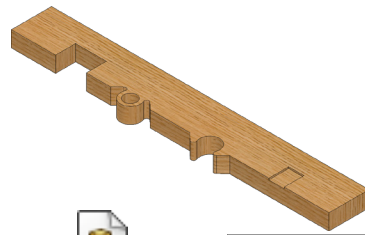


Solar Train End Tie



A. Extrude1.

Step 1. Click **New**  on the Standard toolbar, click **Part Metric**  and OK.

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

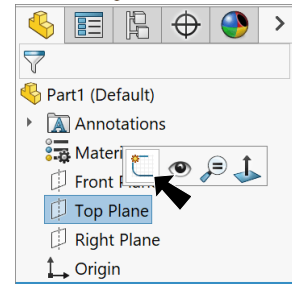


Fig. 1

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

Step 4. Sketch **vertical centerline from Origin**  and another **horizontal centerline to right**, **Fig. 2**.

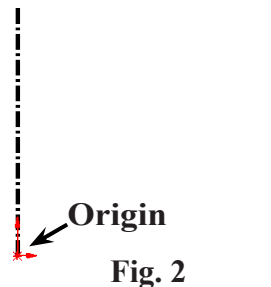


Fig. 2

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

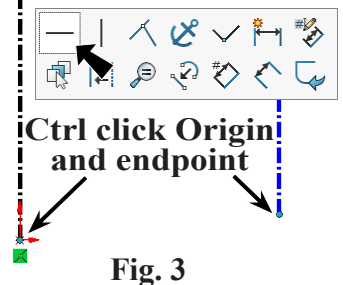


Fig. 3

Step 6. **Ctrl click Origin**  and **bottom endpoint of second centerline** to select both. Release Ctrl key and click **Make Horizontal**  on the context toolbar, **Fig. 3**.

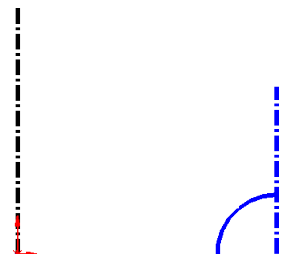


Fig. 4

Step 7. Click **Centerpoint Arc**  (S) in the **Arc flyout**  on the Sketch toolbar.

Step 8. Sketch centerpoint arc at bottom endpoint of second centerline. Click to place the first endpoint above on centerline, then swing arc to left. Click to place the second endpoint below centerpoint, **Fig. 4**.

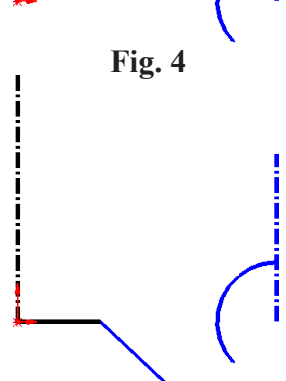


Fig. 5

Step 9. Click **Line**  (L) on the Sketch toolbar.

Step 10. Sketch a **horizontal line from Origin**  to right and a **chained a line down at angle**, **Fig. 5**.

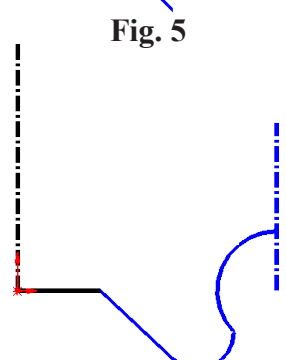


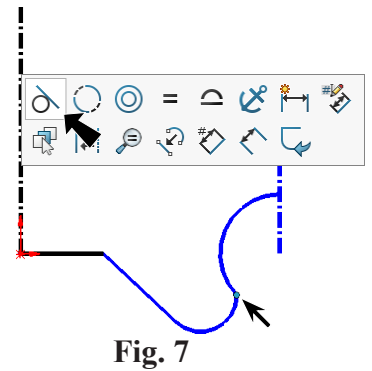
Fig. 6

Autotransition to Tangent Arc tool and **sketch arc to centerpoint arc**, **Fig. 6**. To autotransition to arc, after sketching endpoint of line, move cursor away and back. The preview shows a tangent arc. Click to place the tangent arc.

