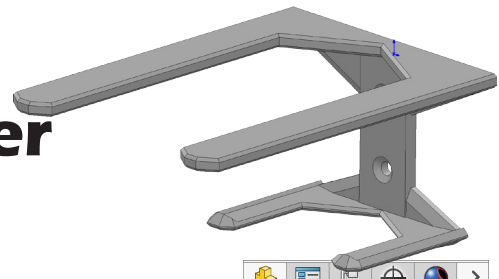




# Tank Wall Hanger



## A. Extrude1.

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**.

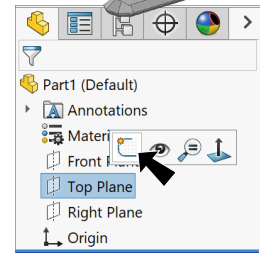


Fig. 1

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

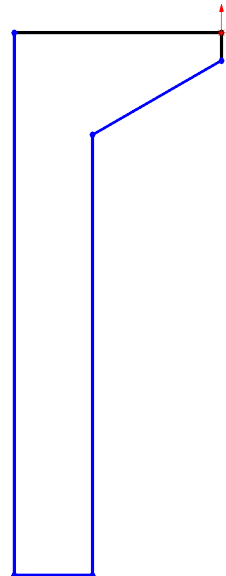
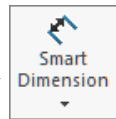


Fig. 2

Step 4. Starting at the **Origin** sketch the 6 chained lines, **Fig. 2**.



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



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

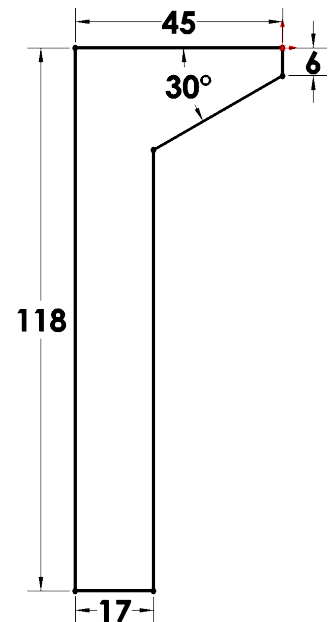


Fig. 3

Step 7. Click **Sketch Chamfer Fillet flyout** on the Sketch toolbar.



Step 8. In the Sketch Chamfer Property Manager set: under Chamfer Parameters, **Fig. 4** select **Angle-distance** under Chamfer Parameters

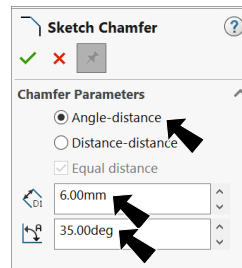


Fig. 4

Distance  $D1$  6

Angle  $R$  35°

Click **bottom horizontal line as first entity and left vertical line as second entity**, **Fig. 5**

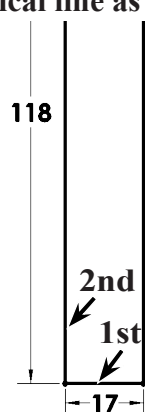


Fig. 5

Repeat at other **bottom corner**, click **bottom line and right vertical line**, **Fig. 6**.

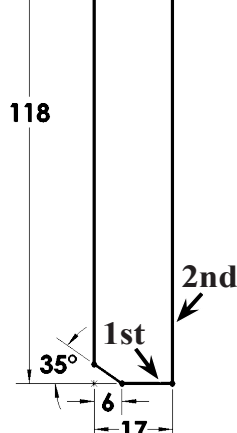


Fig. 6

Click OK

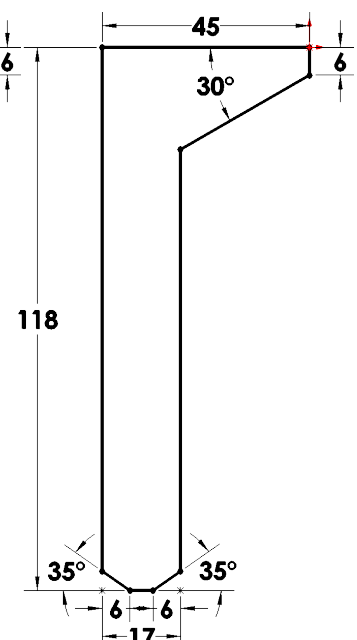


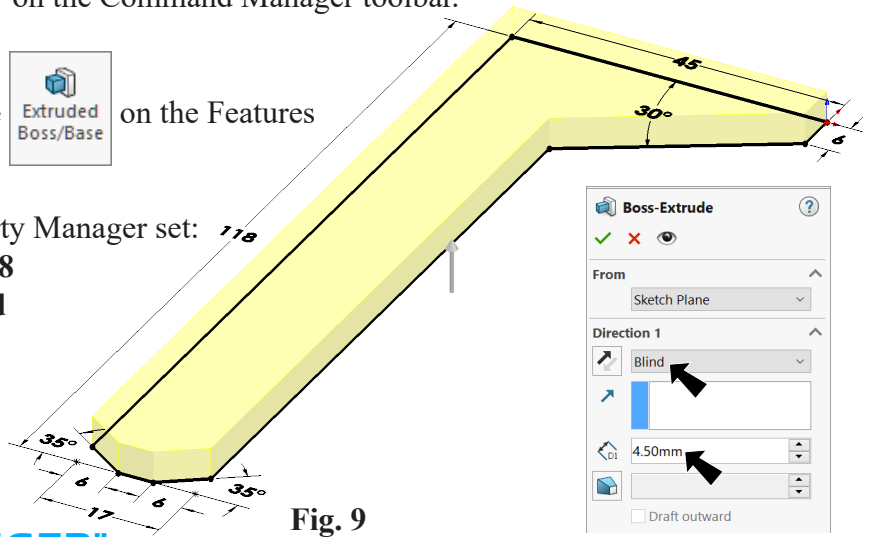
Fig. 7

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

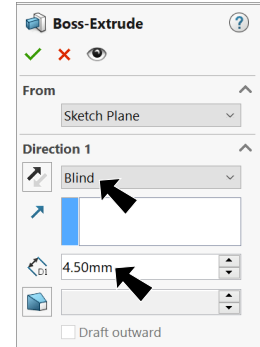
Step 10. Click **Extruded Boss/Base**  on the Features toolbar.

Step 11. In the Boss-Extrude Property Manager set:  
 under Direction 1, **Fig. 8**  
 End Condition **Blind**

**Depth**  **4.5**  
 click OK .



**Fig. 9**





**Fig. 8**

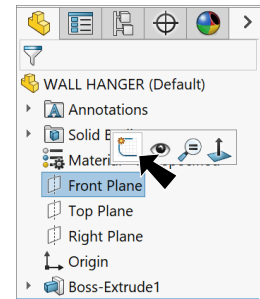
## B. Save as "WALL HANGER".

Step 1. Click File Menu > Save As.


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

## C. Loft Sketch2.

Step 1. Click **Front Plane**  in the Feature Manager and click **Sketch**  on the context toolbar, **Fig. 10**.




**Fig. 10**

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

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

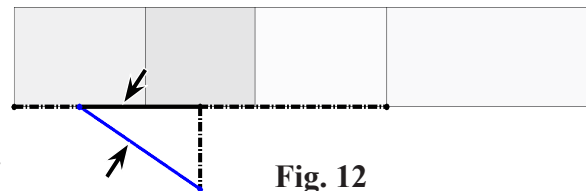
Step 4. Sketch **horizontal centerline across bottom edge from left vertex to vertex of arm**, Sketch a **vertical centerline line down from midpoint**  of horizontal centerline **Fig. 11**.

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



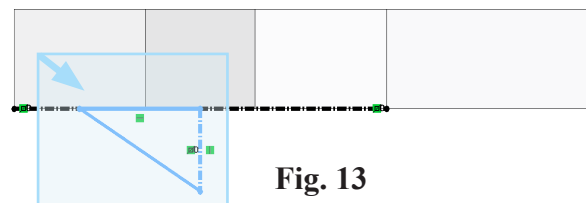
**Fig. 11**

Step 6. Sketch line from bottom endpoint of vertical centerline up to horizontal centerline and back along edge to vertical centerline, **Fig. 12**.



**Fig. 12**

Step 7. **Right click graphics area and click Select**  from menu to unselect Line tool.



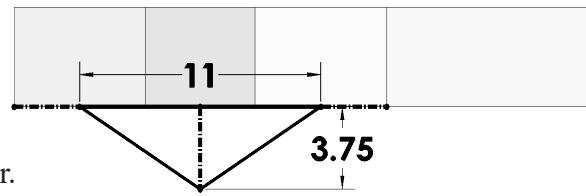
**Fig. 13**

Step 8. Drag a selection to **right to select lines and vertical centerline**, **Fig. 13**.


Step 9. Click **Mirror Entities**  **Mirror Entities** on the Sketch toolbar.

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



Step 11. Add dimension, **Fig. 14**.




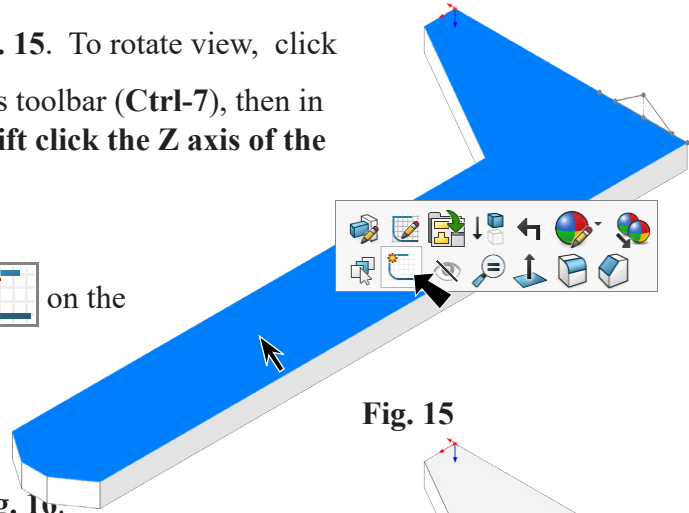
**Fig. 14**

Step 12. Click **Exit Sketch**  on the Sketch toolbar.

