objects

1. Select **Edit > Select All** to select all objects in the drawing.
2. Select **Model > Convert to NURBS**, and then select **Organize > Ungroup**.
3. Click in an unused area of the drawing with the **2D Selection** tool to deselect all objects in the drawing.
4. Holding down the Shift key, select the red circle and the black rectangle, and then group them together by selecting **Organize > Group**.
5. Click on the large pink circle. Holding down the Shift key, select the small pink circle, and then group the two circles together by selecting **Organize > Group**.

Creating Guide Lines

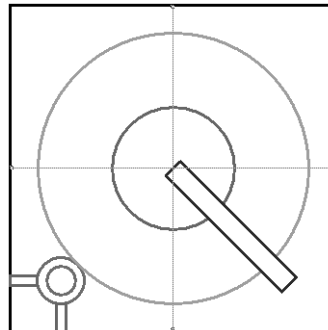


Line Tool



2D Selection Tool

1. Click the **Line** tool from the 2D Tools palette.
2. Draw a horizontal line from the top center to the bottom center of the black rectangle.
3. Draw a vertical line from the left center to right center of the black rectangle.
4. Click the **2D Selection** tool from the 2D Tools palette.
5. With the vertical line still selected, hold the Shift key and select the horizontal line.
6. Select **Edit > Guides > Make Guide**.



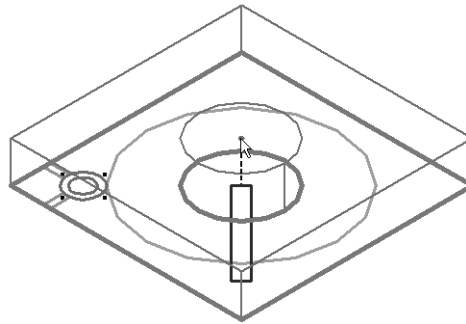
Creating Protrusions and Ribs

7. Select **Edit > Guides > Hide Guides** to temporarily hide the guide lines.

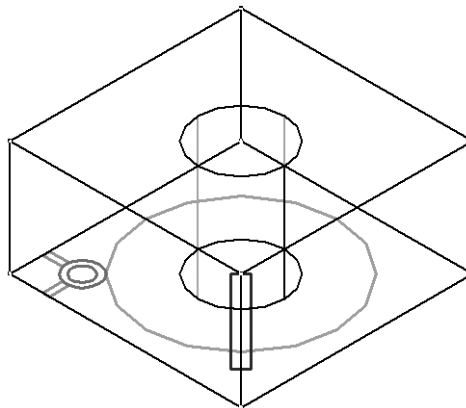
Creating the Base Protrusion



1. Select **View > Standard Views > Right Isometric**.
2. Click the **Protrusion/Cutout** tool from the 3D Tools palette, and then select **Extrude Face** and **Add** from the Mode bar.
3. Click on the black rectangle, and then drag the green handle up.



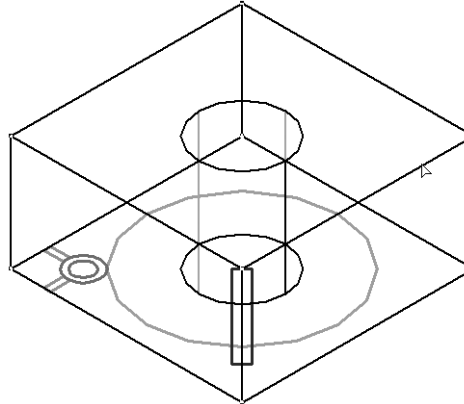
4. Click the Tab key to highlight the **Distance** field in the Data bar and enter 2". Press Enter (Windows) or Return (Macintosh) to set the distance.
5. Press Enter (Windows) or Return (Macintosh) or click the check mark button on the Mode bar to create the protrusion.





