

Fig. 1

**A. Surface Extrude.**

Step 1. Click File Menu > New, click **Part Metric** and OK.

Step 2. Click **Top Plane** in the Feature Manager and click **Sketch** on the context toolbar, **Fig. 1**.

Step 3. Click **Style Spline** in the **Spline flyout** on the Sketch toolbar.

Step 4. Sketch a **5 control vertex point** **Spline up from the Origin**, **Fig. 2**. Press Escape to end spline.

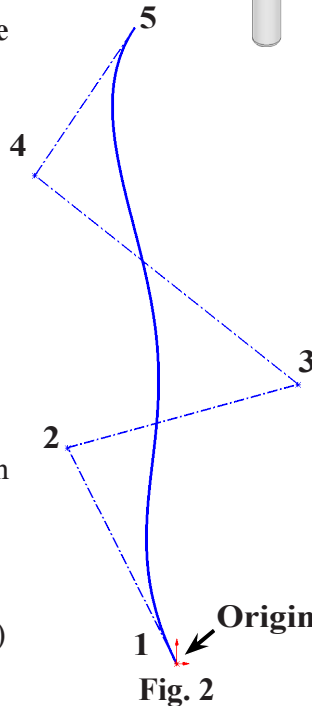


Fig. 2

Step 5. **Ctrl click top vertex point and Origin** to select both. Release Ctrl key and click **Make Vertical** on the context toolbar, **Fig. 3**.

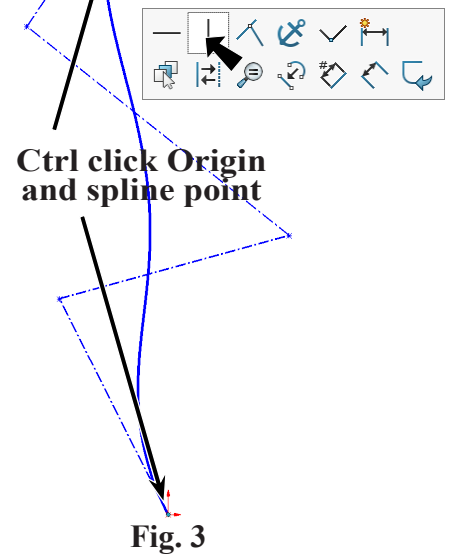
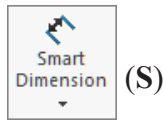


Fig. 3

Step 6. Click **Smart Dimension** on the Sketch toolbar.



Step 7. Add dimensions, **Fig. 4**.

Step 8. If necessary, turn on **Surfaces Command Manager**. To turn on, **right click Sketch** on the Command Manager toolbar select > Tabs > **Surfaces**, **Fig. 5**.

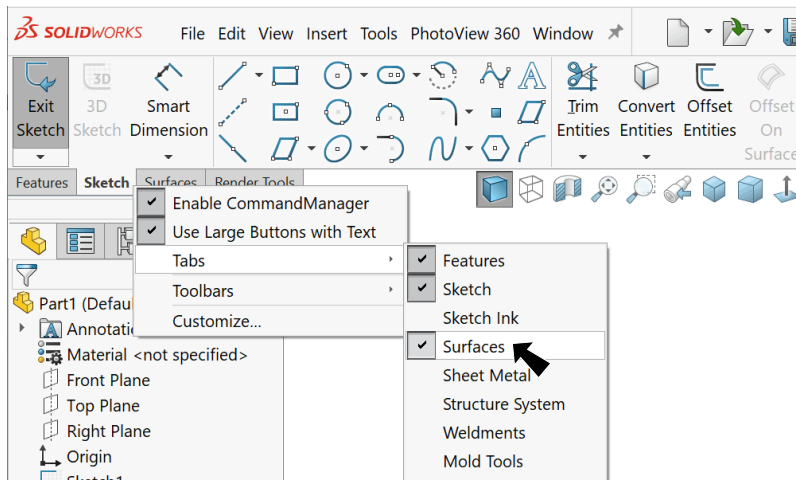


Fig. 5

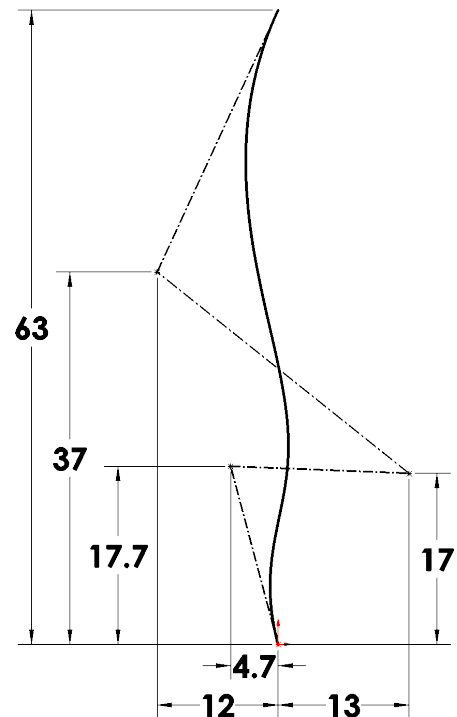



Fig. 4

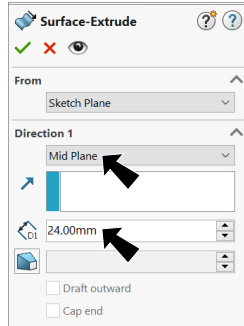
8/30/23

Step 9. Click **Surfaces**  on the Command Manager toolbar.

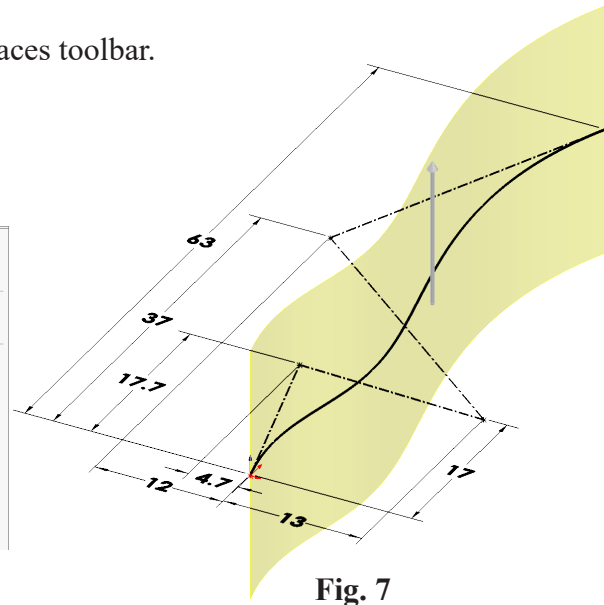
Step 10. Click **Extruded Surface**  on the Surfaces toolbar.

Step 11. In the Surface-Extrude Property Manger:  
 under Direction 1, **Fig. 6**  
 End Condition **Mid Plane**

**Depth**  24  
 click OK .



**Fig. 6**





**Fig. 7**

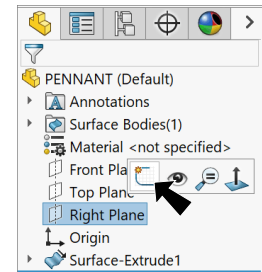
## B. Save as "PENNANT".

Step 1. Click File Menu > Save As.


Step 2. Key-in **PENNANT** for the filename and press ENTER.



## C. Surface Trim.

Step 1. Click **Right Plane**  in the Feature Manager and click **Sketch**  on the context toolbar, **Fig. 8**.

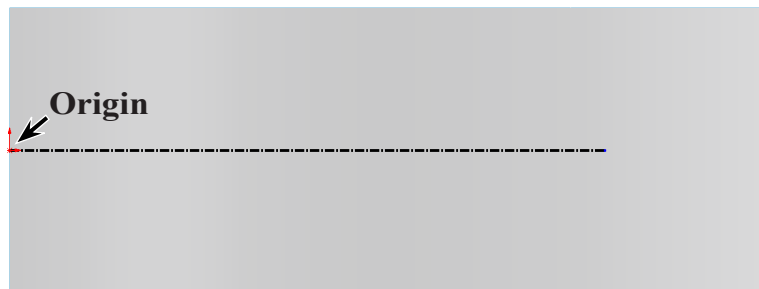


**Fig. 8**

Step 2. Click **Normal To**  on the Standard Views toolbar. (**Ctrl-8**)



Step 3. Click **Centerline**  in the **Line flyout**  on the Sketch toolbar.

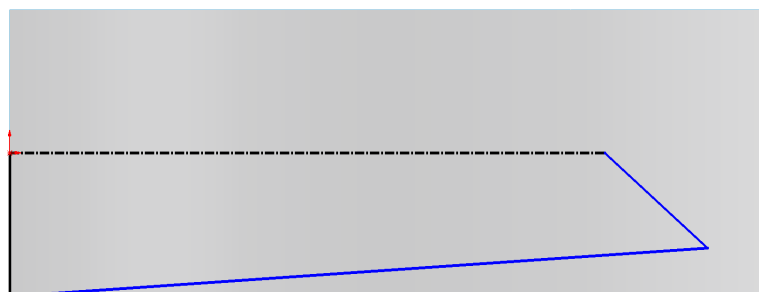
Step 4. Sketch **horizontal centerline**  **from Origin**  , **Fig. 9**.



