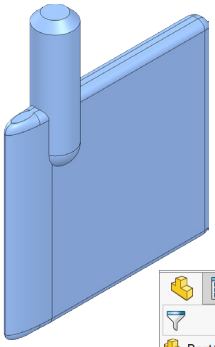
Chapter 8

The Watermaster
Rudder



A. Extrude1 Sketch1 Blade.

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**.

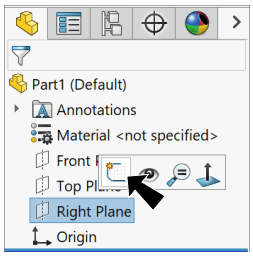


Fig. 1

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

Step 4. Sketch corner rectangle starting at the Origin, **Fig. 2**.

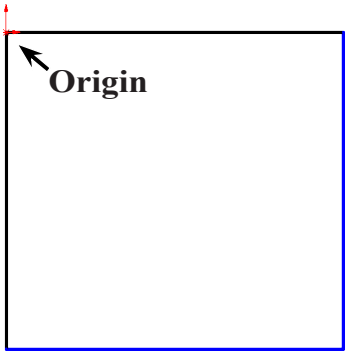


Fig. 2

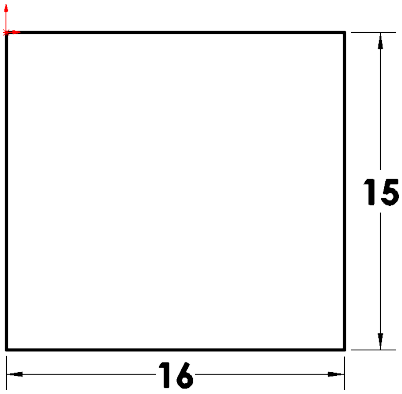


Fig. 3

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

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

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 Direction 1, **Fig. 4**
End Condition **Mid Plane**
Depth **1.5**
click OK.

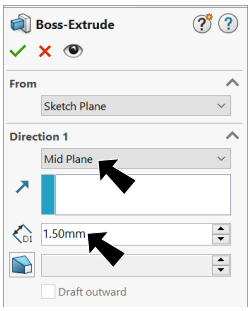


Fig. 4

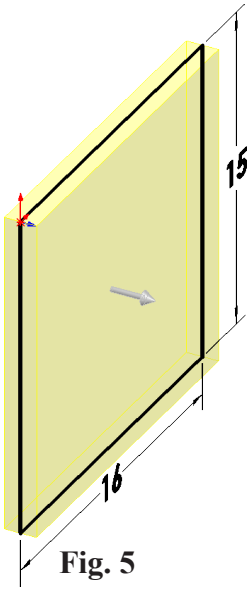


Fig. 5

B. Save as "RUDDER".

Step 1. Click File Menu > Save As.

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

C. Extrude2 Sketch2 Shaft.

Step 1. Click **Top Plane** in the Feature Manager and click **Sketch** on the context toolbar, **Fig. 6**.

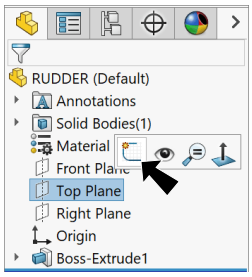


Fig. 6

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 above the Origin, **Fig. 7**.

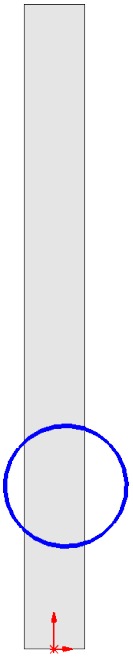


Fig. 7

Step 5. **Unselect Circle tool**. To unselect, **right click graphics area and click Select** from menu.

Step 6. **Ctrl click centerpoint of circle** and **Origin** to select both. Release Ctrl key and click **Make Vertical** on the context toolbar, **Fig. 8**.