### D. Loft Sketch3 and Loft.

Step 1. Rotate view to Reverse Isometric, **Fig. 15**. To rotate view, click **Isometric**  on the Standard Views toolbar (Ctrl-7), then in bottom left corner of graphics area **Shift click the Z axis of the Reference Triad**  **two times.**

Step 2. Click the **top face** and click **Sketch**  on the context toolbar, **Fig. 15**.




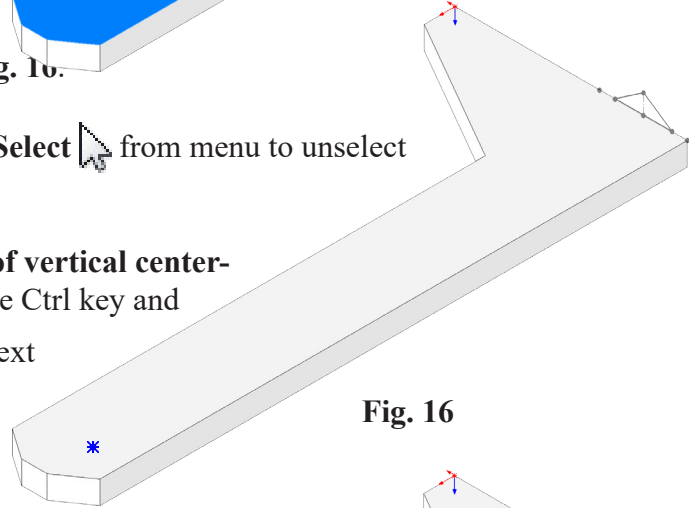
**Fig. 15**

Step 3. Click **Point**  on Sketch toolbar.


Step 4. Sketch a point towards end of arm, **Fig. 16**.

Step 5. **Right click graphics area and click Select**  from menu to unselect Line tool.

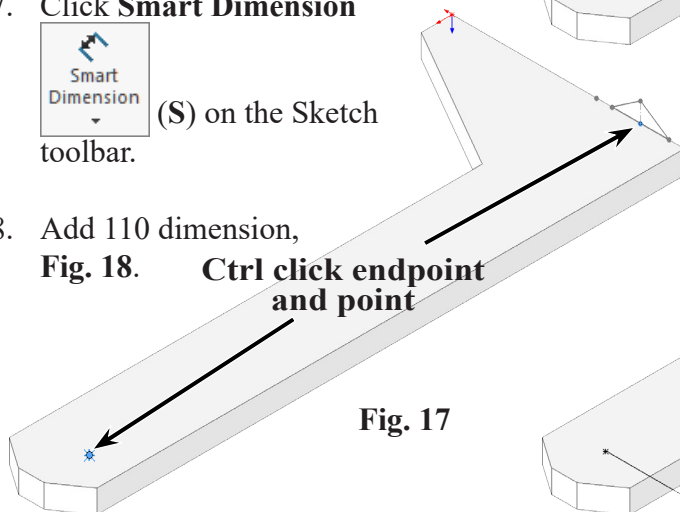
Step 6. **Ctrl click the point and a endpoint of vertical center-line in Sketch2** to select both. Release Ctrl key and click **Make Vertical**  on the context toolbar, **Fig. 17**.



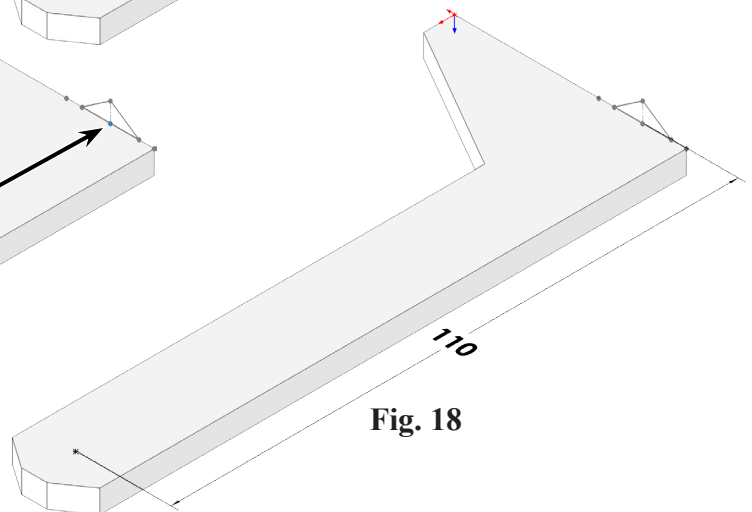
**Fig. 16**

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

Step 8. Add 110 dimension, **Fig. 18**. **Ctrl click endpoint and point**



**Fig. 17**




**Fig. 18**

Step 9. Click **Exit Sketch**  on the Sketch toolbar.

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

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

Step 12. In the Loft Property Manager set:  
under Profiles, **Fig. 19**  
click **same position on the**  
**two Profile sketches, Fig. 20**  
Sketch2  
Sketch3  
click OK .

Step 13. Save  (Ctrl-S).

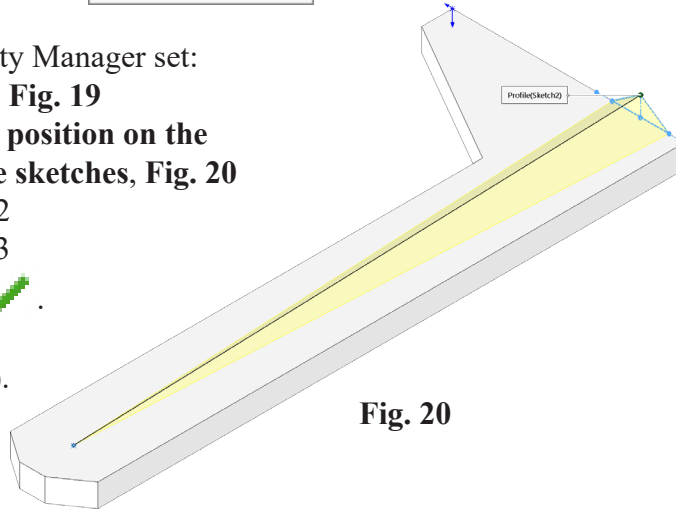


Fig. 20

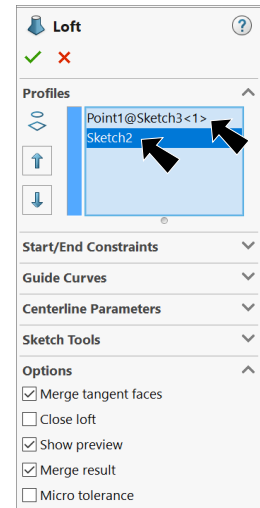




Fig. 19

## E. Move Copy Body.

Step 1. Click **Trimetric**  on the Standard Views toolbar.

Step 2. Click Insert Menu > Features > Move/Copy.

Step 3. In the Move/Copy Property Manager set:  
under Body-Move/Copy, **Fig. 21**  
click **body, Fig. 22**  
check **Copy**  
**Number of Copies**  **1**  
under **Translate**  
**Y ΔY -82**  
click OK .

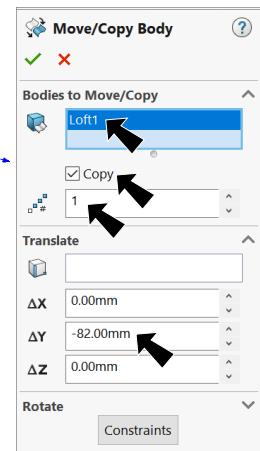
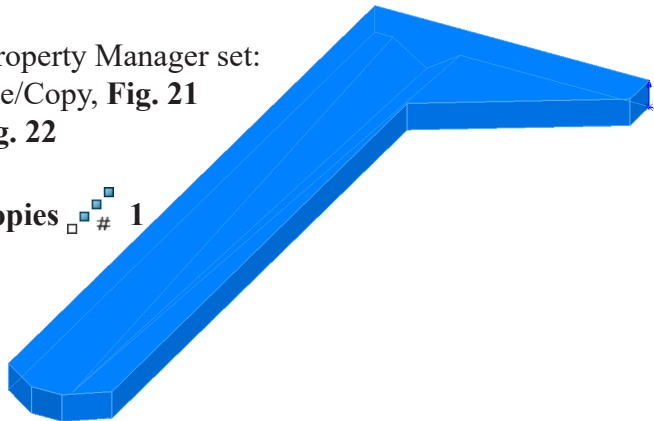


