

Introduction to AutoCAD 2010

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Chapter 14

Notes about renderings

1. Two exercises in this chapter require a knowledge of adding materials and lighting before rendering the models. To see examples of the addition of materials and lights, see Chapter 15.
2. Many of the renderings given in this and later chapters in these web pages will be seen as being different to those given in the book. This is to allow the reader to see different methods of rendering.

Chapter 14 Exercise 1

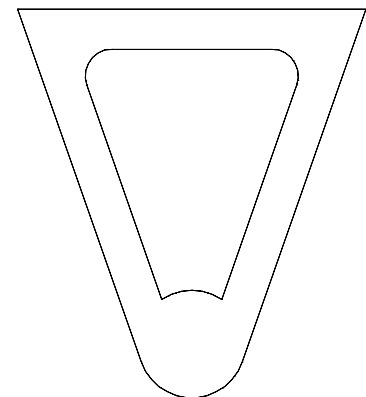
1. Open **AutoCAD 2010** with a *double-click* on its shortcut icon in the Windows desktop.
2. Open the template **acadiso3D.dwt**.

3. Place the AutoCAD window in the **ViewCube/Front** view .

4. **Zoom** to **1**.

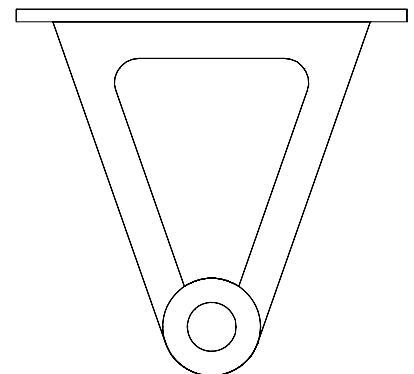
5. Set **ISOLINES** to **8**.

6. With the **Polyline** tool construct a front view of the web of the bracket, extrude both parts to a height of **5** and subtract the inner part from the outer.



7. Construct cylinders for the bottom of the bracket - the first of radius **20**, the second of radius **10** and both of a height of **15**.

8. Construct a box for the upper flange of length **130**, width **5** and height **25**.



9. Place the drawing in the **ViewCube/Top** view and **Zoom** to **1**.

10. Move the cylinders and box into their central position relative to the web.

11. Construct two cylinders of radius **3** and height **5** for the holes in the top of the bracket.

12. Return to the **Front** view and move the two cylinders for the holes into their correct positions.

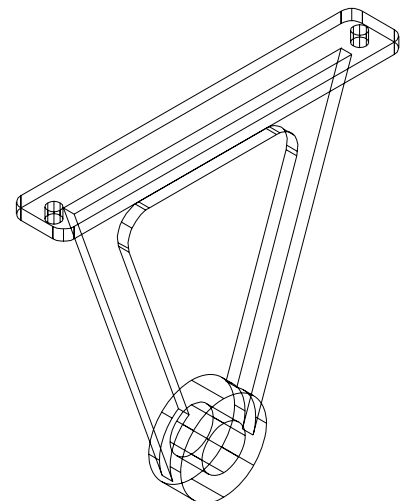
13. Place the drawing in the **ViewCube/Isometric** view and **Zoom** to **1**.

14. Form a union of the box, the larger cylinder and the web.

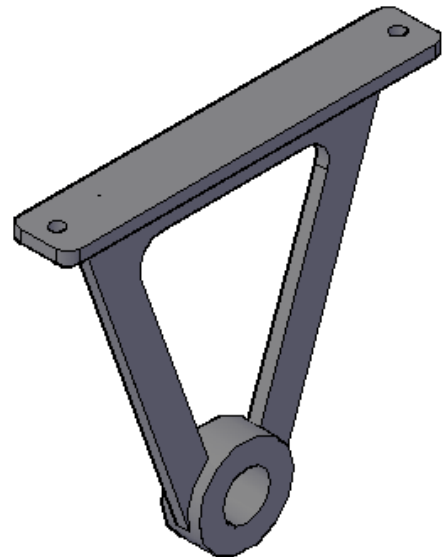
15. Subtract the two hole cylinders from the box.

16. Subtract the smaller cylinder from the union.

17. Fillet the corners of the box to a radius of **5**.

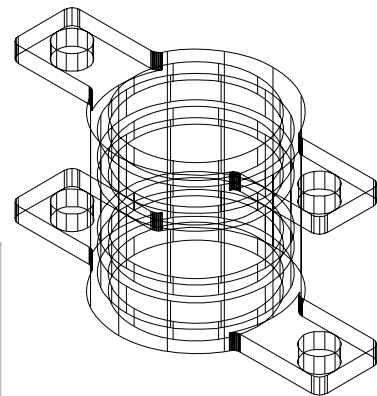
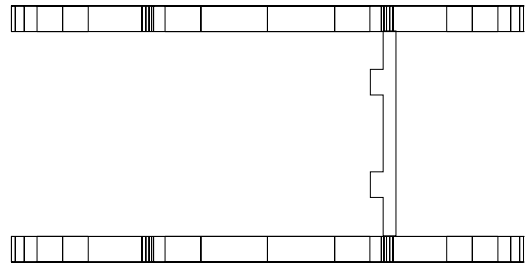


18. Shade the model in the **Conceptual** visual style.
19. Save the model drawing with a file name **14_Exercise01.dwg** to a floppy disk.
20. Close the drawing window.