**Fig. 9**

Step 5. Click **Line**  (**L**) on the Sketch toolbar.

Step 6. Sketch **vertical line down**  **from Origin**  **down along edge to corner of surface and two chained angled line back to centerline**, **Fig. 10**.



**Fig. 10**

Step 7. **Unselect Line tool.** To unselect, **right click graphics area and click Select** from menu.

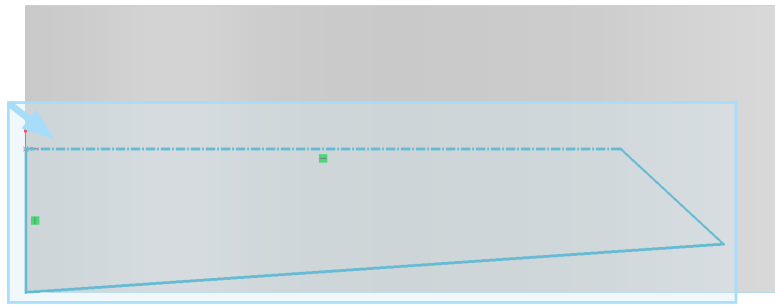


Fig. 11

Step 8. Drag a selection to **select all geometry**, Fig. 11.

Step 9. Click **Mirror Entities**



Step 10. Click **Smart Dimension**

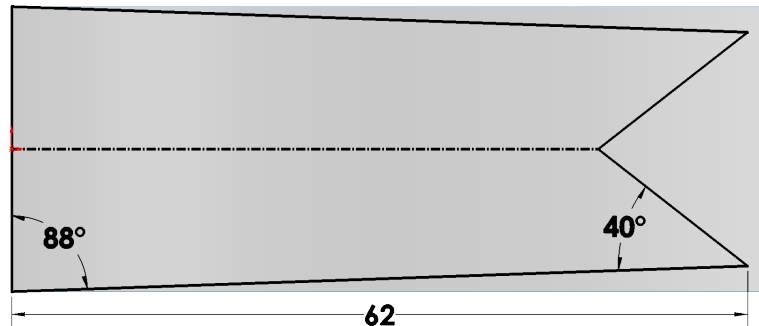
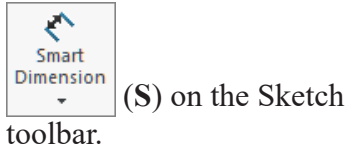


Fig. 12

Step 11. Add dimensions, Fig. 12.

Step 12. Click **Surfaces** on the Command Manager toolbar.

Step 13. Click **Trim Surface** on the Surfaces toolbar.

Step 14. In the Trim Surface Property Manager set:

under Trim Type, Fig. 13

select **Standard**

under Selections

Trim Tool:

Sketch2 was preselected

select **Keep selections**

in Pieces to Keep box

click **surface inside Sketch2**, Fig. 14

click OK ✓.

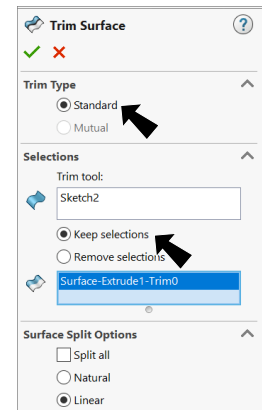


Fig. 13

Step 15. Save (Ctrl-S).

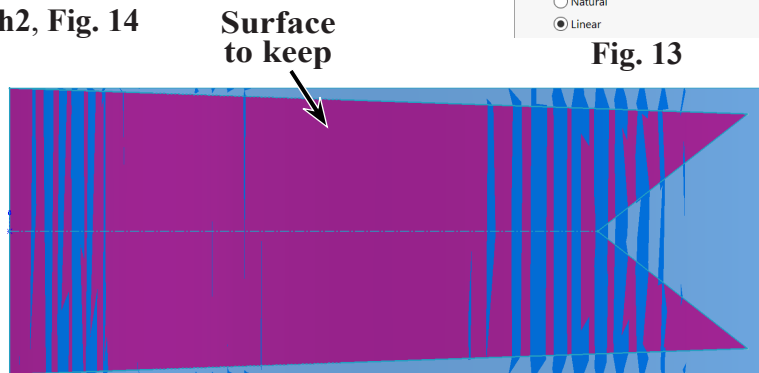

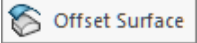


Fig. 14

## D. Copy Using Offset Surface.

Step 1. Click **Isometric**  on the Standard Views toolbar. (Ctrl-7)

Step 2. Click **Offset Surface**  on the Surfaces toolbar.

Step 3. In the Offset (Copy) Surface Property Manger:  
under Offset Parameters, **Fig. 15**

click **surface**, **Fig. 16**

**Offset Distance 0**

click OK .

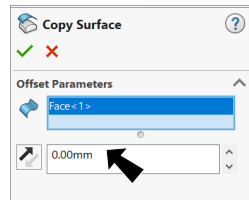


Fig. 15

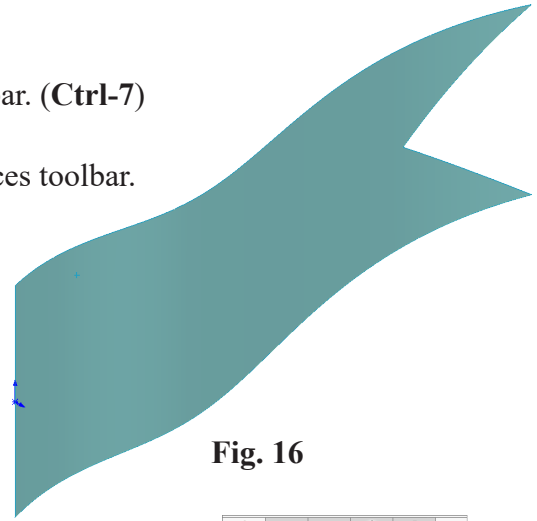






Fig. 16

## E. Thicken Surface.

Step 1 **Hide Surface-Offset1** . To hide, expand Surface Bodies  folder in the Feature Manager. Click Surface-Offset1  and **Hide**  on the context toolbar, **Fig. 17**.

Step 2. Click **Thicken**  on the Surfaces toolbar.

Step 3. In the Thicken Property Manager set:  
under Surface To Thicken, **Fig. 18**

click Surface-Trim1 in graphics area, **Fig. 19**

under Thickness:

select **Thicken Both Sides** 

**Thickness**  **.6**

click OK .

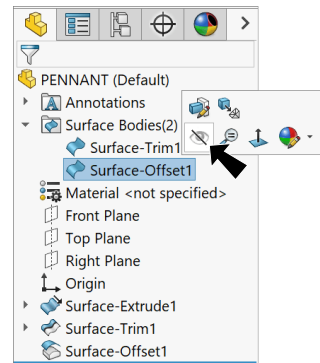


Fig. 17

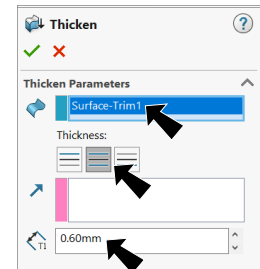


Fig. 18

Step 4. Save  (Ctrl-S).

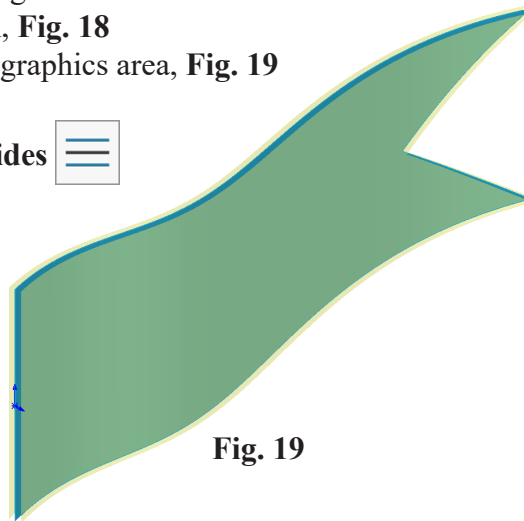


Fig. 19

## F. Create Plane.

Step 1. Click **Right Plane**  in the Feature Manager to display Plane in graphics area, **Fig. 20**.

Step 2. In graphics area **Ctrl drag Right plane to port side** of Flag and release, **Fig. 21**.

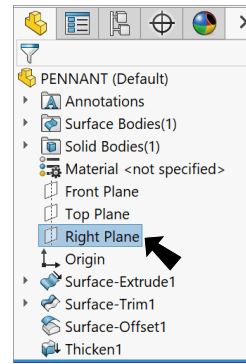
Step 3. In the Plane Property Manager set: under First Reference, **Fig. 22**

**Distance**  **4**

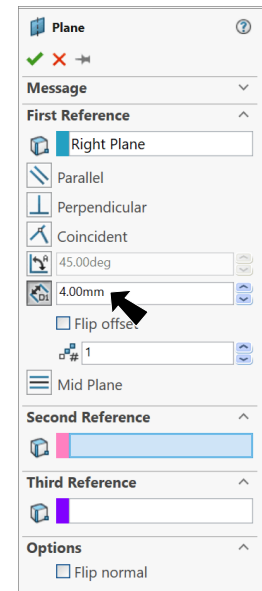
and press **ENTER**.