Fig. 21

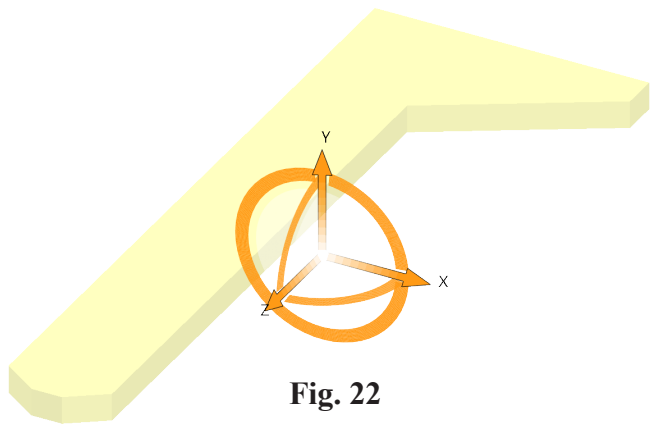
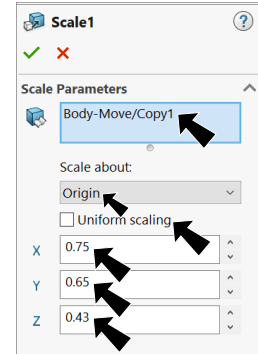
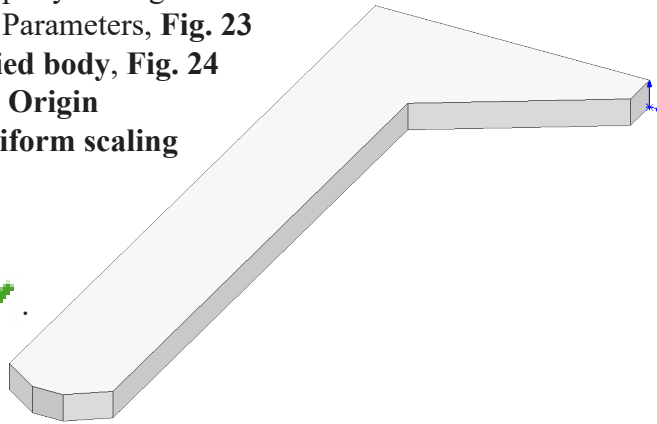


Fig. 22

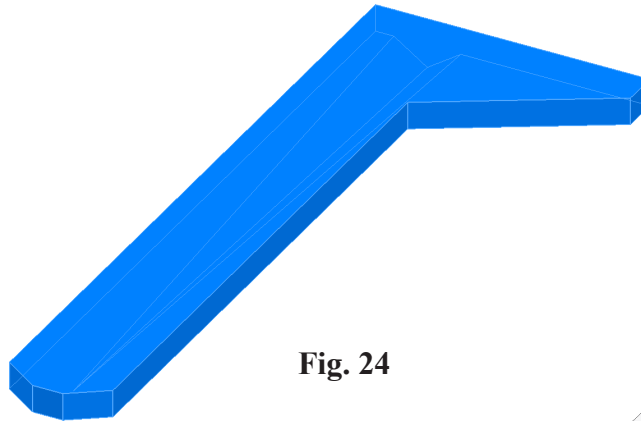
## F. Scale.

Step 1. Click Insert Menu > Features > Scale.

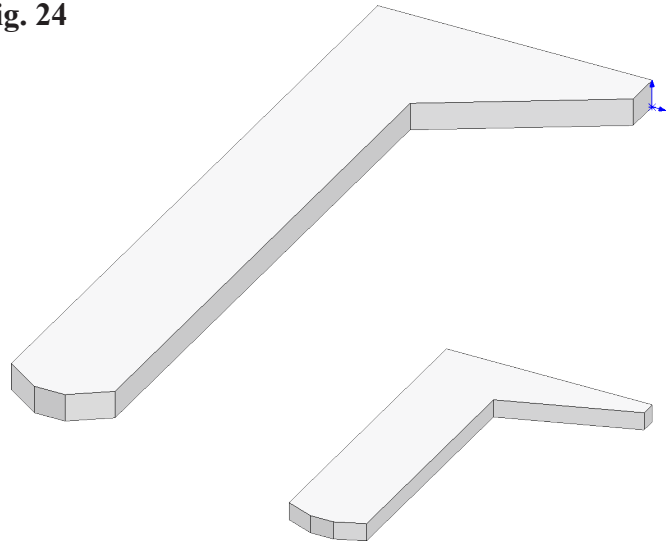
Step 2. In the Scale Property Manager set:  
under Scale Parameters, **Fig. 23**  
click **copied body**, **Fig. 24**  
Scale about **Origin**  
uncheck **Uniform scaling**  
**X .75**  
**Y .65**  
**X .43**  
click OK ✓ .



**Fig. 23**



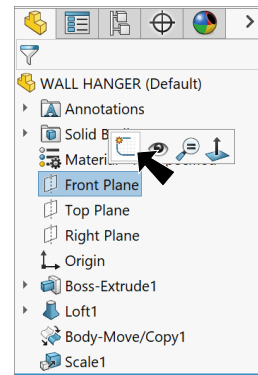
**Fig. 24**




**Fig. 25**

## G. Extrude2 Vertical Support.

Step 1. Click **Front Plane**  in the Feature Manager and click **Sketch**  on the context toolbar, **Fig. 26**.

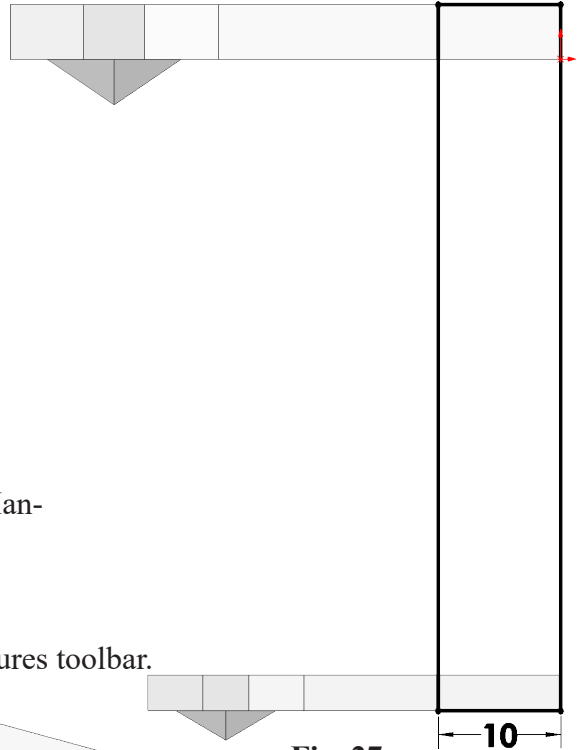


**Fig. 26**

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

Step 3. Click **Corner Rectangle**  in the **Rectangle flyout**  on the Sketch toolbar.

Step 4. Sketch corner rectangle from top right vertex of top body to bottom edge of bottom body, **Fig. 27**.



**Fig. 27**

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

Step 6. Add 10 dimension, **Fig. 27**.

Step 7. Click **Trimetric**  on the Standard Views toolbar.

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

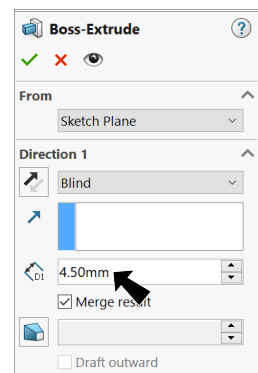
Step 9. Click **Extruded Boss/Base**  on the Features toolbar.

Step 10. In the Boss-Extrude Property Manager set:  
under Direction 1, **Fig. 28**

End Condition **Blind**

**Depth**  **4.5**

click OK .



**Fig. 28**

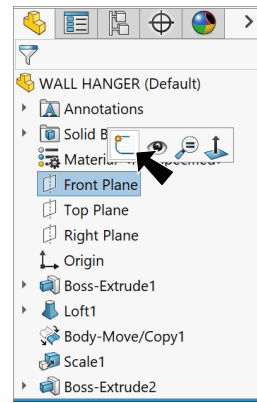
Step 11. Save  (**Ctrl-S**).




**Fig. 29**

## H. Extrude3 Braces.

Step 1. Click **Front Plane**  in the Feature Manager and click **Sketch**  on the context toolbar, **Fig. 30**.

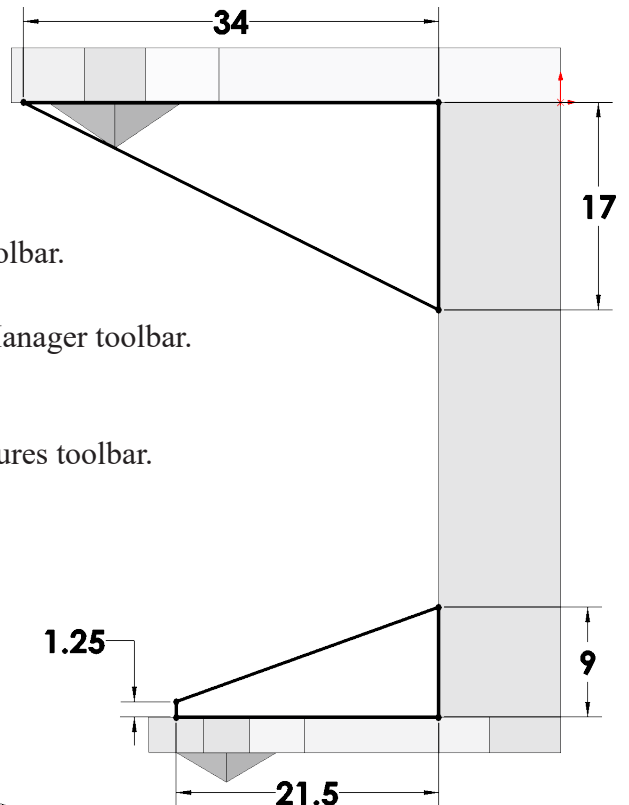


**Fig. 30**

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

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

Step 4. Sketch the 7 lines, **Fig. 31**.



**Fig. 31**

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

Step 6. Add dimensions, **Fig. 31**.

Step 7. Click **Trimetric**  on the Standard Views toolbar.

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

Step 9. Click **Extruded Boss/Base**  on the Features toolbar.

