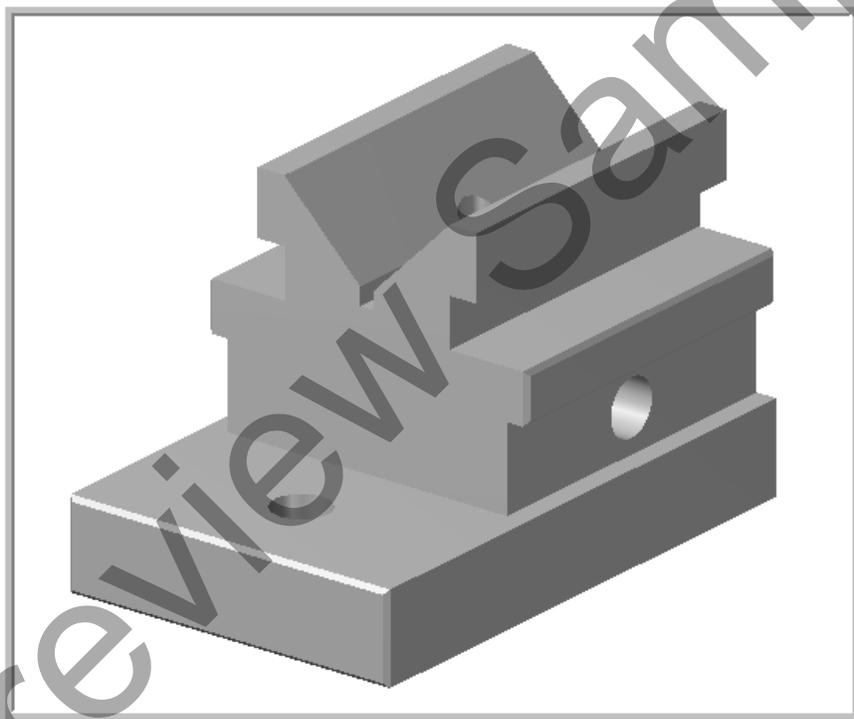# Mastercam X5

TRAINING GUIDE

SOLIDS-LESSON-11

camInstructor

Objectives

You will create the geometry for Solids-Lesson-11, and then generate the solid from the geometry. This Lesson covers the following topics:
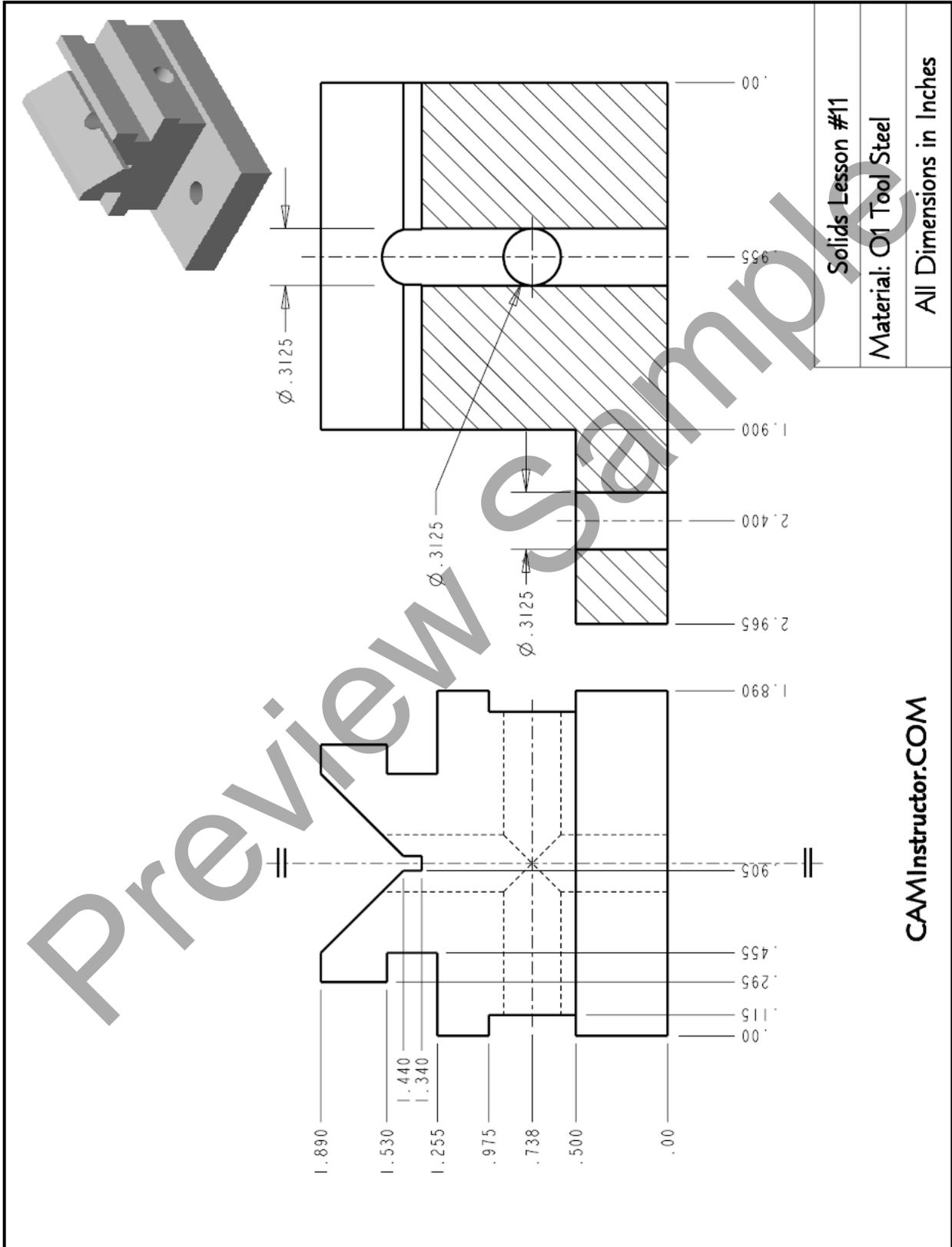
➲ **Create a 2-dimensional drawing by:**
Creating lines
Trimming geometry
Mirroring geometry

➲ **Create a solid model:**
Extrude and Create a solid body
Extrude and Cut a solid body

SOLIDS-LESSON-11 DRAWING

SOLIDS-LESSON-11- THE PROCESS

Geometry and Solid Creation

TASK 1: Setting the environment
TASK 2: Create contour geometry
TASK 3: Mirror geometry
TASK 4: Extrude solid
TASK 5: Extrude base solid
TASK 6: Create the solid cut geometry
TASK 7: Cut the solid holes
TASK 8: Save the drawing