Chapter 14 Exercise 2

1. Open **acadiso3d.dwt** - *left-click* **New...** in the **Quick Access** toolbar.
2. Construct a closed polyline of the link. Extrude all parts to a height of **10** and subtract the holes from the outline.
3. Place in the **ViewCube/Front** view, **Zoom** to **1** and copy the extrusion to form the upper part of the link.
4. Construct a polyline outline for the lid of revolution for the vertical part of the link.
5. Set **ISOLINES** to **12** and revolve the polyline.
6. Place the drawing in the **ViewCube/Top** view, **Zoom** to **1** and move the solid of revolution into its correct position relative to the two flanges.
7. Place the drawing in the **ViewCube/Isometric** view, **Zoom** to **1** and form a union of the three parts.
8. Set the model in **Home/View 3D Hidden** style to check the model.
9. Place the window in the **ViewCube/Top** view and **Zoom** to **1**.
10. Call the **Slice** tool from the **Home/Modify** panel. The command line shows:



Command: `_slice`

Select objects to slice: *pick* the 3D model **1** found

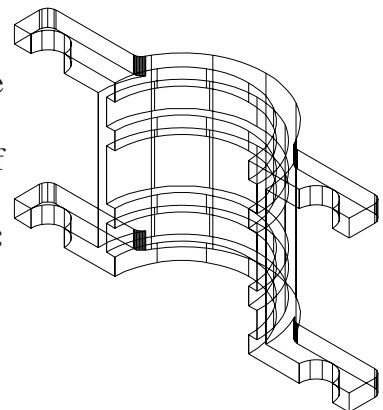
Select objects to slice: *right-click*
Specify start point of slicing plane
or [planar Object/Surface/Zaxis/

View/XY/YZ/ZX/3points] **<3points>**: *pick* a point to the left centre of the model

Specify second point on plane: *pick* a point to the right centre of the model

Specify a point on desired side or [keep Both sides] **<Both>**:
pick a point above the model

Command:



11. Place the model in the **ViewCube/Isometric** view and **Zoom** to **1**.

12. Set the model in **Home/View 3D Hidden** style.
13. Place the model in the **ViewCube/Top** view and **Zoom** to 1.
14. At the command line:

Command: *enter* lightingunits *right-click*

Enter new value for LIGHTINGUNITS <2>: *enter* 0 *right-click*

15. Select **Point** from the **Render/Lights** panel. The command line shows:

Command: *_pointlight*

Specify source location <0,0,0>: *enter* .xy *right-click* of *pick* centre of model (need Z): *enter* 400 *right-click*

Enter an option to change [Name/Intensity factor/Status/Photometry/shadow/Attenuation/filterColor/eXit] <eXit>: *enter* n *right-click*

Enter light name <Pointlight1>: *right-click*

Enter an option to change [Name/Intensity factor/Status/Photometry/shadow/Attenuation/filterColor/eXit] <eXit>: *right-click*

Command:

16. Select **Distant Light** from the panel. The command line shows:

Command: *_distantlight*

Specify light direction FROM <0,0,0> or [Vector]: *enter* .xy *right-click* of *enter* 330,-20 *right-click* (need Z) *enter* 400 *right-click*

Specify light direction TO <1,1,1>: *enter* .xy *right-click* of *pick* a central point of the model (need Z) *enter* 50 *right-click*

:Enter an option to change [Name/Intensity/factorStatus/Photometryshadow/filter Color/eXit] <eXit>: *right-click*

Command:

17. Create a distant light in front of the model at a height of 450, pointing to 50 above the centre of the model.

Note

Three lights have now been placed to illuminate the model - a **Point** light 400 above the model, a **Distant** light above and to the right front of the model, and another **Distant** light above and to the front left of the model.

18. Place the model in the **ViewCube/Isometric** view.

19. Click the **Render Region** icon in the **Render/Render** panel and window the model.

20. The model renders. If not satisfied with the rendering, adjust the **Intensity** etc. in the **Light** control panel.

21. Add a material to the model and render again. To add a material:

(a) Click the **Tool Palettes** button in the **View/Palettes** panel and select **Metals - Materials Sample**.

(b) At the command line *enter* materials. The **Available Materials in Drawing** palette appears. In the **Material Editor - Global** area of the palette adjust the **Color** and **Shininess** slider until satisfied that the material icon at the top of the palette shows a satisfactory result.

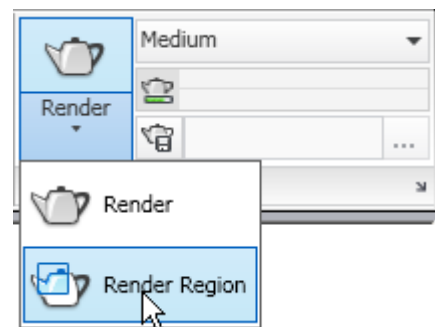
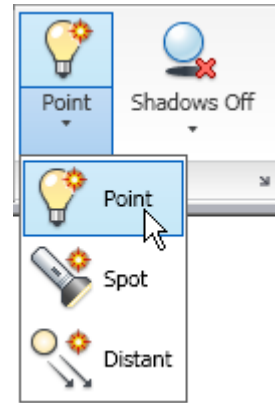
(b) Drag the icon of material from the **Metals - Materials Sample** palette on to the model.