Step 10. In the Boss-Extrude Property Manager set:

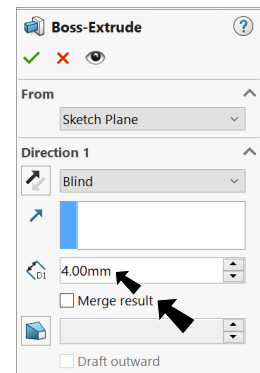
under Direction 1, **Fig. 32**

End Condition **Blind**

Depth  **4**

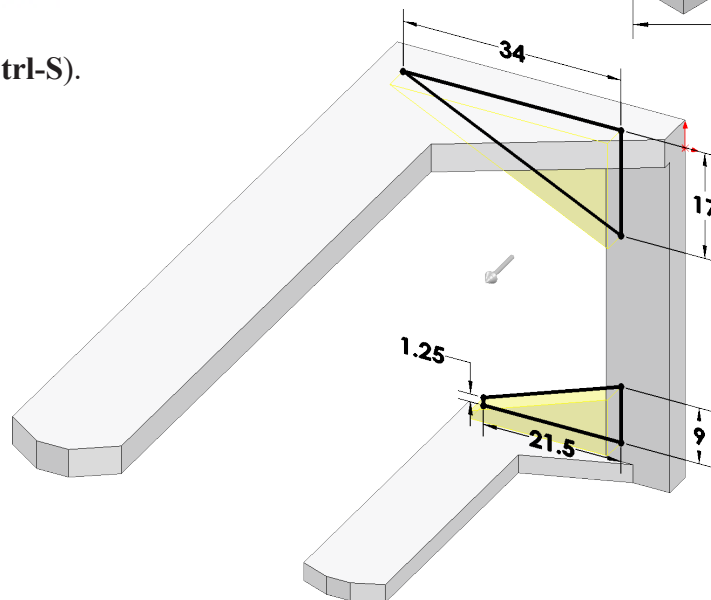
**uncheck** Merge result

click **OK** .



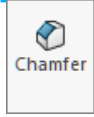
**Fig. 32**

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



**Fig. 33**

# I. Chamfer1 Upper Arm Top.

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

Step 2. In the Chamfer Property Manager set:  
under Chamfer Type, **Fig. 34**

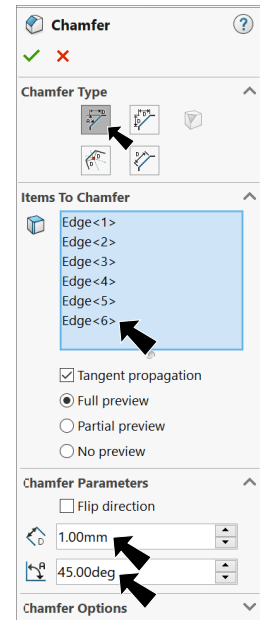
select **Angle Distance**   
under Chamfer Parameters

**Distance**  1

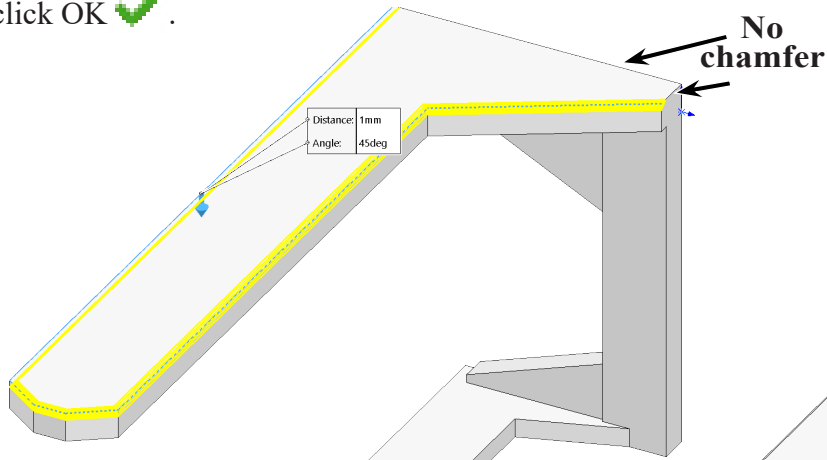
**Angle**  45°

click all top edges of arm except inside and rear (6), **Fig. 35**

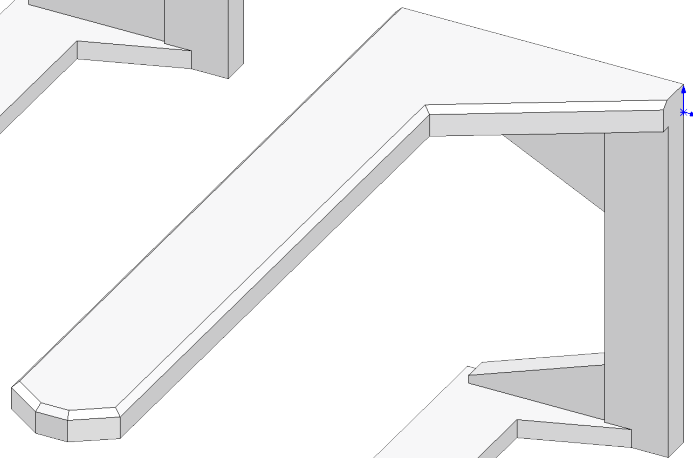
click OK  .



**Fig. 34**



**Fig. 35**




**Fig. 36**

## J. Chamfer2 Upper Arm Underside.

Step 1. Rotate view to **view bottom**, **Fig. 38**. Use **Up Arrow key**  **4 times**.

Step 2. Click **Chamfer**  on the Features toolbar.

Step 3. In the Chamfer Property Manager set:

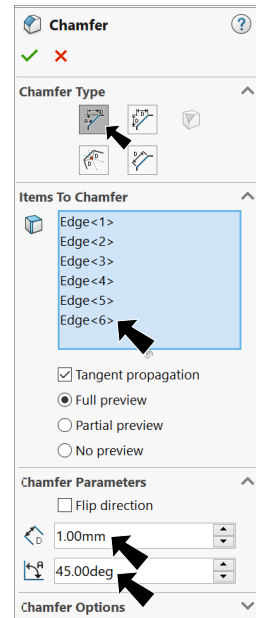
under Chamfer Type, **Fig. 37**  
select **Angle Distance**   
under Chamfer Parameters

**Distance**  **1**

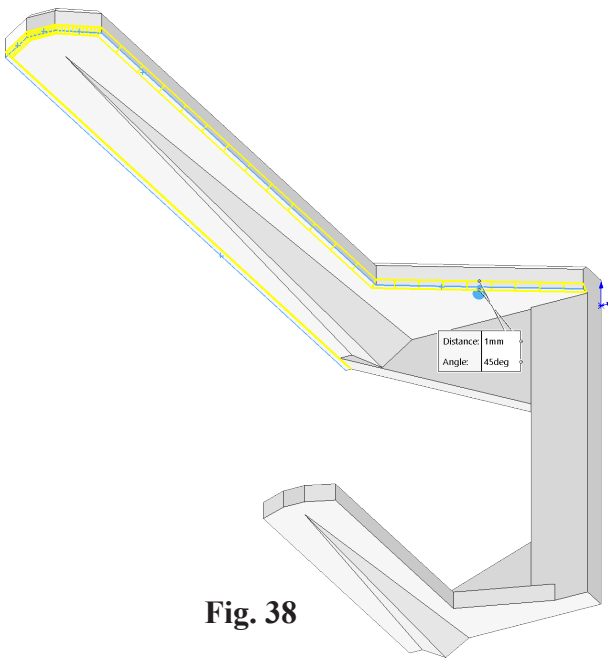
**Angle**  **45°**

click **same edges on bottom of arm (6)**, **Fig. 38**

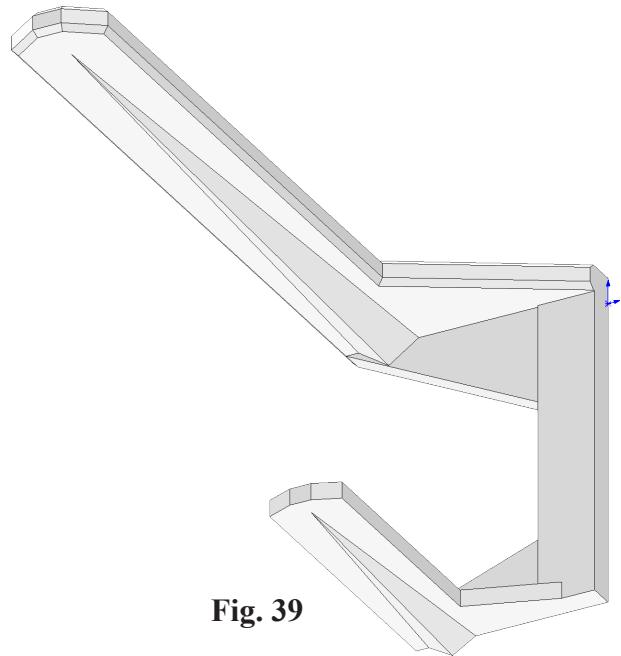
click **OK**  .



**Fig. 37**





**Fig. 38**



**Fig. 39**

## K. Chamfer3 Top Brace.

Step 1. Rotate view to **view side of braces**, **Fig. 41**. Use **Left**  on the Standard Views toolbar (**Ctrl-3**), then **Left Arrow** key  twice.



Step 2. Click **Chamfer**  in the **Fillet flyout**  on the Features toolbar.

