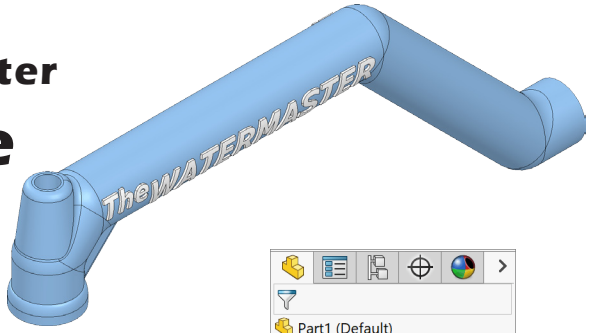
Chapter 6

The Watermaster
Out Pipe



A. Sweep Sketch1 Path.

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

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

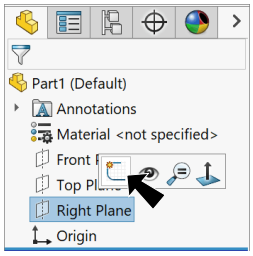


Fig. 1

Step 3. Click **Line** **(L)** on the Sketch toolbar.

Step 4. Sketch a chain of 5 lines starting at the Origin , **Fig. 2**.

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

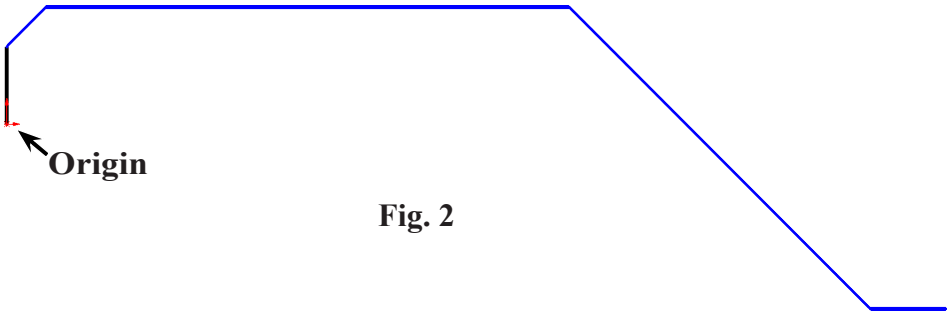


Fig. 2

Step 6. Add dimensions, **Fig. 3**.

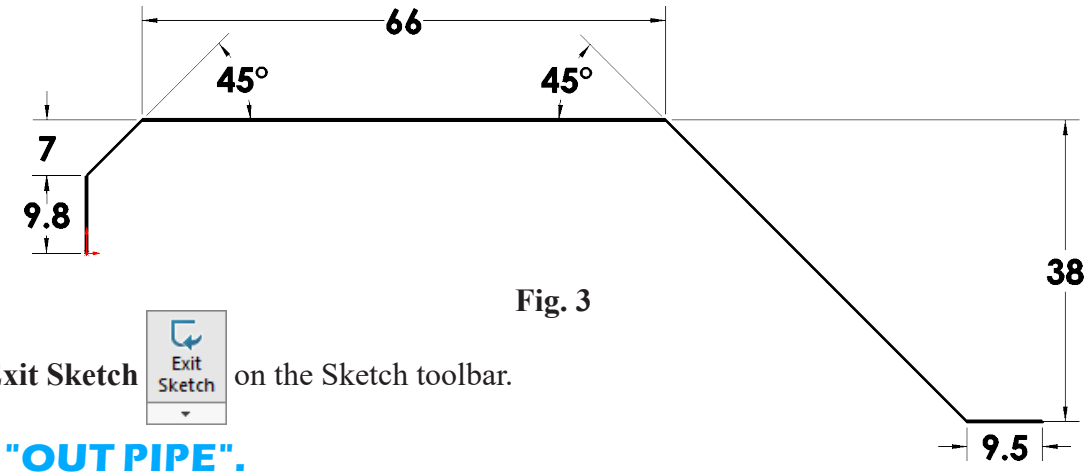


Fig. 3

Step 7. Click **Exit Sketch** on the Sketch toolbar.

B. Save as "OUT PIPE".

Step 1. Click File Menu > Save As.

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

C. Sweep Sketch2 Profile.

Step 1. Click **Top Plane** in the Feature Manager and click **Sketch** on the context toolbar, **Fig. 4**.

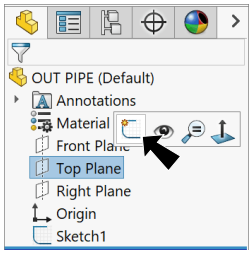


Fig. 4

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

Step 3. Click **Circle** on the Sketch toolbar.

Step 4. Sketch a circle starting at the Origin , **Fig. 5**.

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

Step 6. Dimension circle **diameter 10.5**, **Fig. 6**.

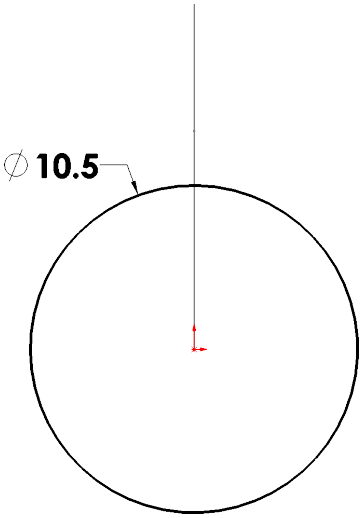


Fig. 6

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

Step 8. In the Offset Entities Property Manager set:
under Parameters, **Fig. 7**
Distance .1 (clearance for Pump nozzle)
uncheck **Reverse**
uncheck **Bi-directional**
under Construction geometry
check **Base geometry**
click **circle**, **Fig. 8**
Yellow offset circle on outside - base geometry (construction) on inside.
Click **Keep Visible** and OK . The Push Pin on allows selection of another offset.

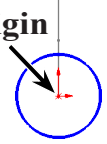


Fig. 5

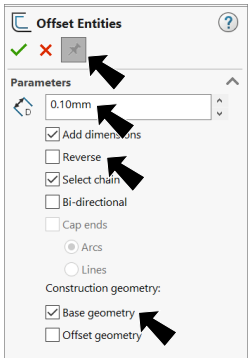


Fig. 7

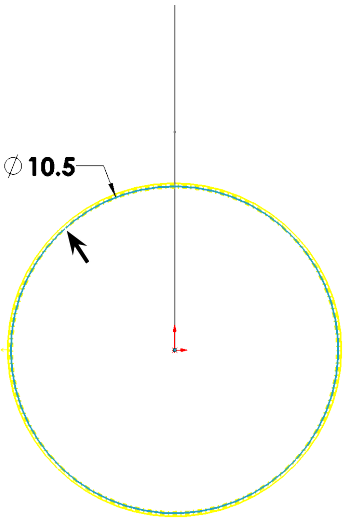


Fig. 8

Step 9. Still in the Offset Entities Property Manager set:
under Parameters, **Fig. 9**
Distance **.7**
under Construction geometry
uncheck **Base geometry**
click **offset circle**, **Fig. 10**
Yellow offset circle on outside
click OK **twice**.

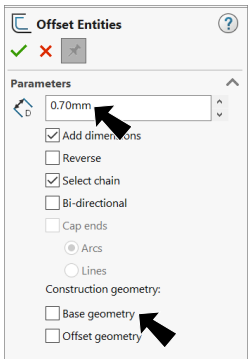


Fig. 9

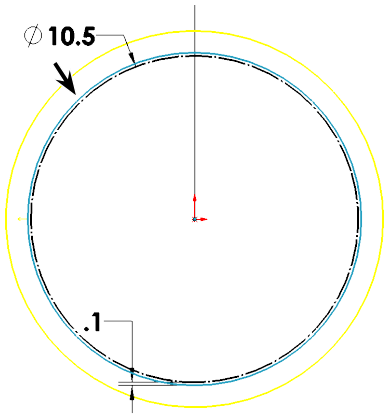


Fig. 10

Step 10. Click **Isometric** on the Standard Views toolbar. (**Ctrl-7**)

Step 11. Click **Features** Features on the Command Manager toolbar.

Step 12. Click **Swept Boss/Base** Swept Boss/Base on the Features toolbar.

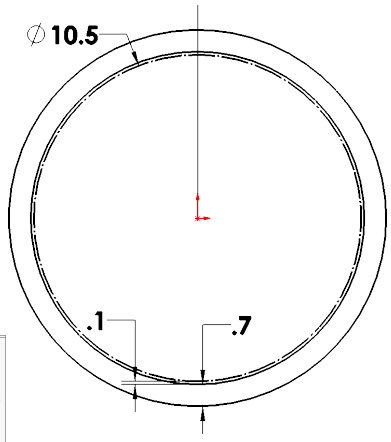


Fig. 11

Step 13. In the Swept Boss/Base Property Manager:
under Profile and Path, **Fig. 12**
Profile **Sketch2** is preselected
Path click **Sketch1**
click OK .

Step 14. Save (**Ctrl-S**).

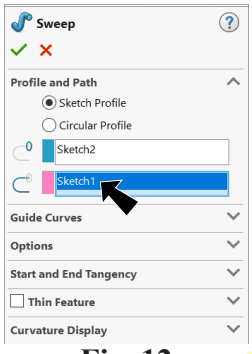


Fig. 12

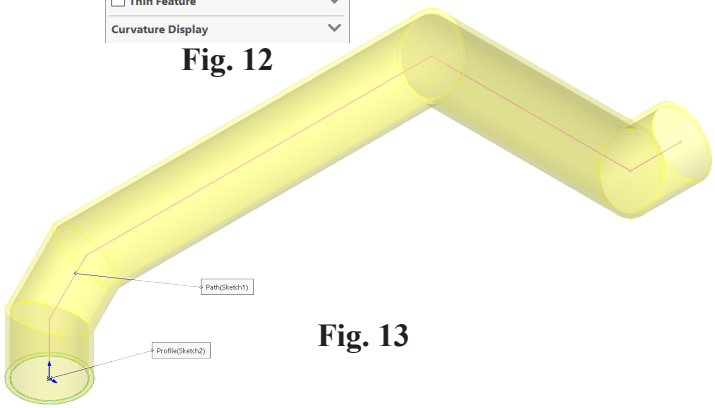


Fig. 13

D. Extrude1 Sketch3 Support Ring.

Step 1. Click **Top Plane** in the Feature Manager and click **Sketch** on the context toolbar, **Fig. 14**.