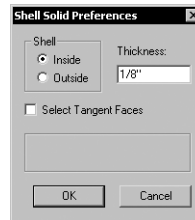
Shell Solid
Tool

- Click the **Shell Solid** tool from the 3D Tools palette, and then click on the top surface of the tapered extrude.



The Shell Solid Preferences dialog box opens.

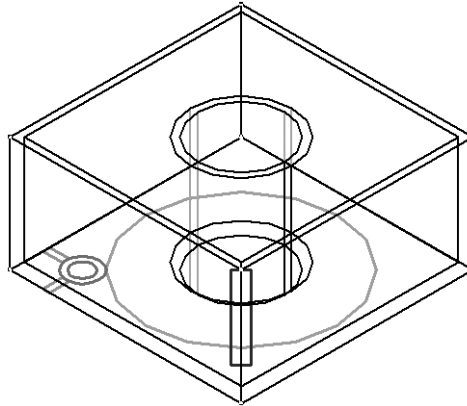
- Enter 1/8" as the **Thickness**, and then click **OK**.



The top of the box is highlighted in red. If not, select the correct face using the Select Face dialog box.

- Press Enter (Windows) or Return (Macintosh) or click the check mark button on the Mode bar to create the shell.

Creating Protrusions and Ribs

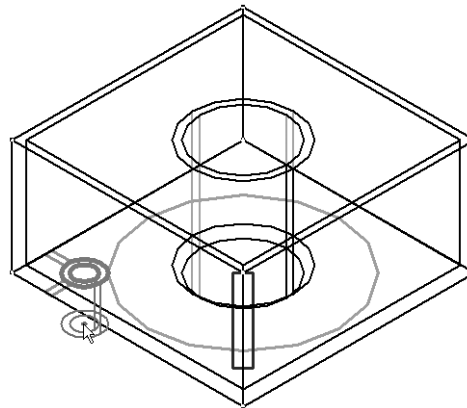


Creating More Protrusions

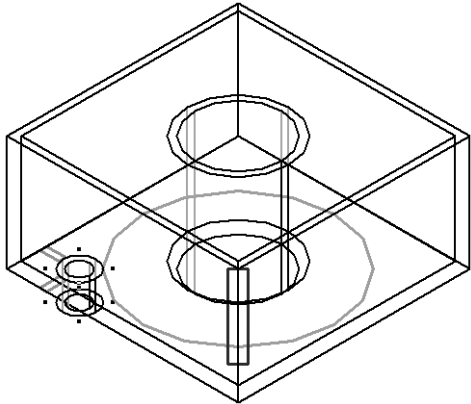


Protrusion/
Cutout Tool

1. Click the **Protrusion/Cutout** tool from the 3D Tools palette, and then select **Extrude Face** and **Add** from the Mode bar.
2. Click on one of the pink circles, and then drag the green handle down.



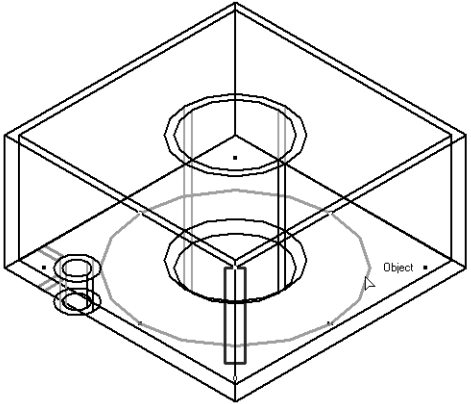
3. Click the Tab key to highlight the **Distance** field in the Data bar and enter 1/2". Press Enter (Windows) or Return (Macintosh) to set the distance.
4. Press Enter (Windows) or Return (Macintosh) or click the check mark button on the Mode bar to create the protrusion.