Geometry Creation

TASK 1:
SETTING THE ENVIRONMENT

➲ Before starting the geometry creation you should set up the grid, toolbars and machine type as outlined in the **Setting up the Environment** section at the beginning of this text:
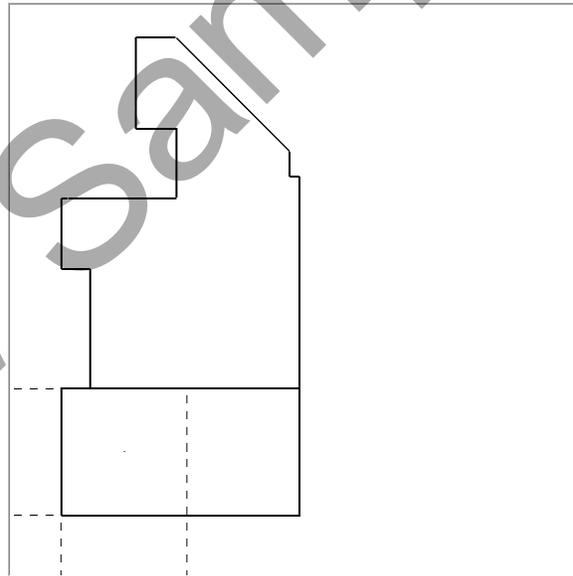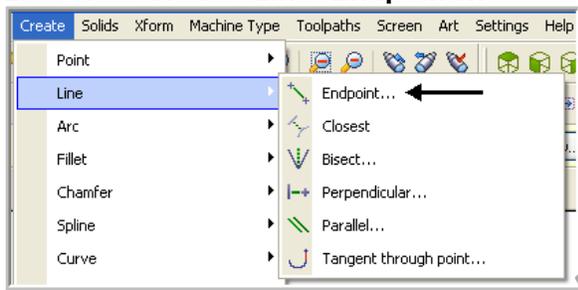1. Set up the Grid. This will help identify the location of the origin.
2. Customize the toolbars to machine a 2D part.
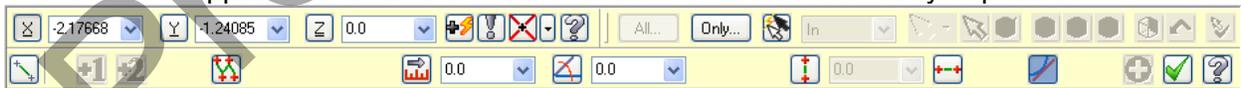
TASK 2:
CREATE CONTOUR GEOMETRY - X0 Y0 LOWER LEFT CORNER

➲ In this task you will create the geometry for the contour.

1. Select the Front Plane

2. **Select Create>Line>Endpoint…**

3. On the graphics screen you are prompted **"Specify the first endpoint"** and the Line ribbon bar appears. Click on the **Multi-line** icon if it is not already depressed.

4. To satisfy this first prompt click on the **FastPoint** Icon on the Auto Cursor ribbon bar and input **0,0** then hit the **enter key**.
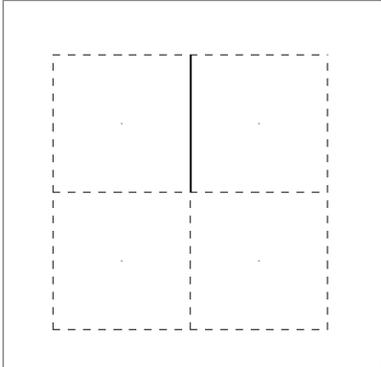
   ```
   0,0
   ```

5. The prompt will change to **"Specify the second endpoint"**. Click on the **Fastpoint** icon again, input a value of **0,0.5** and hit the **enter key**.

   ```
   0,0.5
   ```
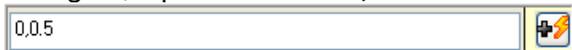
6. Select the **Screen Fit** icon found at the top of the screen to fit the part to the screen

7. Select the **Un Zoom 50%** icon found at the top of the screen [icon].
8. The line just created should appear as below:

9. Select the **Fastpoint** icon, enter the value **0.115,0.5** and then press the **enter** key.
10. Select the **Fastpoint** icon, enter the value **0.115,0.975** and then press the **enter** key.
11. Select the **Fastpoint** icon, enter the value **0,0.975** and then press the **enter** key.
12. Select the **Fastpoint** icon, enter the value **0,1.255** and then press the **enter** key.
13. Select the **Fastpoint** icon, enter the value **0.455,1.255** and then press the **enter** key.
14. Select the **Fastpoint** icon, enter the value **0.455,1.530** and then press the **enter** key.
15. Select the **Fastpoint** icon, enter the value **0.295,1.530** and then press the **enter** key.
16. Select the **Fastpoint** icon, enter the value **0.295,1.890** and then press the **enter** key.
17. Select the **Fastpoint** icon, enter the value **0.455,1.890** and then press the **enter** key.
18. Select the **Fastpoint** icon, enter the value **0.905,1.440** and then press the **enter** key.
19. Select the **Fastpoint** icon, enter the value **0.905,1.340** and then press the **enter** key.
20. Select the **Fastpoint** icon, enter the value **0.945,1.340** and then press the **enter** key.
21. Select the **Fastpoint** icon, enter the value **0.945,0** and then press the **enter** key.
22. Select the **Fastpoint** icon, enter the value **0,0** and then press the **enter** key.
23. Click on the **OK** icon [icon].
24. The chain should appear as shown in the image below:
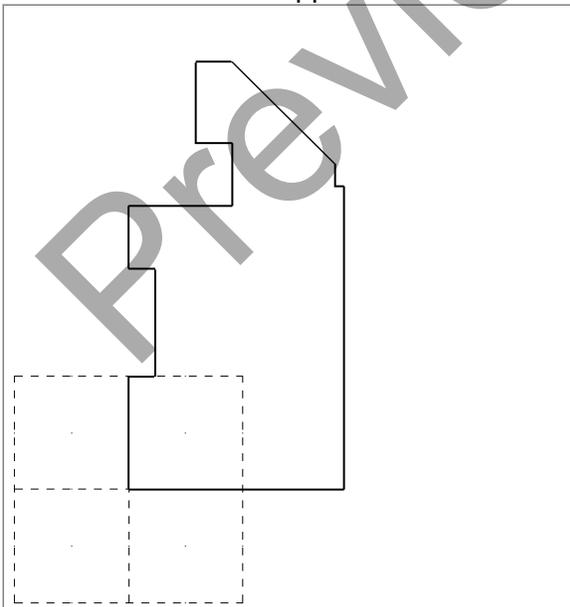
25. Select **Create>Line>Endpoint...**
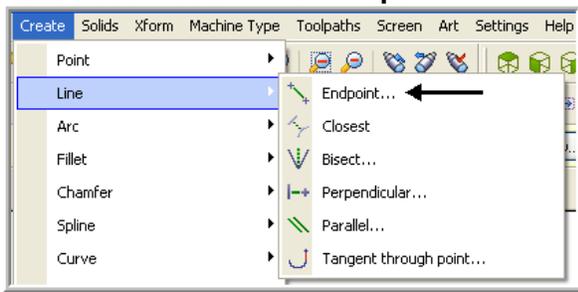
26. On the graphics screen you are prompted **"Specify the first endpoint"** and the Line ribbon bar appears. Select the end point of the second line as shown in the left image below:
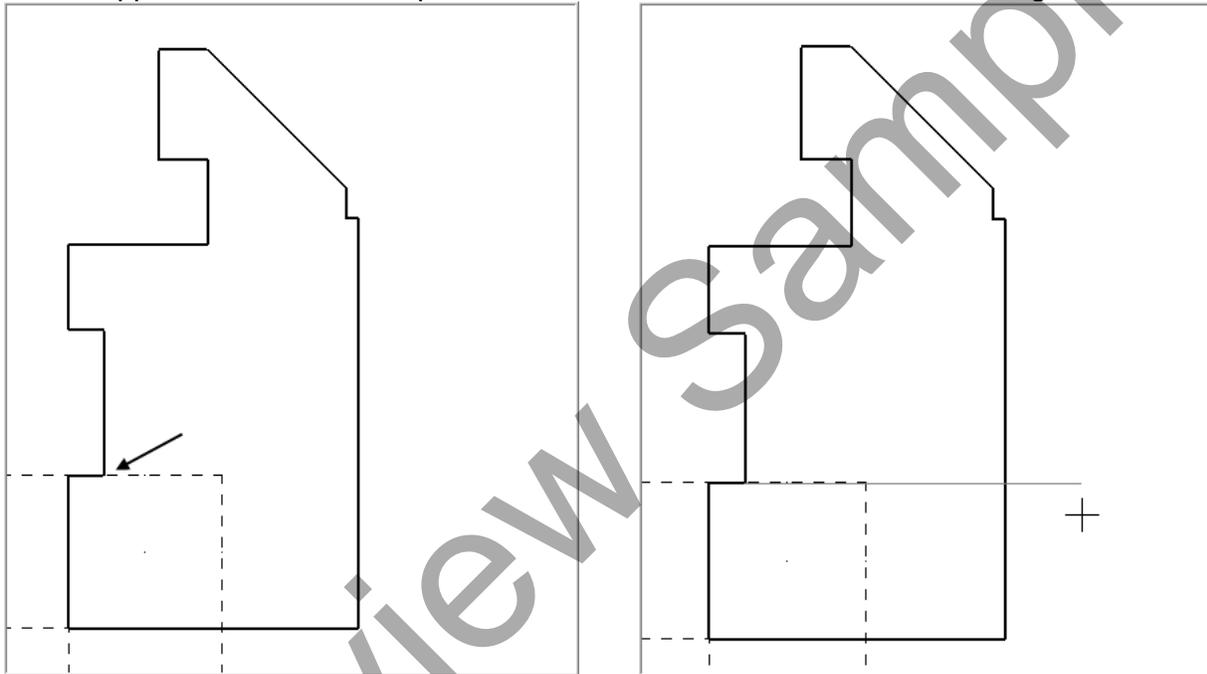

