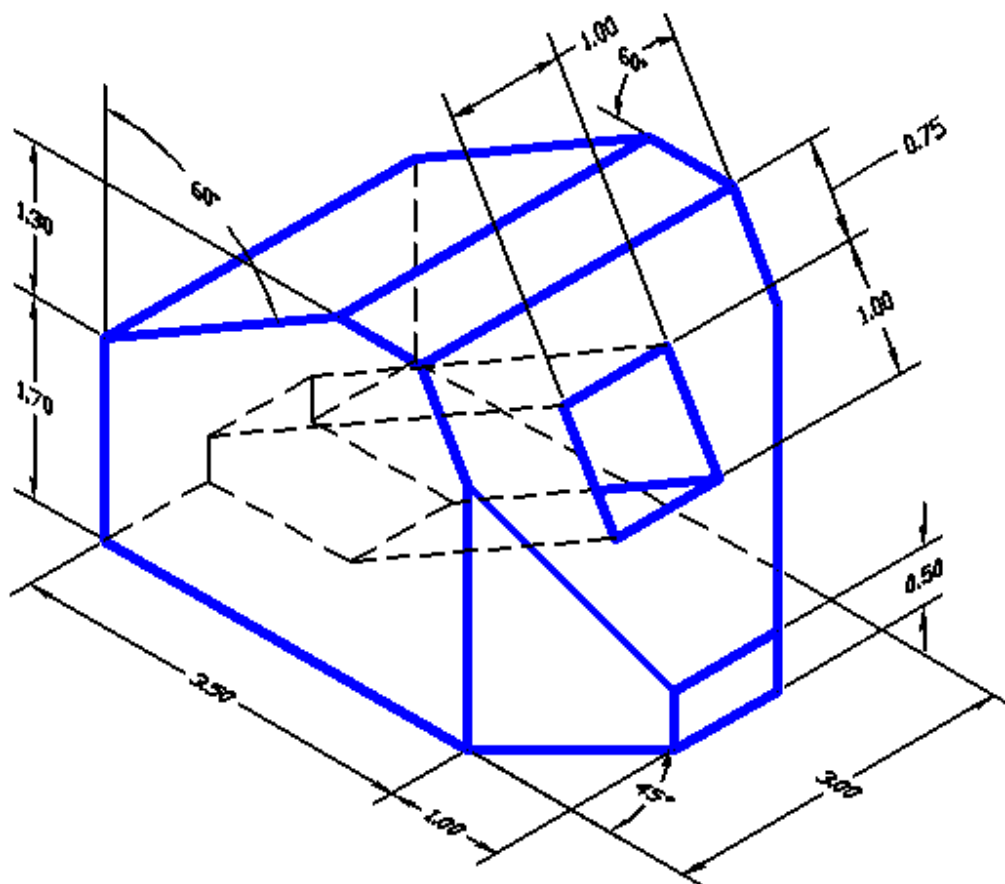## Lab. No. 14
More Wireframe Modeling

This exercise emphasizes creation of drawing entities on inclined and oblique construction planes by modifying the position and orientation of the User Coordinate System.

1. Start by opening a new file.
2. In the *Select Template* manager, **left-mouse-click** on the *triangular* button to the right of the *Open* button, and select *Open with no Template – Imperial*.
3. In the *Status Bar* area, **right-mouse-click** the *SNAP* tab.
4. In the *Drafting Settings* dialog box, turn **OFF** *SNAP*. Turn **ON** the *GRID*. Select the *Polar Tracking* tab, set the **Increment Angle** to **15**, and turn **ON** *Polar Tracking*. Select the *Object Snap*, check the *Endpoint, Center, Intersection* and *Extension* modes, and turn on both *Object Snap* and *Object Snap Tracking*. Close the dialog box.
5. In the *Status Bar* also turn on *LWT* and *MODEL* options.
6. Create two new layers with the following settings:

Layer	Color	LineType	Line Weight
Construction	White	Continuous	Default
Object	Blue	Continuous	0.30mm

7. Select the *Construction* layer as the current layer.
8. Click on the **OK** button to accept the settings and exit the *Layer Properties Manager* dialog box.

Creating a 3D rectangular box

We will first construct the wireframe geometry defining the rectangular base of the design.