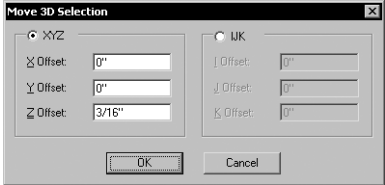
Creating the 3D Wireframe



1. Click the **2D Selection** tool from the 2D Tools palette, and then select the yellow circle.

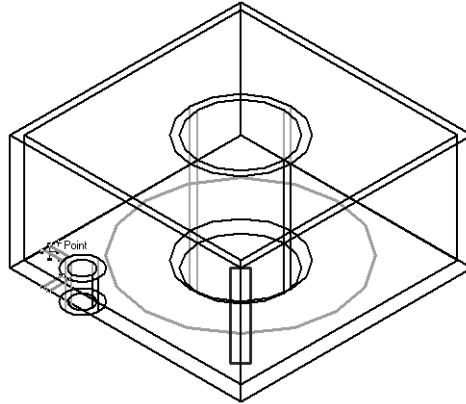


2. Select **Tool > Move > Move 3D**.
The Move 3D Selection dialog box opens.
3. Set the **Z Offset** value to 3/16", and then click **OK**.

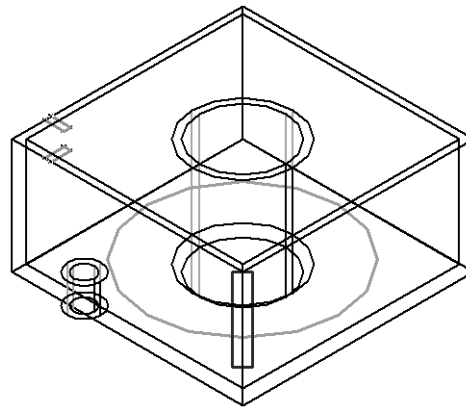


Creating Protrusions and Ribs

4. Click on an unused area of the drawing to deselect all objects.
5. Holding the Shift key, select the two green rectangles.



6. Select **Tool > Move > Move 3D**.
The Move 3D Selection dialog box opens.
7. Set the **Z Offset** value to 2", and then click **OK**.

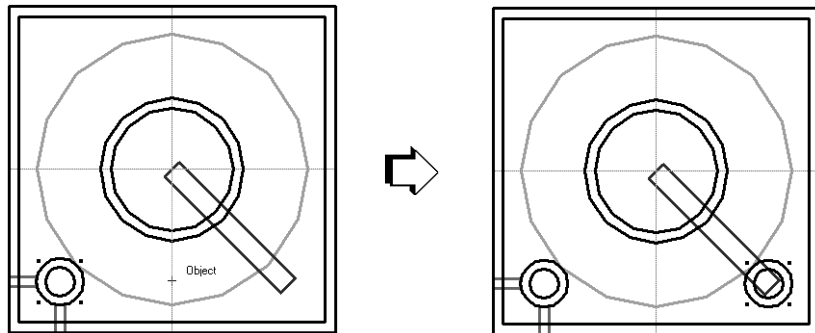


Mirroring the Protrusion

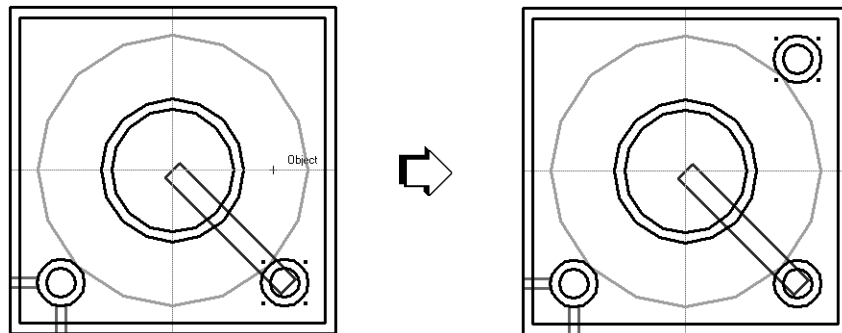
1. Select **View > Standard Views > Top/Plan**.
2. Select **Edit > Guides > Show Guides**.
3. Click on the extruded double circles on the bottom left.