The new plane should be on port side, **Fig. 21**.

Click **OK** .

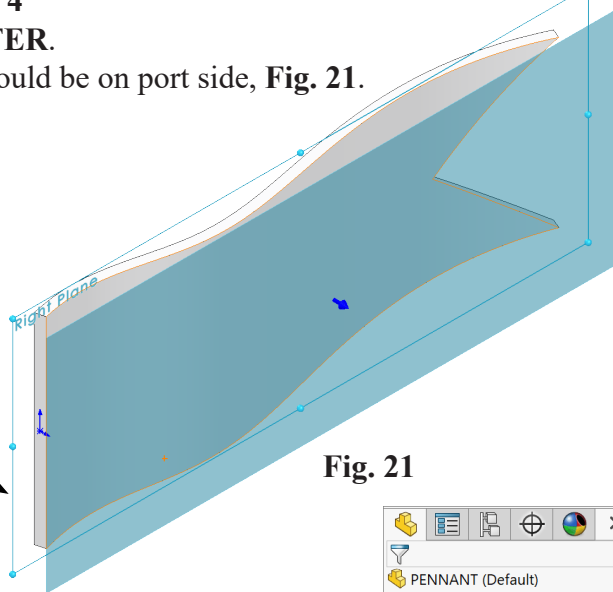


**Fig. 20**






**Fig. 22**



**Hold down Ctrl drag plane to port side**  
**Set distance 4** 






**Fig. 21**

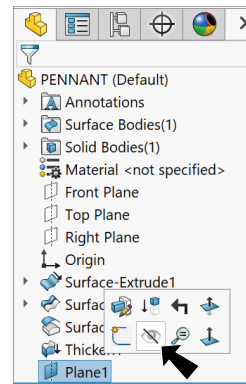
## G. Text 1.

Step 1. **Hide Plane1** . To hide, click **Plane1**  in the Feature Manager and **Hide**  on the context toolbar, **Fig. 23**.

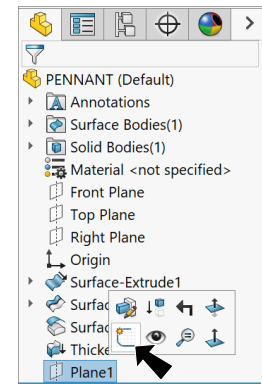
Step 2. Click **Plane1**  in the Feature Manager and click **Sketch**  on the context toolbar, **Fig. 24**.

Step 3. Click **Normal To**  on the Standard Views toolbar. (**Ctrl-8**)

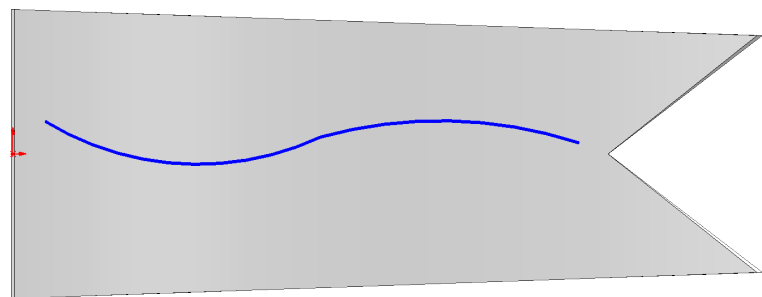
Step 4. Click **3 Point Arc**  (**S**) in the **Arc flyout**  on the Sketch toolbar.



**Fig. 23**



**Fig. 24**



**Fig. 25**

Step 5. Sketch **two chained arcs with radius of first arc down and second arc radius up**, **Fig. 25**.

Step 6. **Unselect Arc tool.** To unselect, **right click graphics area and click Select** from menu.

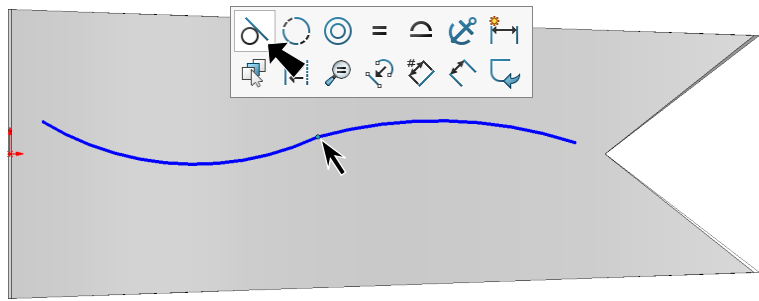


Fig. 26

Step 7. Click **endpoint between arcs** and click **Make Tangent** on the context toolbar, Fig. 26.

Step 8. **Ctrl click the three endpoints** of arcs to select all three. Release Ctrl key and click **Make Horizontal** on the context toolbar, Fig. 27.

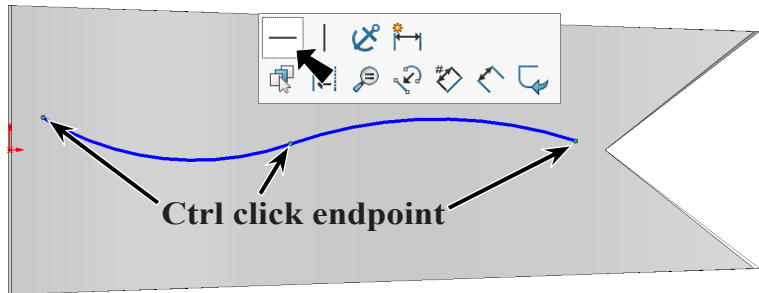


Fig. 27

Step 9. **Ctrl click both arcs** to select both. Release Ctrl key and click **Make Equal** on the context toolbar, Fig. 28.

Step 10. Click **Smart Dimension** (S) on the Sketch toolbar.

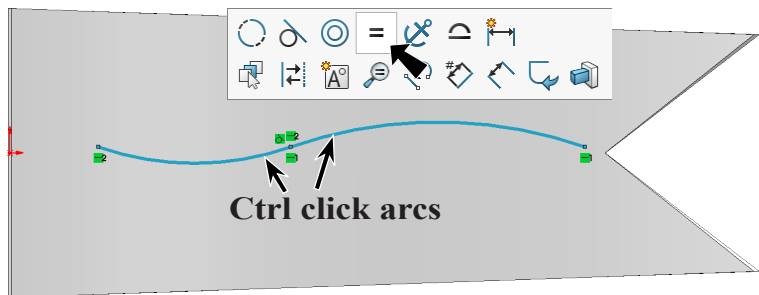


Fig. 28

Step 11. Add dimensions, Fig. 29. Be careful with dimensioning to the Origin.

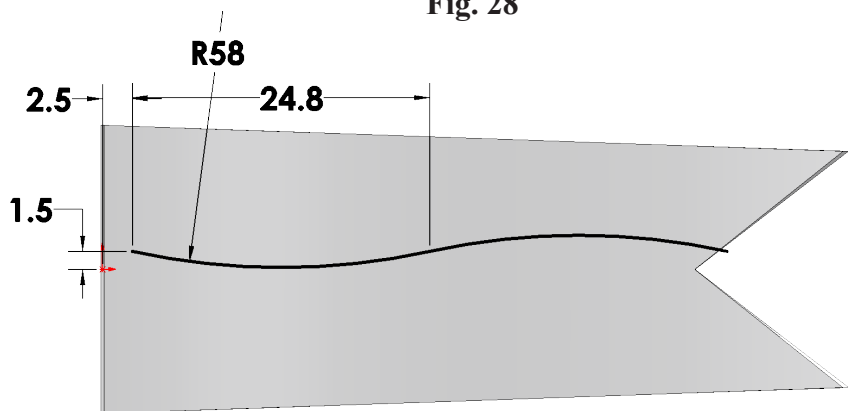
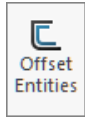


Fig. 29

Step 12. Click **Offset Entities** on the Sketch toolbar.



Step 13. In the Offset Entities Property Manager set:  
under Parameters, **Fig. 30**

**Distance** **10.5**

uncheck **Reverse**

check **Select chain**

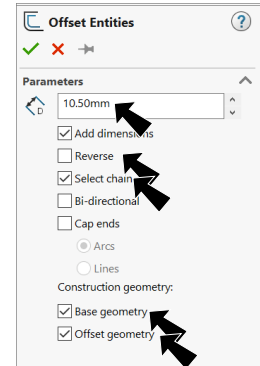
click an **arc**, **Fig. 31**

under Construction geometry

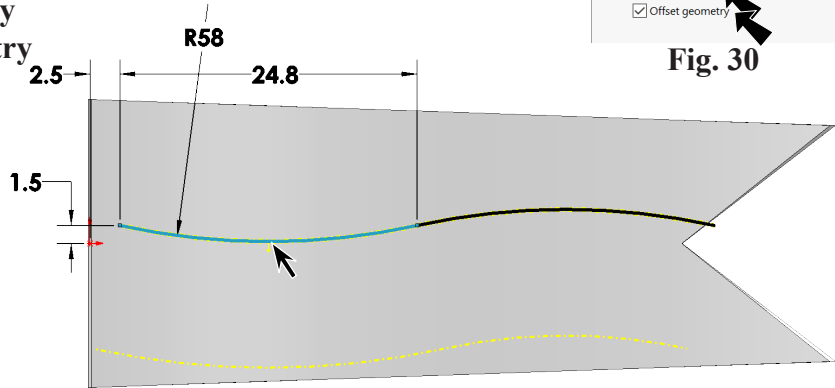
check **Base geometry**

check **Offset geometry**

click OK .