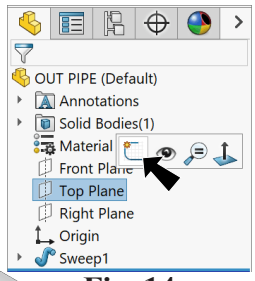


Fig. 14

Step 2. Click **Convert Entities** on the Sketch toolbar.

Step 3. In the Convert Entities Property Manager:
under Entities to Convert, **Fig. 15**
click **outside circular edge of Sweep at Origin**, **Fig. 16**
click OK .

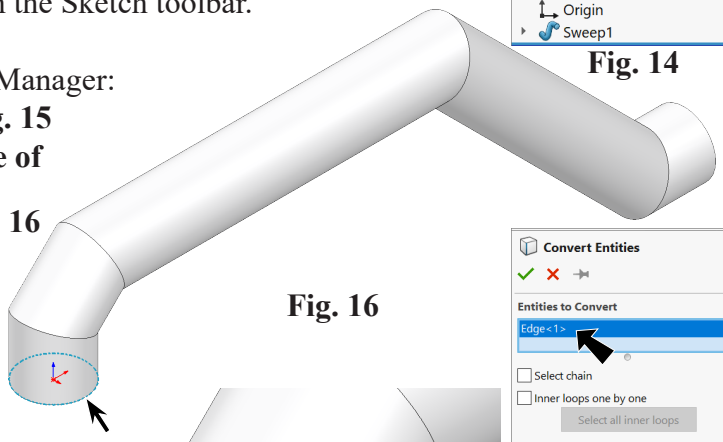


Fig. 16

Fig. 15

Step 4. Click **Offset Entities** on the Sketch toolbar.

Step 5. In the Offset Entities Property Manager set:
under Parameters, **Fig. 17**
Distance .7
click **converted circle**, **Fig. 18**
Yellow offset circle on outside
click OK .

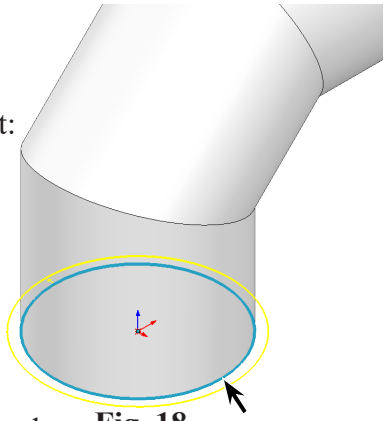


Fig. 18

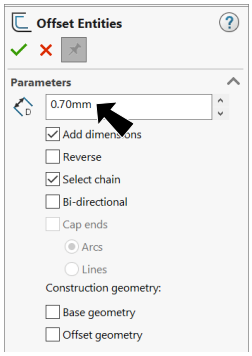


Fig. 17

Step 6. Click **Features** on the Command Manager toolbar.

Step 7. Click **Extruded Boss/Base** on the Features toolbar.

Step 8. In the Boss-Extrude Property Manager set:
under Direction 1, **Fig. 19**
End Condition **Blind**
Depth 3.8
click OK .

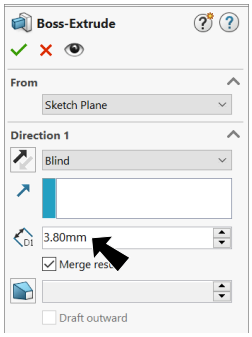


Fig. 19

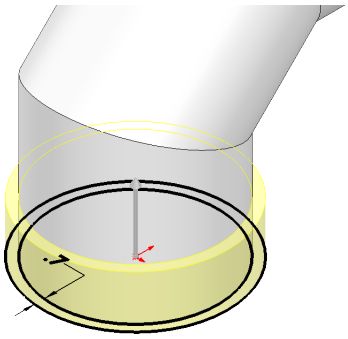


Fig. 20

Step 9. Save **(Ctrl-S)**.

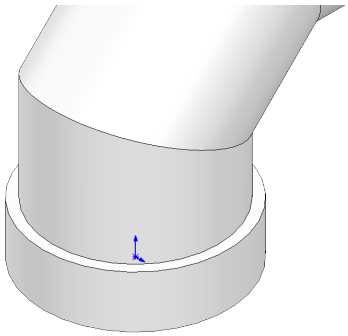


Fig. 21

E. Rib Sketch4 3D Print Support.

Step 1. Click **Right Plane** in the Feature Manager and click **Sketch** on the context toolbar, **Fig. 22**.

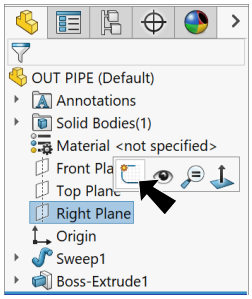


Fig. 22

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

Step 3. Click **Line** **(L)** on the Sketch toolbar.

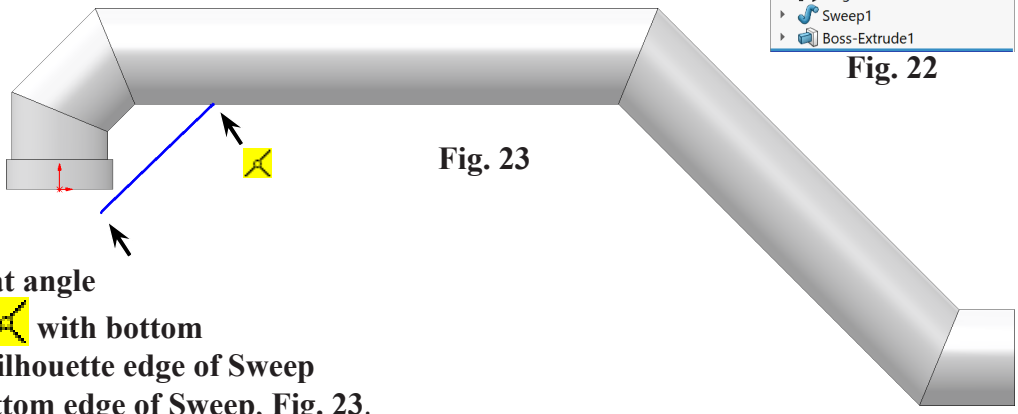


Fig. 23

Step 4. Sketch **line at angle coincident with bottom horizontal silhouette edge of Sweep to below bottom edge of Sweep**, **Fig. 23**.

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

Step 6. Add dimensions, **Fig. 24**.

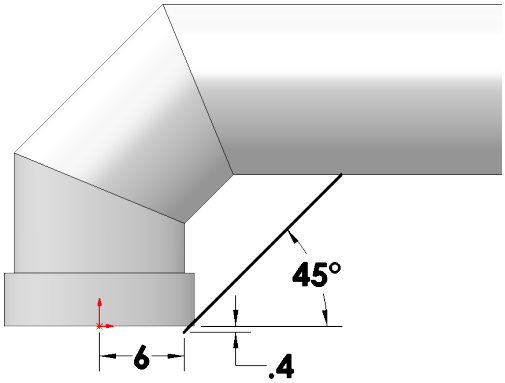


Fig. 24

Step 7. Rotate view up to view Rib, use **Left Arrow key** **3 times.**

Step 8. Click **Features** on the Command Manager toolbar.

Step 9. Click **Rib** on the Features toolbar.

Step 10. In the Rib Property Manager set:

under Parameters, **Fig. 25**

select Both Sides

Rib Thickness **2.7**

The **Direction arrow** should point towards Sweep, **Fig. 26**.

If arrow is pointing in wrong direction, check **Flip material side**.

click OK .

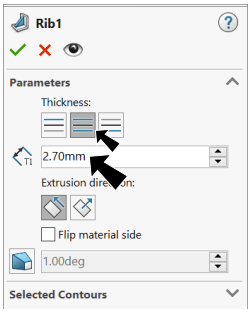


Fig. 25

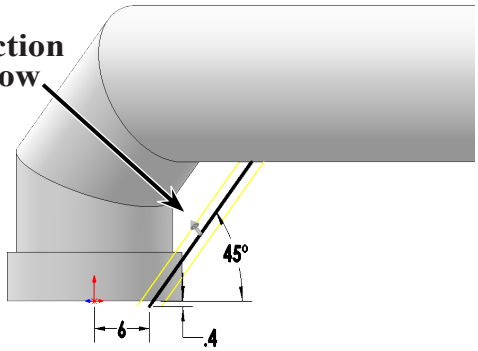


Fig. 26

Step 11. Save **(Ctrl-S)**.

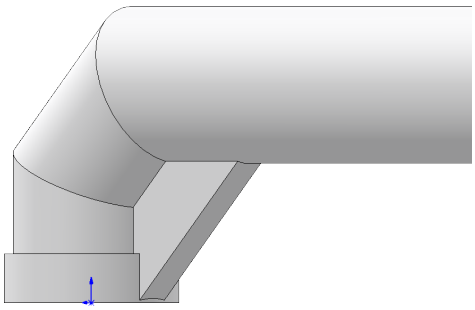


Fig. 27

F. Fillet1 Sweep 45s.

Step 1. Click **Fillet** 

on the Features toolbar.

Step 2. In the Fillet Property Manager set:
select **FilletXpert**, **Fig. 28**

① **Radius** 6
click **edges of Sweep at the 45s**, **Fig. 29**

click OK .