4. Click the **2D Mirror** tool from the 2D Tools palette, and then select **Duplicate and Mirror** from the Mode bar.
5. Click on the intersection of the guide lines and draw a vertical axis line downwards. Click to duplicate and mirror the tapered extrude.

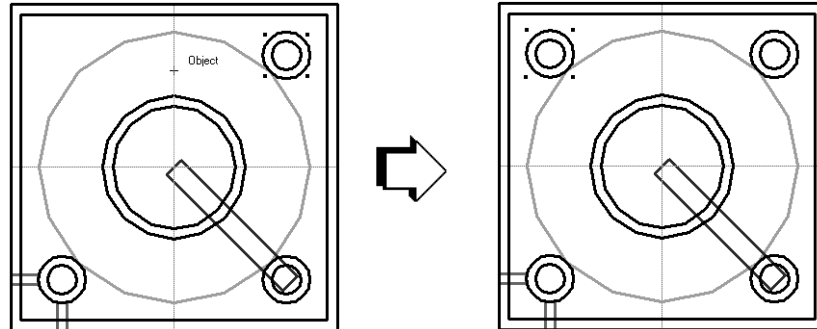


6. With the new tapered extrude selected, click on the intersection of the guide lines with the **2D Mirror** tool and draw a horizontal axis line to the right. Click to duplicate and mirror the tapered extrude.



7. With the new tapered extrude selected, click on the intersection of the guide lines with the **2D Mirror** tool and draw a vertical axis line upwards. Click to duplicate and mirror the tapered extrude.

Creating Protrusions and Ribs




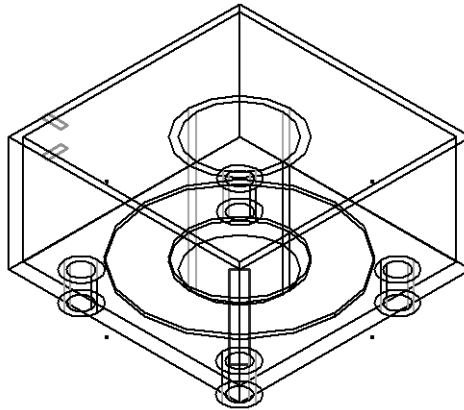
8. Select **Edit > Guides > Hide Guides**.


Creating Ribs



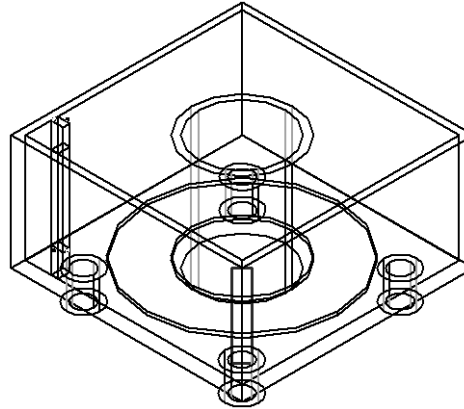
Project Tool

1. Select **View > Standard Views > Right Isometric**.
2. Click the **Project** tool from the 3D Tools palette, and then select **Project and Add** and **Project and Add Downward**  from the Mode bar. This is the projection direction that points toward the base of the protrusion for the yellow circle.
3. Click on the yellow circle, and then click on the shelled block.



4. With the **Project** tool still selected, select **Project and Add Upward**  from the Mode bar. This is the projection direction that points toward the base of the protrusion for the green rectangles.

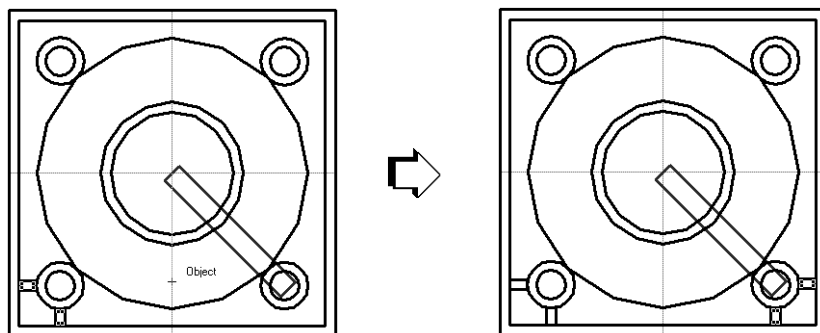
- Click on the front most green rectangle and then the shelled block. Click on the second green rectangle and then the shelled block.



