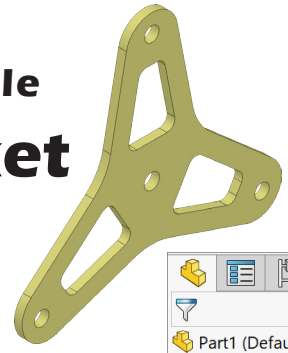
Chapter 4

Cluster Wheel Vehicle

Outside Bracket



A. Extrude.

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**.

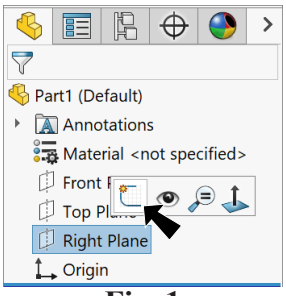


Fig. 1

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

Step 4. Sketch a **vertical centerline up from the Origin**, **Fig. 2**.

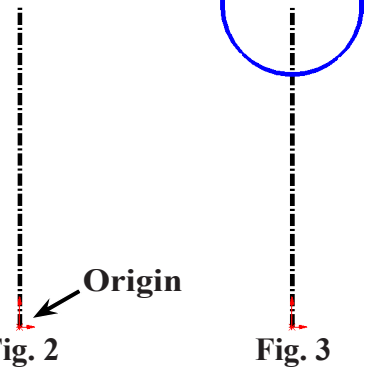


Fig. 2

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

Step 6. Sketch **circle at top endpoint of centerline**, **Fig. 3**.

Fig. 3

Step 7. Click **Line** **(L)** on the Sketch toolbar.

Step 8. Sketch **tangent line down from circle**, **Fig. 4**. To create tangent relation, hover over circle for a moment before starting the line.

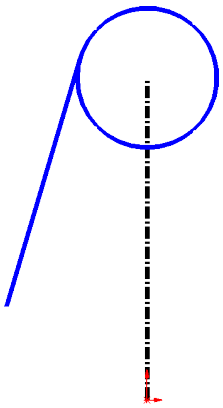


Fig. 4

Step 9. Click **Smart Dimension** **(S)** on the Sketch toolbar.

Step 10. Add dimensions, **Fig. 5**. To dimension the 60º angle, click the centerline, and the bottom endpoint (Origin) and then bottom endpoint of the line.

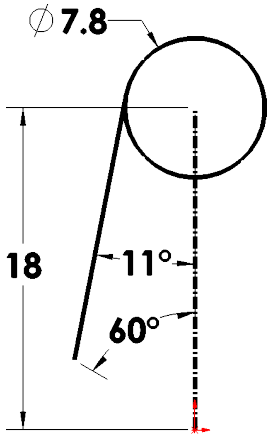


Fig. 5

Step 11. **Unselect Smart Dimension**. To un-select, right click graphics area and click Select from menu.

Step 12. **Ctrl drag a selection to left** to **select centerline and line**, **Fig. 6**.

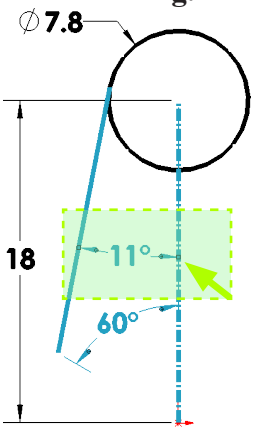


Fig. 6

Step 13. Click **Mirror Entities** on the Sketch toolbar, **Fig. 7**.

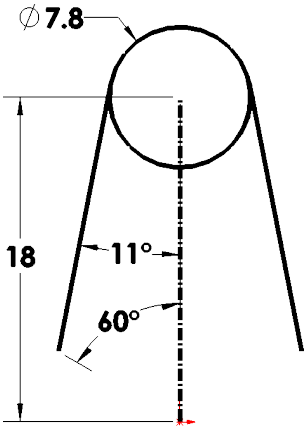


Fig. 7

1/22/25

Step 14. **Ctrl drag** a selection to right to select all, **Fig. 8**.