**Fig. 30**



**Fig. 31**

Step 14. Click **Text Tool**  on the Sketch toolbar.

Step 15. In the Sketch Text Property Manager set:

under Curves, **Fig. 32**  
click **both top arcs**, **Fig. 33**

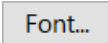
under Text  
click in the box and  
key-in **CUDA**

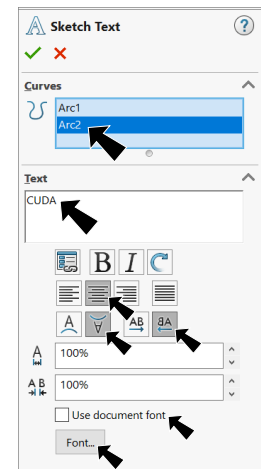
**Center Align** 

**Flip Vertical** 

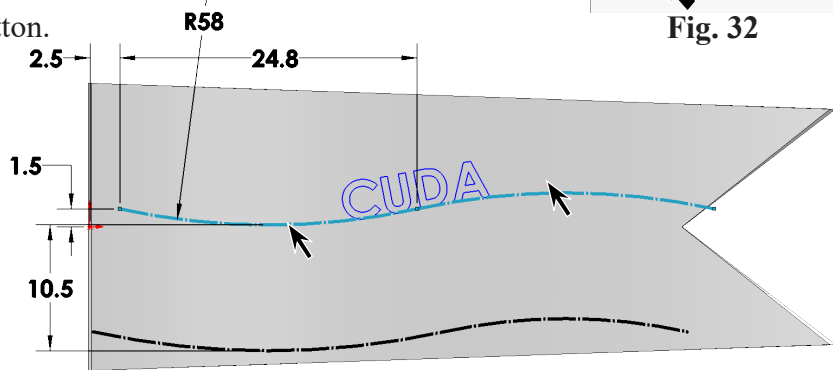
**Flip Horizontal** 

uncheck **Use document font**

click **Font**  button.



**Fig. 32**



**Fig. 33**

Step 16. In the Choose Font dialog box select:

under Font, **Fig. 34**

select **Verdana**

**Tip:** click in the Font box and press  
V key.

under Font Style

**Bold Italic**

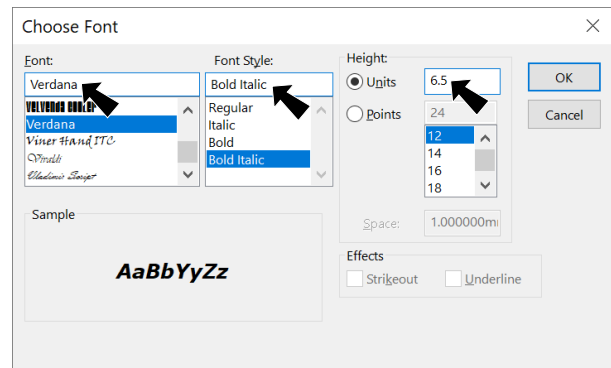
under Height

select **Units**

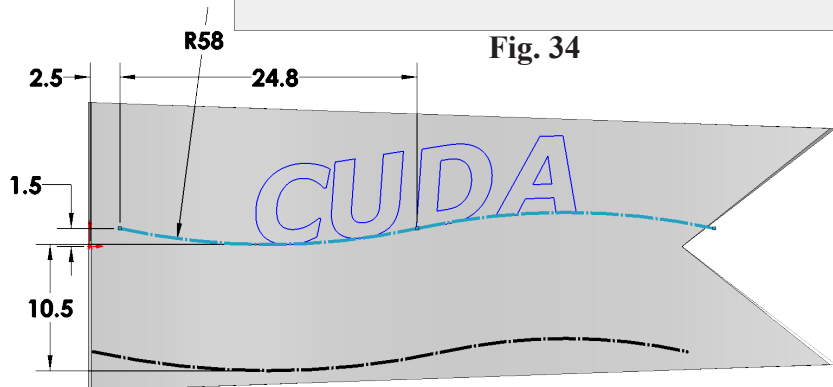
**Size 6.5**

click **OK** button

click **OK** .



**Fig. 34**




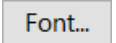


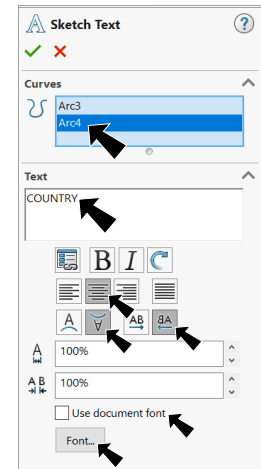
**Fig. 35**



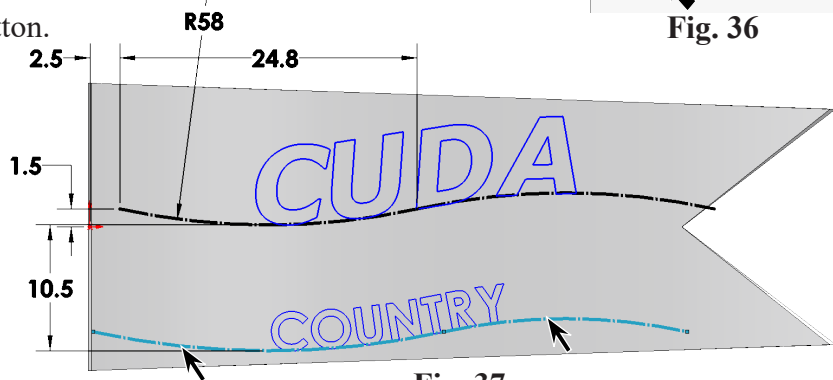
Step 17. Click **Text Tool**  on the Sketch toolbar.

Step 18. In the Sketch Text Property Manager set:

- under Curves, **Fig. 36**
- click **both offset arcs**, **Fig. 37**
- under Text
- click in the box and key-in **COUNTRY**
- Center Align** 
- Flip Vertical** 
- Flip Horizontal** 
- uncheck **Use document font**
- click **Font**  button.



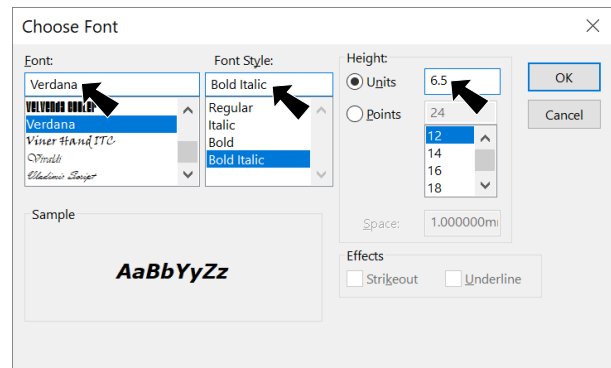
**Fig. 36**



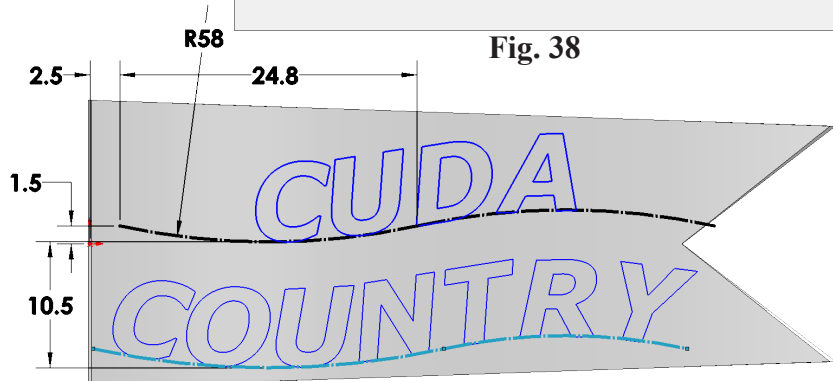
**Fig. 37**

Step 19. In the Choose Font dialog box select:


- under Font, **Fig. 38**
- select **Verdana**
- under Font Style
- Bold Italic**
- under Height
- select **Units**
- Size 6.5**
- click **OK** button
- click **OK** .



**Fig. 38**



**Fig. 39**

Step 20. Click **Isometric**  on the Standard Views toolbar. (**Ctrl-7**)

Step 21. Click **Features**  on the Command Manager toolbar.

Step 22. Click **Extruded Boss/Base**  on the Features toolbar.