Mirroring the Ribs

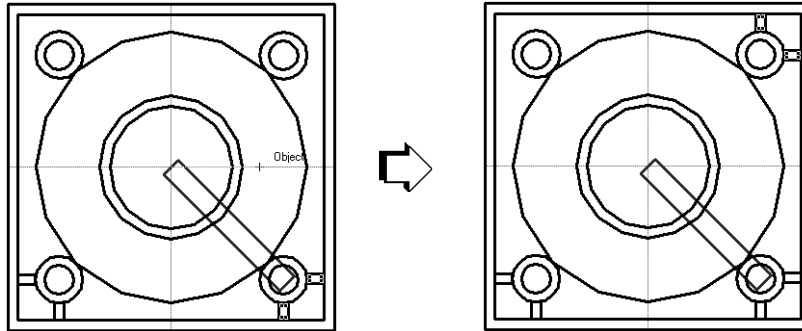


- Select **View > Standard Views > Top/Plan**.
- Select **Edit > Guides > Show Guides**.
- Holding the Shift key, select the two small rectangular ribs (that were just created) using the **2D Selection** tool.
- Click the **2D Mirror** tool from the 2D Tools palette, and then select **Duplicate and Mirror** from the Mode bar.
- Click on the intersection of the guide lines and draw a vertical axis line downward. Click to duplicate and mirror the two ribs.

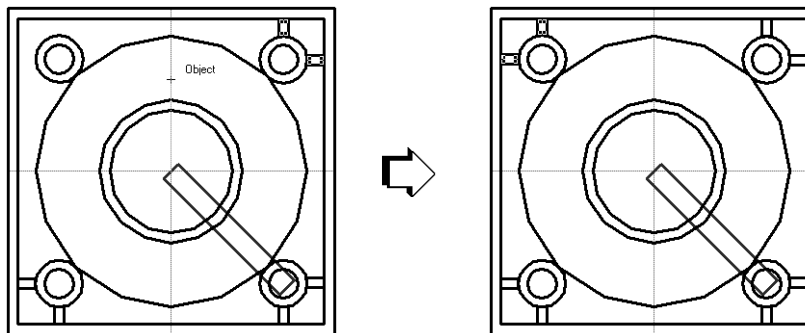


Creating Protrusions and Ribs

6. With the new ribs selected, click on the intersection of the guide lines with the **2D Mirror** tool and draw a horizontal axis line to the right. Click to duplicate and mirror the ribs.

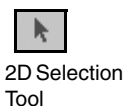


7. With the new ribs selected, click on the intersection of the guide lines with the **2D Mirror** tool and draw a vertical axis line upward. Click to duplicate and mirror the ribs.



8. Select **Edit > Guides > Hide Guides**.

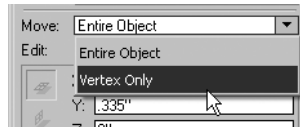
Adding the Solids



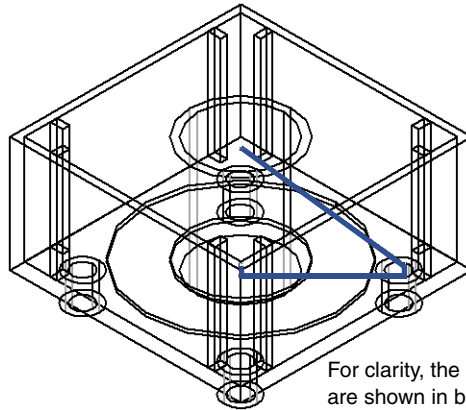
1. Select **View > Standard Views > Right Isometric**.
2. Click the **2D Selection** tool from the 2D Tools palette, and then click on the large circular rib at the center bottom of the block.
3. Select **Organize > Ungroup**, and then select **Model > Add Solids**.
4. Holding the Shift key, select the shelled block, and then select **Model > Add Solids**.