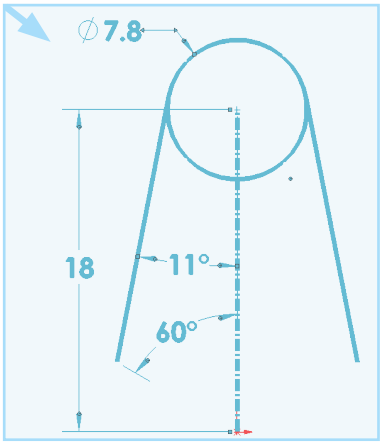
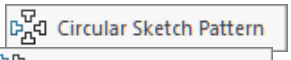
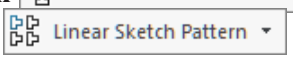


Fig. 8

Step 15. Click **Circular Sketch Pattern** 

in the **Linear Sketch Pattern flyout** 

on the Sketch toolbar.

Step 16. In the Circular Sketch Pattern Property Manager set:
under Parameters, **Fig. 9**
click **Origin (Point 1)**, **Fig. 10**
Angle **360**
select **Equal spacing**
Number of Instances **3**
under Entities to Pattern
entities were preselected
click OK .

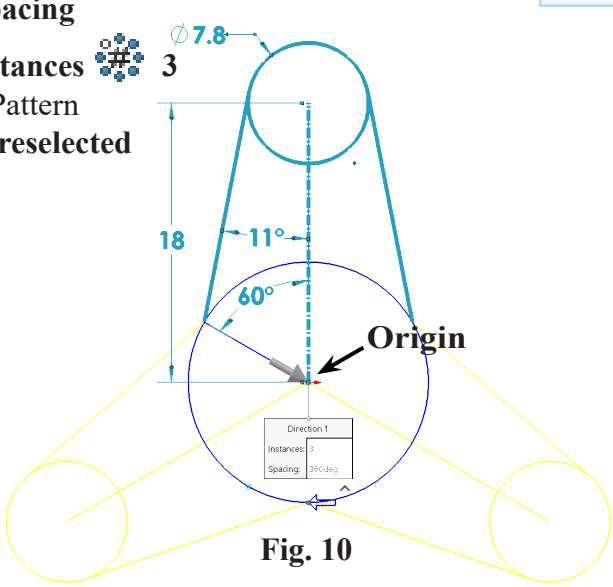


Fig. 10

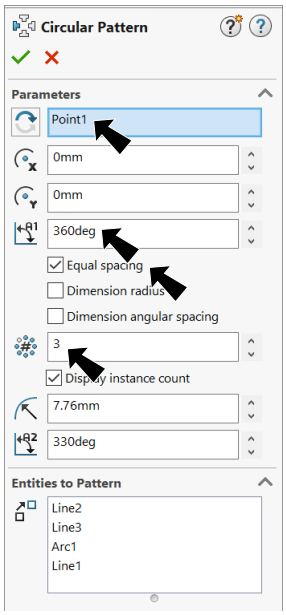
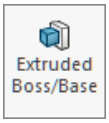


Fig. 9

Step 17. Click **Features** 

on the Command Manager toolbar.

Step 18. Click **Extruded Boss/Base** 

on the Features toolbar.

Step 19. In the Boss-Extrude Property Manager set:
under Direction 1, **Fig. 11**
End Condition **Blind**
Depth **1.2**
Reverse Direction
under Selected Contours
click the **4 contours**, **Fig. 12**
click OK .

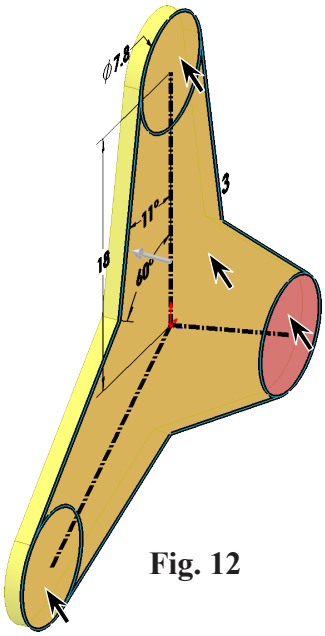


Fig. 12

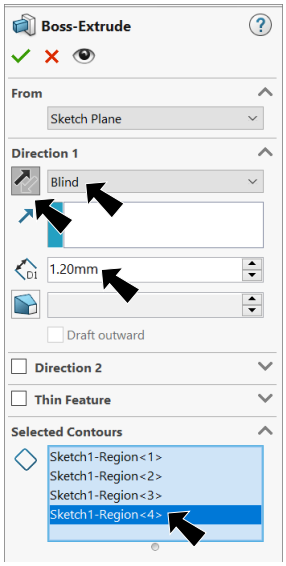


Fig. 11

B. Save as "OUTSIDE BRACKET".

Step 1. Click File Menu > Save As.