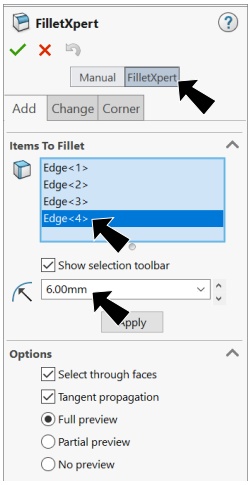


Fig. 28

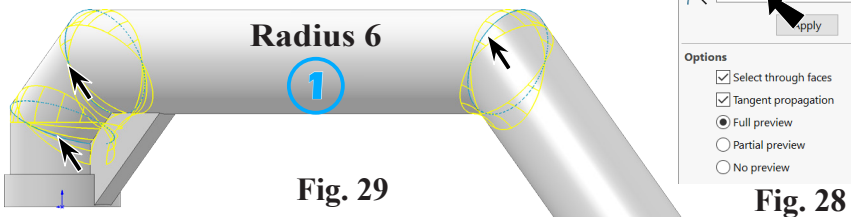


Fig. 29

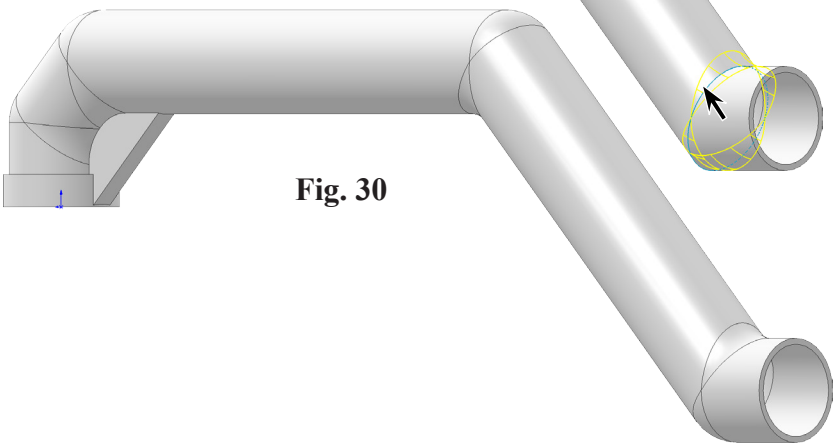


Fig. 30

G. Extrude2 Sketch5 Flag Mount.

Step 1. Click **Top Plane** in the Feature Manager and click **Sketch** on the context toolbar, **Fig. 31**.

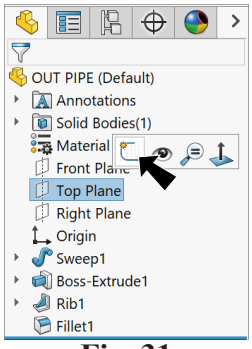


Fig. 31

Step 2. Click **Isometric** on the Standard Views toolbar. (**Ctrl-7**)

Step 3. Click **Circle** on the Sketch toolbar.

Step 4. Sketch a circle starting at the Origin , **Fig. 32**.

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

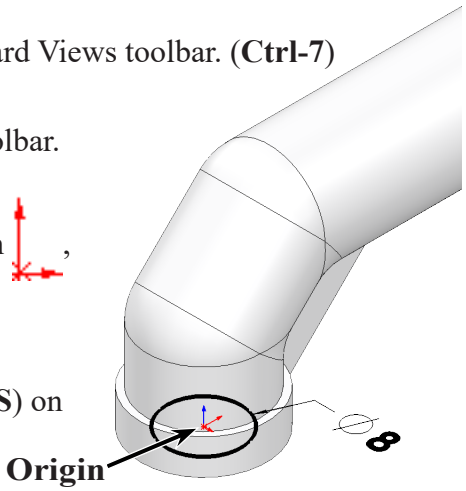


Fig. 32

Step 6. Dimension **diameter 8**, **Fig. 32**.

Step 7. Click **Features** on the Command Manager toolbar.

Step 8. Click **Extruded Boss/Base** on the Features toolbar.

Step 9. In the Boss-Extrude Property Manager set:

under From, **Fig. 33**
Start Condition **Offset**
Offset Value 24.5
under Direction 1
Reverse Direction
End Condition **Up To Body**
click **body**, **Fig. 34**
click **Draft** **7º**
check **Draft outward**
click OK .

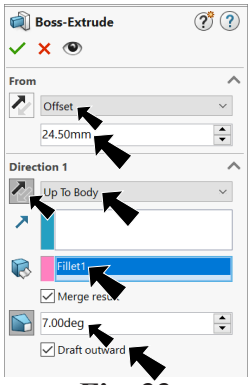


Fig. 33

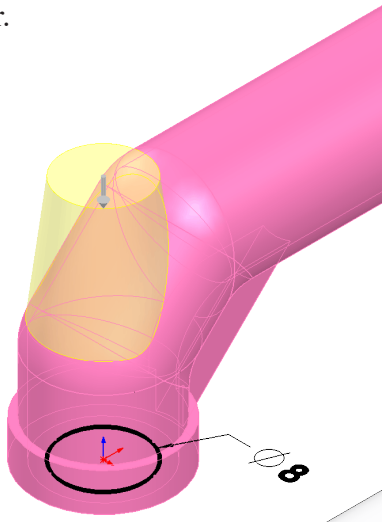


Fig. 34

Step 10. Save (**Ctrl-S**).

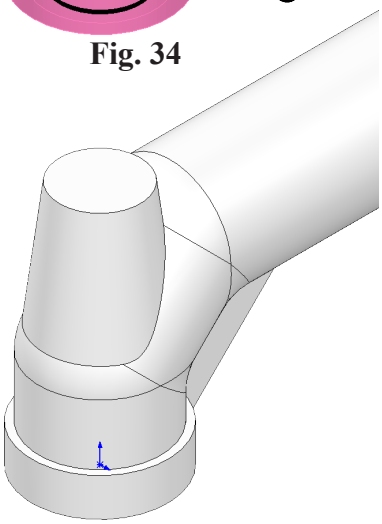


Fig. 35

H. Hole Wizard.

Step 1. Click **Hole Wizard** 

on the Features toolbar.

Step 2. In the Property Manager on the Type tab set:

under Hole Type, **Fig. 36**

select **Hole** 

under Standard:

select **ANSI Metric**

under Type:

Drill Sizes

under Size:

select **4.5**

check **Show custom sizing**

Angle at Bottom  **90º**

under End Condition

Blind

Blind Hole Depth  **6**

select **Depth up to Tip** 

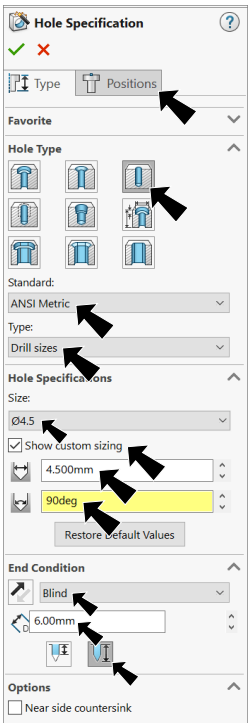


Fig. 36

Step 3. Click **Positions tab** 

at top of Property Manager.

Step 4. Click **top face of flag mount** one time as face for hole and click the **Origin**  to place the point, **Fig. 37**.

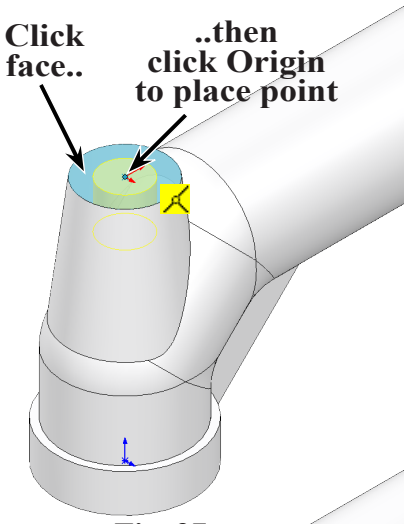


Fig. 37

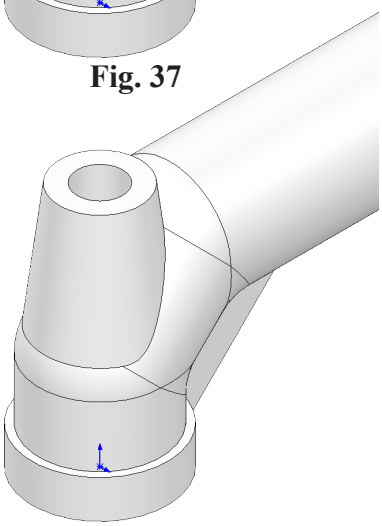


Fig. 38

Step 5. Click OK  in Hole Property Manager.

Step 6. Save  (**Ctrl-S**).

I. Fillet2 Manual Ring Support.

Step 1. Click **Fillet** 

on the Features toolbar.

Step 2. In the Fillet Property Manager,
select **Manual**, **Fig. 39**
under Fillet Type
select **Constant Size Fillet** 
under Items To Fillet
click **top outside circular edge of Extrude1**
under Fillet Parameters
Fillet Method **Asymmetric**
② Distance 1 **2**
Distance 2 **.7**
The long 2 should be on the **side of Extrude1**, **Fig. 40**
If positioned in opposite direction,
click **Reverse Direction** 
click OK ✔ .

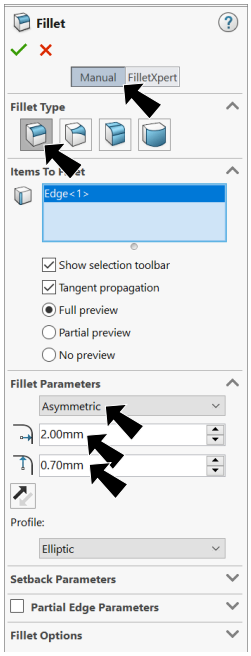


Fig. 39

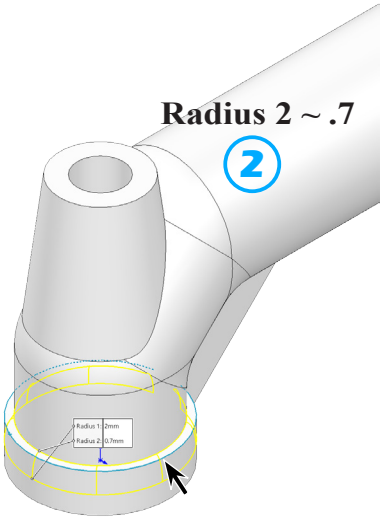


Fig. 40

J. Fillet 3-6.

Step 1. Click **Fillet** 

on the Features toolbar.