Tip: Toggle between line and arc without returning to the endpoint, use A key.

Step 11. **Unselect Line tool.** To unselect, right click graphics area and click Select  from menu.

Step 12. Click **point of intersection of the two arcs** and click **Make Tangent**  on the context toolbar, **Fig. 7.**



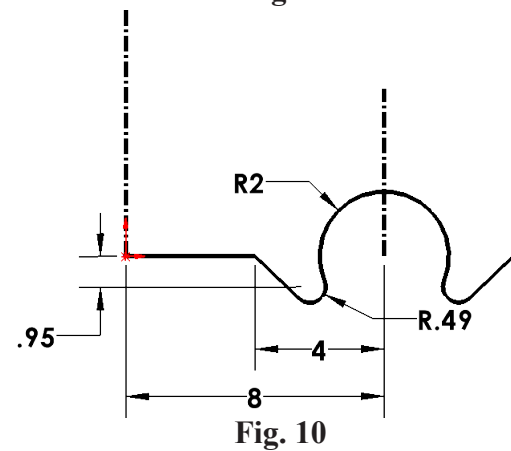
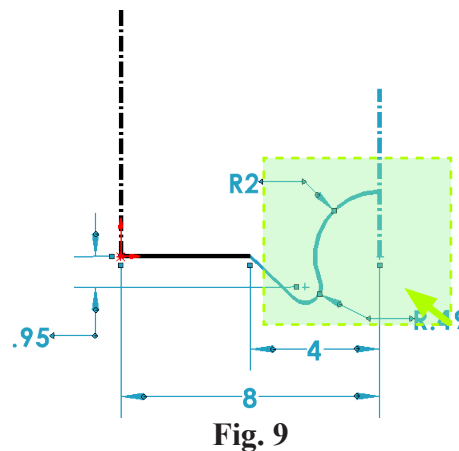
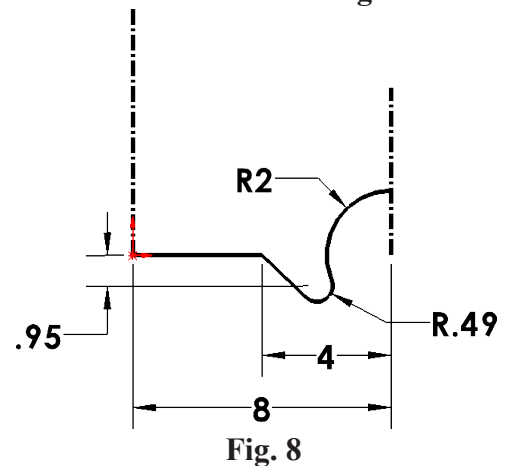
Step 13. Click **Smart Dimension**  (S) on the Sketch toolbar.

Step 14. Add dimensions, **Fig. 8.**

Step 15. **Unselect Smart Dimension.** To unselect, right click graphics area and click Select  from menu.

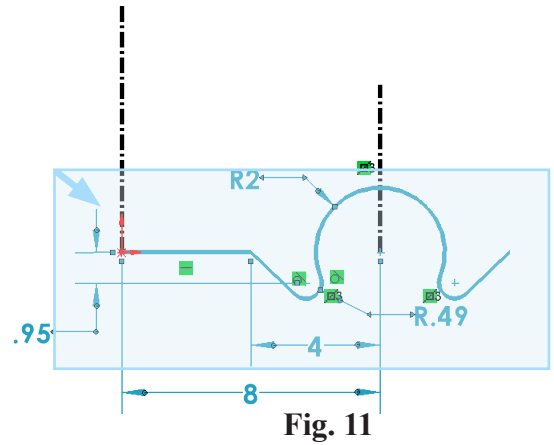
Step 16. **Drag a selection to left to select only angled line, two arcs and second centerline, Fig. 9.**

Step 17. Click **Mirror Entities**  **Mirror Entities** on the Sketch toolbar, **Fig. 10.**



Step 18. Drag a selection to right to select all but center-lines, Fig. 11.