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

C. Extruded Cut1.

Step 1. Click **Right Plane** in the Feature Manager and click **Sketch** on the context toolbar, **Fig. 13**.

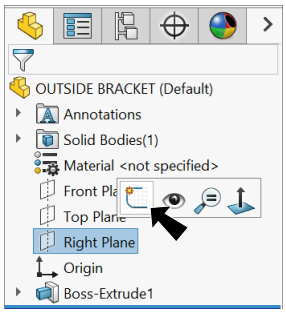


Fig. 13

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 a **vertical centerline up from Origin**, **Fig. 14**.

Fig. 14

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

Step 6. Sketch **circle at top endpoint of centerline and at Origin**, **Fig. 15**.

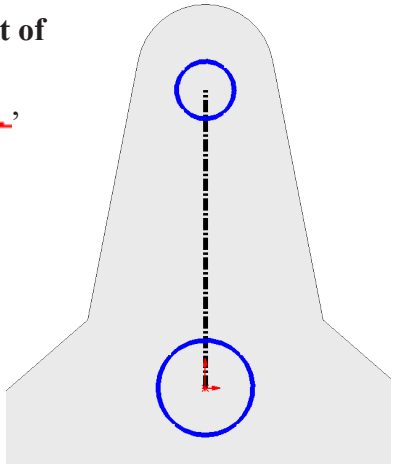


Fig. 15

Step 7. Click **Line** **(L)** on the Sketch toolbar.

Step 8. Sketch a **horizontal line out from centerline**, **continue chained line down at angle and horizontal line back to centerline**, **Fig. 16**.

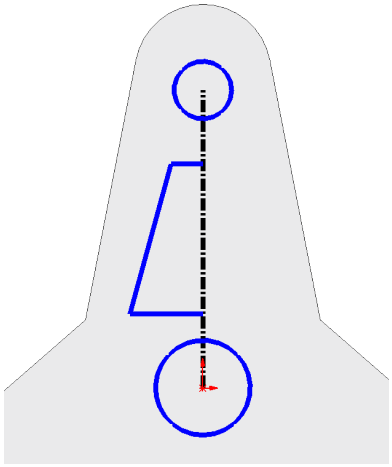


Fig. 16

Step 9. **Unselect Line tool**. To unselect, right click graphics area and click Select from menu.

Step 10. **Ctrl click edge of body and angled line** to select both. Release Ctrl key and click **Make Parallel** on the context toolbar, **Fig. 17**.

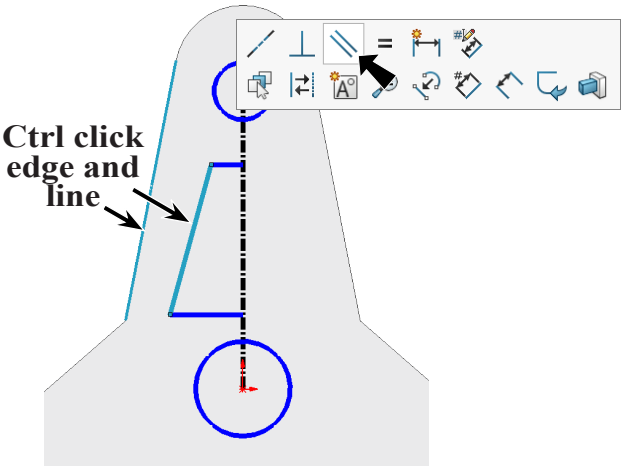


Fig. 17

Step 11. Click **Smart Dimension** 

(**S**) on the Sketch toolbar.

Step 12. Add dimensions, **Fig. 18**.

Step 13. **Unselect Smart Dimension**. To unselect, right click graphics area and click Select  from menu.