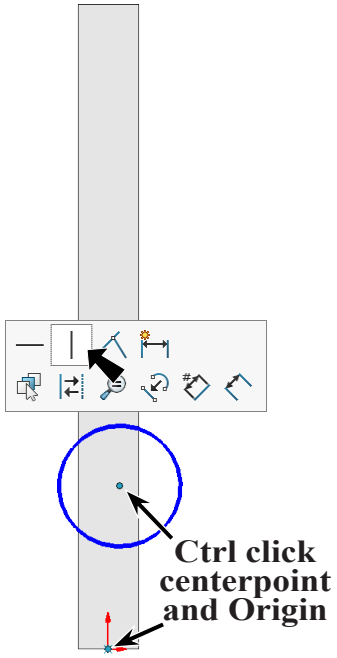


Fig. 8

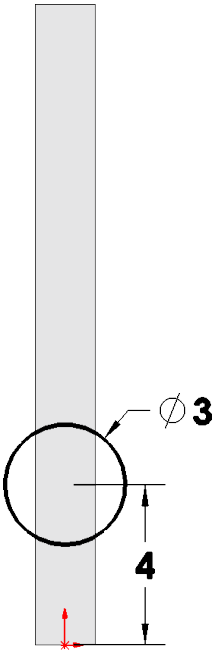


Fig. 9

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

Step 8. Add dimensions, **Fig. 9**.

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

Step 10. In the Offset Entities Property Manager set:

under Parameters, **Fig. 10**

Distance .06 (clearance of Nozzle rudder mount)

check **Reverse**

uncheck **Bi-directional**

under Construction geometry

check **Base geometry**

click **circle**, **Fig. 11**

Yellow offset circle on inside - base geometry (construction) on outside.

click OK .

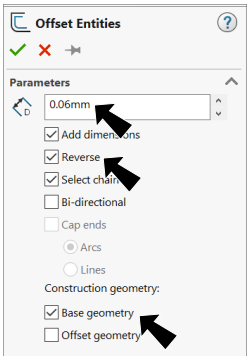


Fig. 10

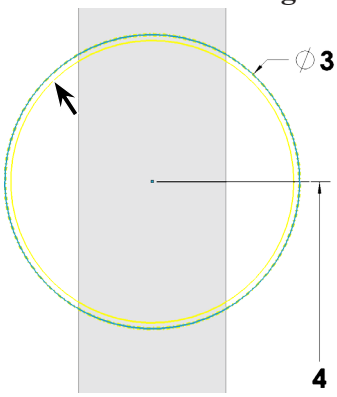


Fig. 11

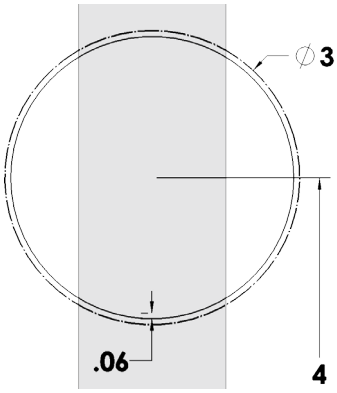


Fig. 12

Step 11. Click **Isometric** on the Standard Views toolbar. (**Ctrl-7**)

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

Step 13. Click **Extruded Boss/Base** Extruded Boss/Base on the Features toolbar.

Step 14. In the Boss-Extrude Property Manager set:

under Direction 1, **Fig. 13**

End Condition **Blind**

Depth D1 **6**

uncheck **Merge result**

under Direction 2

Depth D2 **3**

click OK .

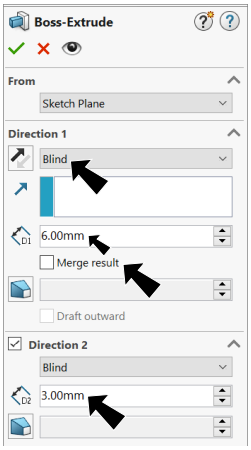


Fig. 13

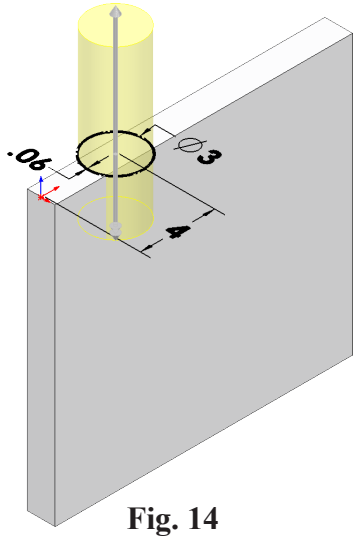
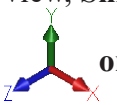


Fig. 14

Step 15. Save (**Ctrl-S**).