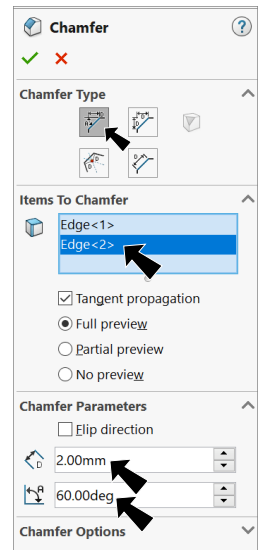
Step 3. In the Chamfer Property Manager set:  
under Chamfer Type, **Fig. 40**

select **Angle Distance**   
under Chamfer Parameters

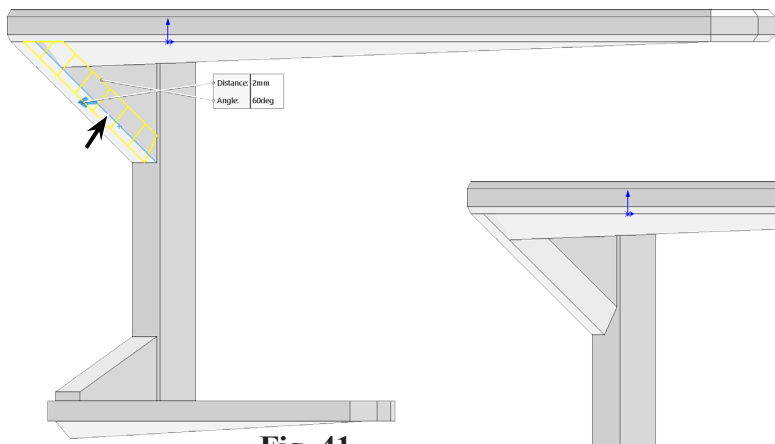
**Distance**  **2**

**Angle**  **60°**

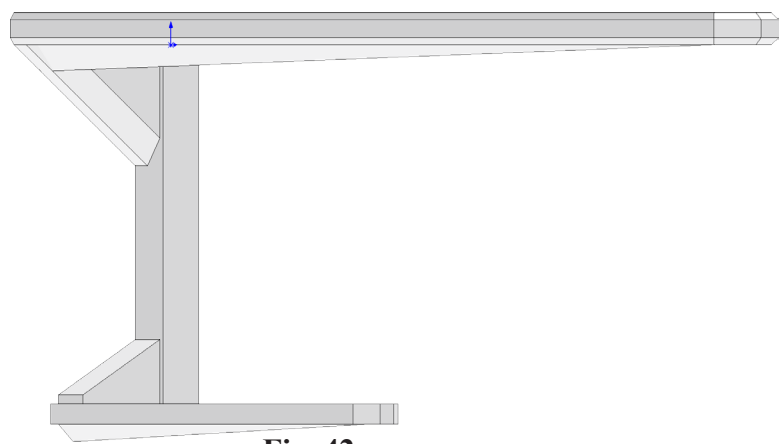
Click **bottom front edge of top brace (Extrude3)**, **Fig. 41**.  
The Chamfer Direction arrow (blue)  should **point to rear**.  
If arrow is pointing in wrong direction, **click arrow to flip**.  
Click **OK** .



**Fig. 40**



**Fig. 41**



**Fig. 42**

## L. Chamfer4 Bottom Brace.

Step 1. Click **Chamfer**  in the **Fillet flyout**  on the Features toolbar.

Step 2. In the Chamfer Property Manager set:

under Chamfer Type, **Fig. 43**

select **Angle Distance** 

under Chamfer Parameters

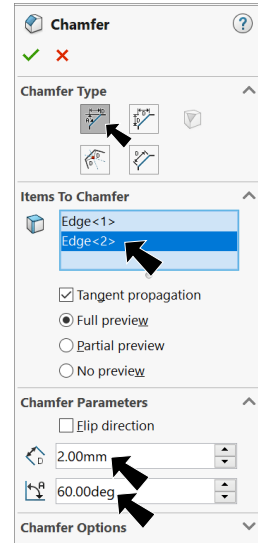
**Distance**  2

**Angle**  60°

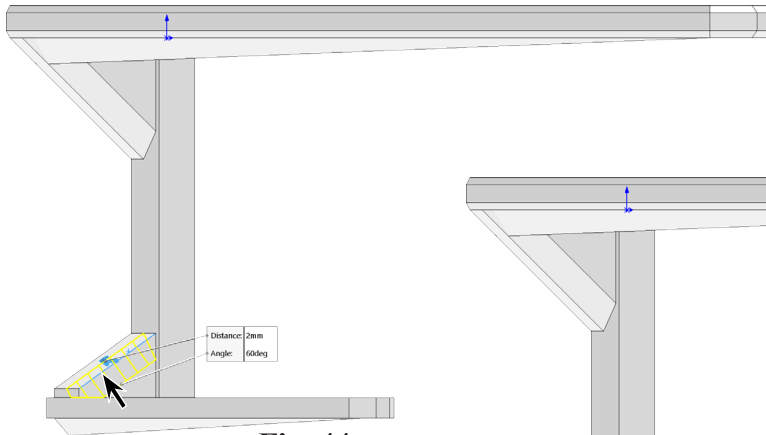
Click **top front edge of bottom brace (Extrude3)**, **Fig. 44**.

The Chamfer Direction arrow  should **point to rear**.

Click **OK** .



**Fig. 43**



**Fig. 44**



**Fig. 45**

## M. Chamfer4 Lower Arm.

Step 1. Click **Trimetric**  on the Standard Views toolbar.

Step 2. Click **Chamfer**  on the Features toolbar.

Step 3. In the Chamfer Property Manager set:

under Chamfer Type, **Fig. 46**

select **Angle Distance**   
under Chamfer Parameters

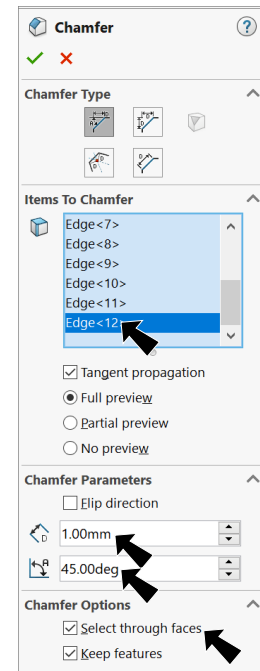
**Distance**  1

**Angle**  45°

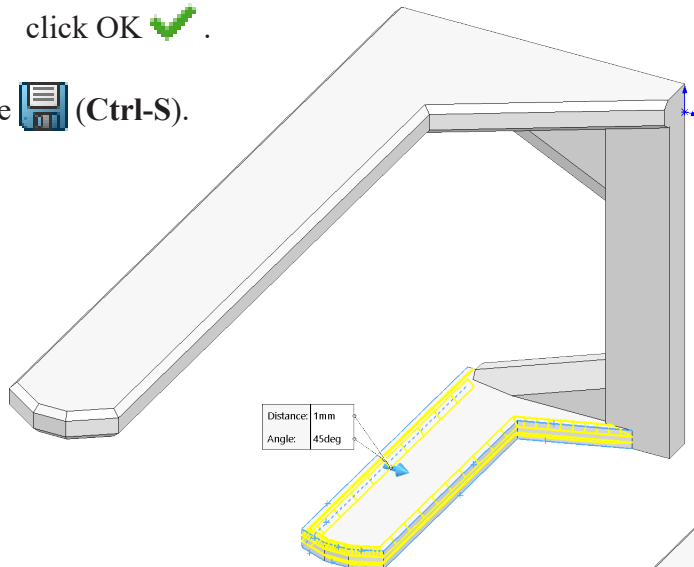
click **same edges on lower arm top and bottom** that were selected on upper arm (12), **Fig. 47**

click OK .

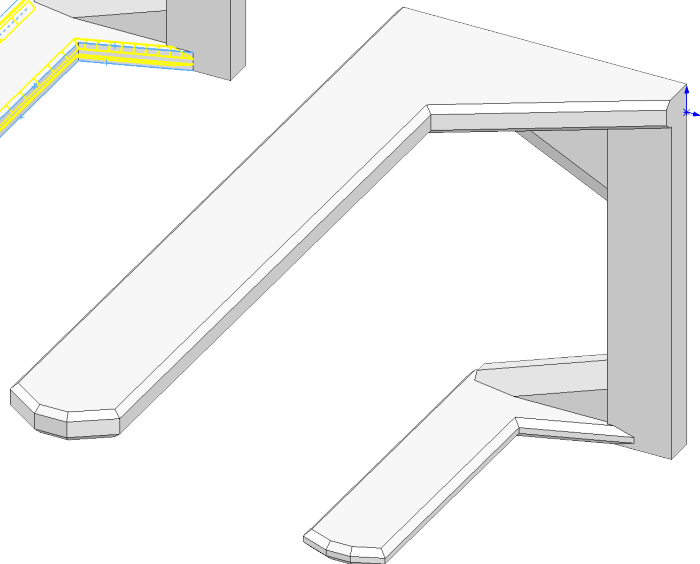
Step 4. Save  (Ctrl-S).



**Fig. 46**



**Fig. 47**



**Fig. 48**

## N. Extrude4

Step 1. Click the **top face of lower arm** and click **Sketch**  on the context toolbar, **Fig. 49**.

Step 2. With the face still selected, click **Convert Entities**  on the Sketch toolbar, **Fig. 50**.