27. The prompt will now read **"Specify the second endpoint"**. To satisfy the prompt, select the horizontal line icon on the ribbon bar and select any point to the right of the chain already created, as shown in the left image above.

28. Click on the **OK** icon [✓].

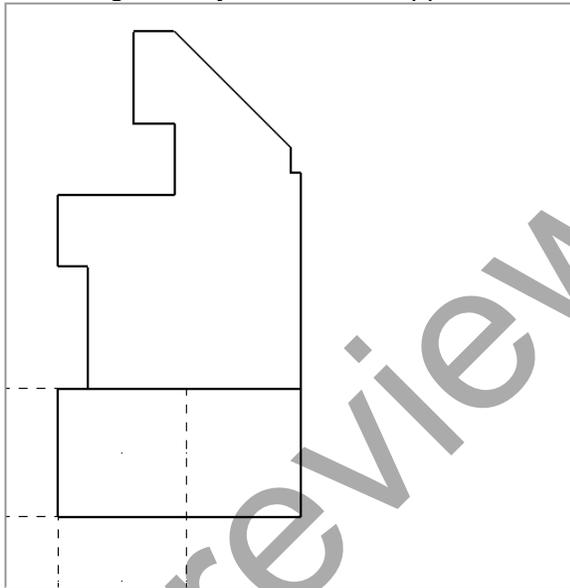29. Select **Edit>Trim/Break>Trim/Break/Extend...**
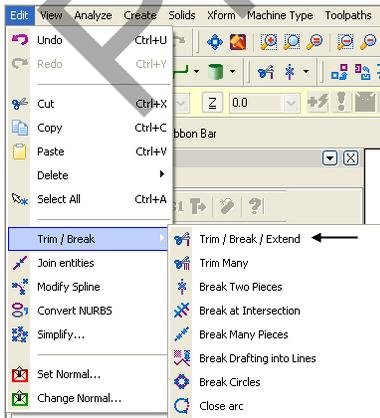
30. The **Trim/Extend** ribbon bar will appear with the prompt **"Select the entity to trim/extend"**. Select the horizontal line first, then select the vertical line second, as shown in the image below:
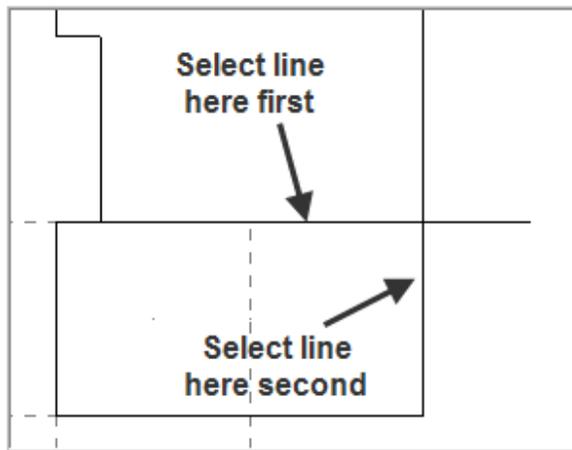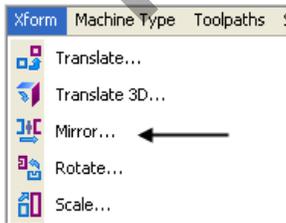

31. Click on the **OK** icon ✓.

32. The geometry should now appear as in the image below:

TASK 3:
# MIRROR THE GEOMETRY

1. Select **Xform>Mirror...**

2. The prompt **"Mirror: select entities to mirror"** appears in the graphics screen. To satisfy the prompt, click on the **All** button in the selection toolbar. The **Select All** window will appear, select **Wireframe** as shown below:

3. Click on the **OK** icon.

4. Click on the **End Selection** icon.

5. The **Mirror** window will now appear. Make sure **Copy** is selected and then click on the **Select Line** icon to select geometry for the mirroring axis:
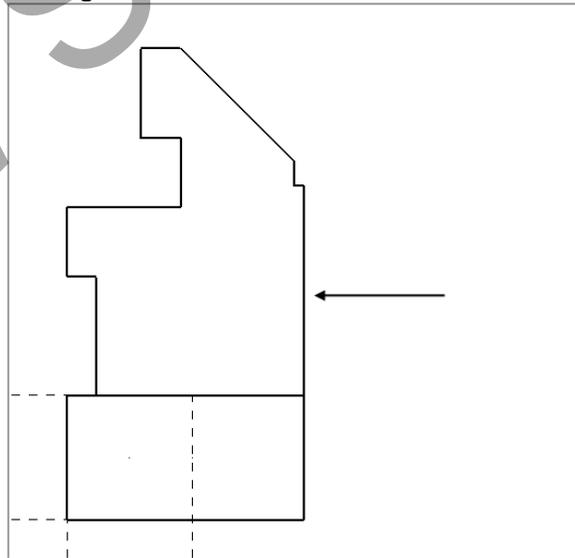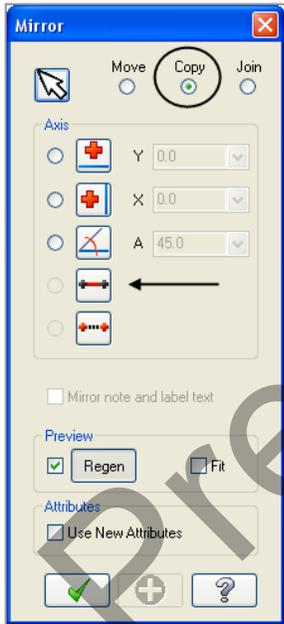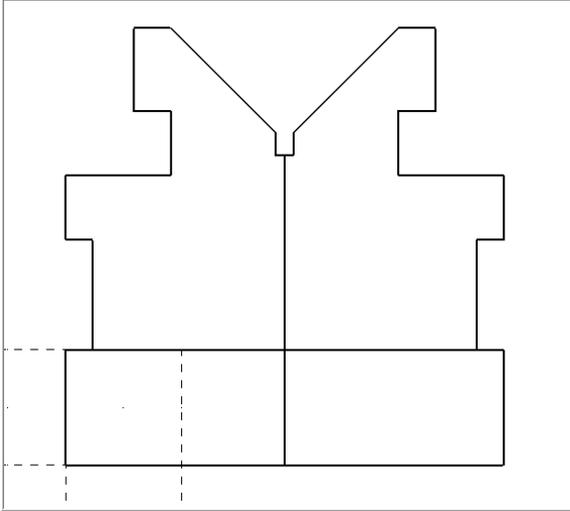

6. Select the vertical line shown in the right image above.

7. Click on the **OK** icon in the **Mirror** window.

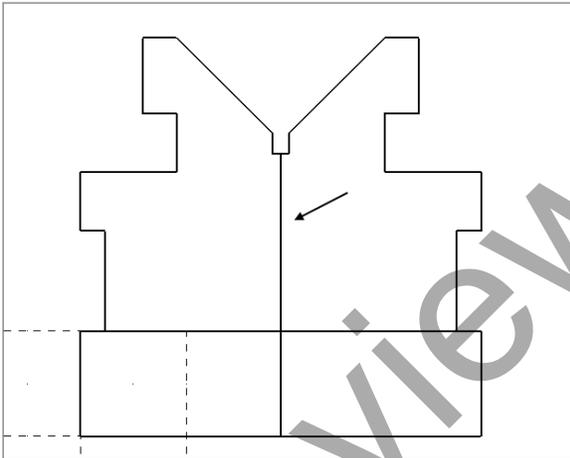8. In the main screen, select the **Clear Colours** icon

9. The image below displays the mirrored geometry:
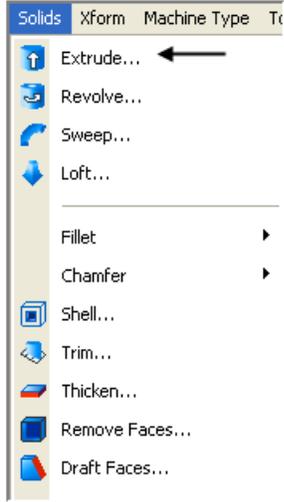
10. Select the **Delete Duplicates** icon
11. Select the middle line, as shown below, and press the **delete** key.

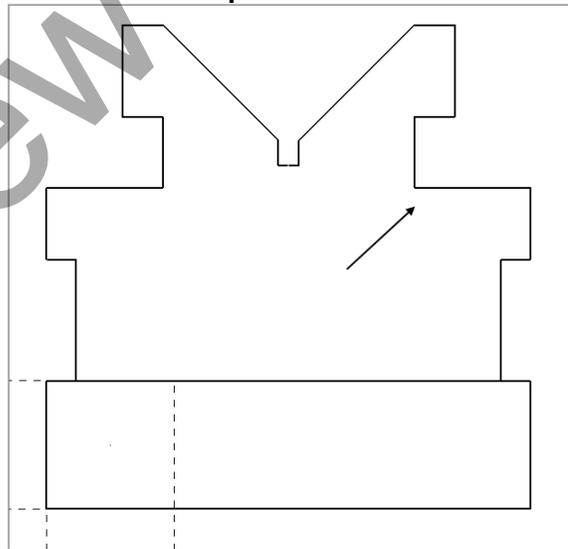## TASK 4:
EXTRUDE SOLID

1. Select Solid>Extrude...

➲ On the screen you will now see the **Chaining** dialog box, with the **Chain Button** selected as shown by the arrow. In the graphics screen a prompt to **"Select chain(s)" to be extruded** is displayed.

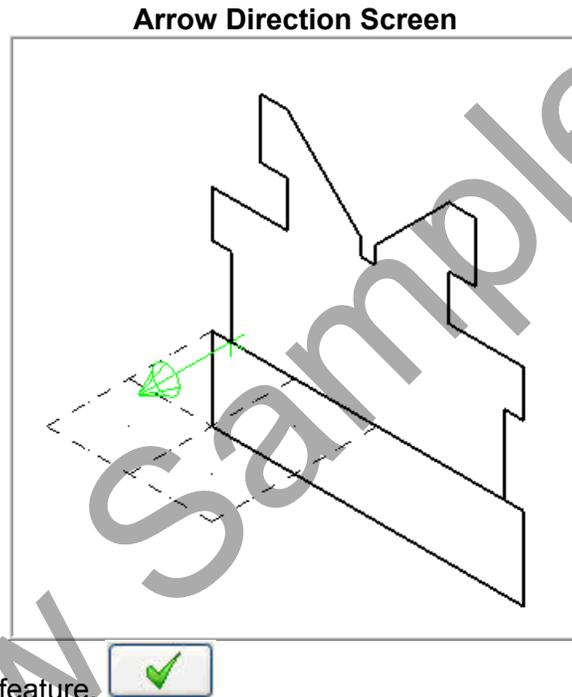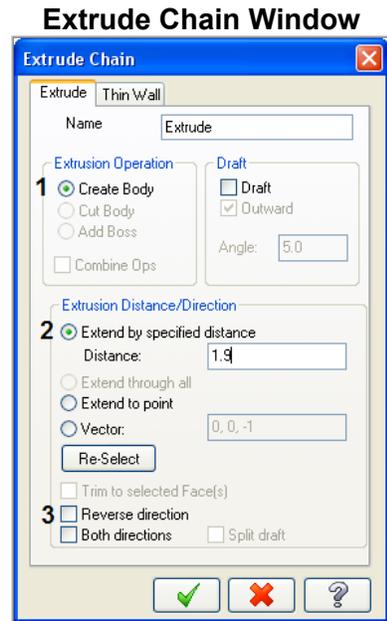2. Select the chain as shown in the **Graphics Screen** diagram:

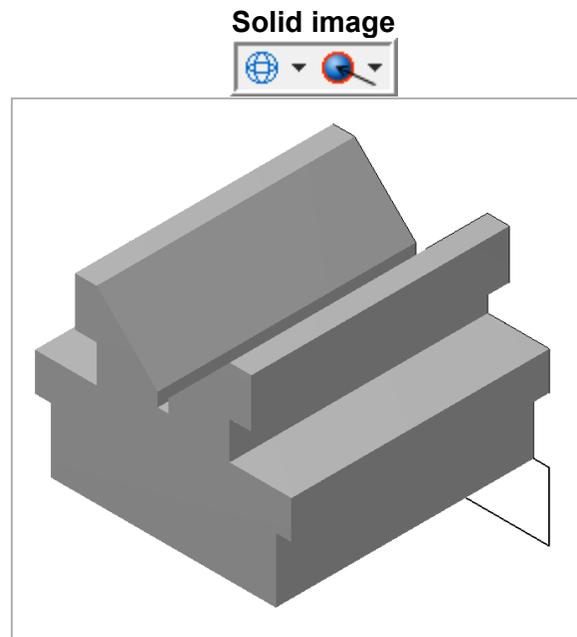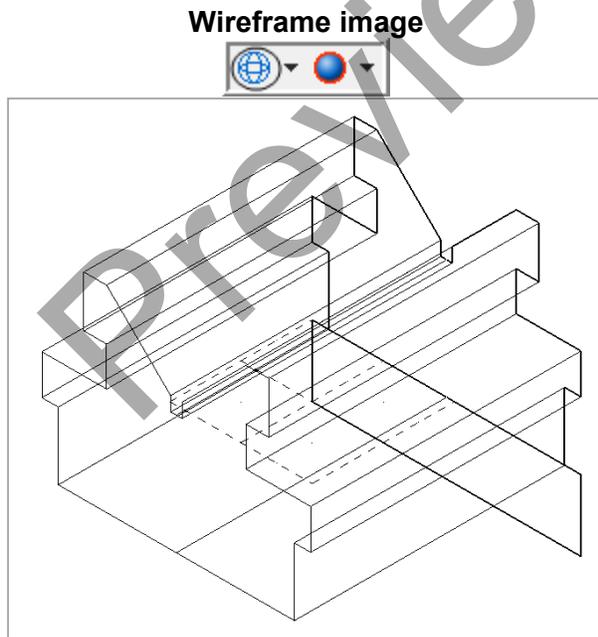**Chaining Box**   **Graphics Screen**
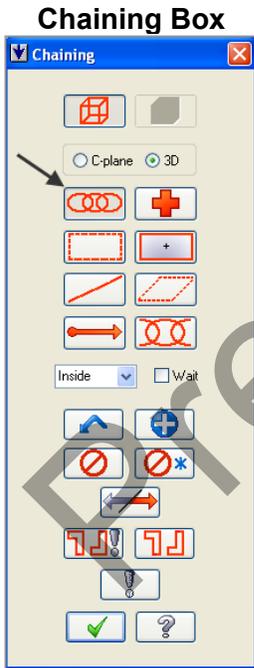
3. Click on the **OK** icon.

4. On the screen the **Extrude Chain** window will be displayed. Make sure the following items are checked and values are entered;
      1. **Create Body** is selected.
      2. **Extend by specified distance** is selected and the value **1.90"** is entered.
      3. Note the **arrow** direction. If the arrow is not pointing in the proper direction, select the **Reverse direction** check box or use the **Re-Select** option.
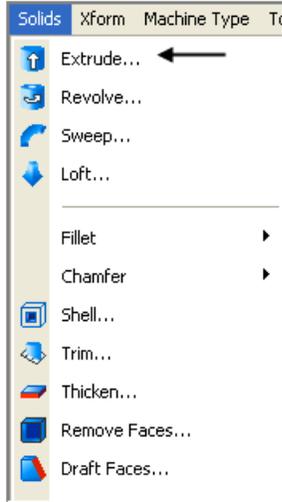
Extrude Chain Window	**Arrow Direction Screen**

5. Click on the **OK** icon to complete this feature.
6. To change from a **wireframe image** to a **solid image** select the **Alt and S** or the **Shading** icon. Your screen should look like the screenshots below:
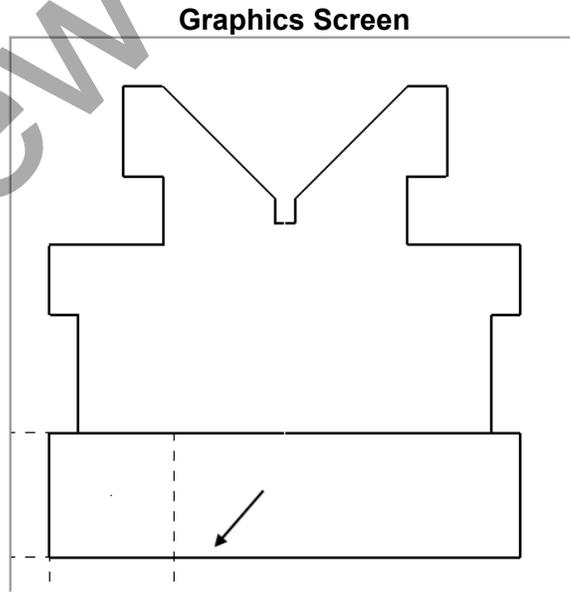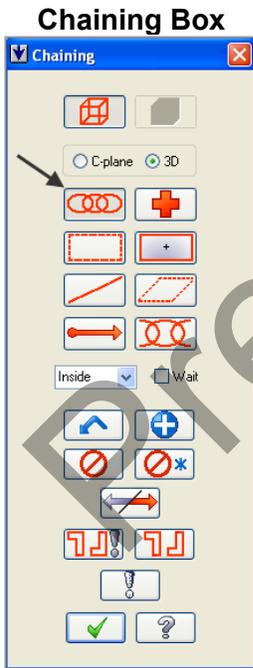
Wireframe image	**Solid image**

TASK 5:
EXTRUDE BASE SOLID

1. Select Solid>Extrude...

● On the screen you will now see the **Chaining** dialog box, with the **Chain Button** selected as shown by the arrow. In the graphics screen a prompt to **"Select chain(s)" to be extruded** is displayed.