Step 2. In the Fillet Property Manager set:
select **FilletXpert**, **Fig. 41**
③ **Radius** **1.5**
click **edge of flag mount at Sweep**, **Fig. 42**
click **Apply**

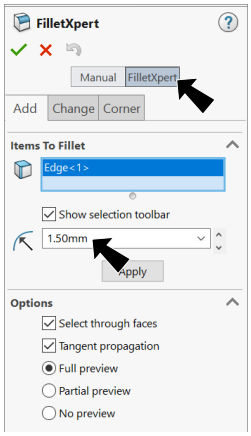


Fig. 41

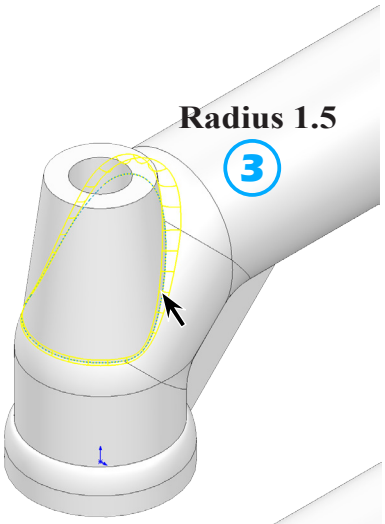


Fig. 42

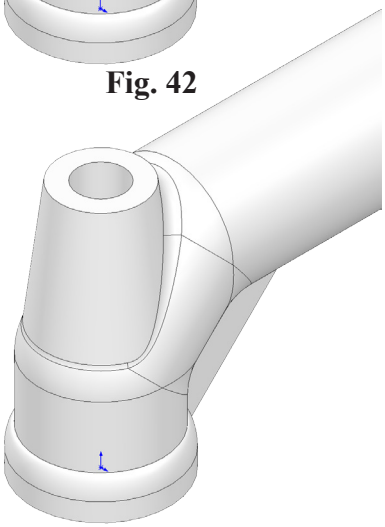


Fig. 43

Step 3. Still n the Fillet Property Manager set:

④ **Radius** 1.5, **Fig. 44**
click **top outer circular edge of flag mount**, **Fig. 45**
click **Apply**

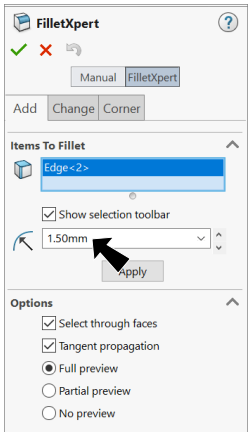


Fig. 44

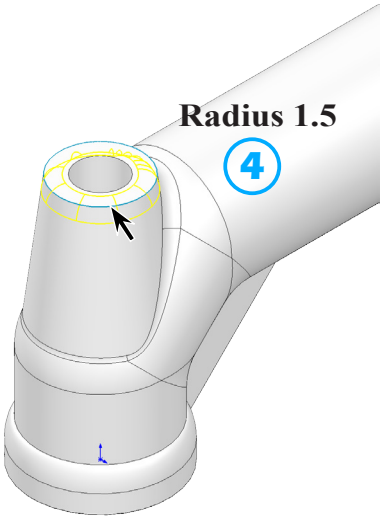


Fig. 45

Rotate to view Rib. Use **Left Arrow key** **7 times**.

⑤ **Radius** 1
click **edges of Rib** (2), **Fig. 46**
click **Apply**

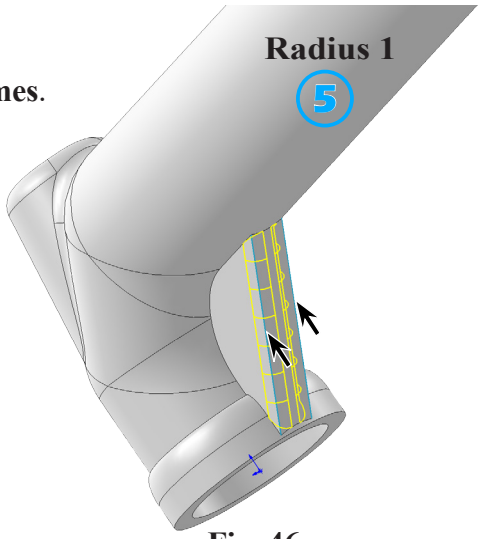


Fig. 46

⑥ **Radius** 1.2
click **edges of Rib at Sweep** (2), **Fig. 47**
click OK .

Step 4. Save (**Ctrl-S**).

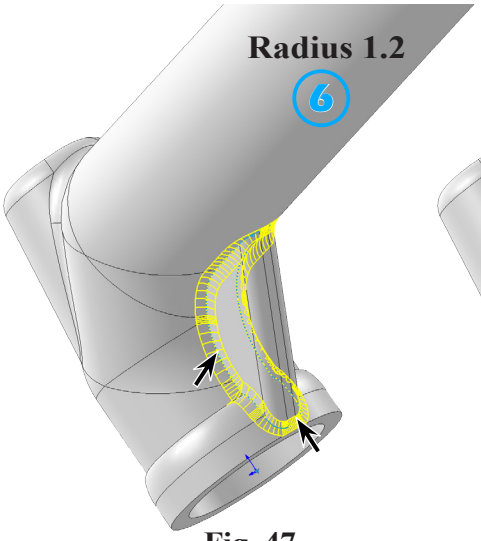


Fig. 47

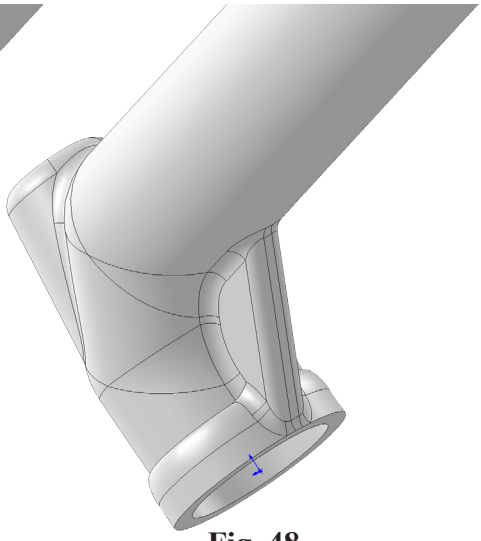


Fig. 48

K. Section View.

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

Step 2. Click **Section View** in View toolbar. Or View > Display > Section View.

Step 3. In the Section View Property Manager:
under Section 1, **Fig. 49**
click **Right Plane**
click OK .

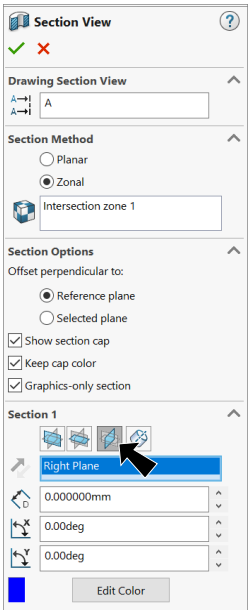


Fig. 49

L. Fillet7 Edges Inside Sweep.

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

Step 2. In the Fillet Property Manager set:
select **FilletXpert**, **Fig. 50**
⑦ **Radius** **5**
click **inside edges of Sweep 45s** (4), **Fig. 51**
click OK .

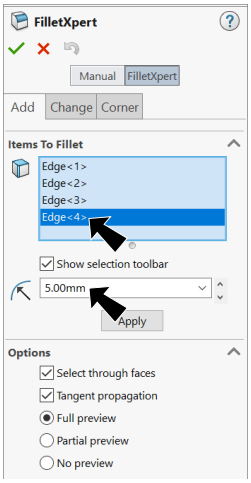


Fig. 50

Step 3. Turn off Section View. Click **Section View** in View toolbar. Or View > Display > Section View.

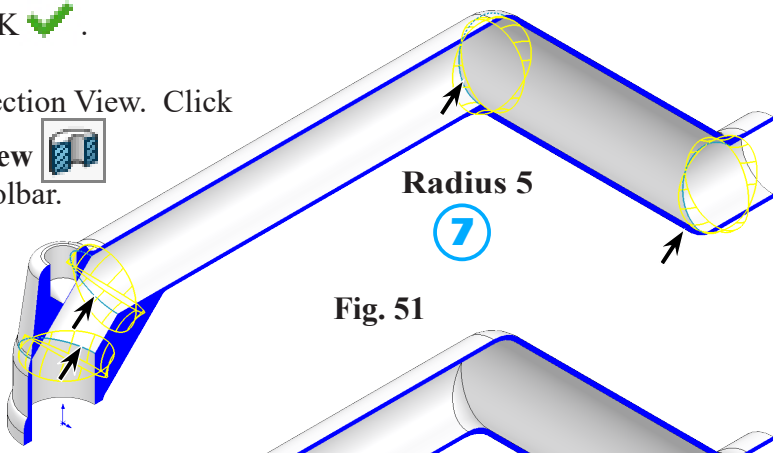


Fig. 51

Step 4. Save (**Ctrl-S**).