Step 19. Click **Circular Sketch Pattern** in the **Linear Sketch Pattern** flyout on the Sketch toolbar.



Step 20. In the Circular Sketch Pattern Property Manager set:
under Parameters, Fig. 12
center for pattern box

click **Origin**, Fig. 13

Angle 360

select **Equal spacing**

Number of Instances 2

under Entities to Pattern
entries were preselected

click OK

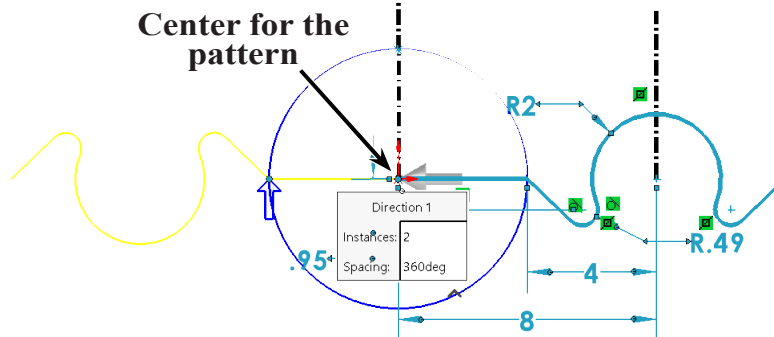
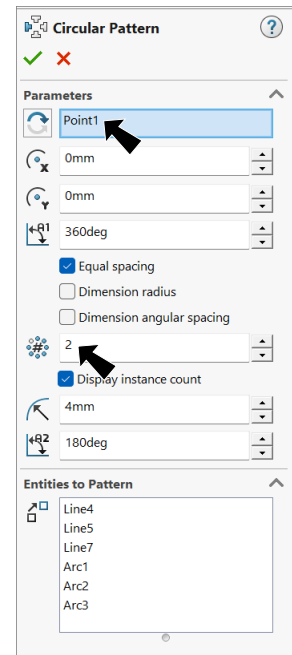


Fig. 13

Step 21. Click **cir pattern horizontal line at Origin** and click **Make Horizontal** on the context toolbar, Fig. 14.

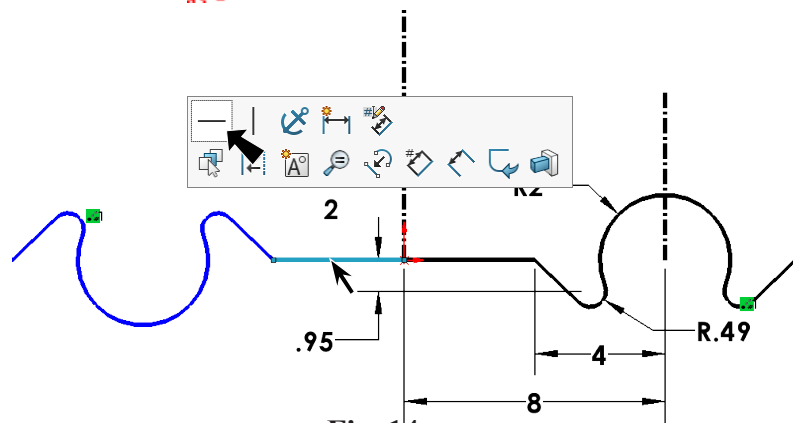


Fig. 14

Step 22. Click **Line**  (L) on the Sketch toolbar.

Step 23. Sketch the 3 lines, **Fig. 15**.