1. Using the *Line* command create a rectangle with corners at the following coordinates: **(0,0)**, **(4.5,0)**, **(4.5,3)**, and **(0,3)**.
2. In the pull-down menus, select:
   [View] => [3D Views] => [SE Isometric]
3. Click on the *Copy Object* icon in the *Modify* toolbar.
4. In the command prompt area, the message *"Select objects ."* is displayed. Pick all the edges of the rectangle.
5. Inside the graphics window, right-mouse-click once to accept the selection.
6. In the command prompt area, the message *"Specify base point or displacement, or [Multiple]:"* is displayed. Pick any corner of the rectangle as a base point to create the copy.
7. In the command prompt area, the message *"Specify second point of displacement or <use first point as displacement>."* is displayed.
   Enter: **@0,0,3 [ENTER]**

8. On your own, create four lines connecting the four corners of the two rectangles as shown.

9. *Right-mouse-click* on any toolbar icon to display the toolbar selection manager. Turn on the *UCS II* toolbar.

10. From the *UCS II* select **Front** to define the front plane as your new UCS. Your user coordinate system should be oriented as shown in the figure.
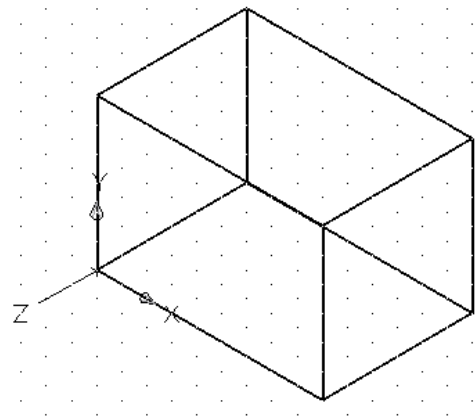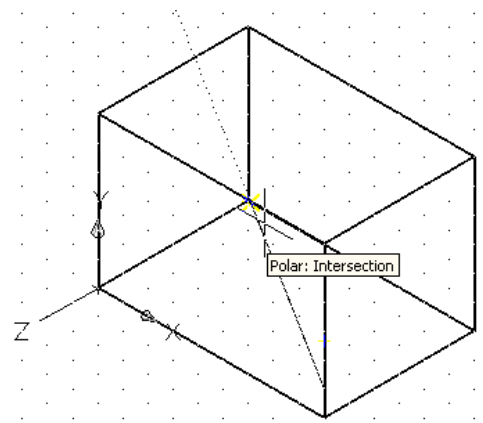
11. In the frontal plane, create the construction line that makes an angle 30º with the right plane by selecting the *Line* command.

12. At the command prompt: *"Command:_line Specify first point:"* select the **Snap From** command in the *Object Snaps* toolbar.
13. At the command prompt: *"_from Base point:"* **left-mouse-click** the lower right corner of the frontal plane.
14. At the command prompt: *".. <Offset>:"*
    Enter: **@0,.5 [ENTER]**
   This anchors the starting point of the construction line.
15. At the command prompt: *"Specify next point or [Undo]:"* use the *Polar Tracking* by moving the cursor near the intersection point, with the angular coordinate

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at 120° in the *Cursor Coordinate Display* area.

16. Repeat the above procedure to draw the other construction line, with offset relative coordinates of @0,1.7 relative to the lower left corner of the frontal plane, and a polar tracking angular coordinate of 30°.
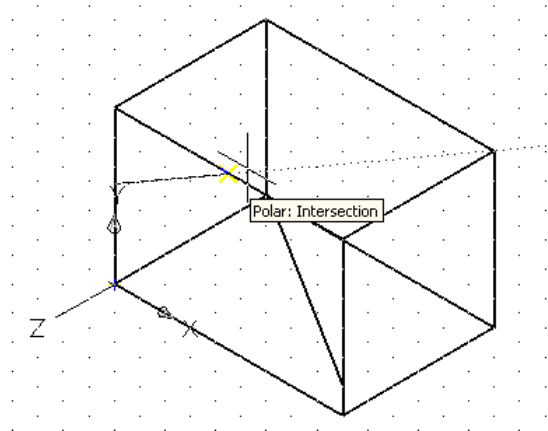
17. Copy the two lines just created in the negative Z-direction (@0,0,-3 relative coordinates).

18. Create the connecting lines between the endpoints of the construction lines in the front and rear planes.
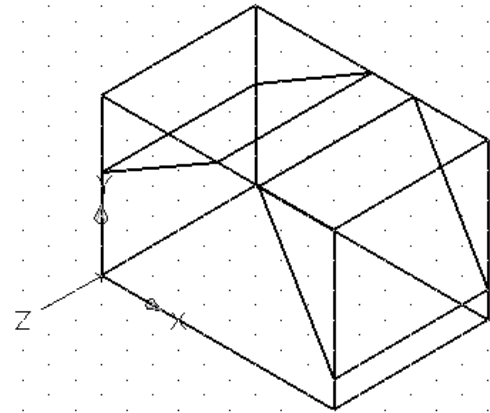
19. Change the position of your UCS coordinate axis by selecting **Top** from the *UCS II* toolbar.