Step 14. **Ctrl drag** a selection to left to **select centerline and lines**, **Fig. 19**.

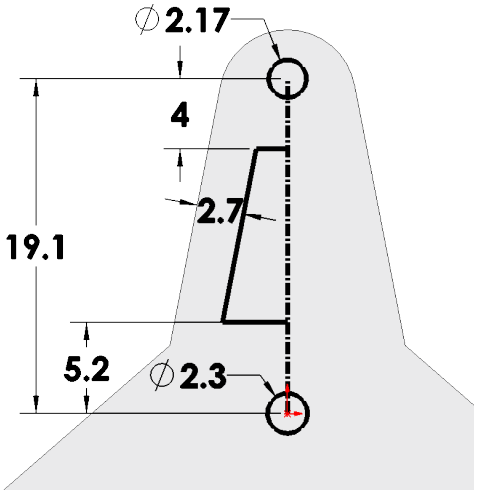
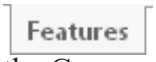


Fig. 18

Step 15. Click **Mirror Entities** 

on the Sketch toolbar, **Fig. 20**.

Step 16. Click **Isometric**  on the Standard Views toolbar. (**Ctrl-7**)

Step 17. Click **Features** 

on the Command Manager toolbar.

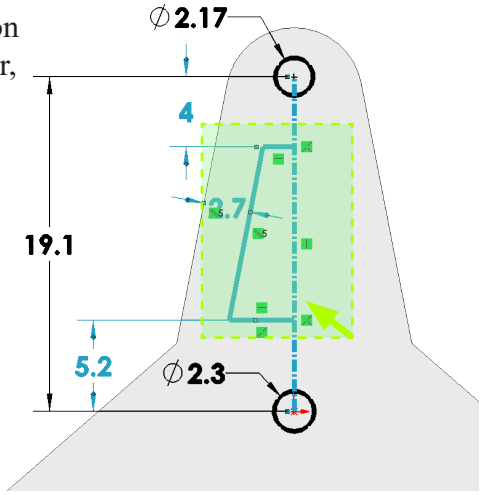


Fig. 19

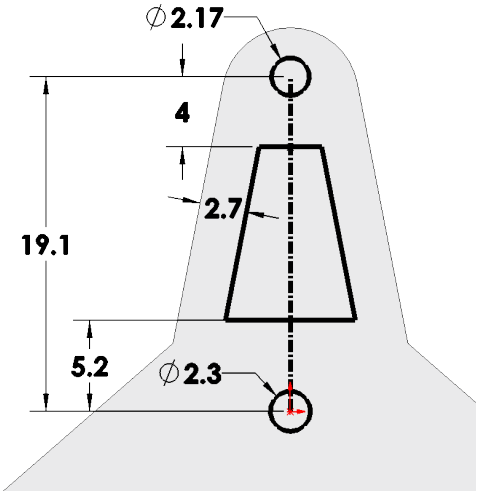
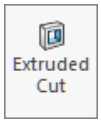


Fig. 20

Step 18. Click **Extruded Cut** 

on the Features toolbar.

Step 19. In the Cut-Extrude Property Manager set:
under Direction 1, **Fig. 21**
End Condition **Through All**
click OK  .

Step 20. Save  (**Ctrl-S**).

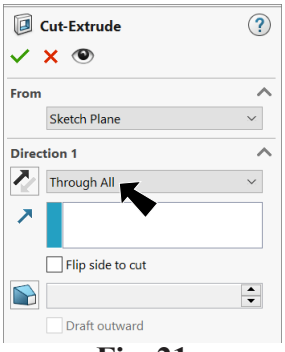


Fig. 21

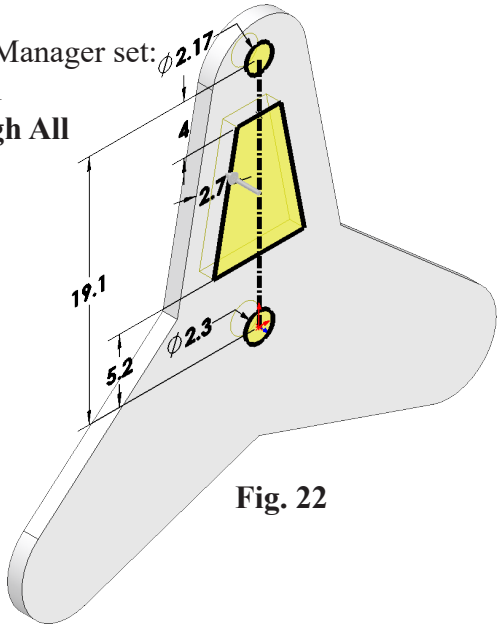
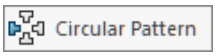