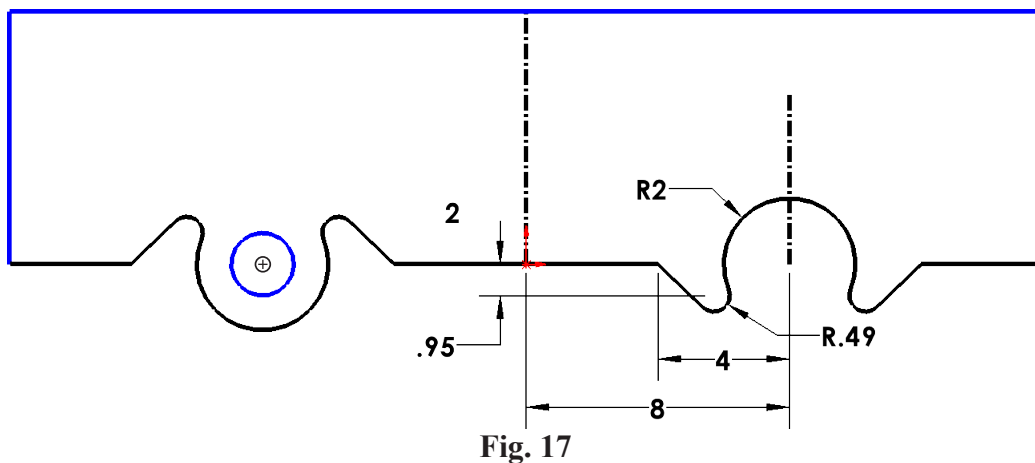
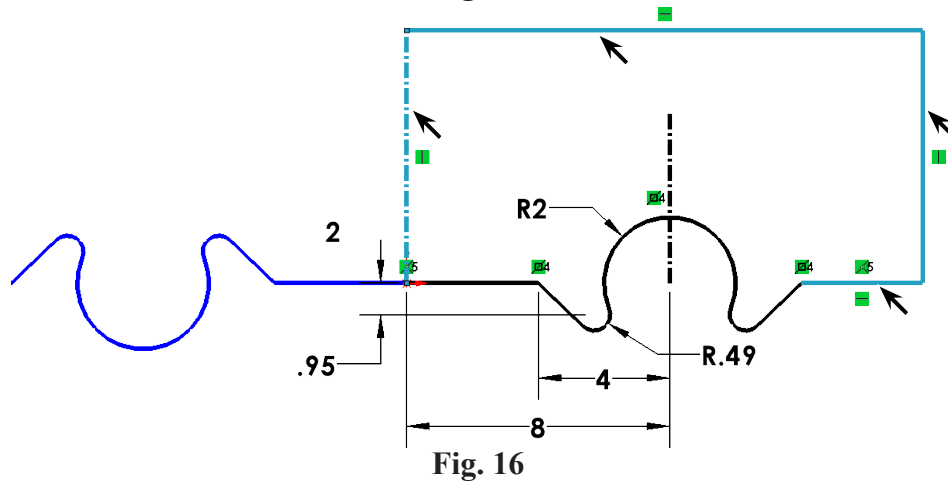
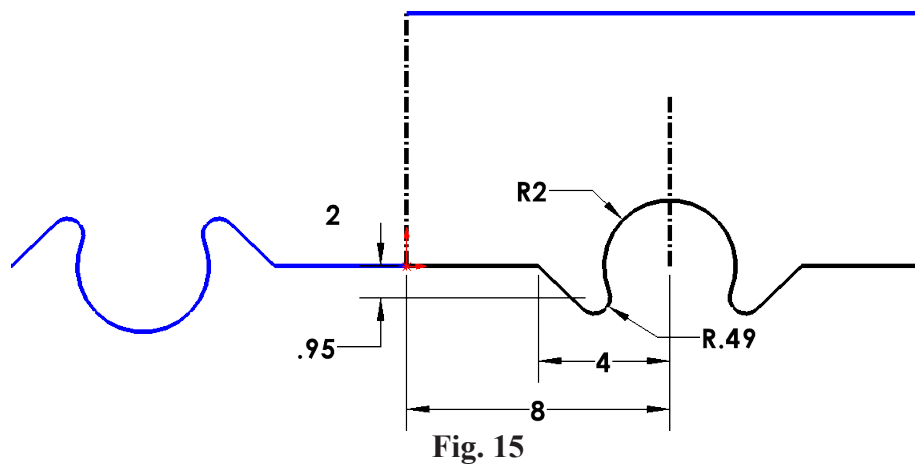
Step 24. **Unselect Line tool**. To unselect, right click graphics area and click **Select**  from menu.