20. Create the inclined construction line at the base of the model as shown. The starting point of the line is at coordinates <3.5,0,0>, and the endpoint of the line is at a tracking angle of 45°.
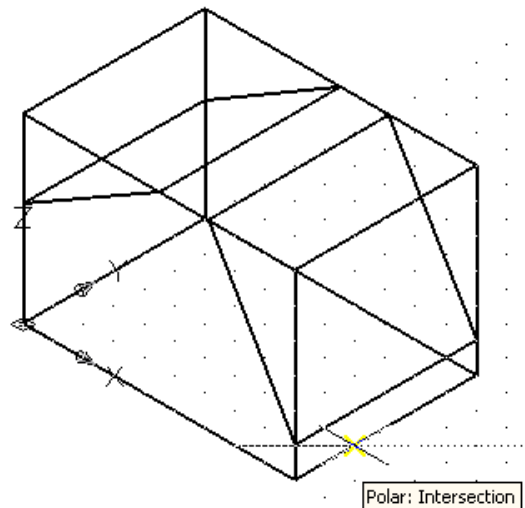
21. Copy the line just created at the base of the
    model in the positive Z-direction.

22. Create additional edges so that the wireframe
    model appears as shown.
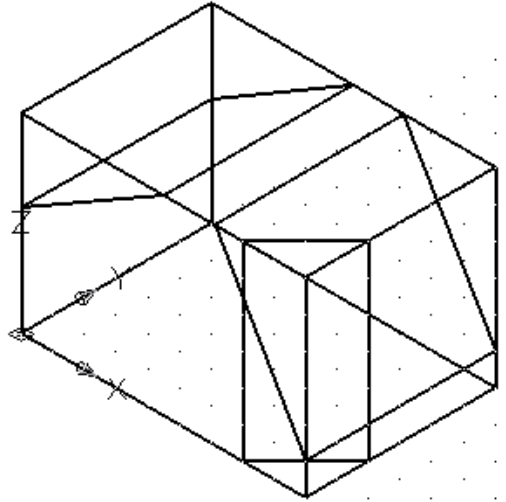
23. Create the object lines for the frontal half of the
    model as shown.
24. Use the ***Mirror*** command in the *Modify* toolbar
   to create the object lines for the rear portion of
    the model.
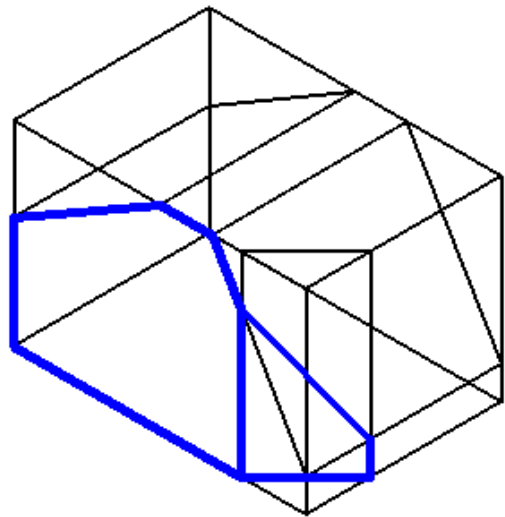
25. Turn ***OFF*** the construction lines layers.

26. Create the additional object lines so that your
   drawing appears as shown.
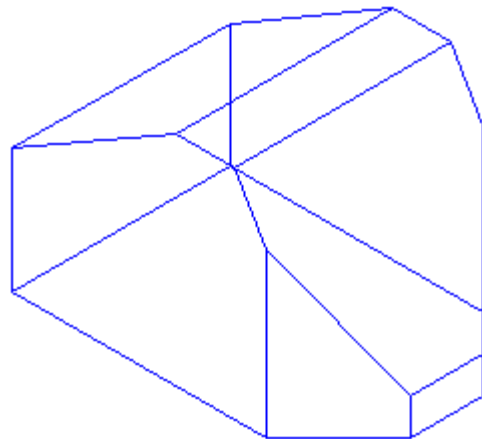
Creating the Rectangular Hole

1. Define the new position of the UCS as shown by selecting in the pull-down menus:
   [Tools] => [New UCS] => 3 Point

2. Select the new origin as the point in the front plane as shown, the corresponding point in the rear plane as the Xaxis point, and the point in the inclined plane as shown as the Yaxis point.