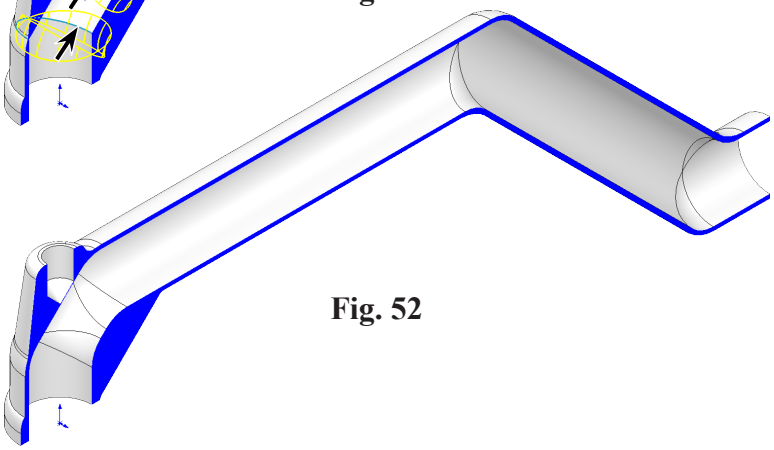


Fig. 52

M. Split.

Step 1. Click **Right Plane** in the Feature Manager to select plane, **Fig. 53**.

Step 2. Click Insert Menu > Features > Split.

Step 3. In the Split Property Manager:
under Trim Tools, **Fig. 54**
Right Plane was preselected
click **Cut Part** Cut Part button
under Resulting Bodies
click **Select All**
uncheck **Consume cut bodies**
click OK .

Step 4. Save (**Ctrl-S**).

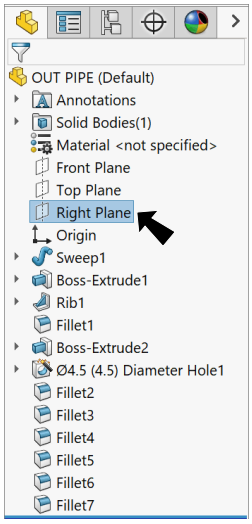


Fig. 53

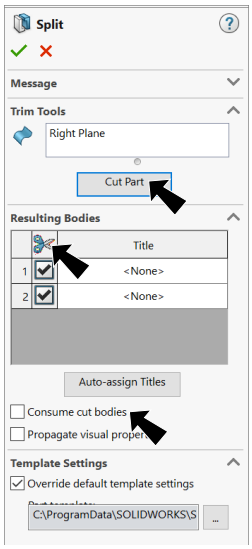


Fig. 54

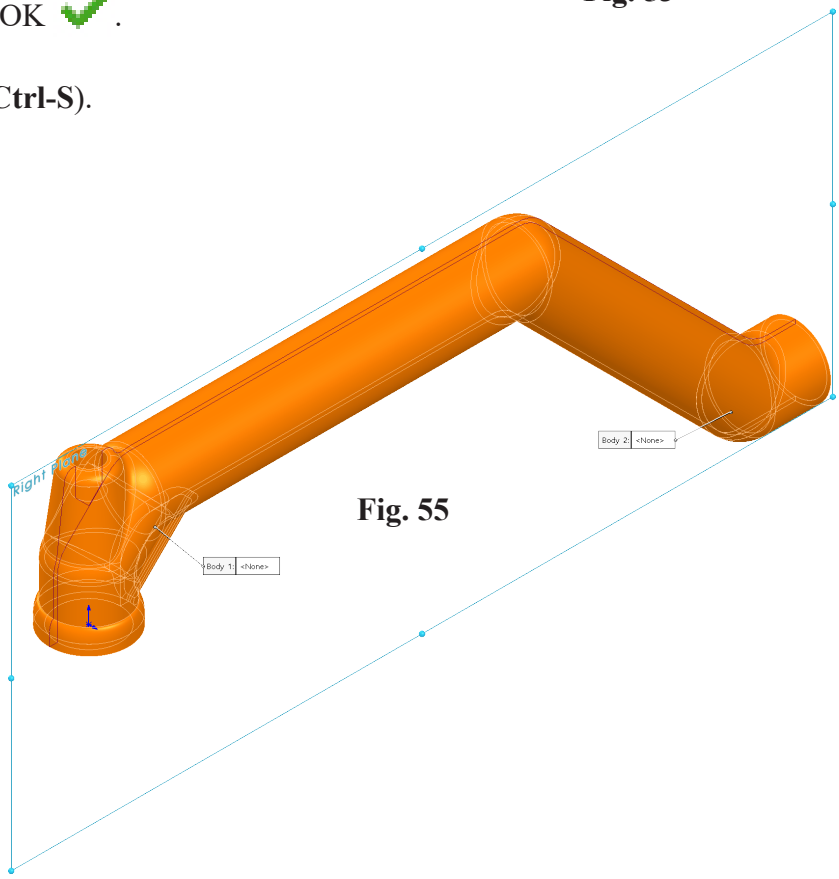


Fig. 55

N. Extrude4 Sketch6 Text WATERMASTER and The.

Step 1. Click **Right Plane** in the Feature Manager and click **Sketch** on the context toolbar, **Fig. 56**.

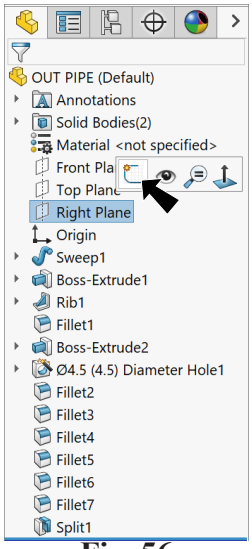


Fig. 56

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 **two horizontal centerlines across horizontal section of Sweep**, **Fig. 57**.

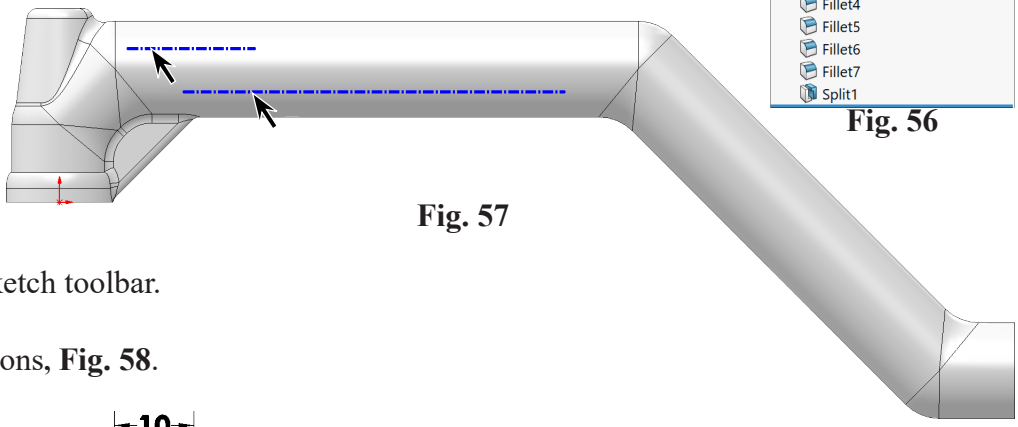
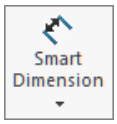


Fig. 57

Step 5. Click **Smart Dimension**



(S) on the Sketch toolbar.

Step 6. Add dimensions, **Fig. 58**.

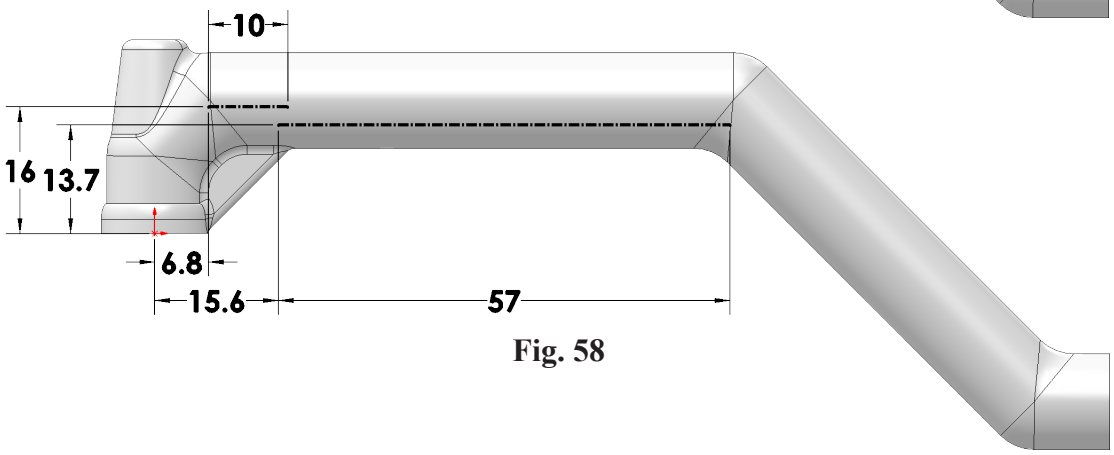


Fig. 58

Step 7. Click **Text Tool**  on the Sketch toolbar.

Step 8. In the Sketch Text Property Manager set:
under Curves, **Fig. 59**
click **long line**, **Fig. 60**
under Text
click in the box and
key-in **WATERMASTER**
Center Align 
Flip Vertical 
Flip Horizontal 
uncheck **Use document font**
click **Font** Font... button.

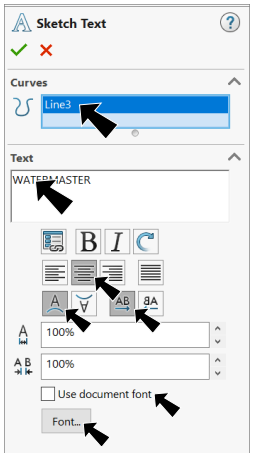


Fig. 59

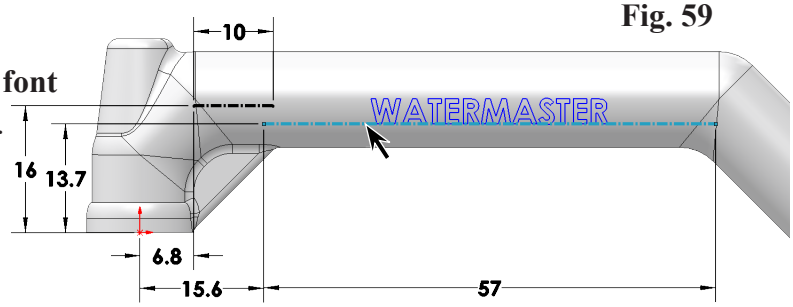


Fig. 60

Step 9. In the Choose Font dialog box select:
under Font, **Fig. 61**
select **Vendana**
Tip: Click in the Font box and press V key.
under Font Style
Bold Italic
under Height
select **Units**
Size 4.5
click **OK** button
click OK  .