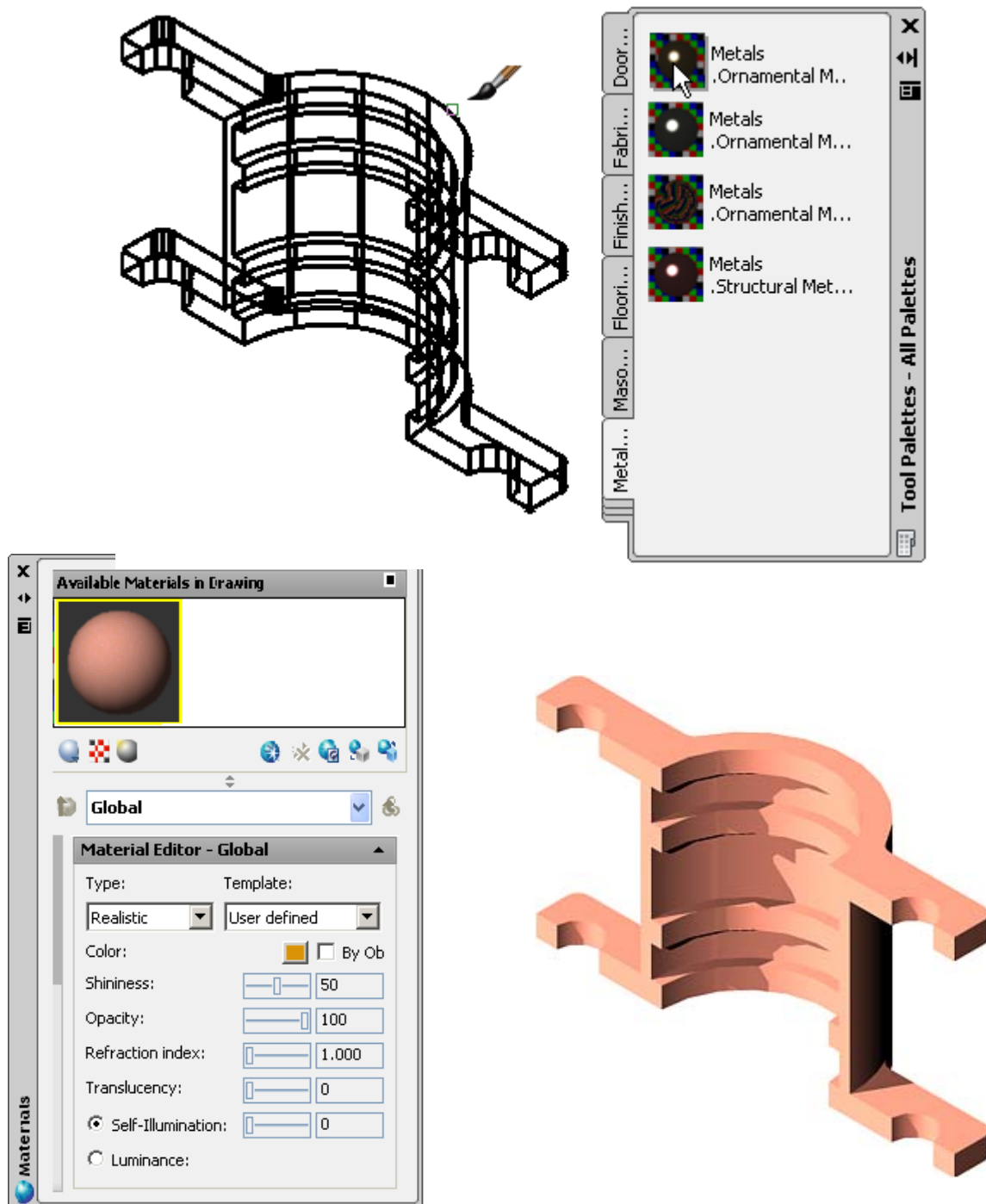
22. Click the **Render Region** icon in the **Render/Render** panel and window the model. The model renders.

24. If not satisfied with the rendering, lights can be adjusted in the **Lights in Model** palette or the settings for the material in the **Available Materials in Drawing** palette can be adjusted.