Step 23. In the Boss-Extrude Property Manager set:  
under From, **Fig. 40**

Start Condition **Surface/Face/Plane**

in Surface/Face/Plane  box

expand the flyout Feature Manager design tree in the top left corner of the graphics area

and click **Surface-Offset1** , **Fig. 41**

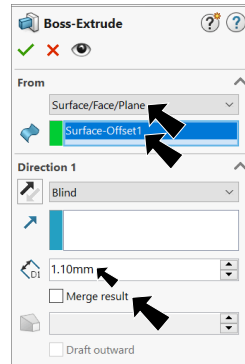
under Direction 1

End Condition **Blind**

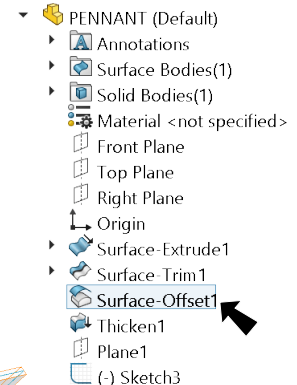
**Depth**  **D1** **1.1**

uncheck **Merge result**

click OK  .

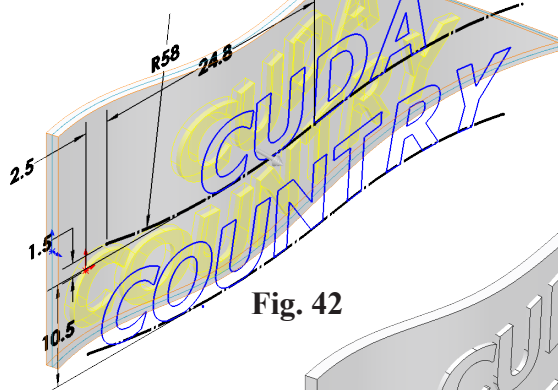


**Fig. 40**

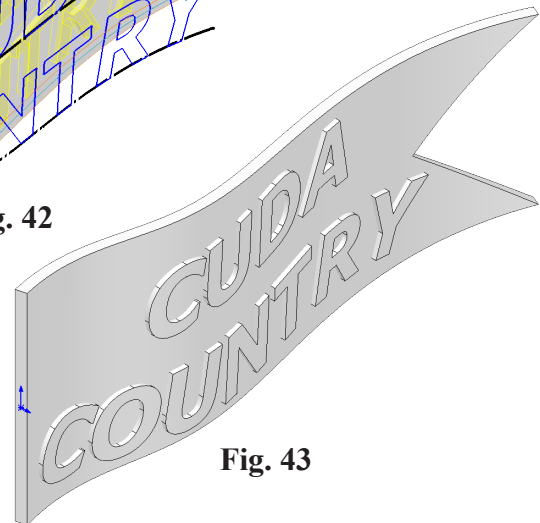


**Fig. 41**

Step 24. Save  (**Ctrl-S**).





**Fig. 42**



**Fig. 43**

## H. Save Sketch3 as Block.

Step 1. Select Sketch3 . To select, expand Boss-Extrude1 in the Feature Manager and click Sketch3 , Fig. 44.

Step 2. Click Tools Menu > Blocks > Save.

Step 3. In the Save As dialog box, Fig. 45  
key-in CUDACOUNTRY for the filename  
navigate to Documents\Tech Ed 23-24\Watermaster  
click Save button.

Step 4. Save  (Ctrl-S).

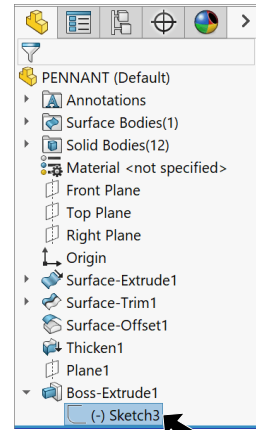


Fig. 44

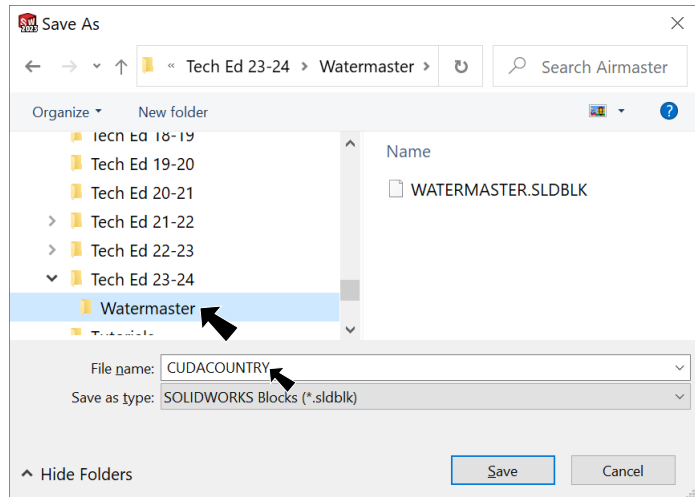




Fig. 45




## I. Insert CUDACOUNTRY Block.



Step 1. Click **Plane1**  in the Feature Manager and click **Sketch**  on the context toolbar, **Fig. 46**.


Step 2. Click **Left**  on the Standard Views toolbar. (**Ctrl-3**)

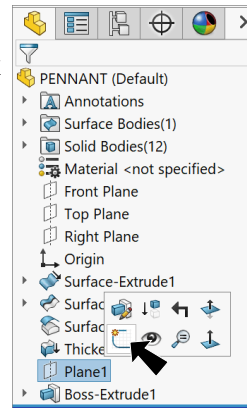
Step 3. Click Tools Menu > Blocks > Insert.

Step 4. In Insert Block Property Manager, click **Browse**, **Fig. 47** in the Open dialog box, navigate to **Documents\Tech Ed 23-24\Watermaster** and open **CUDACOUNTRY** block file, **Fig. 48** under Parameters

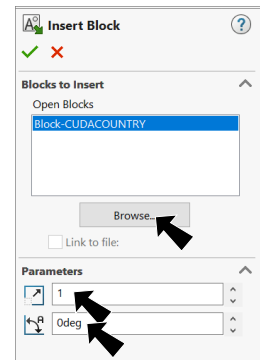
**Block Scale**  **1**  
**Block Rotation**  **0°**  
**zoom out** to see the block  
**click in center**, **Fig. 49**  
**click OK** .

Step 5. Click **Centerline**  in the **Line flyout**  on the Sketch toolbar.

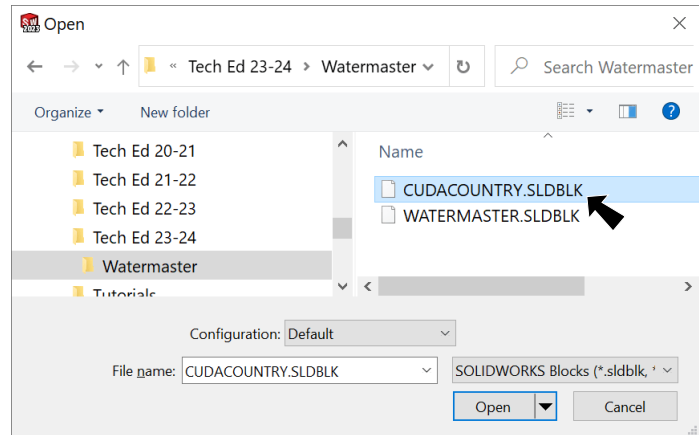
Step 6. Sketch vertical centerline left of **Origin** , **Fig. 50**.



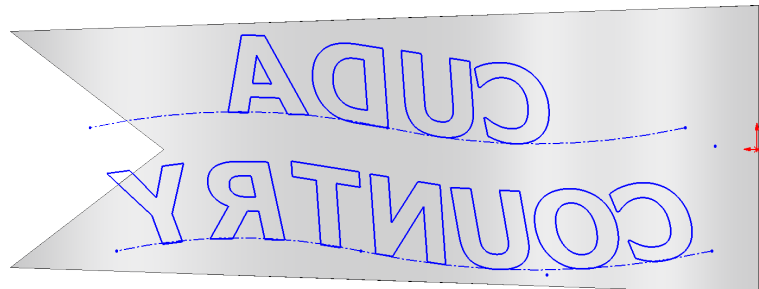
**Fig. 46**



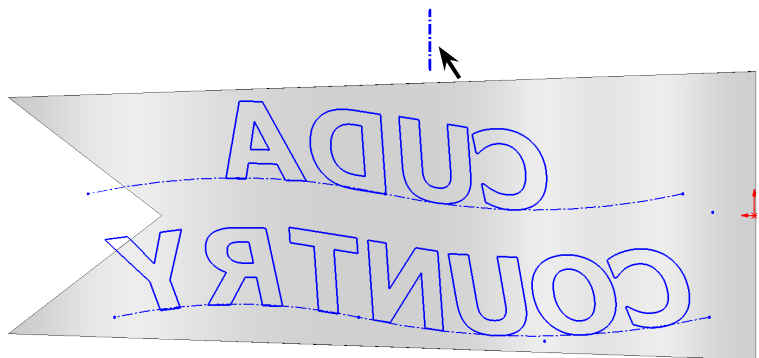
**Fig. 47**



**Fig. 48**



**Fig. 49**



**Fig. 50**

Step 7. Click **Smart Dimension**



(S) on the Sketch toolbar.