Step 25. **Ctrl click the 3 lines and center-line at Origin**  to select, **Fig. 16**.

Step 26. Click **Mirror Entities**  **Mirror Entities** on the Sketch toolbar.

Step 27. Click **Circle**  (S) on the Sketch toolbar.

Step 28. Sketch **circle at centerpoint of patterned large arc**, **Fig. 17**. To wake up centerpoint, hover cursor over arc.



C. Cut-Extrude1.

Step 1. Click **Top Plane**  in the Feature Manager and click **Sketch**  on the context toolbar, **Fig. 21**.

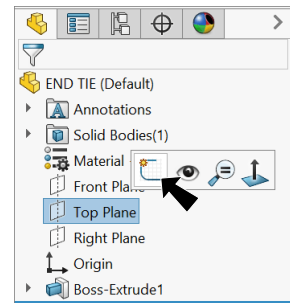


Fig. 21

Step 2. Click **Corner Rectangle**  in the **Rectangle flyout**  on the Sketch toolbar.

Step 3. Sketch corner rectangle to **left of Origin**  coincident with front edge, **Fig. 22**.

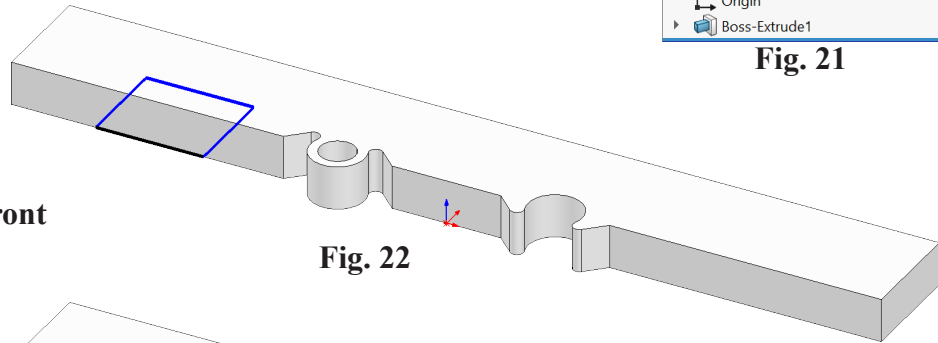


Fig. 22

Step 4. Click **Smart Dimension**  (S) on the Sketch toolbar.

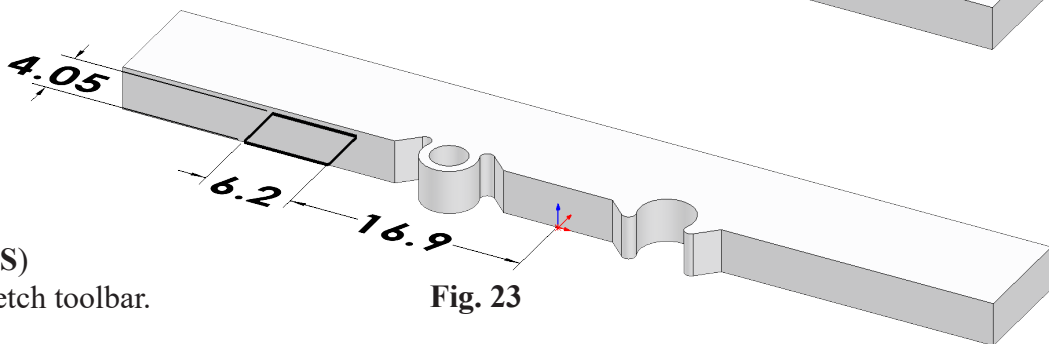
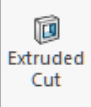


Fig. 23

Step 5. Add dimensions, **Fig. 23**.