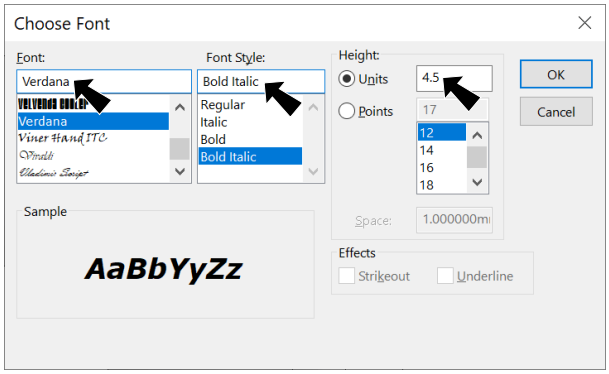


Fig. 61

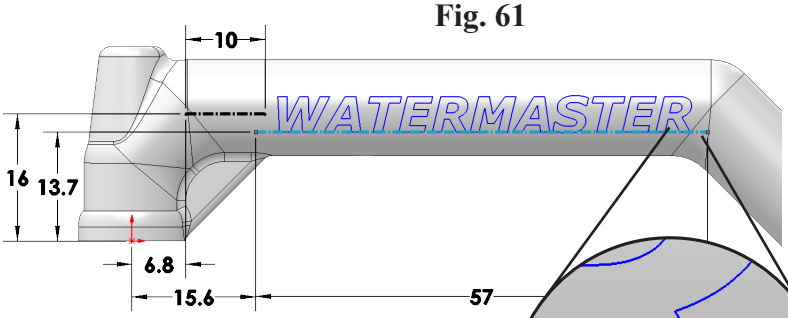
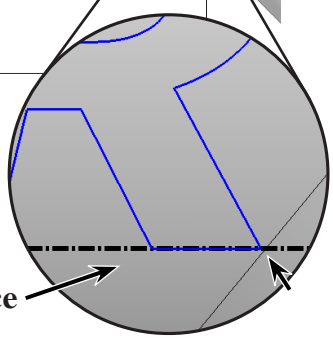


Fig. 62

Caution: **Text must fit on horizontal surface. Can not extend outside.**



Step 10. Click **Text Tool**  on the Sketch toolbar.

Step 11. In the Sketch Text Property Manager set:

under Curves, **Fig. 63**

click **short line**, **Fig. 64**

under Text

click in the box and

key-in **The**

Center Align 

Flip Vertical 

Flip Horizontal 

uncheck **Use document font**

click **Font**  button.

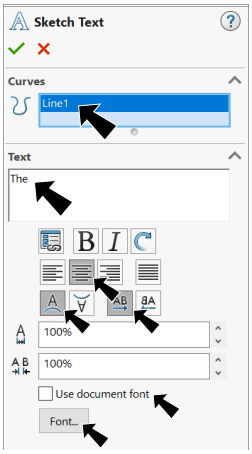


Fig. 63

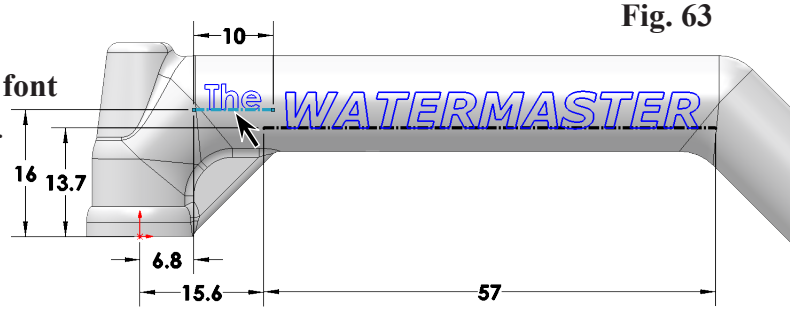


Fig. 64

Step 12. In the Choose Font dialog box select:

under Font, **Fig. 65**

select **Vendana**

under Font Style

Bold Italic

under Height

select **Units**

Size 3.8

click **OK** button

click OK  .

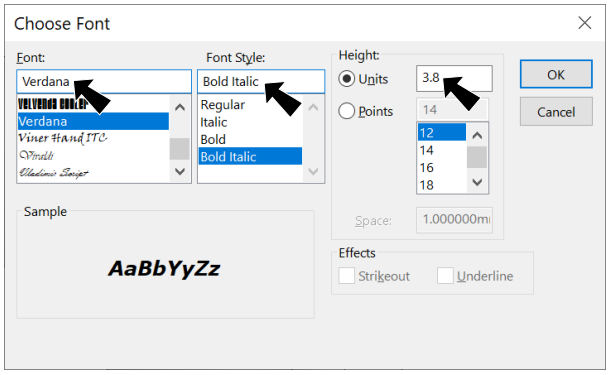


Fig. 65

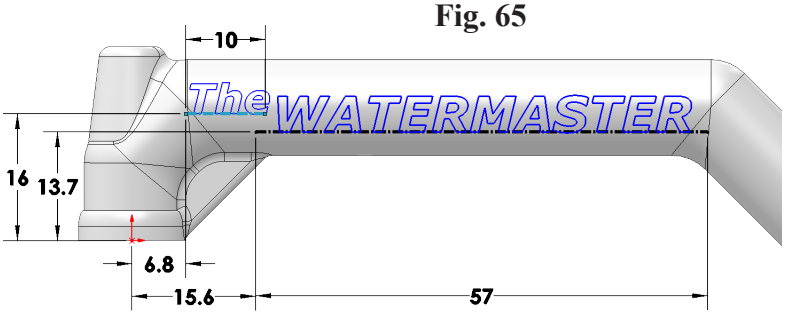


Fig. 66

Step 13. Click **Isometric** on the Standard Views toolbar. (**Ctrl-7**)

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

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

Step 16. In the Boss-Extrude Property Manager set:
under From, **Fig. 67**
Start Condition **Surface/Face/Plane**
in Select A Surface/Face/Plane box
click **face of split Sweep**, **Fig. 68**
under Direction 1
End Condition **Blind**
Depth D1 **.45**
click OK .

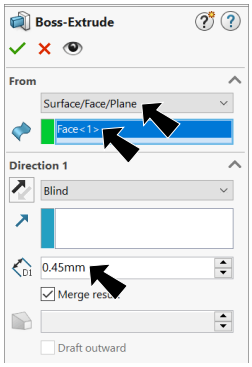


Fig. 67

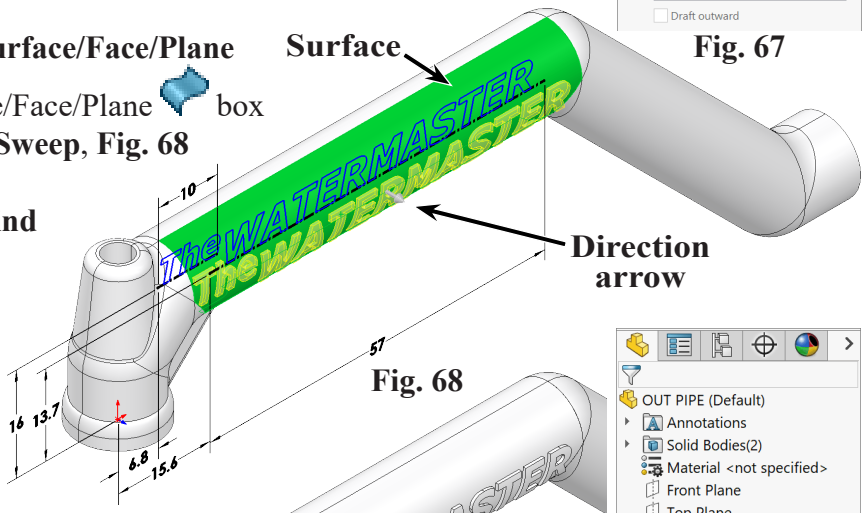


Fig. 68

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

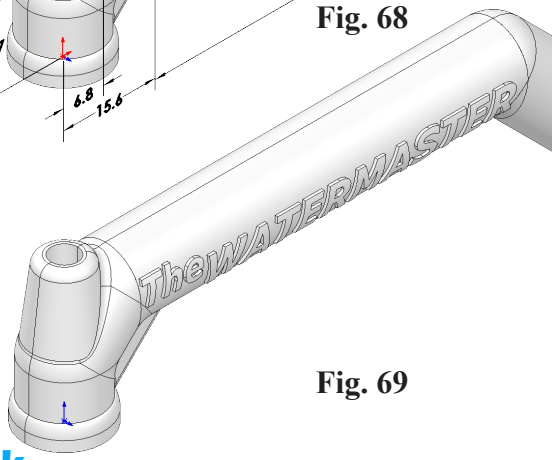


Fig. 69

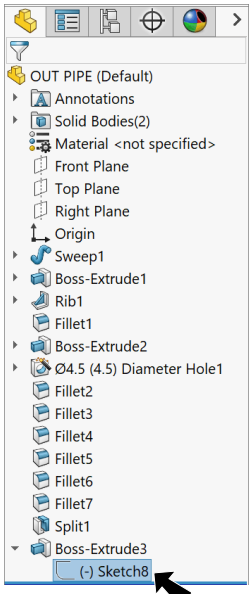


Fig. 70

O. Save Sketch8 as Block.

Step 1. **Select Sketch8** . To select, expand **Boss-Extrude3** in the Feature Manager, click **Sketch8** , **Fig. 70**.