25. Save the drawing to a file name **14_Exercise02.dwg** in a floppy disk.

26. Close the drawing window.

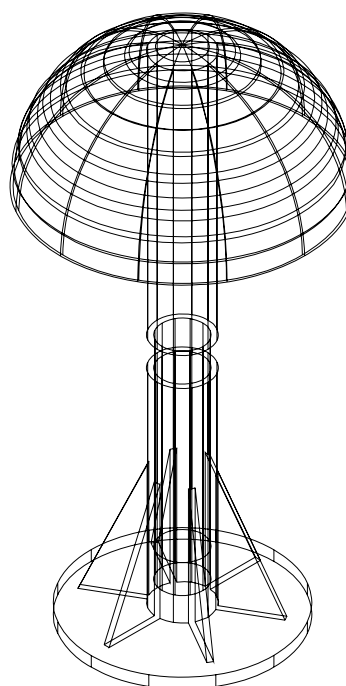
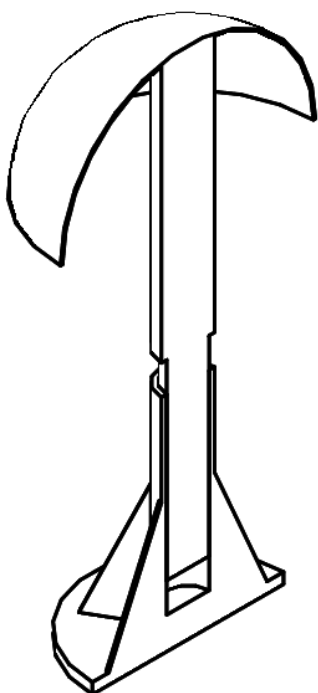




Chapter 14 Exercise 3

1. Open **acadiso3d.dwt** - left-click **New...** in the **Quick Access** toolbar.
2. Set **ISOLINES** to **12**.
3. Construct three cylinders for the stand - upright of radius **25** and height **245**, hole in upright of radius **20** and height **180**, base of radius **90** and height **10**.
4. Place the drawing window in the **ViewCube/Front** view and **Zoom** to **1**. Move the hole and base into their correct relative vertical positions.
5. Form a union from the upright and the base and subtract the hole from the union.
6. Construct one of the supporting triangular shaped pieces from an extruded polyline.
7. Place the drawing in the **ViewCube/Top** view. Move the extrusion into its correct place relative to the union and with the **Array** tool polar array the extrusion six times around the centre of the model.

8. Form a union of the arrayed parts with the body of the model.
9. Check by placing the window in the **ViewCube/Isometric** view.
10. Place the drawing in the **ViewCube/Front** view and construct a closed polyline for the solid of revolution of the other part of the exercise. **Zoom** to 1.
11. Using the **Revolve** tool from the **Home/3D Modeling** panel, form the solid of revolution through **360°**.
12. Move the solid of revolution into its holder.
13. Place in the **ViewCube/Isometric** view to check the two models.
14. Place the window in the **ViewCube/Top** view, **Zoom** to 1 and call the **Slice** tool from the **Home/Solid Editing** panel.
15. **Slice** each part of the model. Place the result in the **ViewCube/Isometric** view.
16. Add appropriate lights - a **Point light** above the model, a **Distant light** above and to the front and a second **Distant light** above and to the front left.
17. Add suitable materials to the base and to the shade.
18. Select **3D Hidden** visual style from **Home/View** panel.
19. Save the drawing to a file name **14_Exercise03.dwg** in a floppy disk.
29. Close the drawing window.



Chapter 14 Exercise 4

1. Open **acadiso3d.dwt** - *left-click* **New...** in the **Quick Access** toolbar.
2. Construct two cylinders - one of radius **70** and height **250**, the other of radius **65** and height **245**.
3. Set **ISOLINES** to **16**.
4. *Left-click* the **Torus** tool icon in the **Home/3D Modeling** panel. The command line shows:

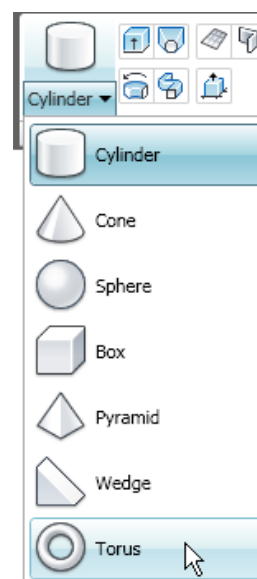
Command: _torus

Specify center of torus or [3P/2P/Ttr] pick

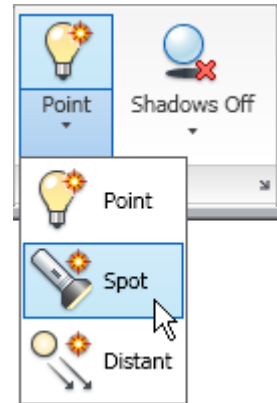
Specify radius or [Diameter]: enter 70 right-click

Specify tube radius or [2Point/Diameter]: enter 5 right-click

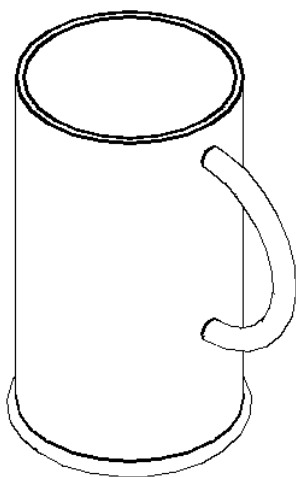
Command:



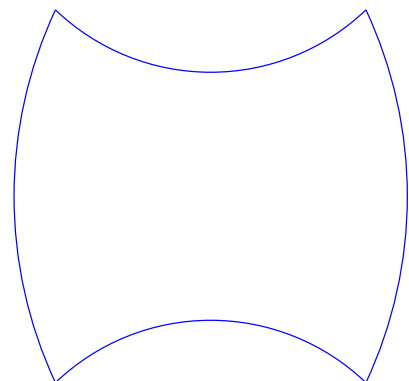
5. Place the screen in the **ViewCube/Front** view and **Zoom to 1**.
6. Move the cylinders and torus into their correct positions relative to each other.
7. Form a union of the larger cylinder and the torus. Subtract the smaller cylinder from the union.
8. Place the screen in the **ViewCube/Right** view and **Zoom to 1**.
9. Start forming the handle by drawing a circle of radius 7 in a good position.
10. Place the screen in the **ViewCube/Front** view and **Zoom to 1**.
11. Construct the semicircle as a path for the circle. Check its correct position in relation to the circle. If necessary move the semicircle into position.
12. Place the drawing in the **ViewCube/Isometric** view and form the extrusion from the circle along the semicircular path.
13. Go back to the **ViewCube/Front** view and move the handle to its proper position and with **Union** join it to the body of the tankard.
14. In the **ViewCube/Isometric** view call and place in the **Home/View//3D Hidden** visual style.
15. Attach a suitable glass material to the model.
16. Add suitable lighting. In order to accentuate the glass effect place a spotlight from behind and low down pointing to the middle of the tankard.
17. Save the window with its drawing to a file name **14_Exercise04.dwg** in a floppy disk.
18. Close the drawing window.

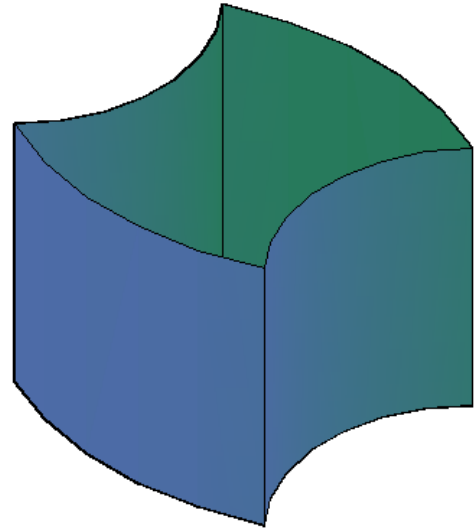
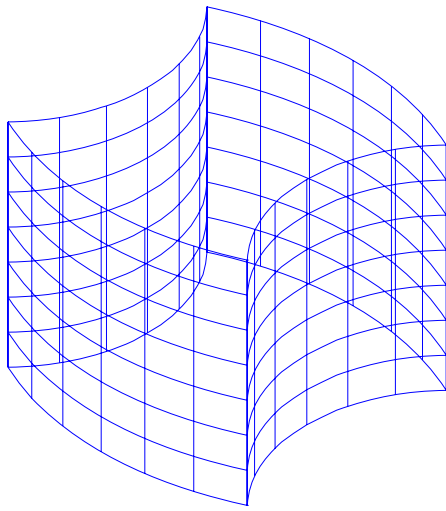


Chapter 14 Exercise 5



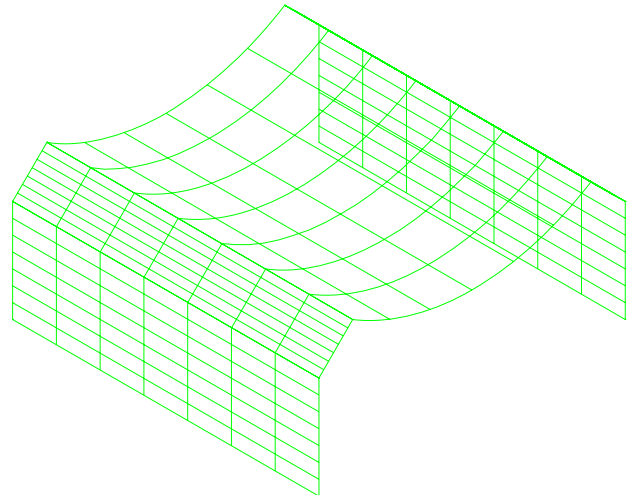
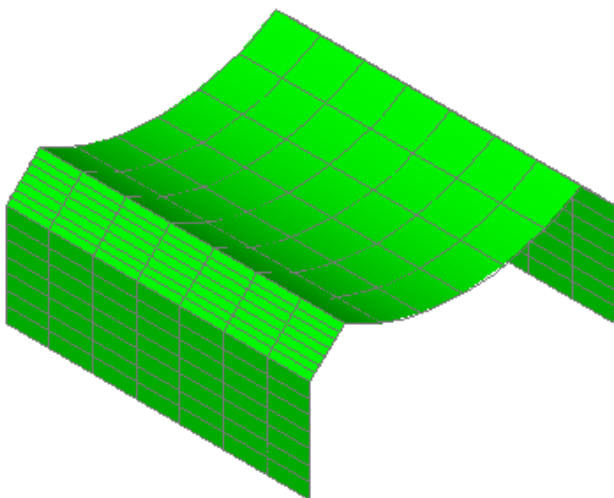
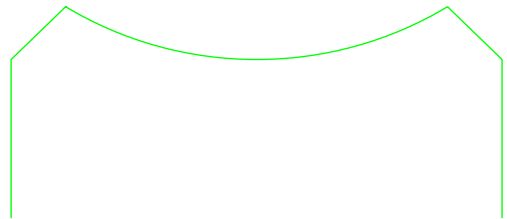
1. Open **acadiso3d.dwt** - *left-click New...* in the **Quick Access** toolbar.
2. In the **ViewCube/Top** view construct the four polylines.
3. Call the **Extrude** tool from the **Home/3D Modeling** and extrude all four elements to a height of **80**.
4. Place in the **ViewCube/Isometric** view.
5. Set visual style to **Conceptual** shading.
6. Save the window with its drawing to a file name **14_Exercise05.dwg** in a floppy disk.
7. Close the drawing window.