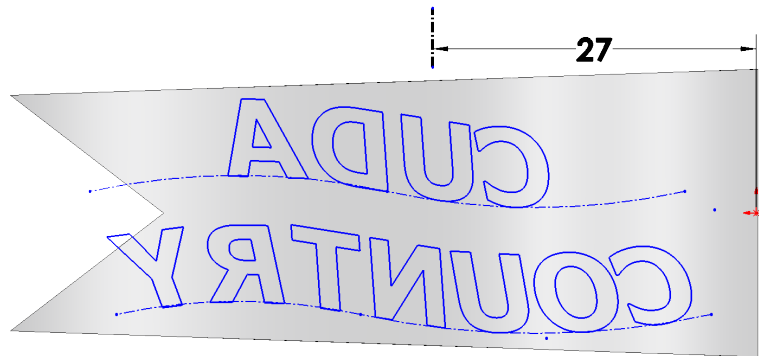
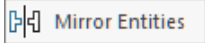


Fig. 51

Step 8. Add **dimension 27**, Fig. 51.

Step 9. Click **Mirror Entities**



on the Sketch toolbar.

Step 10. In the Mirror Property Manager set:

under Options Entities to mirror, Fig. 52

click a **construction arc** to select **Block**, Fig. 53

uncheck **Copy**

click in the Mirror about box

click **centerline**

click **OK** ✓.

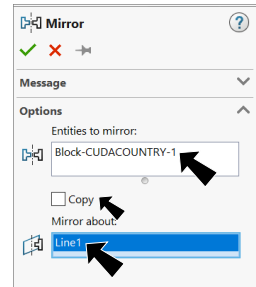


Fig. 52

Step 11. Click **Smart Dimension**



(S) on the Sketch toolbar.



Fig. 53

Step 12. Add dimensions, Fig. 54.

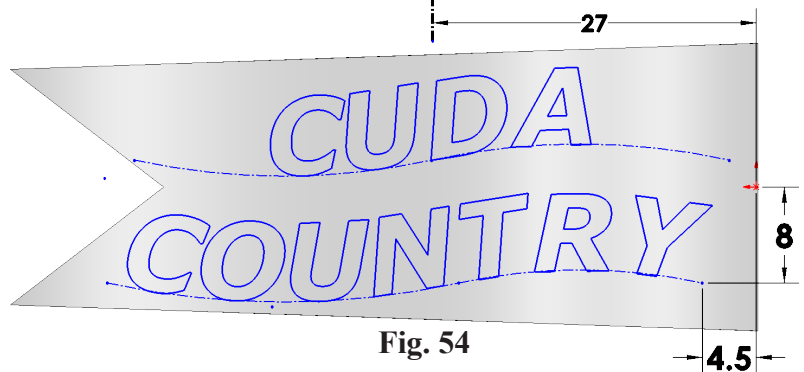




Fig. 54



Step 13. Rotate view to left side, **Fig. 57**. To rotate view, click **Isometric**  and **Shift-Ctrl click the Y axis of the Reference Triad** .

Step 14. Click **Features**  on the Command Manager toolbar.

Step 15. Click **Extruded Boss/Base**  on the Features toolbar.

Step 16. In the Boss-Extrude Property Manager set: under From, **Fig. 55**

Start Condition **Surface/Face/Plane**

in Surface/Face/Plane  box expand the flyout Feature Manager design tree and click **Surface-Offset1** , **Fig. 56**.

under Direction 1

End Condition **Blind**

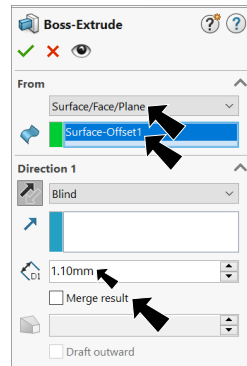
Depth  **1.1**

**Reverse Direction** 

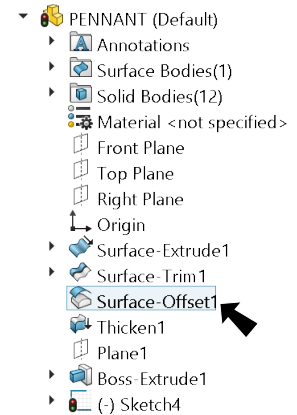
uncheck **Merge result**

click **OK** .

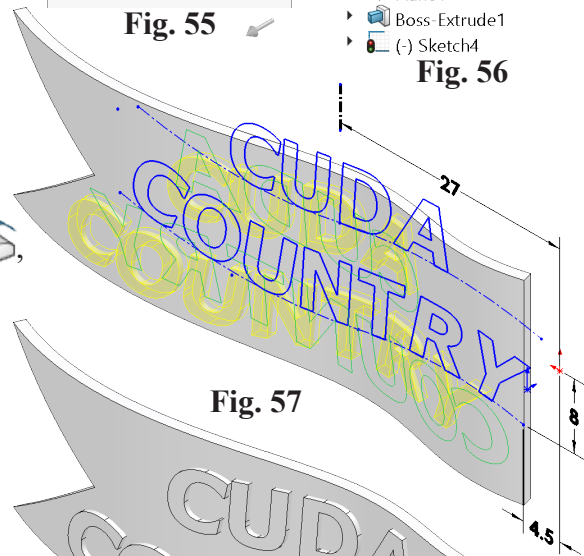
Step 17. Save  (**Ctrl-S**).



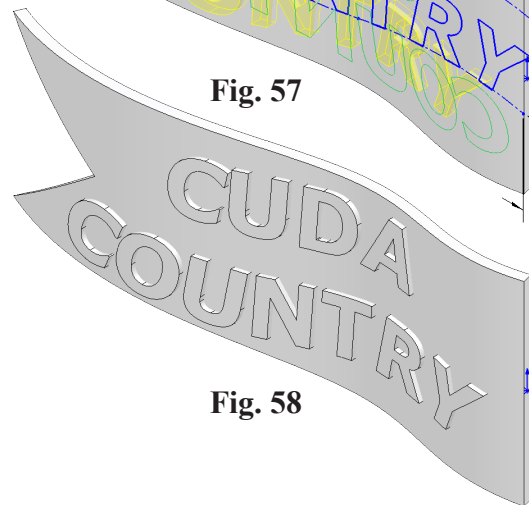
**Fig. 55**



**Fig. 56**






**Fig. 57**



**Fig. 58**

## J. Jackstaff.

Step 1. Click **Top Plane**  in the Feature Manager and click **Sketch**  on the context toolbar, **Fig. 59**.

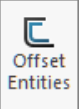
Step 2. Click **Normal To**  on the Standard Views toolbar. (**Ctrl-8**)

Step 3. Click **Circle**  (S) on the Sketch toolbar.

Step 4. Sketch circle at Origin , **Fig. 60**.

Step 5. Click **Smart Dimension**  (S) on the Sketch toolbar.

Step 6. Dimension **diameter 4.5**, **Fig. 60**.

Step 7. Click **Offset Entities**  on the Sketch toolbar.

Step 8. In the Offset Entities Property Manager set:  
under Parameters, **Fig. 61**

**Distance**  **.3**  
(clearance for Out Pipe hole)  
check **Reverse**

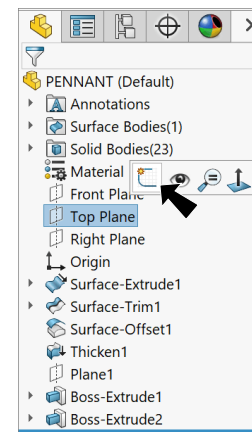
under Construction geometry

check **Base geometry**  
uncheck **Offset geometry**

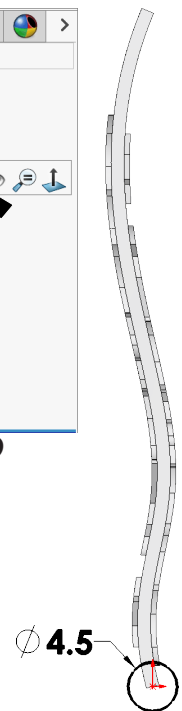
click circle, **Fig. 62**

**yellow offset circle on inside -**  
**base geometry (construction) on outside**

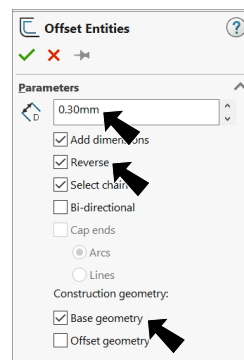
click OK .



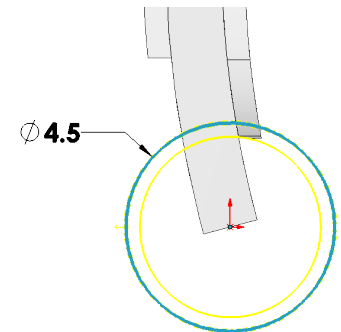
**Fig. 59**



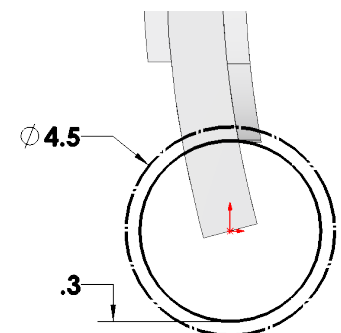
**Fig. 60**




**Fig. 61**



**Fig. 62**



**Fig. 63**

Step 9. Click **Isometric**  on the Standard Views toolbar. (**Ctrl-7**)

Step 10. Click **Features**  on the Command Manager toolbar.