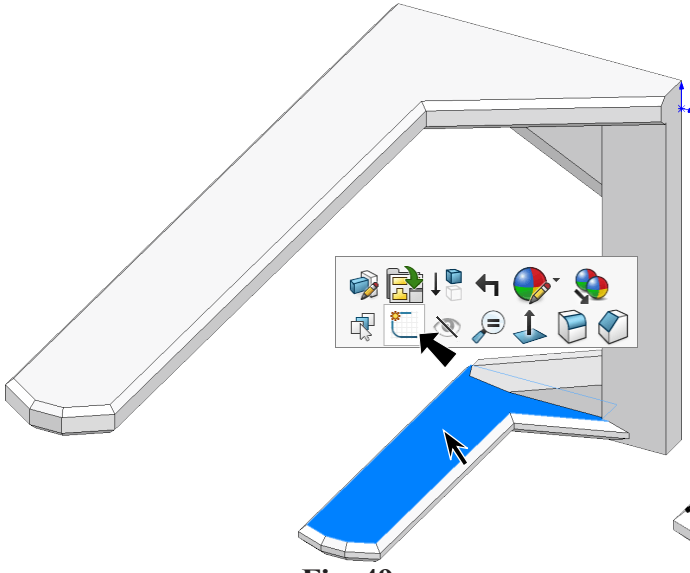


Fig. 49

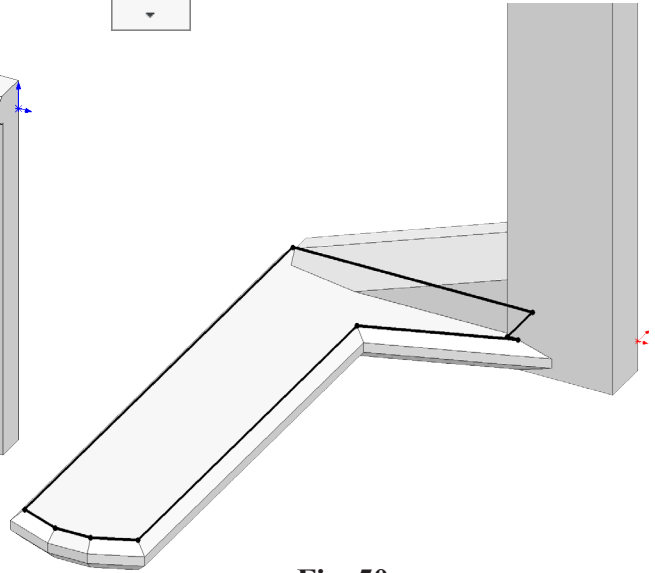



Fig. 50

Step 3. Click **Offset Entities**  on the Sketch toolbar.

Step 4. In the Offset Entities Property Manager set:  
under Parameters, **Fig. 51**

**Distance**  2.5

uncheck **Select chain**

click **outside vertical chamfer edge of lower arm**, **Fig. 52**

check **Reverse** (offset should be **inside**)

click **Keep Visible**  and **OK** .

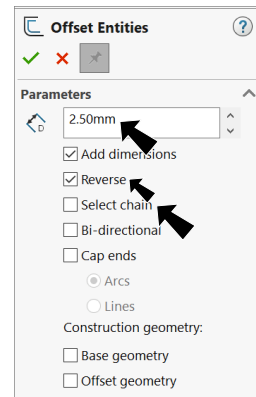


Fig. 51

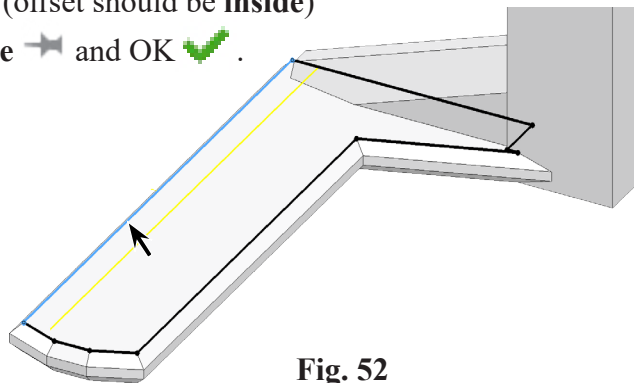





Fig. 52

Step 5. In the Offset Entities Property Manager set:  
under Parameters, Fig. 53

Distance  5.5  
click front horizontal  
chamfer edge of lower  
arm, Fig. 54  
check Reverse  
(offset should be  
inside)  
click OK   
and click Cancel .

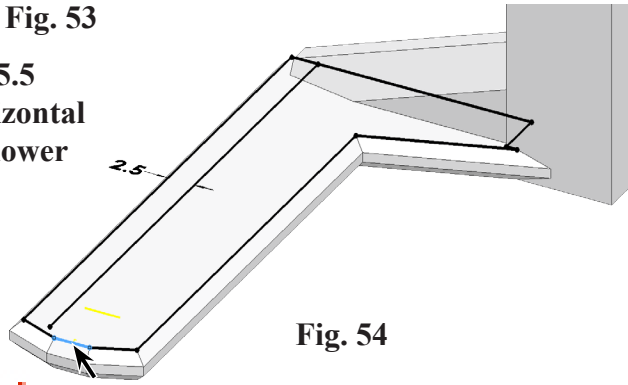


Fig. 54

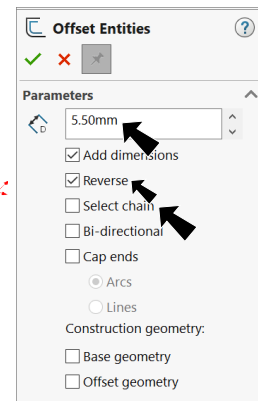




Fig. 53

Step 6. Click **Trim Entities**  (S) on the Sketch toolbar.

Step 7. In the Trim Property Manger:

select **Corner** , Fig. 55  
Trim segment at the 3 intersections.  
Click segments to trim.  
Results shown in Fig. 59.  
Click OK  when done.

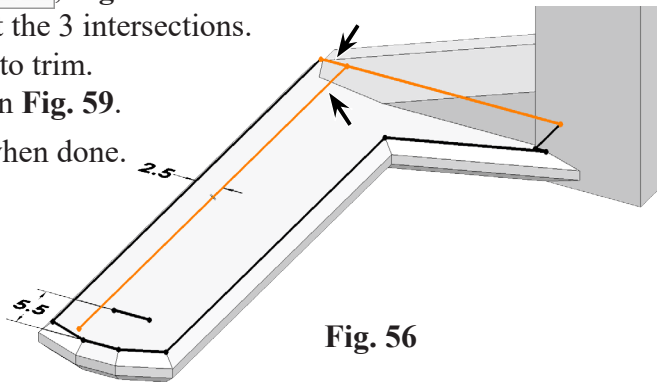


Fig. 56

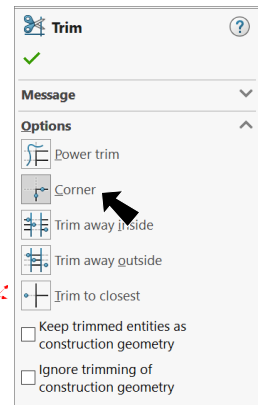


Fig. 55

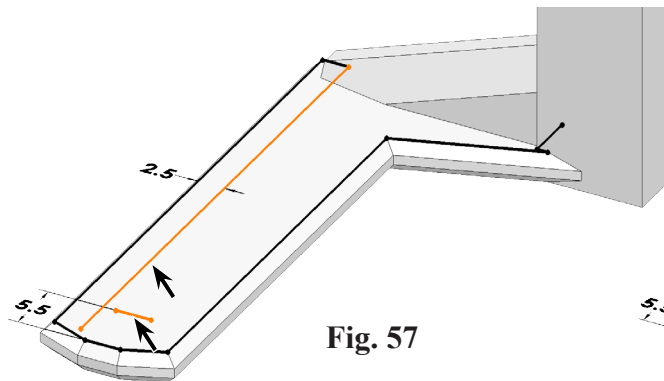


Fig. 57

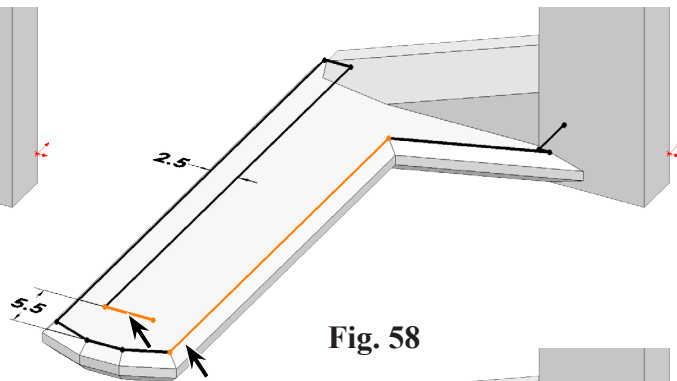


Fig. 58

Step 8. Drag a selection around extra entities to select and delete, Fig. 59.

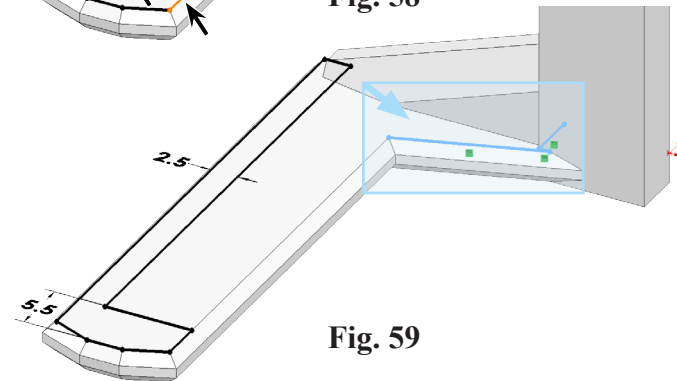



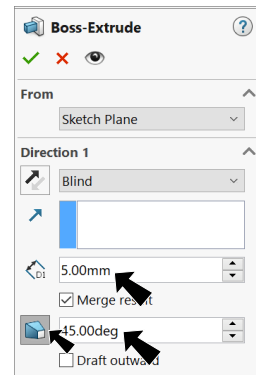
Fig. 59

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

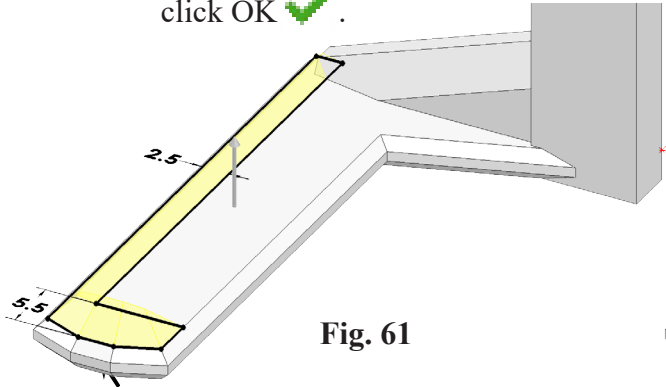
Step 10. Click **Extruded Boss/Base**  on the Features toolbar.