Chapter 14 Exercise 6

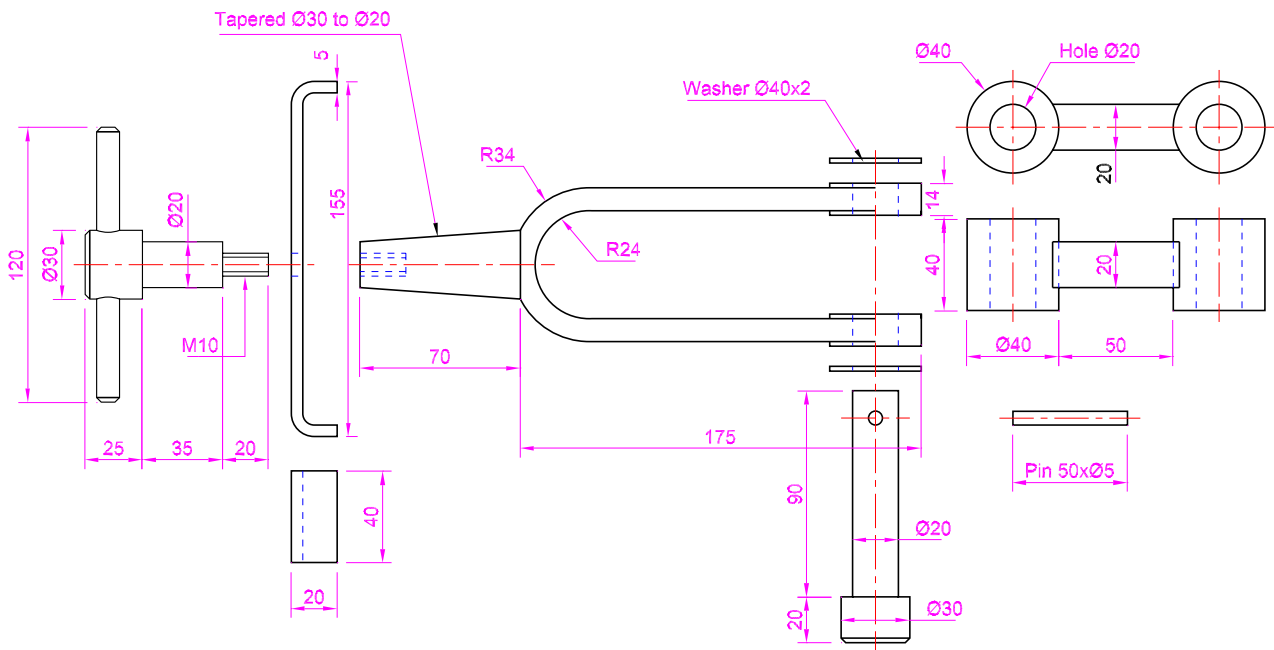
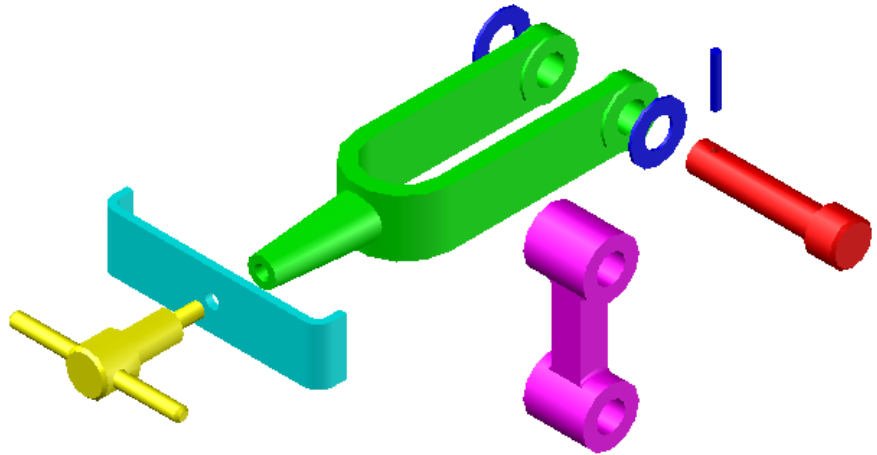
1. Open **acadiso3d.dwt** - *left-click* **New...** in the **Quick Access** toolbar.
2. In the **ViewCube/Right** view construct the four polylines.
3. Call the **Extrude** tool from the **Home/ 3D Modeling** panel and extrude all four elements to a height of **180**.
4. Place in the **ViewCube/Isometric** view.
5. Set visual style to **Realistic** shading.
6. Save the window with its drawing to a file name **14_Exercise06.dwg** in a floppy disk.
7. Close the drawing window.