Step 11. Click **Extruded Boss/Base**  on the Features toolbar.

Step 12. In the Boss-Extrude Property Manager set:

under Direction 1, **Fig. 64**

End Condition **Blind**

Depth  **D1** 15

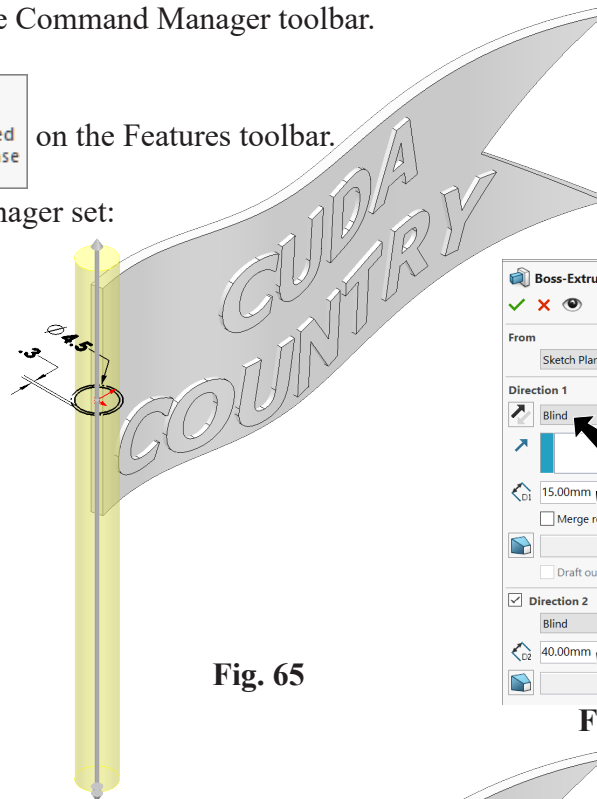
uncheck **Merge result**

under Direction 2

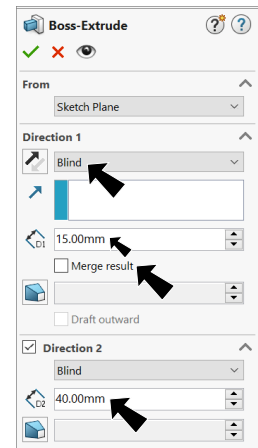
End Condition **Blind**

Depth  **D2** 40

click **OK**  .



**Fig. 65**



**Fig. 64**

Step 13. Save  (**Ctrl-S**).

## K. Fillet.

Step 1. Click **Fillet**  on the Features toolbar.

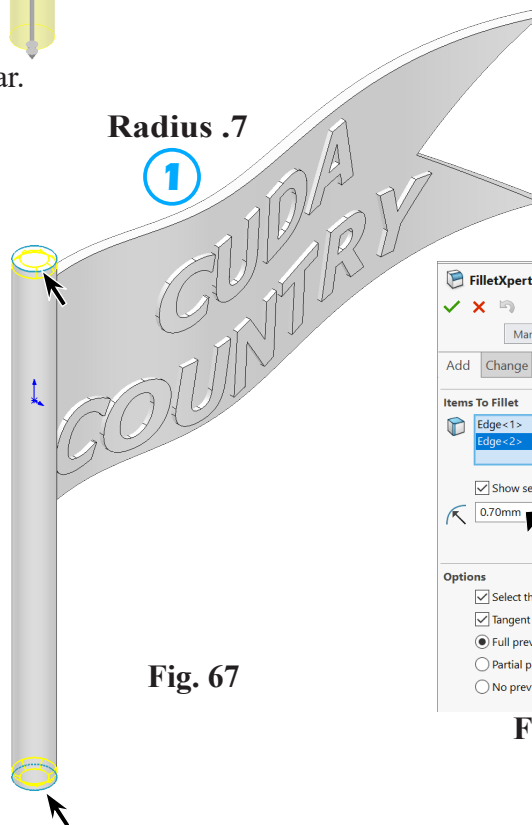
Step 2. In the Fillet Property Manager set:  
select **FilletXpert**, **Fig. 66**

① **Radius**  **.7**

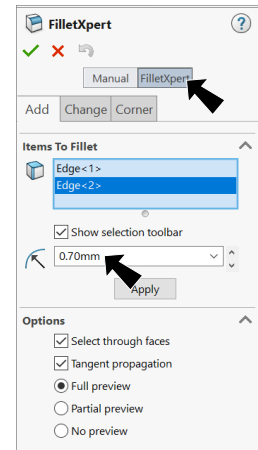
click **both circular edges of Extrude3**, **Fig. 67**

click **OK**  .

Step 3. Save  (**Ctrl-S**).





**Fig. 67**



**Fig. 66**



## L. Appearance: White and Blue Bodies.

Step 1. Click part, click **Appearance Callout**  on the context toolbar and click **PENNANT** , Fig. 68.

Step 2. In the Appearances Property Manager set:  
under Color, Fig. 69

click the **white swatch**

click **Keep Visible**  and OK .

The Push Pin  on allows selection of another appearance.

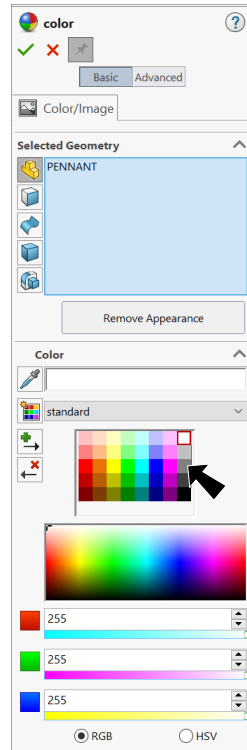


Fig. 69

Step 3. In the Appearances Property Manager,  
under Selected Geometry

click **Select Bodies** , Fig. 71

click **Thicken1**, Fig. 72

under Color

set **RGB values to:**

**R 105**

**G 171**

**B 238**

click OK  and click

Cancel .

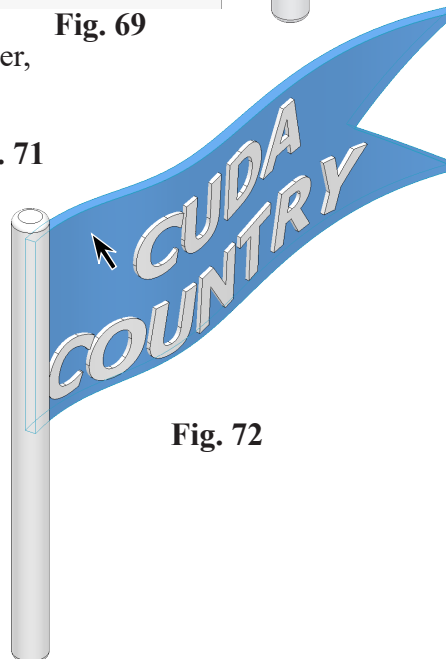


Fig. 72

Step 4. Save  (Ctrl-S).

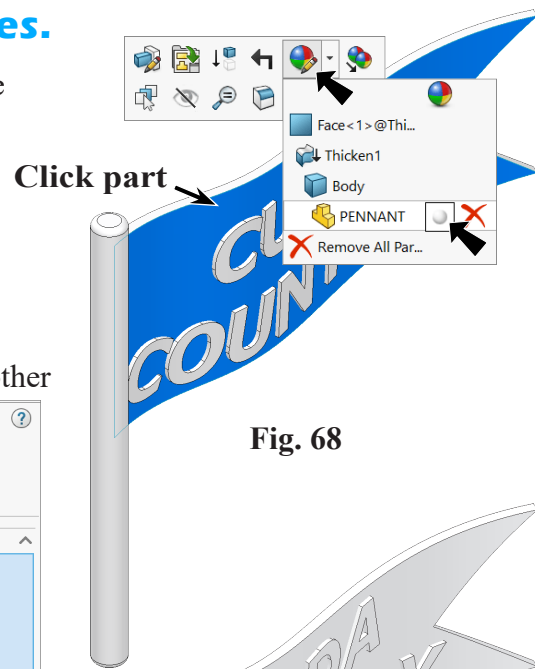


Fig. 68



Fig. 70

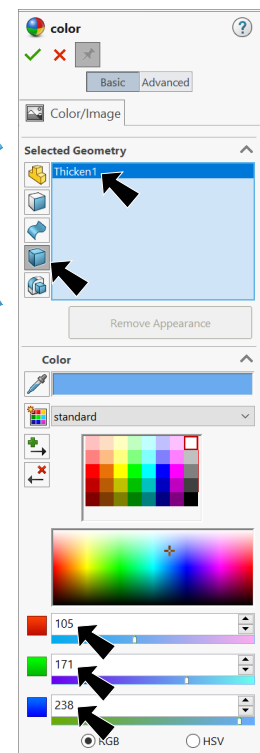
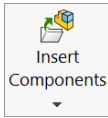


Fig. 71

## M. Open Assembly File and Insert Pennant.

Step 1. Open your **WATERMASTER ASSEMBLY** file.