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

Step 7. Click **Extruded Cut**  on the Features toolbar.

Step 8. In the Cut-Extrude Property Manager set:
under Direction 1, **Fig. 24**
End Condition **Through All**
click OK .

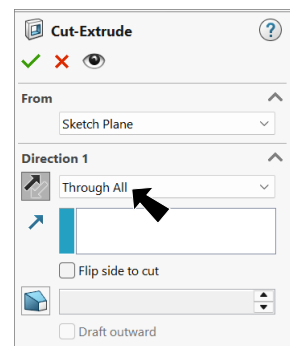


Fig. 24

Step 9. Save  (Ctrl-S).

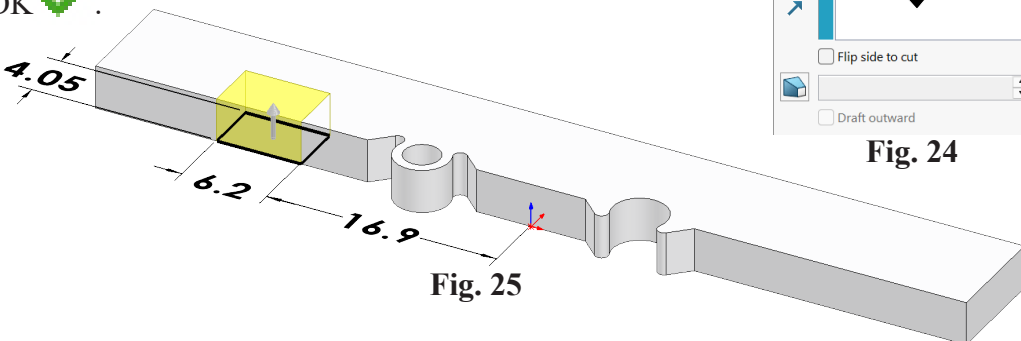


Fig. 25

D. Cut-Extrude2.

Step 1. Click the **top face** and click **Sketch** on the context toolbar, Fig. 26.

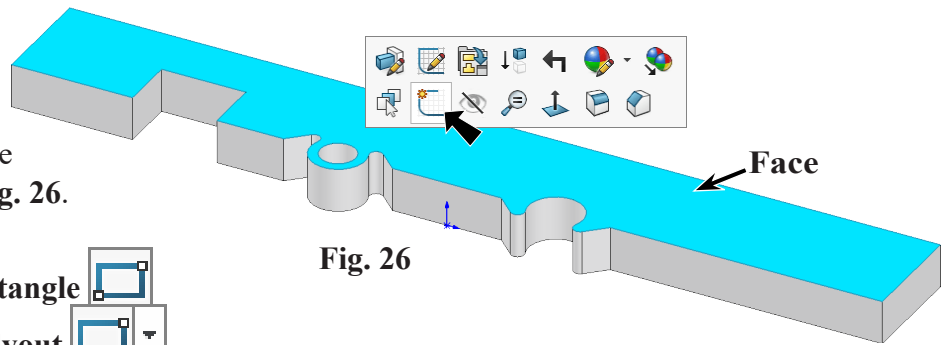


Fig. 26

Step 2. Click **Corner Rectangle** in the **Rectangle flyout** on the Sketch toolbar.



Step 3. Sketch corner rectangle to **right of Origin** co-incident with front edge, Fig. 27.