2. Select the chain as shown in the **Graphics Screen** diagram:

Chaining Box   **Graphics Screen**


3. Click on the **OK** icon.

4. On the screen the **Extrude Chain** window will be displayed. Make sure the following items are checked and values are entered;
   1. **Create Body** is selected.
   2. **Extend by specified distance** is selected and the value **2.965"** is entered.
   3. Note the **arrow** direction. If the arrow is not pointing in the proper direction, select the **Reverse direction** check box or use the **Re-Select** option.

Extrude Chain Window

Arrow Direction Screen
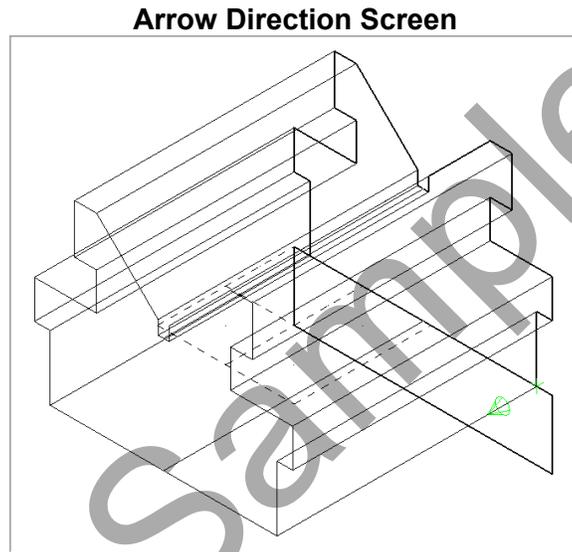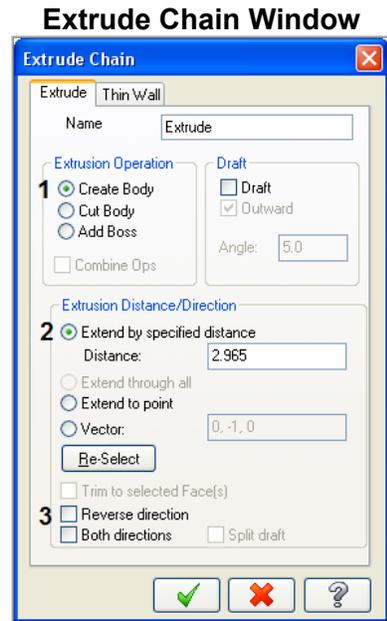
5. Click on the **OK** icon to complete this feature.
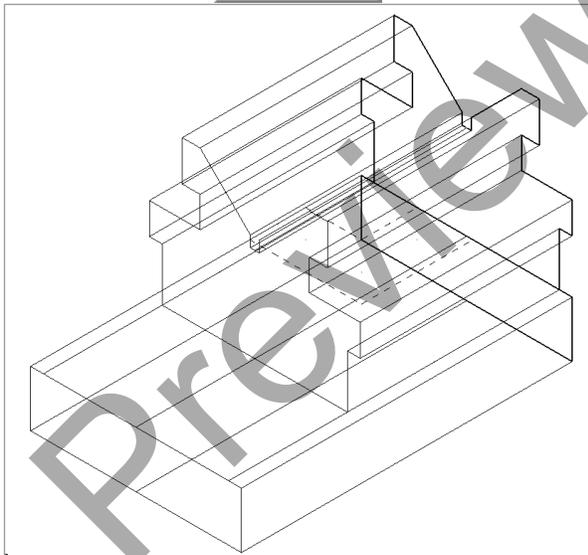6. Select **Solids>Boolean Add**

7. The prompt **"Select target body for Boolean operation"**.
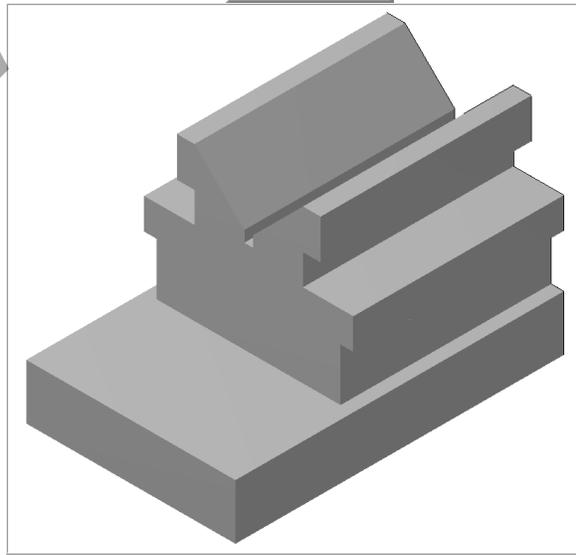8. Select both of the solids as shown in the image below:
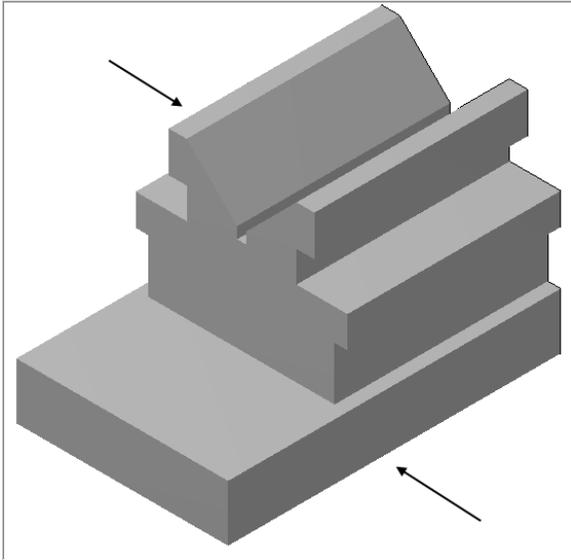
9. Click on the **End Selection** icon .
10. To change from a **wireframe image** to a **solid image** select the **Alt and S** or the **Shading** icon. Your screen should look like the screenshots below:
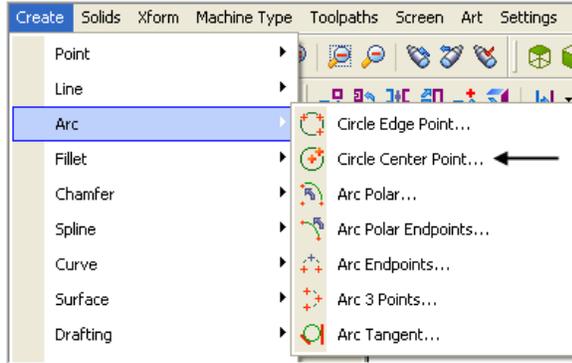
Wireframe image   **Solid image**
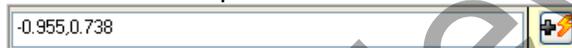
TASK 6:
CREATING THE SOLID CUT GEOMETRY

1. Select the **Right plane** icon

2. Select **Create>Arc>Circle Center Point...**

3. The **Circle Center Point** ribbon bar appears and you are prompted to **"Enter the center point"**.

4. To satisfy this first prompt click on the **FastPoint** Icon on the Auto Cursor ribbon bar

5. In the space input the **-0.955,0.738** values for the center of the circle and hit **enter**. **Note** that there is a comma between the X and Y values, and you do not need to input the Z value for this example.
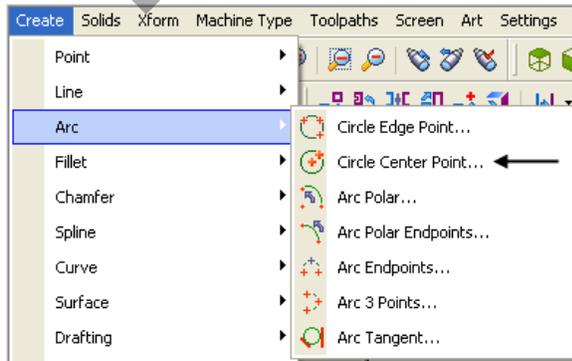
-0.955,0.738

6. You have now input the coordinates for the center of this circle and you now need to supply the value for the diameter. Click in the space for diameter **(shown below)** and enter a value of **0.3125**.