Step 11. In the Boss-Extrude Property Manager set:  
under Direction 1, **Fig. 60**

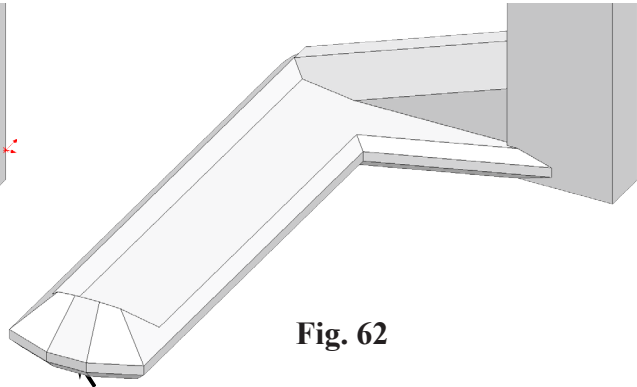
Depth  **5**  
click **Draft**  **45°**  
click **OK**  .



**Fig. 60**




**Fig. 61**

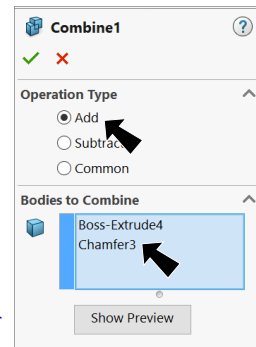


**Fig. 62**

## O. Combine Bodies.

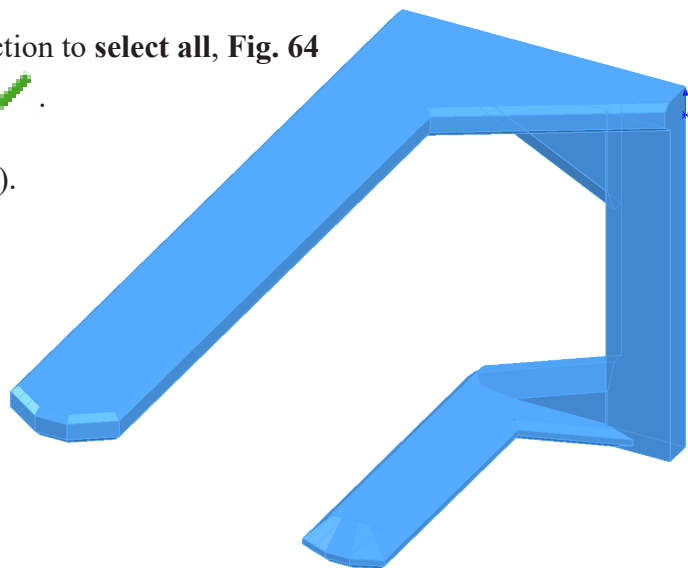
Step 1. Click Insert Menu > Features > Combine.

Step 2. In the Combine Property Manager:  
under Operation Type, **Fig. 63**  
select **Add**  
drag a selection to **select all**, **Fig. 64**  
click **OK**  .





**Fig. 63**

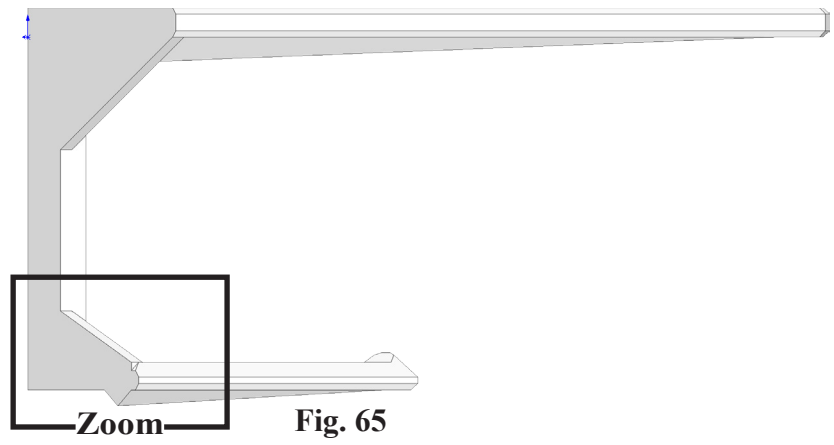
Step 3. Save  (Ctrl-S).




**Fig. 64**

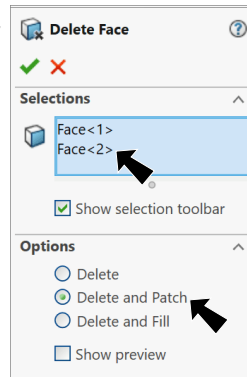
## P. Delete Faces.

Step 1. Rotate view to **view side of braces**, **Fig. 65**. Use **Left**  on the Standard Views toolbar (**Ctrl-3**), then **Right Arrow key**  twice and zoom-in.

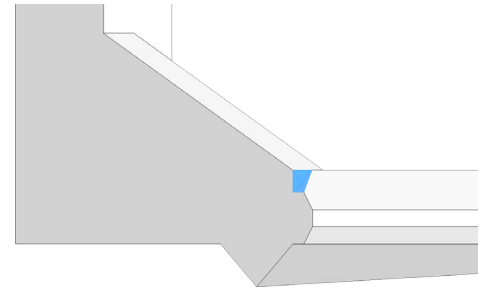


Step 2. Click Insert Menu > Face > Delete.

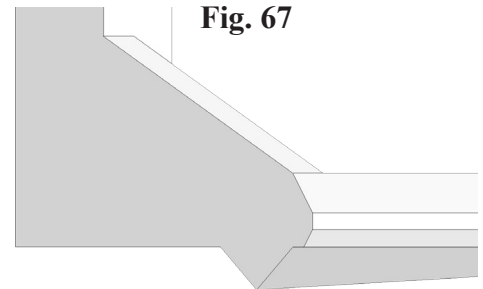
Step 3. In the Delete Face Property Manager:  
under Selections, **Fig. 66**  
click **the two faces**, **Fig. 67**  
under Options  
**Delete and Patch**  
click OK .



**Fig. 66**






**Fig. 67**




**Fig. 68**

## Q. Mirror Body.

Step 1. Click **Trimetric**  on the Standard Views toolbar.

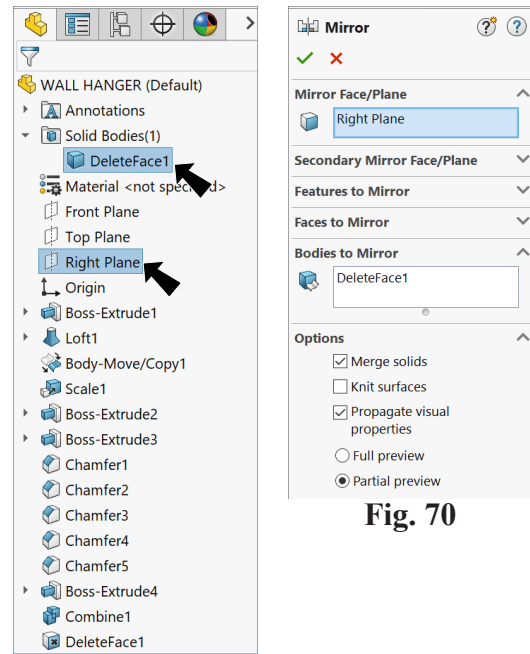
Step 2. Expand Solid Bodies  folder in the Feature Manager. **Ctrl click DeleteFace1**  body and **Right Plane**  to select body and p lane, **Fig. 69**.

Step 3. Click **Features**  on the Command Manager toolbar.

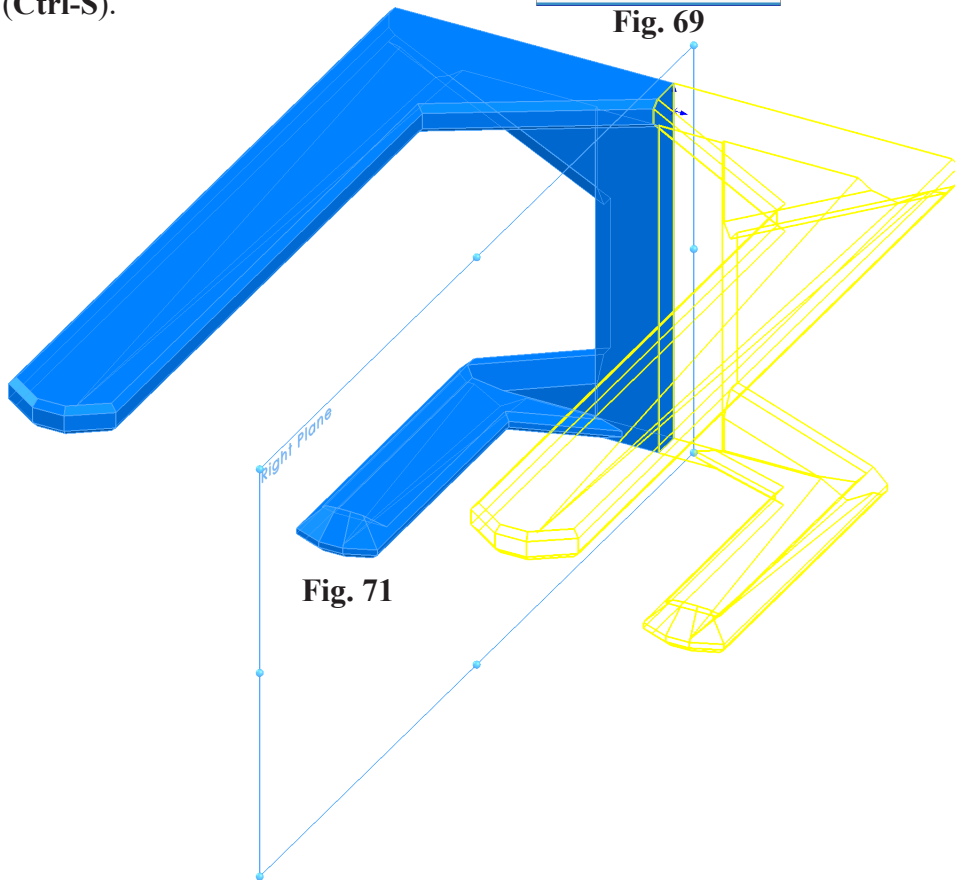
Step 4. Click **Mirror**  on the Features toolbar.