D. Revolve Sketch3.

Step 1. Rotate view to bottom face of shaft, **Fig. 15**. To rotate view, **Shift click the X axis of the Reference Triad**



one time.

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

Step 3. With the face still selected, click **Convert Entities**

Convert Entities on the Sketch toolbar, **Fig. 16**.

Step 4. Click **Centerline** in the **Line flyout** on the Sketch toolbar.

Step 5. Sketch **horizontal centerline the two quadrants points** of circle, **Fig. 17**.

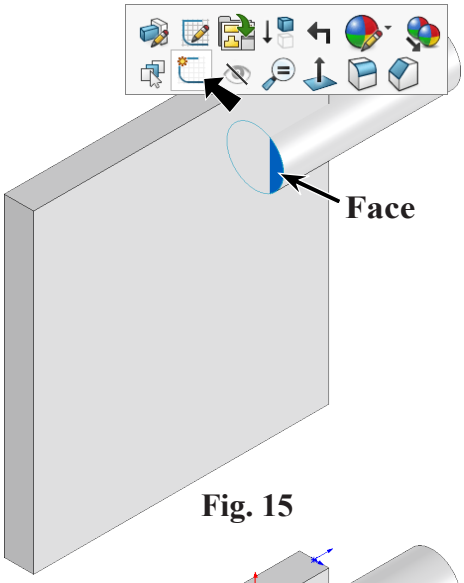


Fig. 15

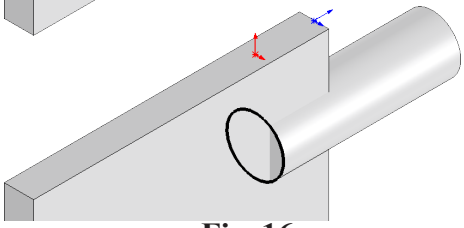


Fig. 16

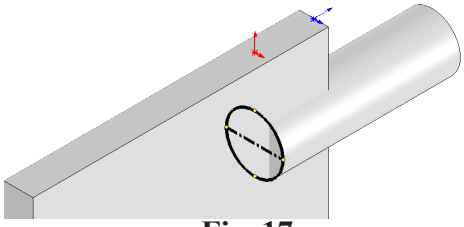


Fig. 17

Step 6. Click **Features** 

on the Command Manager toolbar.

Step 7. Click **Revolved Boss/Base** 

on the Features toolbar.

Step 8. In the Revolve Property Manger set:

under Axis of Revolution 
centerline will be selected, **Fig. 18**
under Selected Contours
click the **contour**, **Fig. 19**
under Feature Scope
unselect **Auto-select**
click the **shaft**
click OK  .

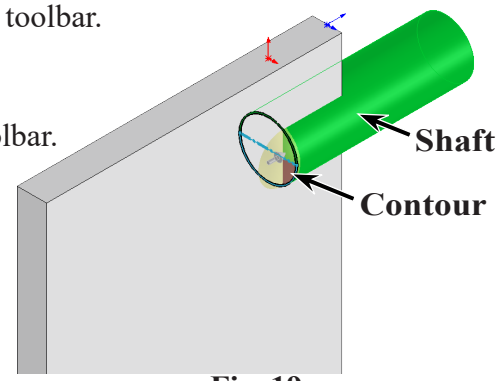


Fig. 19

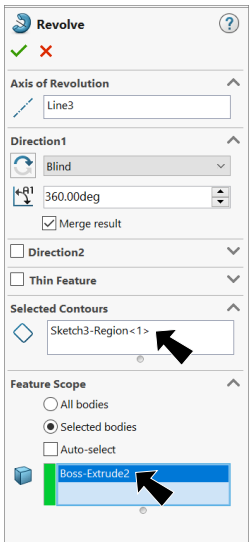


Fig. 18

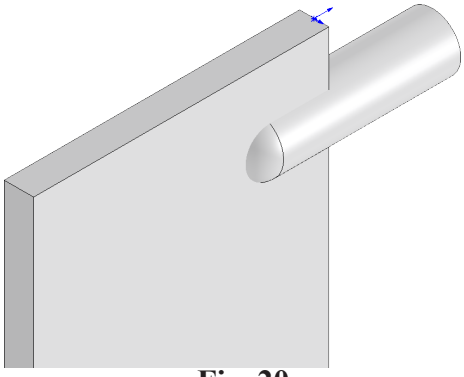


Fig. 20

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

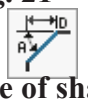
E. Chamfer.