0.15625   0.3125

7. Click on the **OK** icon to complete this feature.

8. Select the **Top** plane icon

9. Select **Create>Arc>Circle Center Point...**

10. The **Circle Center Point** ribbon bar appears and you are prompted to **Enter the center point**.

11. To satisfy this first prompt click on the **FastPoint** Icon on the Auto Cursor ribbon bar.
12. In the space input the **0.945,-0.955** values for the center of the circle and hit **enter**. **Note** that there is a comma between the X and Y values, and you do not need to input the Z value for this example.

`0.945,-0.955`

13. You have now input the coordinates for the center of this circle and you now need to supply the value for the diameter. Click in the space for diameter **(shown below)** and enter a value of **0.3125**.

14. While still in the **Circle Center Point** command, select the **FastPoint** Icon on the Auto Cursor ribbon bar.

15. In the space input the **0.945,-2.400** values for the center of the circle and hit **enter**. **Note** that there is a comma between the X and Y values, and you do not need to input the Z value for this example.

`0.945,-2.400`

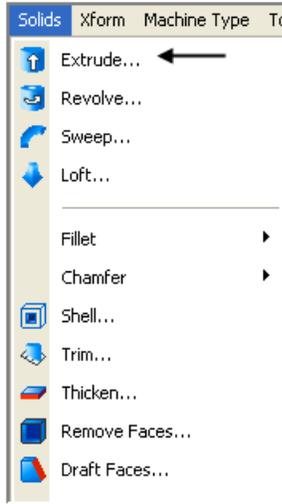16. Click in the space for diameter and enter a value of **0.3125**.

17. Click on the **OK** icon to complete this feature.

18. Select the Isometric view to see the placement of the circles created
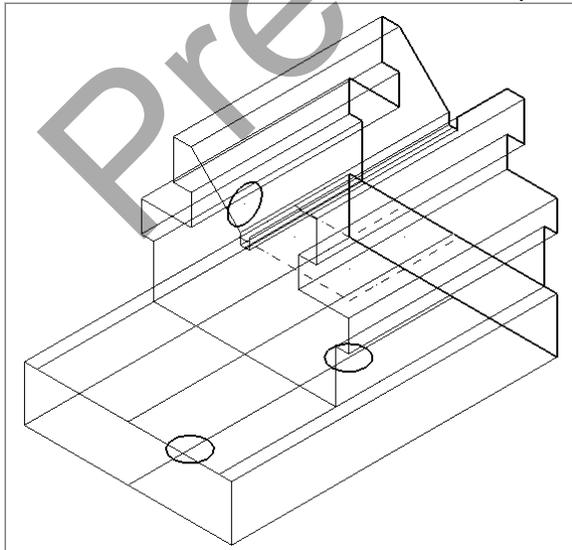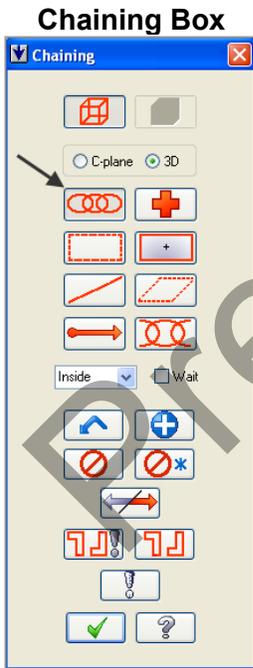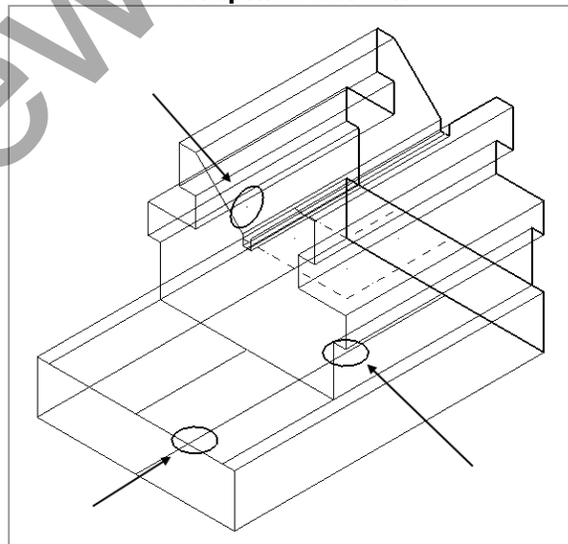
TASK 7:
CUT THE SOLID HOLES

1. Select Solid>Extrude...

2. On the screen you will now see the **Chaining** dialog box, with the **Chain Button** selected as shown by the arrow. In the graphics screen a prompt to **"Select chain(s)" to be extruded** is displayed. Select the chains, the three circles as shown in the **Graphics Screen** diagram:

Chaining Box   **Graphics Screen**

3. Click on the **OK** icon.

4. On the screen the **Extrude Chain** window will be displayed. Make sure the following items are checked and values are entered;

    1. **Cut Body** is selected.

    2. Select **Extend through all**.

    3. Note the **arrow** directions. If the arrows are not pointing in the proper direction, select the **Reverse direction** check box or use the **Re-Select** option.