Step 2. Click Tools Menu > Blocks > Save.

Step 3. In the Save As dialog box, **Fig. 71**
key-in **WATERMASTER** for the filename
navigate to **Documents\ Tech Ed 23-24\Watermaster**
click Save button.

Step 4. Save (**Ctrl-S**).

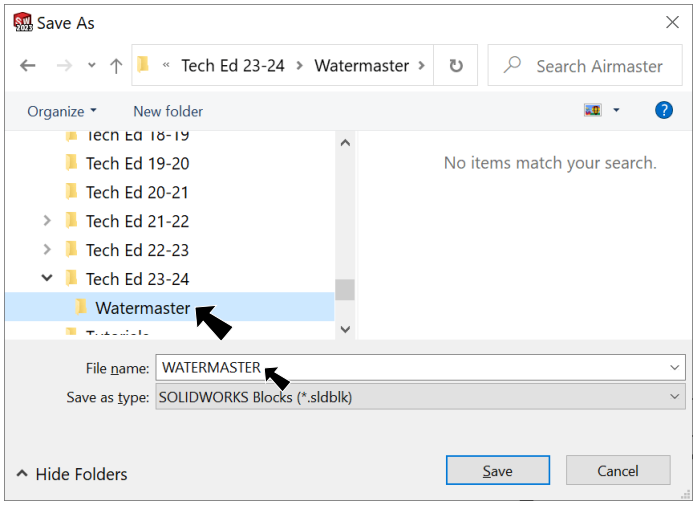


Fig. 71

P. Insert WATERMASTER Block.

Step 1. Click **Right Plane** in the Feature Manager and click **Sketch** on the context toolbar, **Fig. 72**.

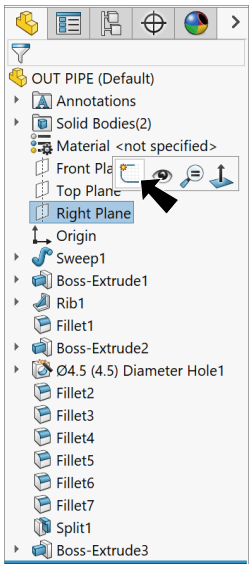


Fig. 72

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. 73**
in the Open dialog box, navigate to **Documents\Tech Ed 23-24\ Watermaster** and open **WATERMASTER** block file
under Parameters
Block Scale **1**
Block Rotation **0º**
click **above the body**, **Fig. 75**
click OK .

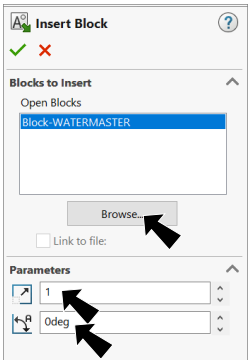


Fig. 73

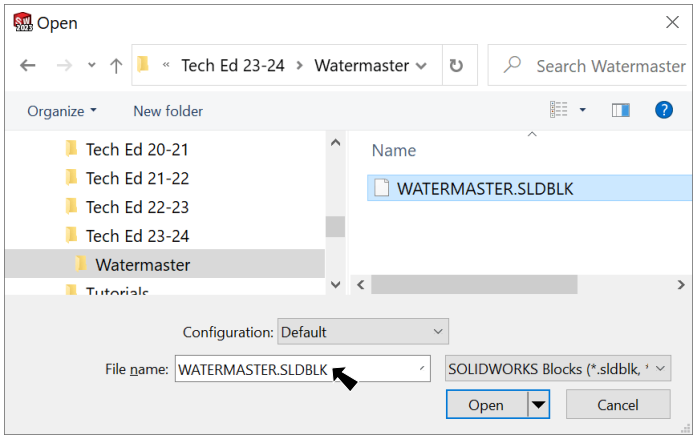


Fig. 74

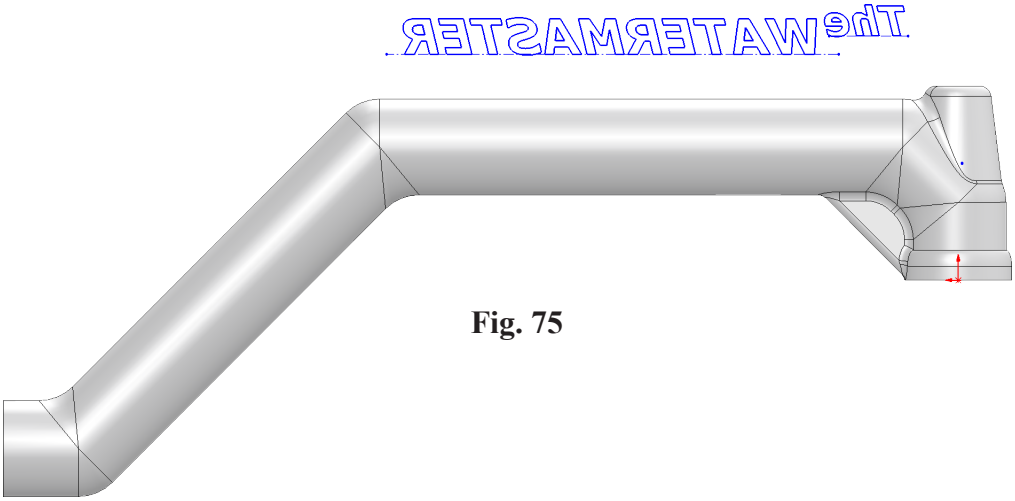
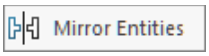


Fig. 75

Step 5. Click **Mirror Entities**  on the Sketch toolbar.

Step 6. In the Mirror Property Manager set:
under Options Entities to mirror, **Fig. 76**
drag a selection of the Block, **Fig. 77**
uncheck **Copy**
click in the Mirror about box
expand the flyout Feature Manager design tree (click ▸) in the top left corner of the graphics area and click **Front Plane**, **Fig. 78**
click OK .

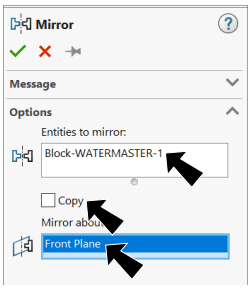


Fig. 76

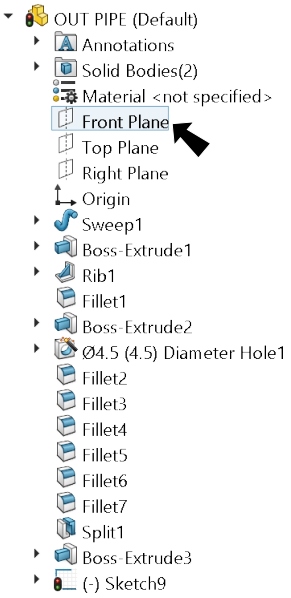


Fig. 78

Step 7. Click **Smart Dimension**  **(S)** on the Sketch toolbar.

Step 8. Add dimensions, **Fig. 79**.
Tip: To bring block to left of Origin key-in **-7.4** (negative).

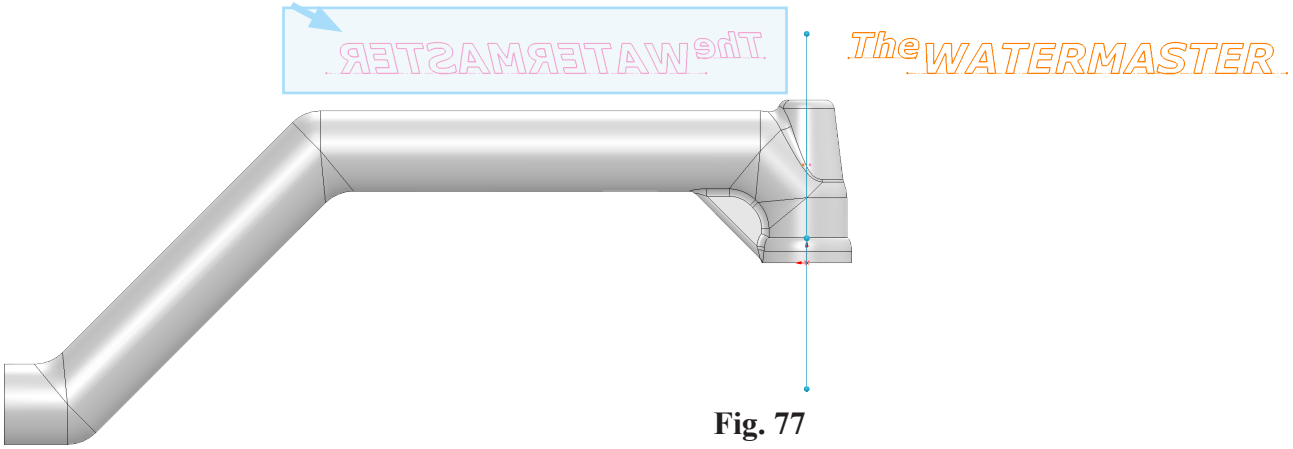


Fig. 77

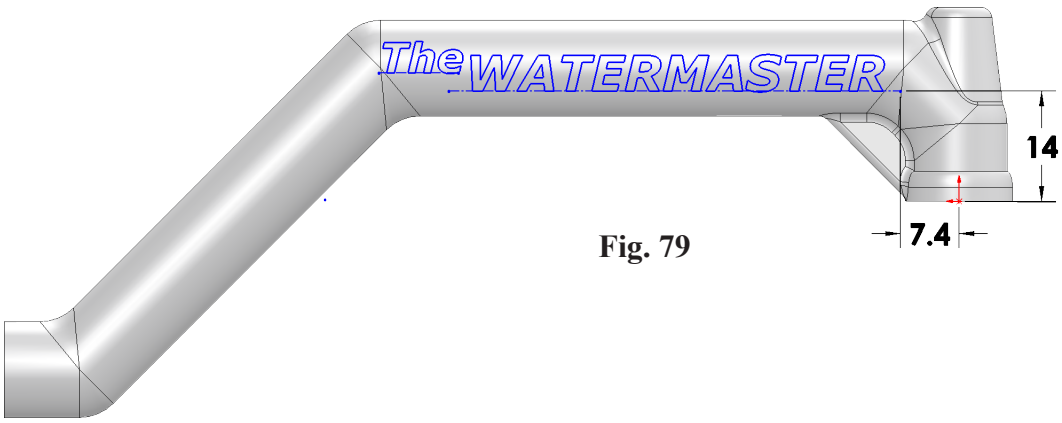


Fig. 79

Step 9. Rotate view to left side, **Fig. 81**. To rotate view, click **Isometric** and **Shift-Ctrl click the Y axis of the Reference Triad** (bottom left corner of graphics area).