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

Step 2. Click **Chamfer** 

on the Features toolbar.

Step 3. In the Chamfer Property Manager set:

under Chamfer Type, **Fig. 21**
select **Angle Distance** 
click **top circular edge of shaft**, **Fig. 22**
under Chamfer Parameters
Distance  **.6**
Angle  **45º**
click OK  .

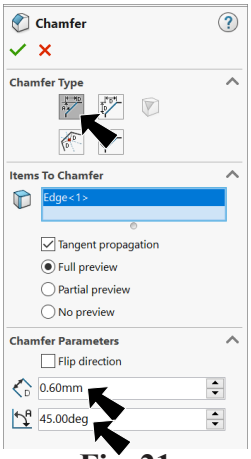


Fig. 21

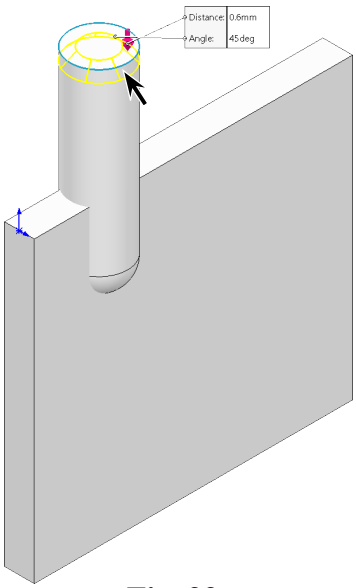


Fig. 22

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

F. Fillet1 Manual Asymmetric.

Step 1. Click **Fillet** 

on the Features toolbar.

Step 2. In the Fillet Property Manager,
select **Manual**, **Fig. 23**
under Fillet Type
select **Constant Size Fillet** 
under Items To Fillet
click **front port edge of blade**, **Fig. 24**
under Fillet Parameters
Fillet Method Asymmetric
Distance 1 **.75**
Distance 2 **3**
The long 3 should be on the **side of blade**
If positioned in opposite direction,
click **Reverse Direction** 
click OK  .

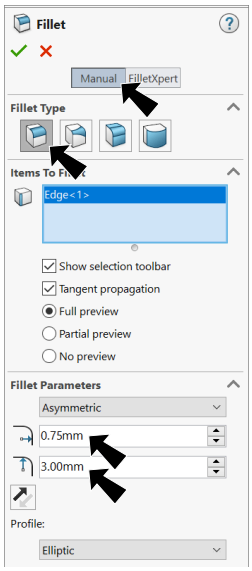


Fig. 23

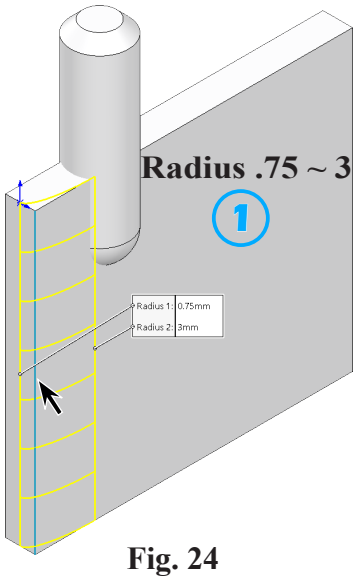


Fig. 24

G. Fillet2 Manual Asymmetric.

Step 1. Click **Fillet** 

on the Features toolbar.

Step 2. In the Fillet Property Manager,
select **Manual**, **Fig. 25**
under Fillet Type
select **Constant Size Fillet** 
under Items To Fillet
click **front starboard edge of blade**, **Fig. 26**
under Fillet Parameters
Fillet Method Asymmetric
Distance 1 **.75**
Distance 2 **3**
The long 3 should be on the **side of blade**
If positioned in opposite direction,
click **Reverse Direction** 
click OK  .