Fig. 22

D. Circular Pattern.

Step 1. Click **Circular Pattern** 

in the **Linear Pattern flyout** 

on the Features toolbar.

Step 2. In the Circular Pattern Property Manager set:
under Features and Faces, **Fig. 23**
click **Cut-Extrude1** in graphics area, **Fig. 24**
under Direction 1
click in **Pattern Axis** box
click a **cylindrical face of center axle hole**
select **Equal spacing**
Number of Instances  **3**
click OK  .

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

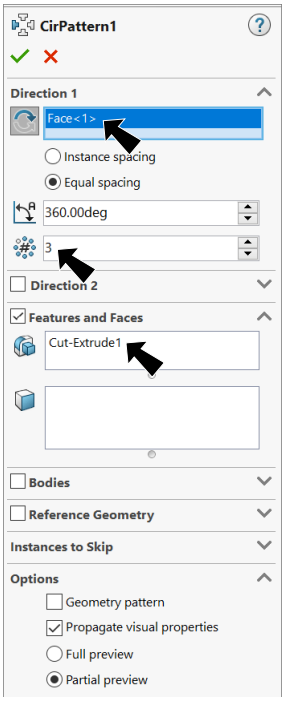


Fig. 23

Fig. 24

E. Fillets.

Step 1. Click **Fillet** 

on the Features toolbar.

Step 2. In the Fillet Property Manager set:
select **FilletXpert**, **Fig. 25**

① **Radius** 8
click a **corner outside edge**, **Fig. 26**
click **Connected to start loop** 
2 Edges on the Fillet pop-up
click **Apply**

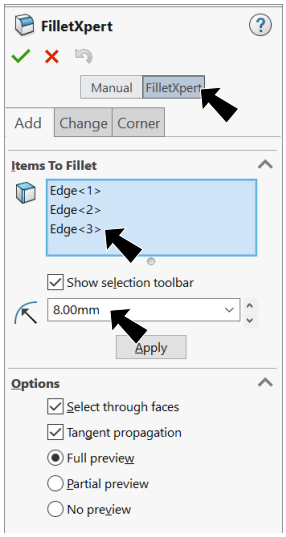


Fig. 25

Radius 8
①

Fig. 26

② **Radius** 1.2 **Fig. 27**
click an **inside corner edge**, **Fig. 28**
click **Connected to start internal loops**  **11 Edges**
on the Fillet pop-up
click OK ✔ .