Creating Slanted Ribs

1. Select **View > Standard Views > Left Isometric**.
2. Select the blue rectangular NURBS curve, and then select **Vertex Only** from the Move list in the Object Info palette.

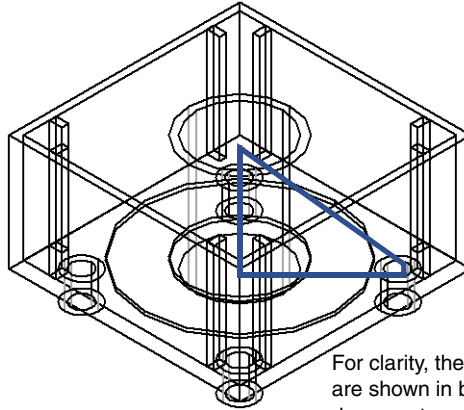


3. Click the left Edit arrow to highlight the first vertex on the left side of the NURBS curve and change the **Z** value to 1.75". Press Enter (on Windows) or Return (on Macintosh) to set the height.



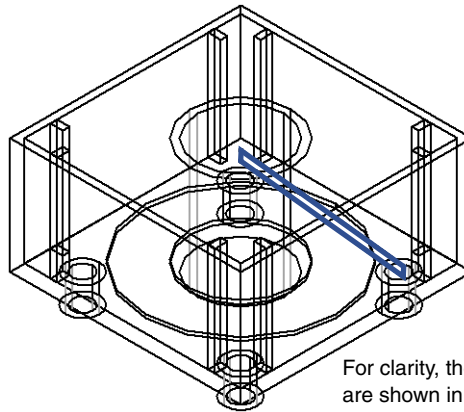
For clarity, the edited results are shown in blue in this document

4. Click the right Edit arrow to highlight the second vertex on the left side of the NURBS curve and change the **Z** value to 1.75". Press Enter (on Windows) or Return (on Macintosh) to set the height.




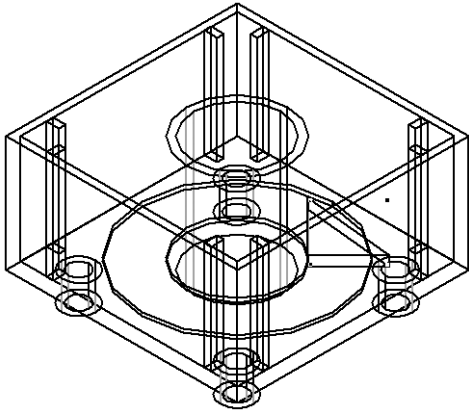
For clarity, the edited results are shown in blue in this document

5. Click the right Edit arrow to highlight the third vertex on the left side of the NURBS curve and change the **Z** value to 1.75". Press Enter (on Windows) or Return (on Macintosh) to set the height.



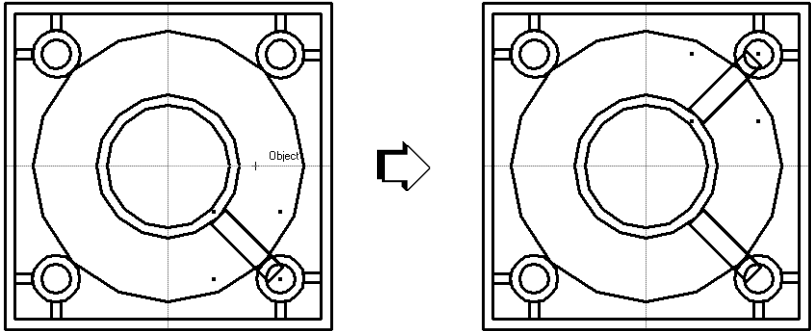
For clarity, the edited results are shown in blue in this document

6. Click the **Project** tool from the 3D Tools palette, and then select **Project and Add** and **Project and Add Downwards**  from the Mode bar. This is the projection direction that points toward the base of the protrusion for the blue NURBS curve.
7. Click on the slanted blue NURBS curve, and then click on the shelled block.