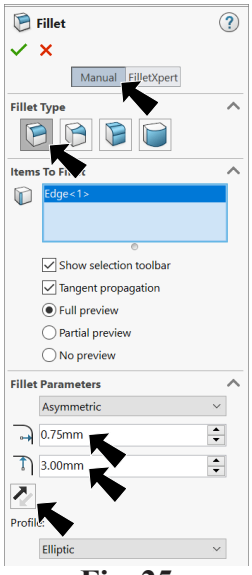


Fig. 25

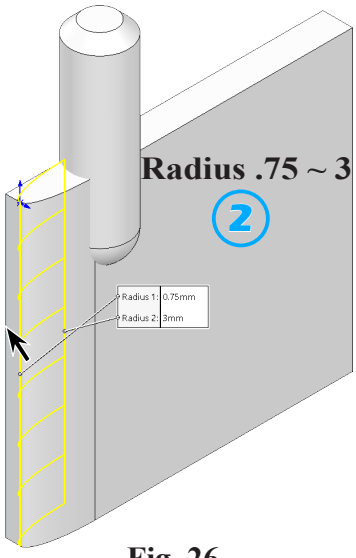


Fig. 26

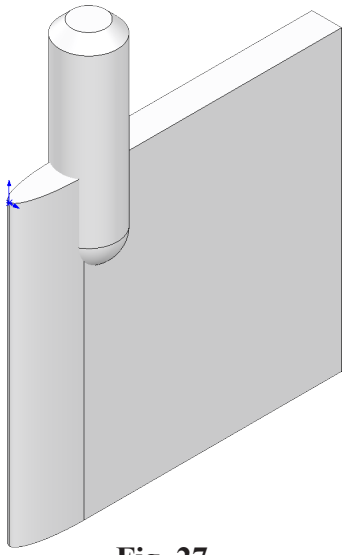


Fig. 27

H. Fillets 3-4.

Step 1. Click **Fillet** 

on the Features toolbar.

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

③ **Radius** **.55**
click **top and bottom edges of blade (2)**, **Fig. 29**
click **Apply**

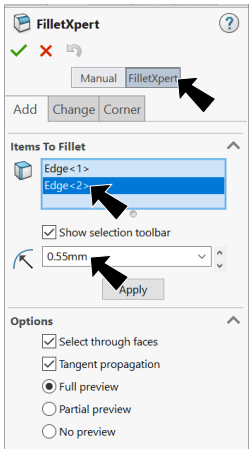


Fig. 28

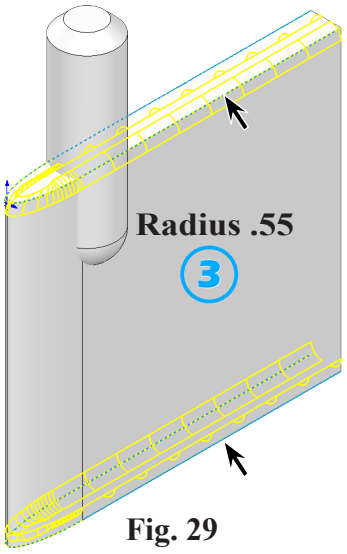


Fig. 29

④ **Radius** **.75**, **Fig. 30**
click **rear edges of blade (2)**, **Fig. 31**
click OK ✔.

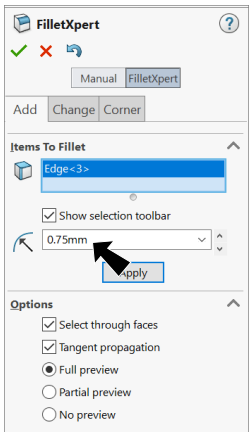


Fig. 30

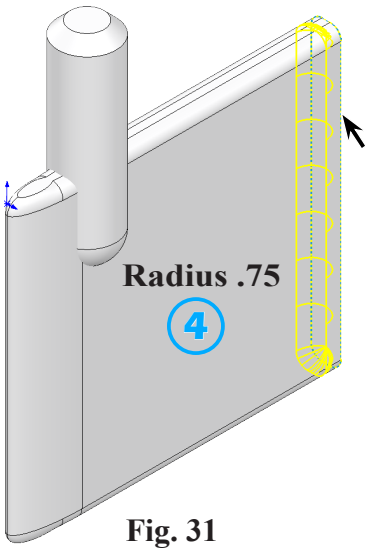


Fig. 31

I. Combine Bodies.

Step 1. Click Insert Menu > Features > Combine.