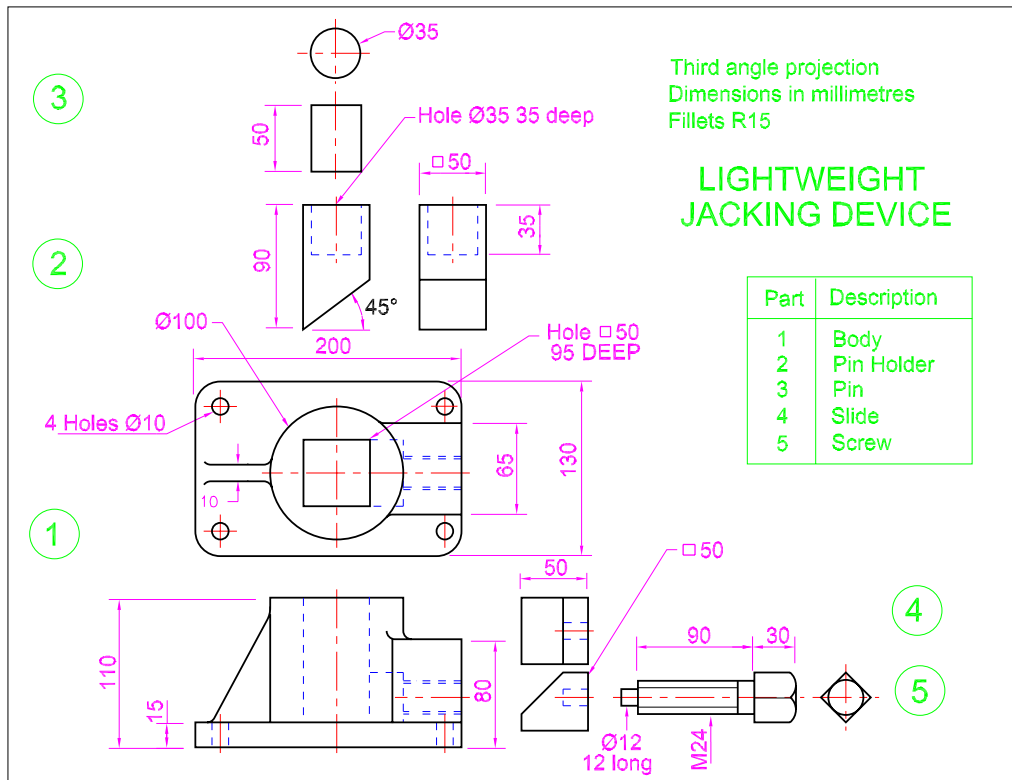
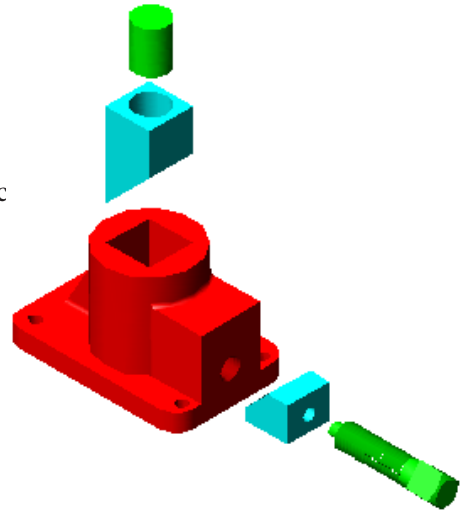
Additional exercises

1. An exploded **Conceptual** shaded 3D solid model drawing of a rotating part from a machine is shown on the right. The drawing below gives details of shapes and dimensions of its parts.

Working to the details given below construct the exploded 3D solid model drawing as shown.