Step 5. In the Mirror Property Manager click OK .

Step 6. Save  (Ctrl-S).



**Fig. 70**




**Fig. 71**

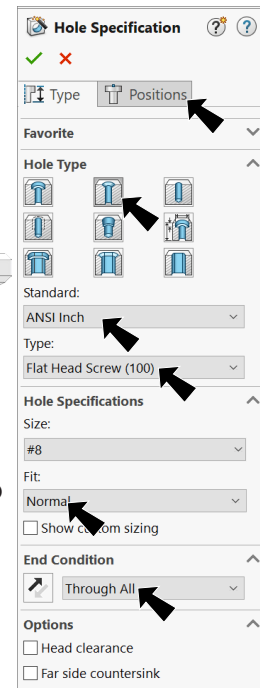
## R. Hole Wizard.

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

Step 2. Click **Hole Wizard**  on the Features toolbar.

Step 3. In the Property Manager:  
 under Hole Type, **Fig. 72**  
 click **Countersink**   
 under Standard:  
 select **ANSI Inch**  
 under Type:  
 select **Flat Head Screw (100)**  
 under Hole Specification:  
**Size: #8**  
 under End Condition  
 End Condition **Through All**

click **Positions** tab  at top of the Property Manager.





**Fig. 72**

Step 4. Click **front face support** one time as face for holes and click **face twice to place 2 points**, **Fig. 73**.

Step 5. **Right click graphics area and click Select**  from menu to unselect Point tool.

Step 6. **Ctrl click both points and Origin** . Release Ctrl key and click **Make Vertical**

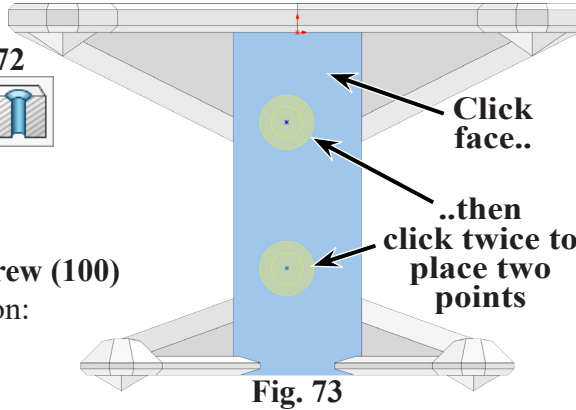
 on the context toolbar, **Fig. 74**.

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

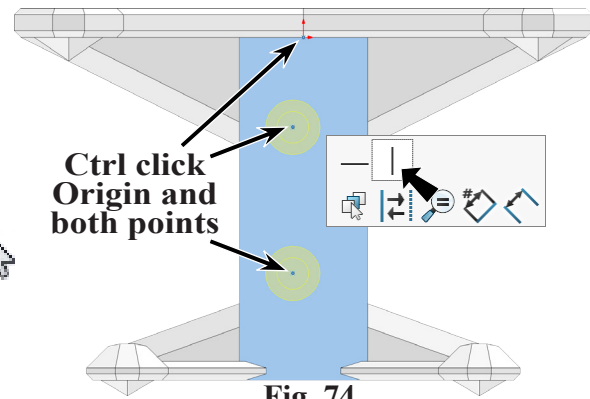
Step 8. Add dimensions, **Fig. 75**.

Step 9. Click OK  in the Hole Wizard Property Manager.

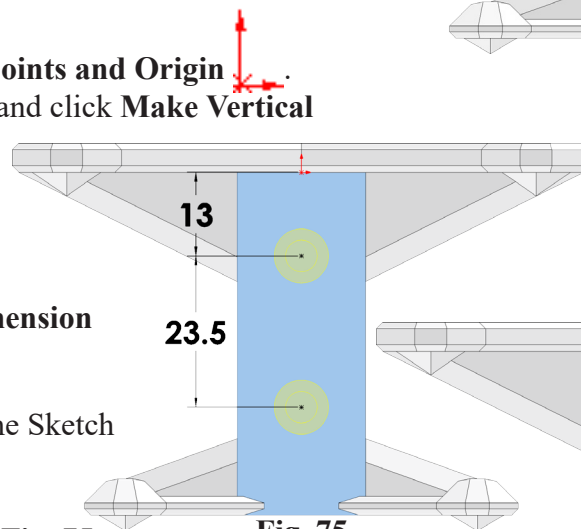
Step 10. Save  (Ctrl-S).



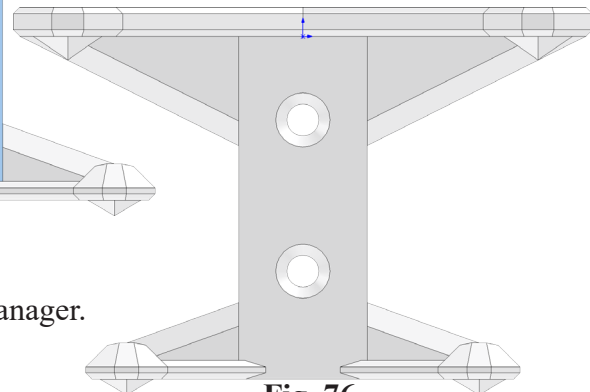
**Fig. 73**



**Fig. 74**



**Fig. 75**



**Fig. 76**

## S. Appearance: Gray.

Step 1. Click **Trimetric**  on the Standard Views toolbar.

Step 2. Click part, click **Appearance**

**Callout**  on the context toolbar and click **WALL HANGER** , Fig. 77.

Step 3. In the Appearances Task pane, expand **Plastic**, click **High Gloss** and in the lower pane select **light gray high gloss plastic**, Fig. 78.

Step 4. Click OK  in Appearances Property Manager.

Step 5. Save  (Ctrl-S).

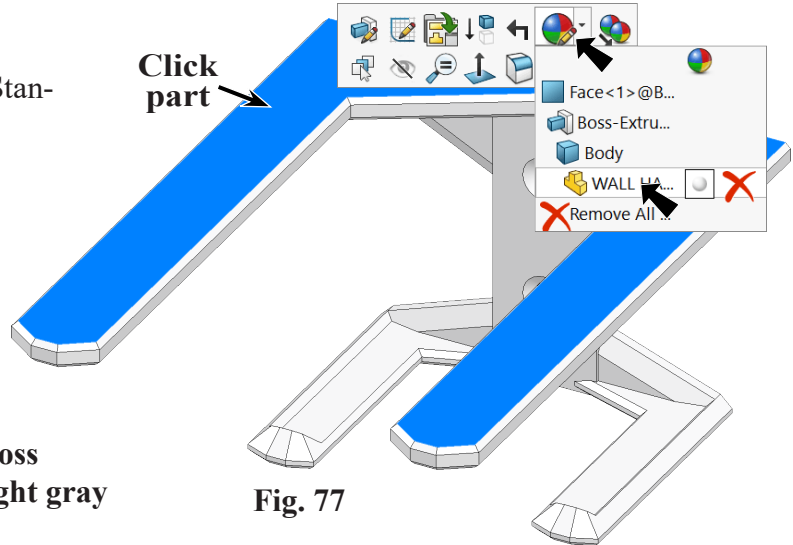


Fig. 77

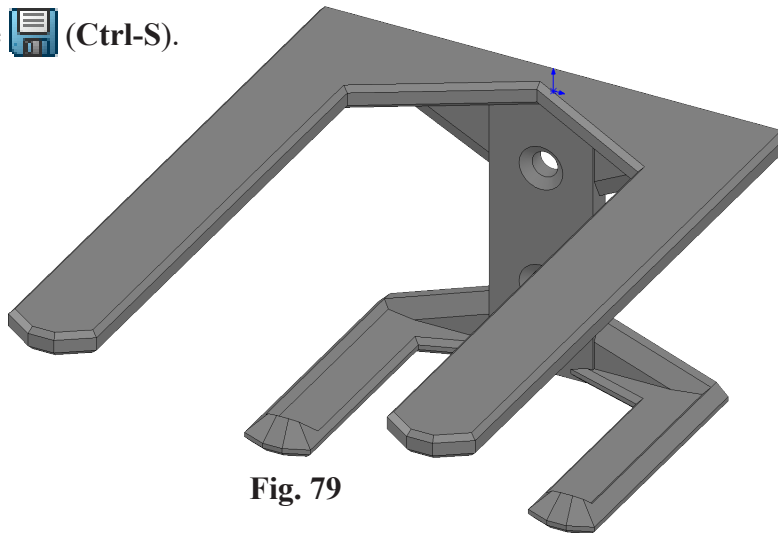


Fig. 79

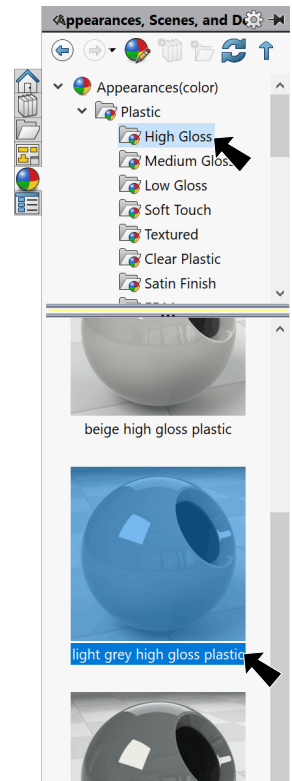


Fig. 78