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

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

Step 12. In the Boss-Extrude Property Manager set:
under From, **Fig. 80**
Start Condition **Surface/Face/Plane**
in Select A Surface/Face/Plane box
click **face of split Sweep**, **Fig. 81**
under Direction 1
End Condition **Blind**
Depth D1 **.45**
Reverse Direction
click OK .

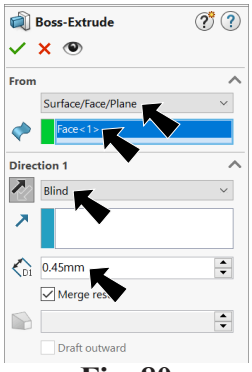


Fig. 80

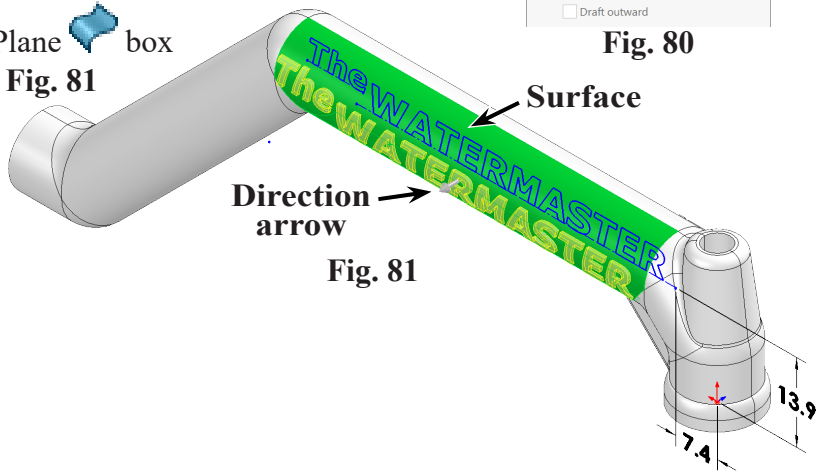


Fig. 81

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

Q. Combine Bodies.

Step 1. Click Insert Menu > Features > Combine.

Step 2. In the Combine Property Manager:
under Operation Type, **Fig. 82**
select **Add**
drag a selection to select all or **Ctrl-A**, **Fig. 83**
click OK .

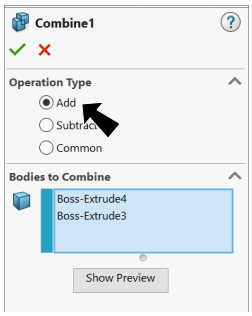


Fig. 82

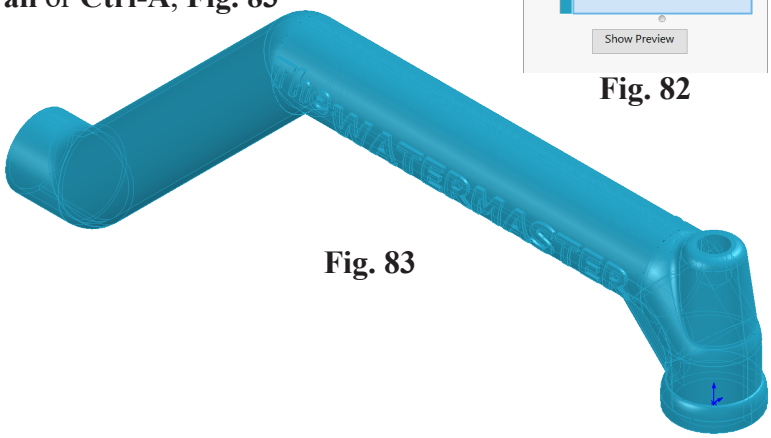


Fig. 83

R. Appearance: White and Blue.

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

Step 2. **Ctrl click Boss-Extrude3 and Boss-Extrude4** (text) in the Feature Manager to select both. Click **Appearance Callout** on the context toolbar and click **Boss-Extrude3**, **Fig. 84**.

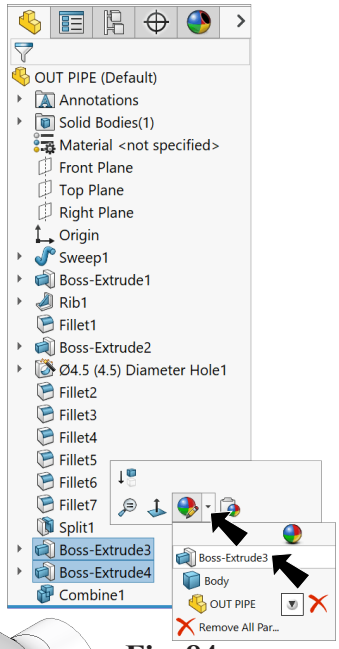


Fig. 84

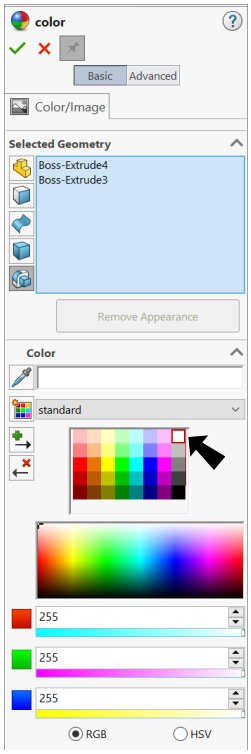


Fig. 85

Step 3. In the Appearances Property Manager set:
under Color, **Fig. 85**
click the **white swatch**
Click **Keep Visible** and OK .
The Push Pin on allows selection of another appearance.

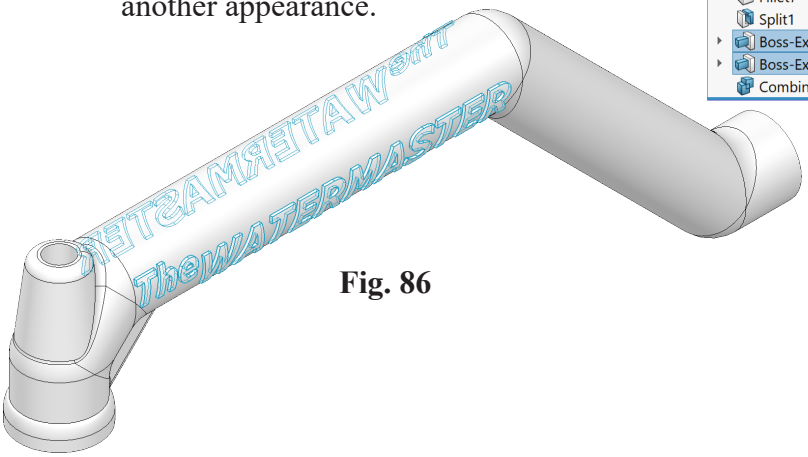


Fig. 86

Step 4. In the Appearances Property Manager,
under Selected Geometry
click **Select Bodies**, **Fig. 87**
click **Combine1 body**, **Fig. 88**
under Color, **Fig. 17**
set **RGB values** to:
R 145
G 190
B 234
click OK and click Cancel .

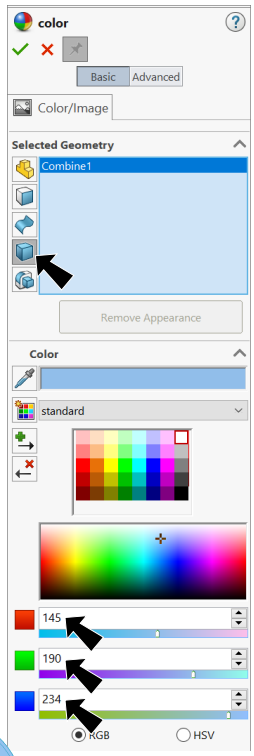


Fig. 87

Step 5. Save (**Ctrl-S**).

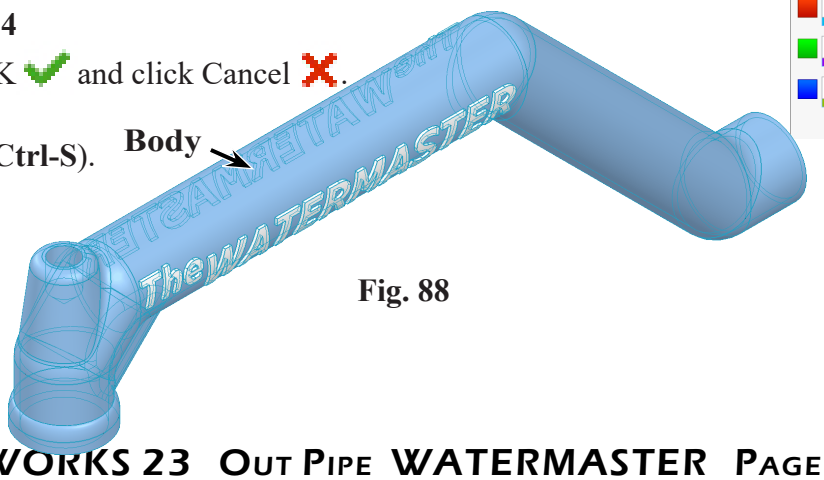


Fig. 88