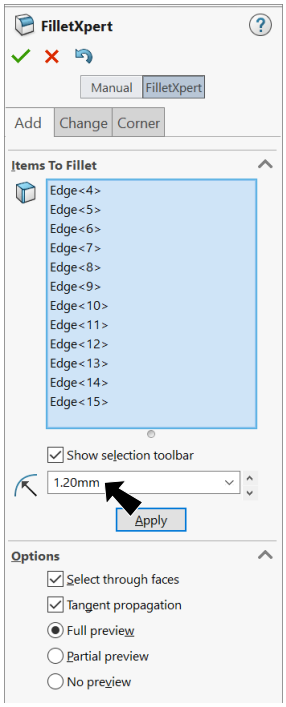


Fig. 27

Radius 1.2
②

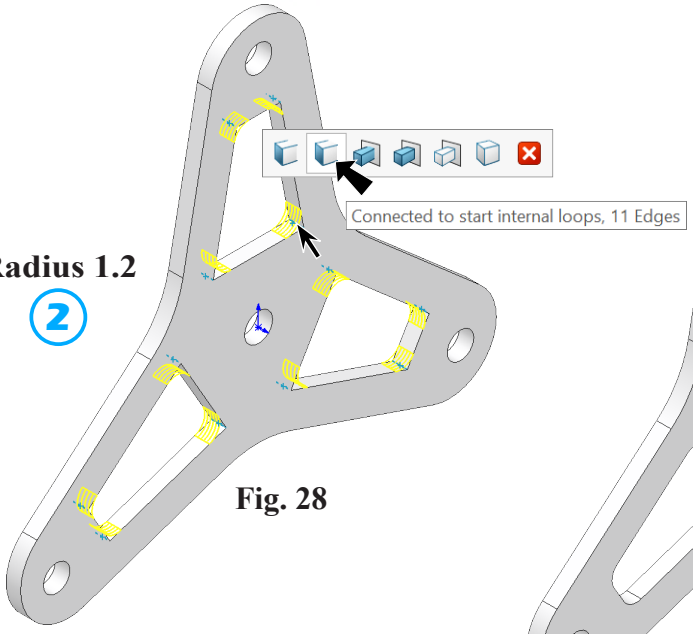


Fig. 28

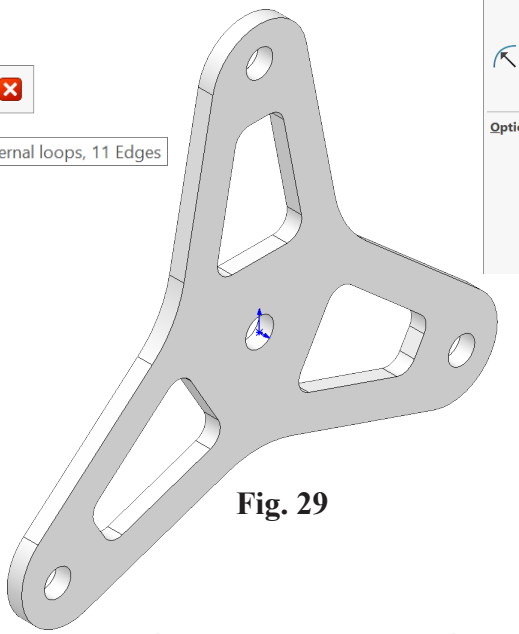


Fig. 29

F. Mate Reference.

Step 1. Click **Reference Geometry** on the Features toolbar and **Mate Reference** from the menu.

Step 2. In the Mate Reference Manager set:
under **Primary** Reference Entity
click **cylindrical face of center axle hole**, **Fig. 31**
click OK .

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

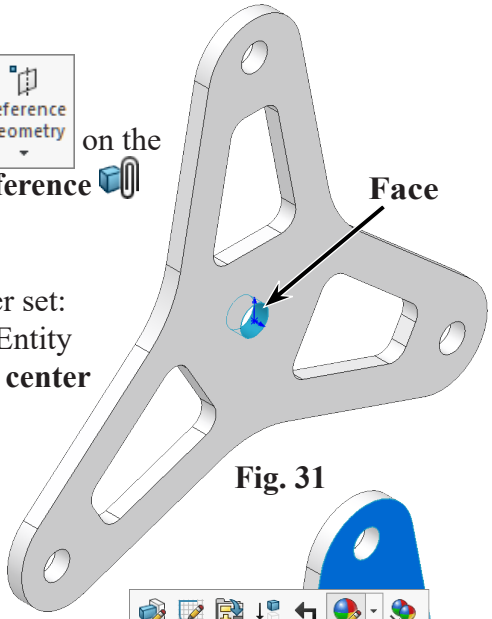


Fig. 31

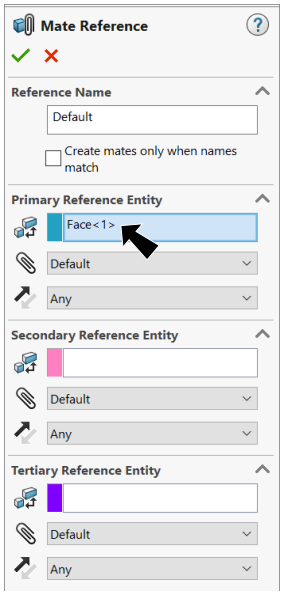


Fig. 30

G. Appearance: Green.

Step 1. Click part, click **Appearance Callout** on the context toolbar and click **OUTSIDE BRACKET**, **Fig. 32**.