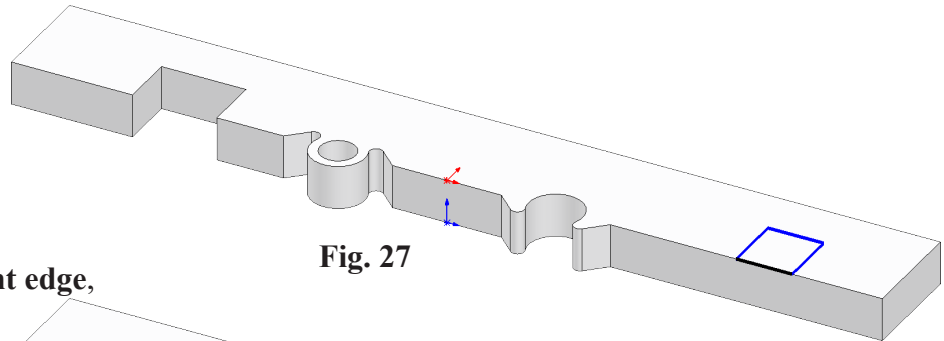


Fig. 27

Step 4. Click **Smart Dimension** (S) on the Sketch toolbar.

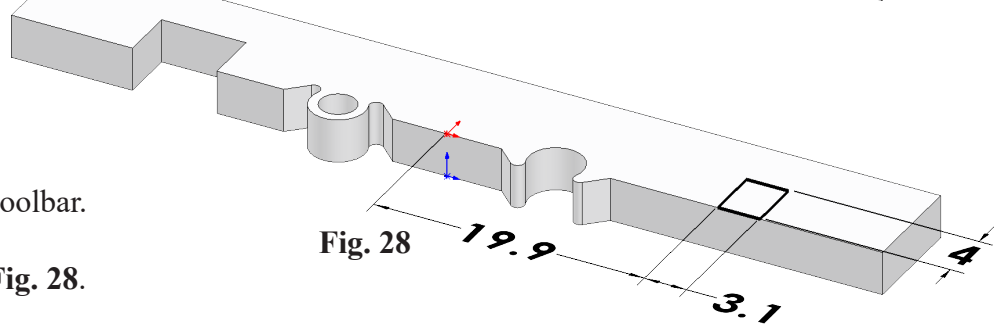


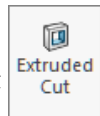
Fig. 28

Step 5. Add dimensions, Fig. 28.

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



Step 7. Click **Extruded Cut** on the Features toolbar.



Step 8. In the Cut-Extrude Property Manager set:
under Direction 1, Fig. 29
End Condition **Blind**
Depth .3
click OK.

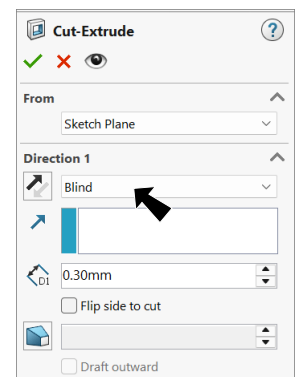


Fig. 29

Step 9. Save (Ctrl-S).

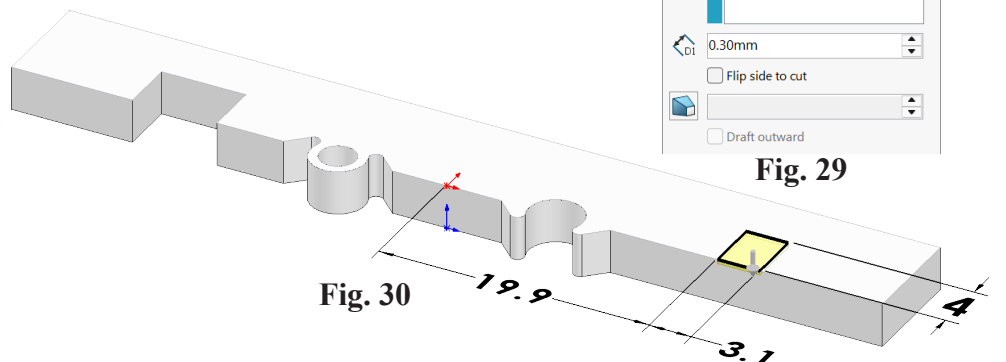


Fig. 30

E. Appearance: Unfinished Oak.

Step 1. Click the part, click **Appearance Callout**  on the context toolbar and click **END TIE** , Fig. 31.