3. To display the view defined by the current UCS, in the pull-down menus select
   **[View] => [3D Views] => [Plan View] => [Current UCS]**
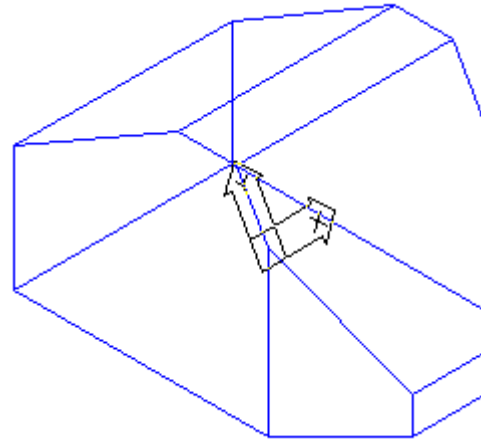
4. Move the origin of the UCS by selecting in the pull-down menus
   [Tools] => [New UCS] => [Origin]

5. At the command prompt "*Specify new origin point or [Zdepth]<0,0,0>:*" **left-mouse-click** on the new UCS origin shown.

6. Create a square in the current construction XY plane using the *Line* command with coordinates $\langle 1, -0.75 \rangle$, $\langle 2, -0.75 \rangle$, $\langle 2, -1.75 \rangle$, and $\langle 1, -1.75 \rangle$ as coordinates of its corners.
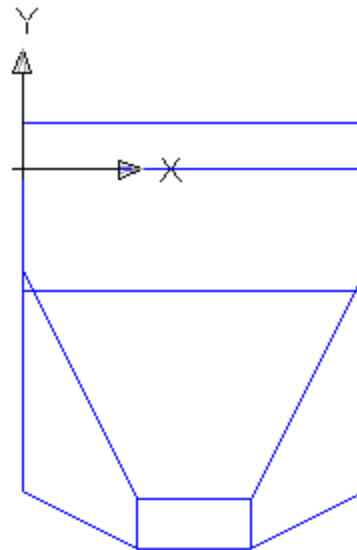
7. Change the view to *SE Isometric View*.

8. *Copy* the sides of the squares. When prompted to "*Specify base point or displacement:*" select *any* of the four corners of the square.

9. When prompted to "*Specify second point of displacement or <use first point as displacement>:*"
   Enter: **@0,0,-5 [ENTER]**

10. Create four lines connecting the corners of the two squares created as shown.

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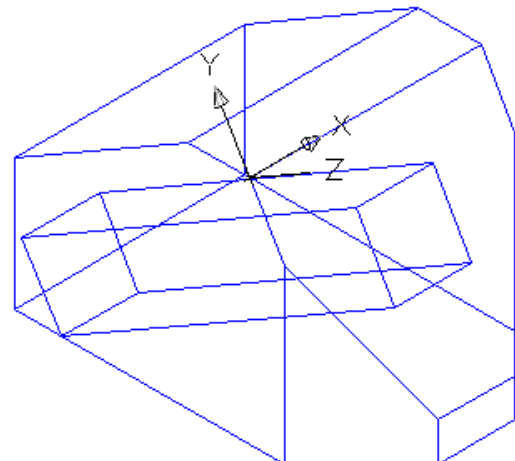
11. Change the view to *Front View*.

After Trim and Erase
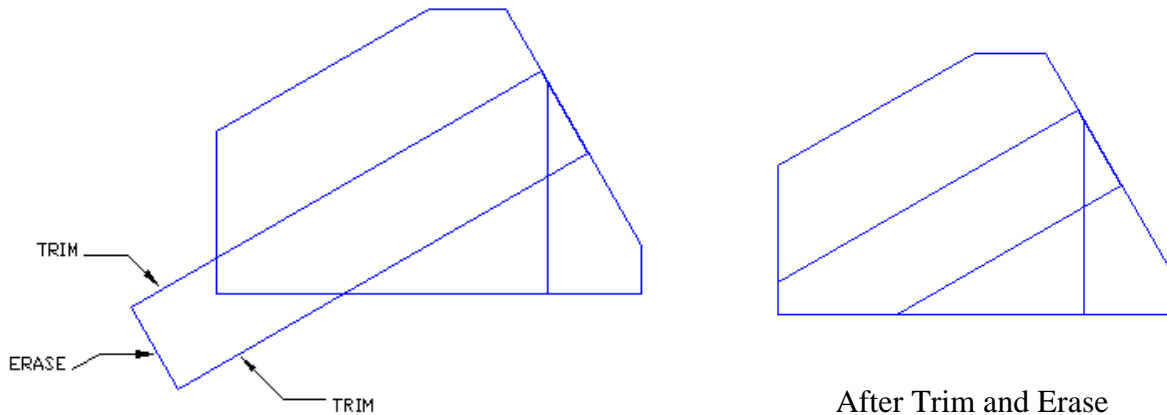
11. *Trim* and *Erase* portions of the hole that extend beyond the model boundaries. Remember that each of the lines shown in the front view corresponds to more than one line so that trimming and erasing might need to be repeated.