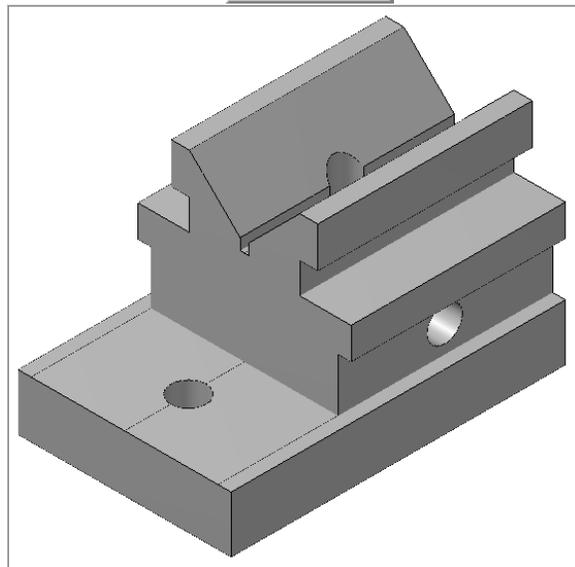**Extrude Chain Window**

Arrow Direction Screen
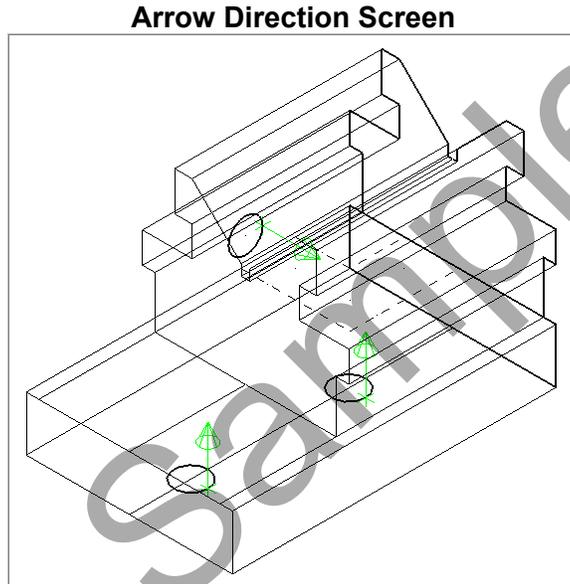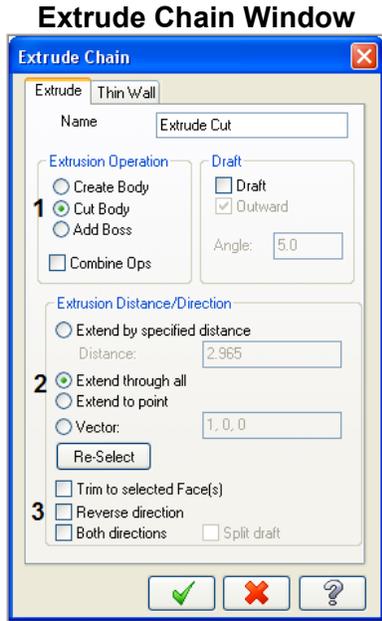
5. Click on the **OK** icon to complete this feature.
6. To change from a **wireframe image** to a **solid image** select the **Alt and S** or the **Shading** icon. Your screen should look like the screenshots below:

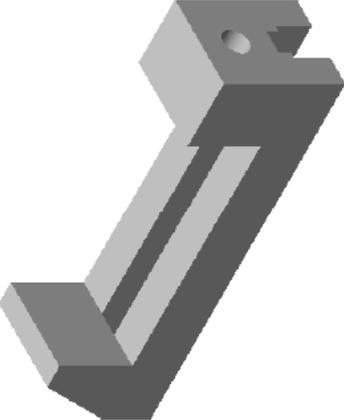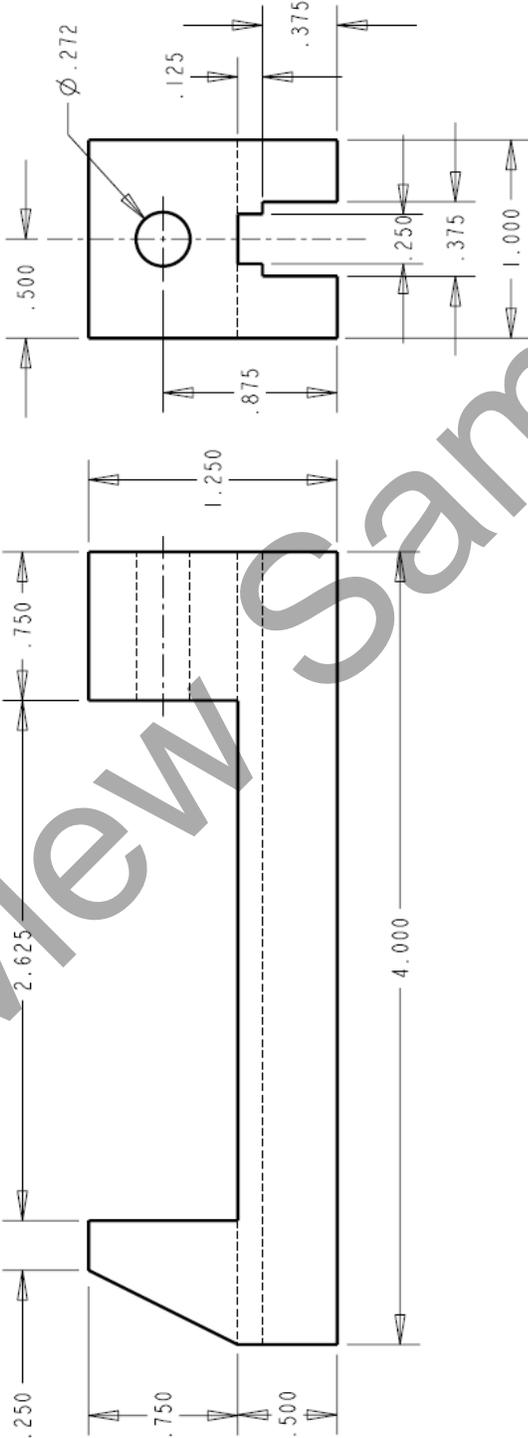**Wireframe image**
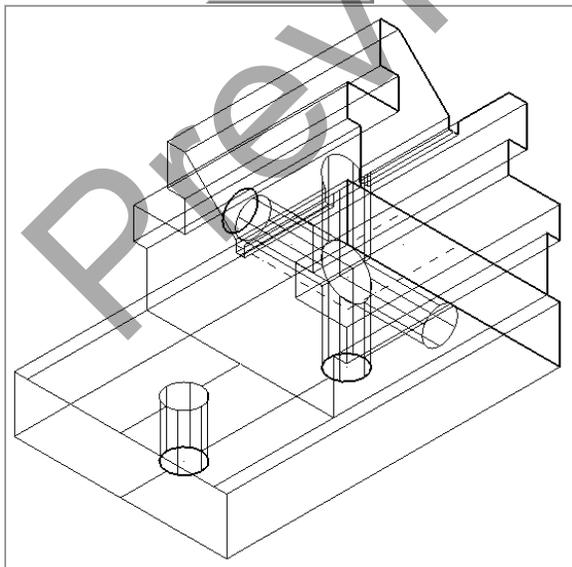
Solid image

TASK 8:
SAVE THE DRAWING

1. Select **File**.
2. Select **Save as…**
3. In the File name box, type **Solids-Lesson-11**.
4. Save to an appropriate location**.**
5. Select the green check mark button ☑ to save the file and complete this function.

File name:	SOLIDS-LESSON-11.MCX	▼
Save as type:	Mastercam X Files (*.MCX)	▼

SOLIDS-LESSON-11 EXERCISES

Multi-Axis Lesson-4 Ex-1

Material: O1 Tool Steel

All Dimensions in mm

CAMInstructor.COM