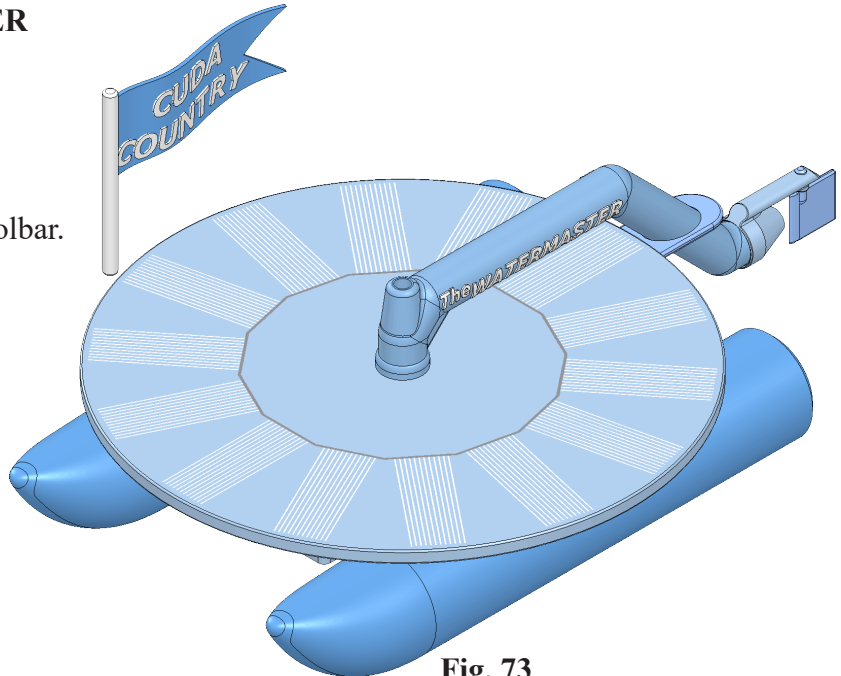
Step 2. Click **Insert Components**



on the Assembly toolbar.

Step 3. Click **PENNANT** file and click Open from the Open dialog box.

Step 4. Click to place Pennant as positioned in **Fig. 73**.



**Fig. 73**

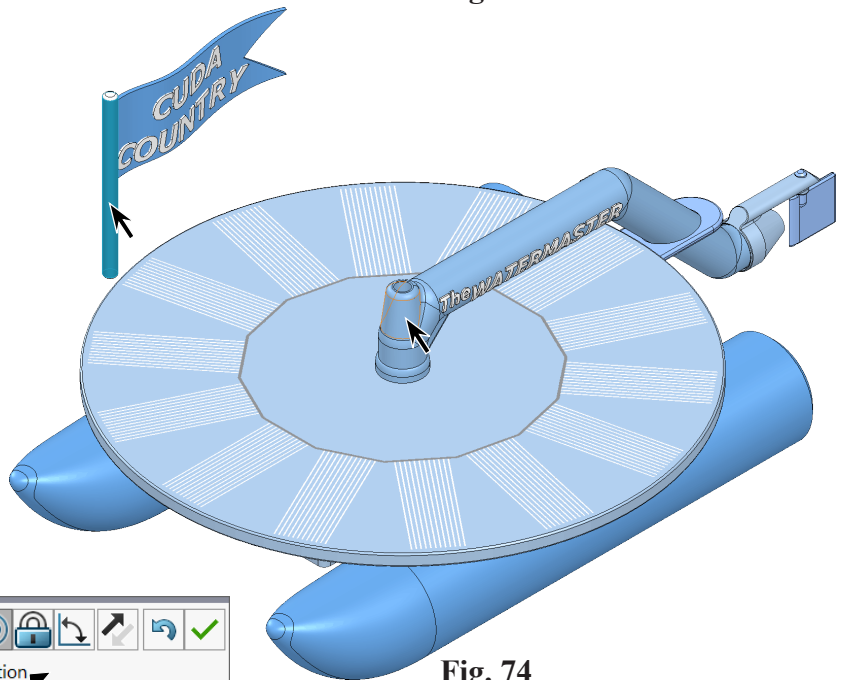
## N. Mate: Pennant.

Step 1. Click **Mate**



Step 2. Click **cylindrical face of staff** and **cylindrical face of mount on Pipe**, **Fig. 74**.

Step 3. Check **Lock Rotation** and Add/Finish Mate  in Mate pop-up toolbar to add a **Concentric** mate, **Fig. 75**.

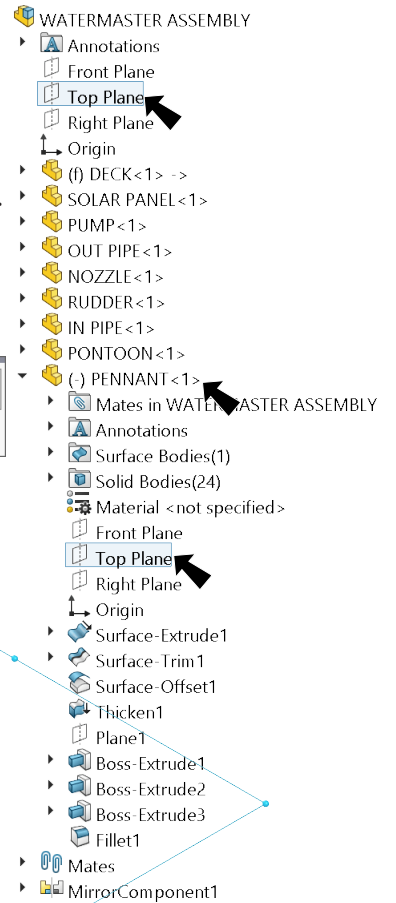


**Fig. 74**



**Fig. 75**

Step 4. Expand the flyout Feature Manager design tree and click **Top Plane**. Expand **PENNANT** and click **Top Plane**, Fig. 76.



Step 5. Click **Distance** in Mate pop-up, Fig. 77. Set distance **64.1** and press ENTER. The **Pennant** should be end of mount, Fig. 78.

If positioned in opposite direction, click **Flip Dimension** in the Mate pop-up. Click Add/Finish Mate to add Distance mate.



Fig. 77

Step 6. Click OK in the Property Manager.

Step 7. Save (Ctrl-S).

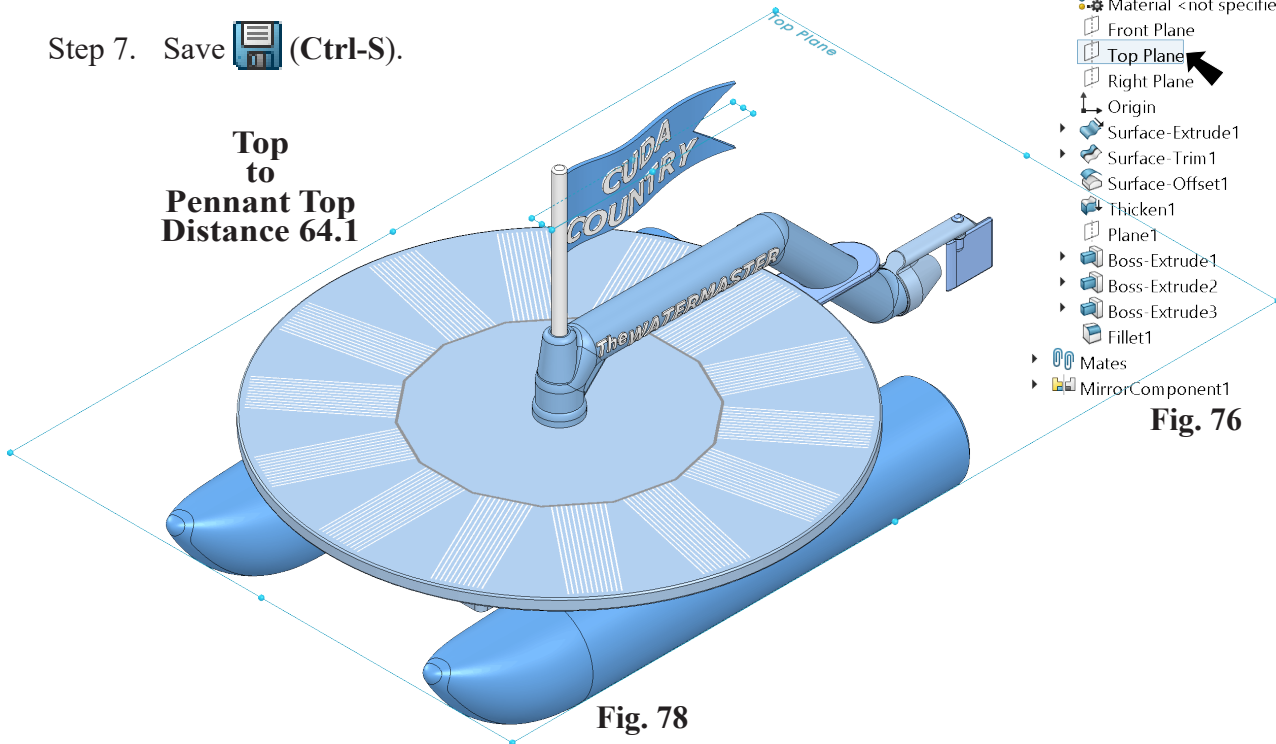


Fig. 76

Fig. 78