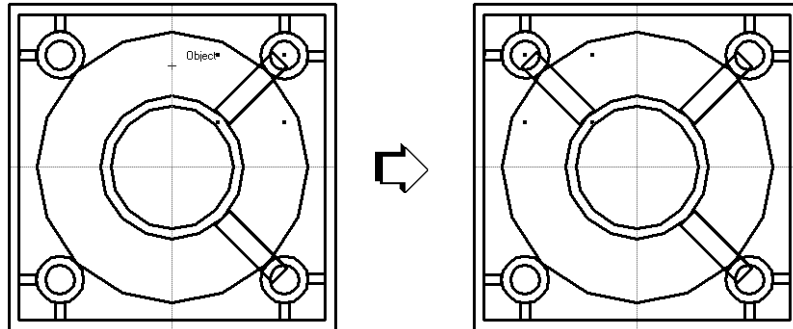
Mirroring the Slanted Ribs

1. Select **View > Standard Views > Top/Plan**.
2. Select **Edit > Guides > Show Guides**.
3. With the new rib still selected, click the **2D Mirror** tool from the 2D tools palette, and then select **Duplicate and Mirror** from the Mode bar.
4. Click on the intersection of the guide lines and draw a horizontal axis line to the right. Click to duplicate and mirror the rib.

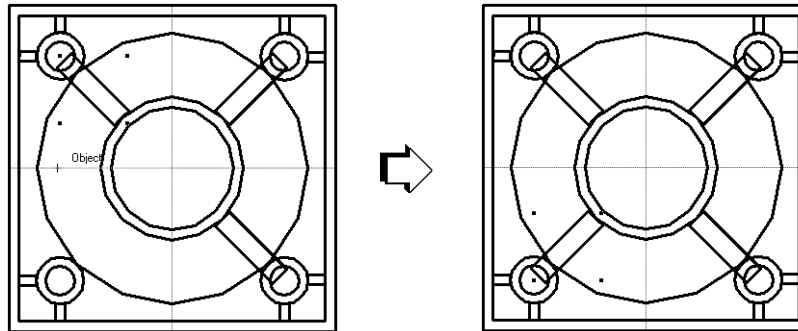


5. With the new rib selected, click on the intersection of the guide lines with the **2D Mirror** tool and draw a vertical axis line upward. Click to duplicate and mirror the rib.

Creating Protrusions and Ribs

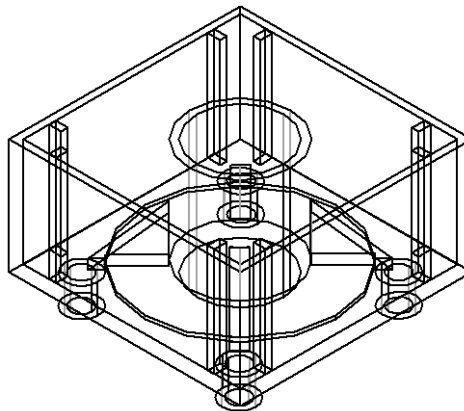


6. With the new rib selected, click on the intersection of the guide lines with the **2D Mirror** tool and draw a horizontal axis line to the left. Click to duplicate and mirror the rib.



7. Select **Edit > Guides > Hide Guides**.

The toy block is complete.





Light Tool

8. To render the model, click the **Light** tool from the 3D Tools palette to insert a light source, and then select **View > Rendering > OpenGL**.