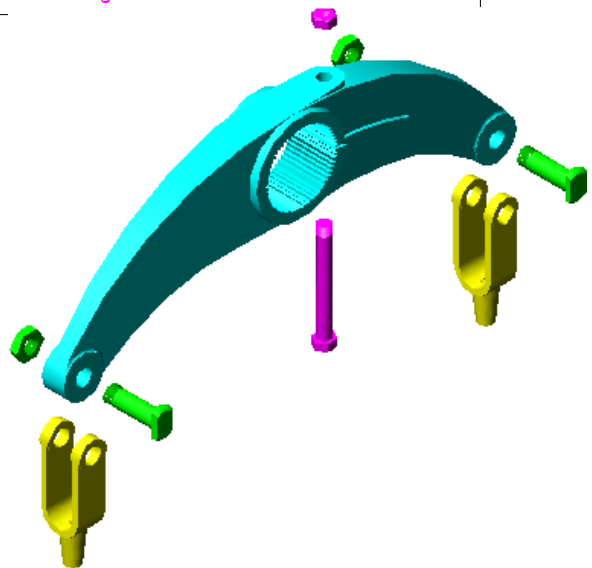


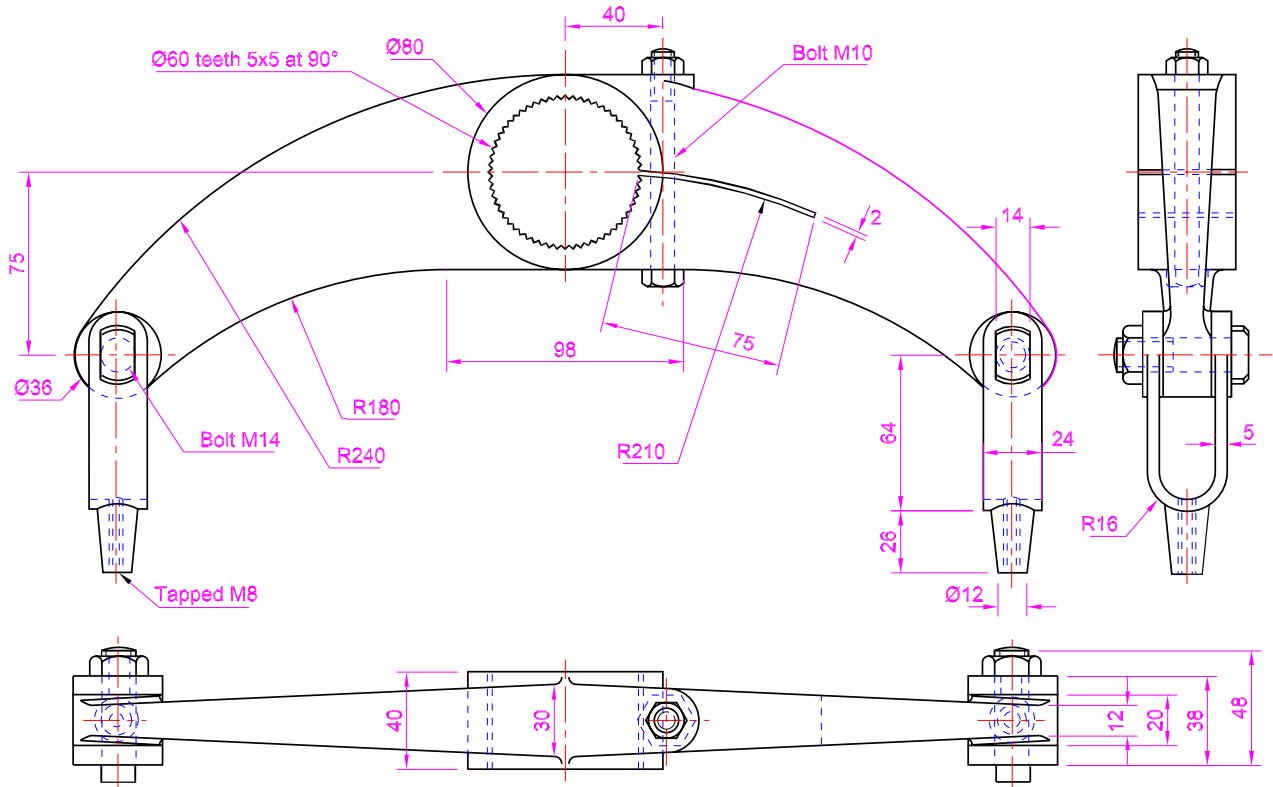
2. Construct the exploded 3D solid model drawing of a lightweight jacking device, details of which are given below.



3. An exploded **Conceptual** shaded 3D solid model drawing of a part from a braking device of a heavy goods vehicle is shown to the right and the drawing below gives details of its parts.

Construct the 3D solid model drawing, working to the details given in the drawing on the next page.





Multiple choice questions

- Is it possible to construct a polar array from a 3D solid model drawing using the **Array** tool from the **Home/Modify** panel?
 - No
 - Yes
 - If your answer is Option **a**, with which tool can one construct an array from a 3D solid model drawing
 - Only if the 3D solid model drawing is placed in the World UCS
- From which panel can the **Mass Properties** tool be called?
 - Home/Modify**
 - Tool/Inquiry**
 - Visualize/Edge Effects**
 - The tool cannot be called from a **Ribbon** panel
- The purpose of the **Viewpoint Presets** dialog is:
 - To set a 3D solid model drawing in any form of viewing position
 - To set a 3D solid model drawing in an isometric view
 - To set a 3D solid model drawing in a perspective view
- The **Slice** tool is used for slicing a 3D solid model into:
 - Two parts
 - Two parts ready for the calling of the **Section** tool
 - Into as many parts as are required
 - To remove a part not wanted in a 3D solid model drawing
- When using the **Section** tool on a 3D solid model drawing:
 - Hatching of the resulting sectional view is automatic
 - The section outline must be removed from the 3D solid model drawing
 - Only a sectional view outline is formed
 - The resulting sectional view automatically appears as a separate view in the drawing area