12. Change back the view to *SE Isometric View*.

13. Switch the position of the UCS to front by selecting **Front** from the *UCSII* toolbar.

14. Move the origin of the UCS to the lower left corner of the front face of the model using **[Tools] => [New UCS] => [Origin]**.
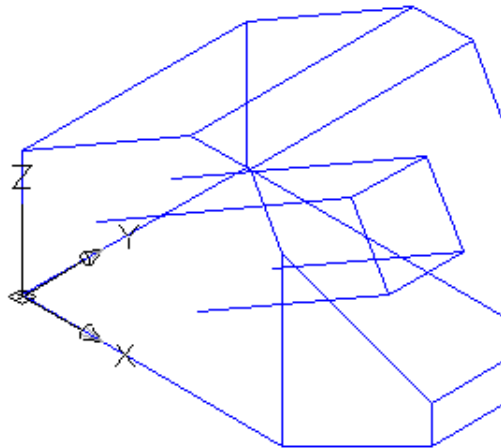
15. Create lines to define the intersection of the rectangular hole with the bottom and left profile planes. You can use either the *Snap Perpendicular* option, or *Polar Tracking* to find the intersection points with the Yaxis.

16. Trim the bottom left edge of the model corresponding to the hole. Your model should look like the one shown below. You might want to use **[View] => [Orbit]** to carefully inspect your model.
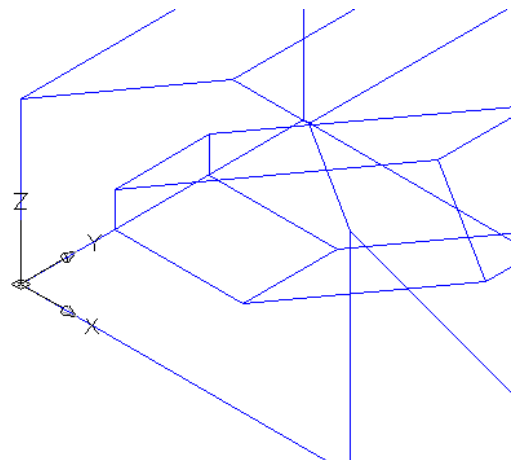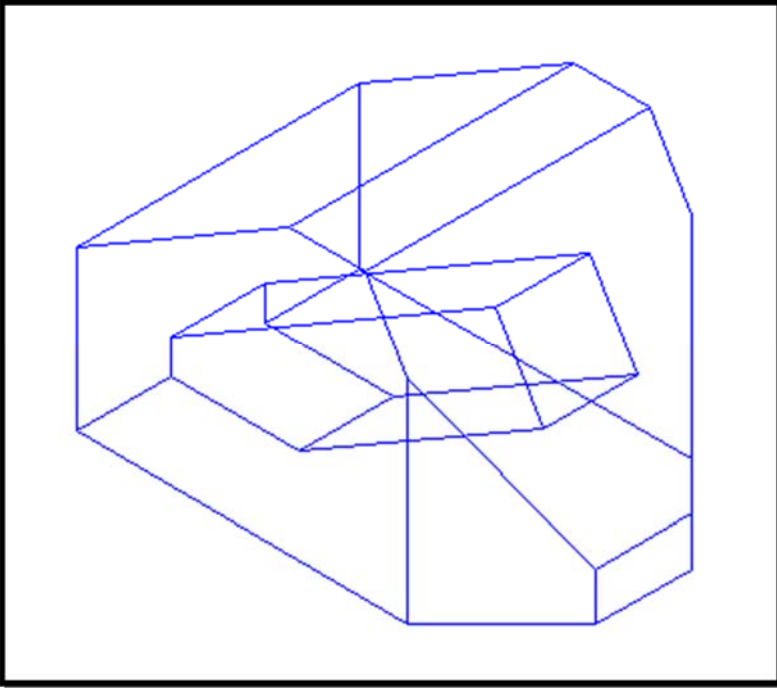
17. Save this drawing file as **lab14-a.dwg**.

Assignment: Create a wireframe model of the given object. Dimensions are in millimeters. Save this drawing as **lab14-b.dwg**.