Step 2. In the Appearances Task pane at the bottom select **CWV** and in the lower pane select **army green plastic**, **Fig. 33**.

Step 3. Click OK in Property Manager.

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

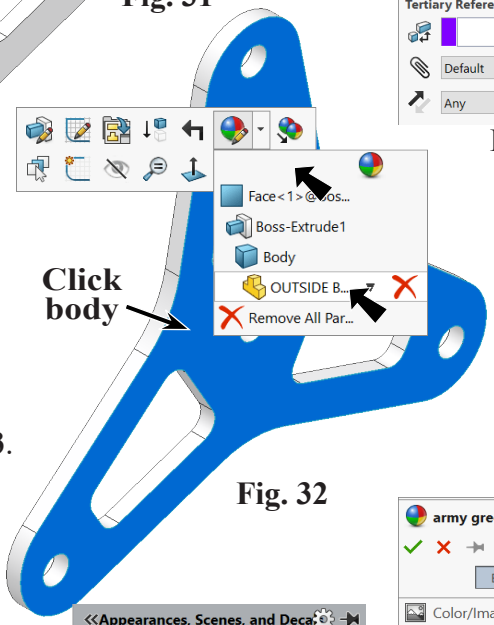


Fig. 32

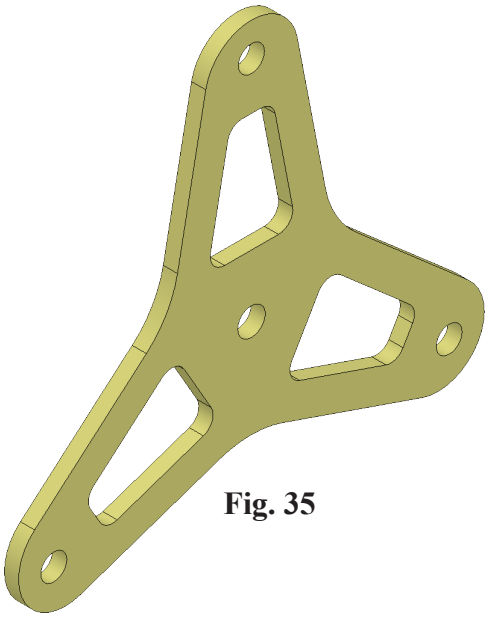


Fig. 35

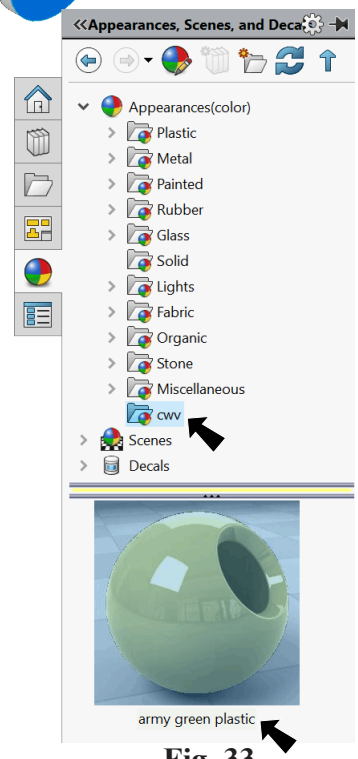


Fig. 33

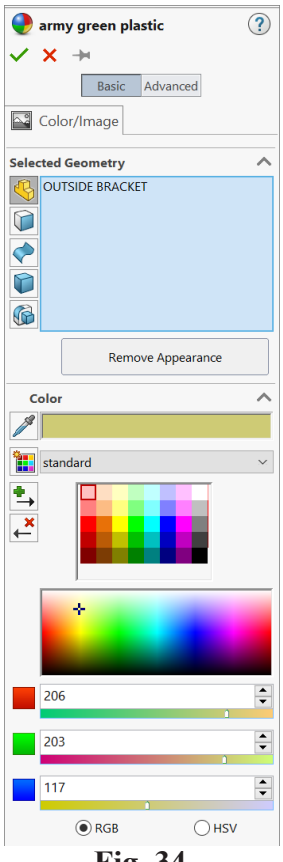


Fig. 34