Step 2. In the Combine Property Manager:
under Operation Type, **Fig. 32**
select **Add**
drag a selection to select all or **Ctrl-A**, **Fig. 33**
click OK ✔.

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

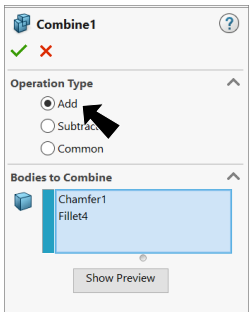


Fig. 32

Ctrl-A

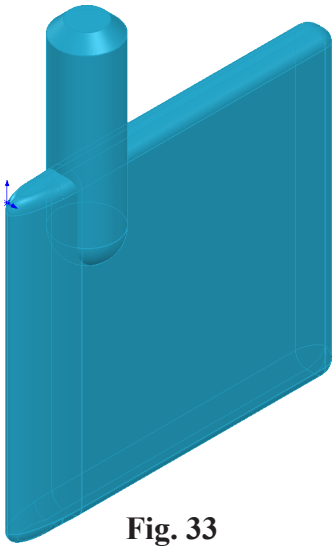


Fig. 33

J. Appearance: Blue.

Step 1. Click part, click **Appearance Callout** on the context toolbar and click **RUDDER**, **Fig. 34**.

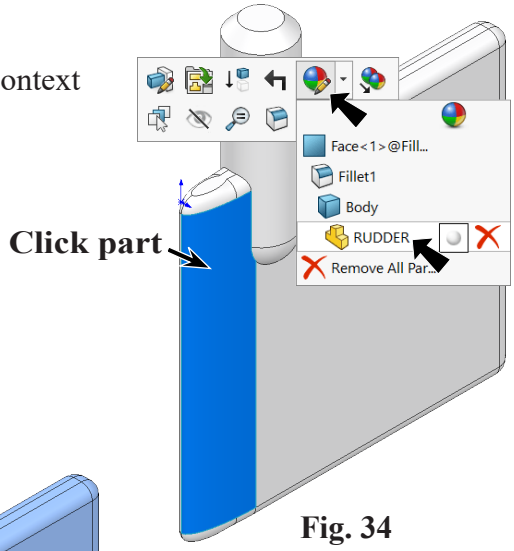


Fig. 34

Step 2. In Appearances Property Manager:
under Color, **Fig. 35**
set **RGB values** to:
R 158
G 196
B 255
click OK .

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

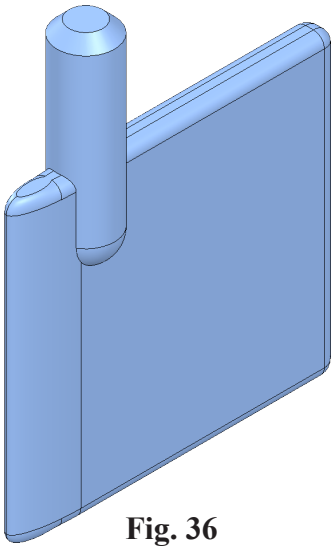


Fig. 36

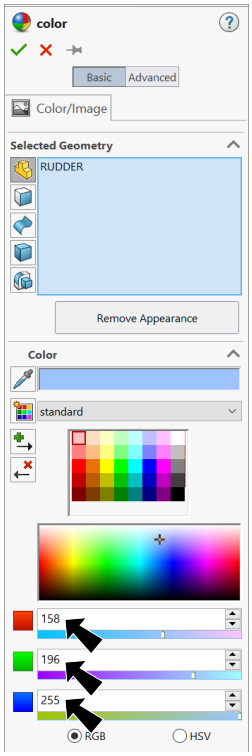


Fig. 35