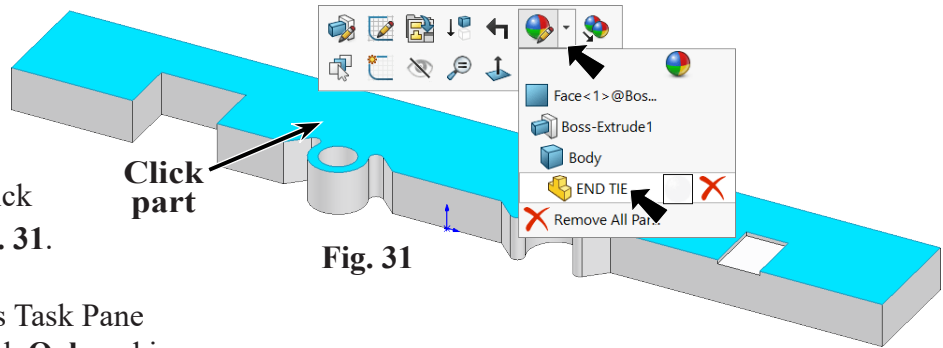


Fig. 31

Step 2. In the Appearances Task Pane expand **Wood**, click **Oak** and in the lower pane click **unfinished oak**, Fig. 32.

Step 3. Click OK  in the Property Manager.

Step 4. Save  (Ctrl-S).

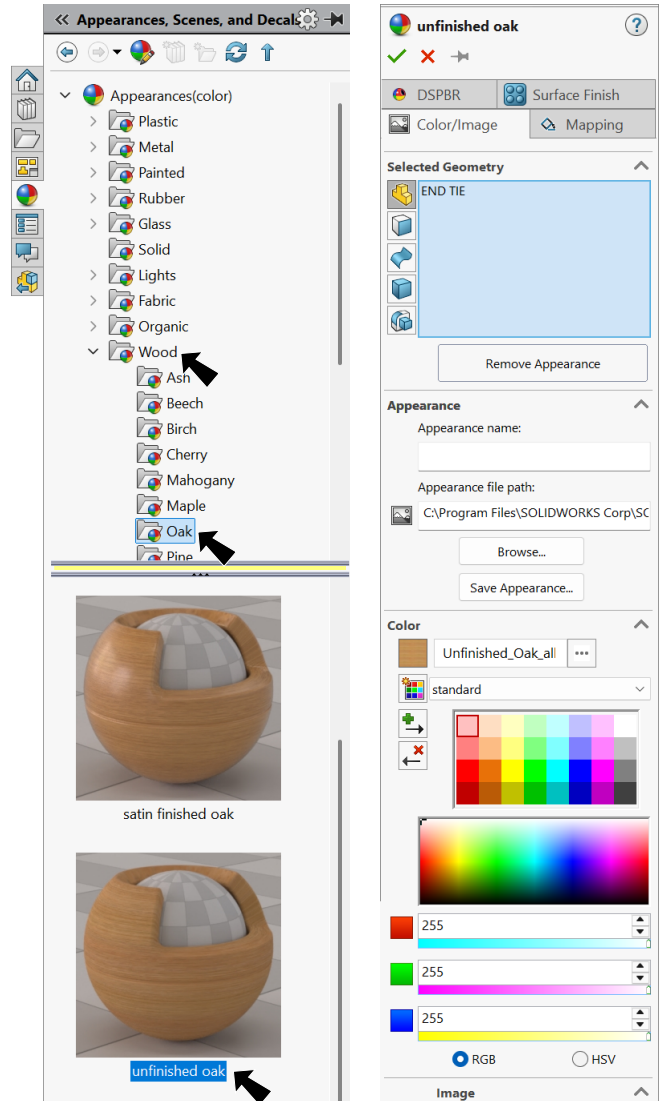


Fig. 32

Fig. 33

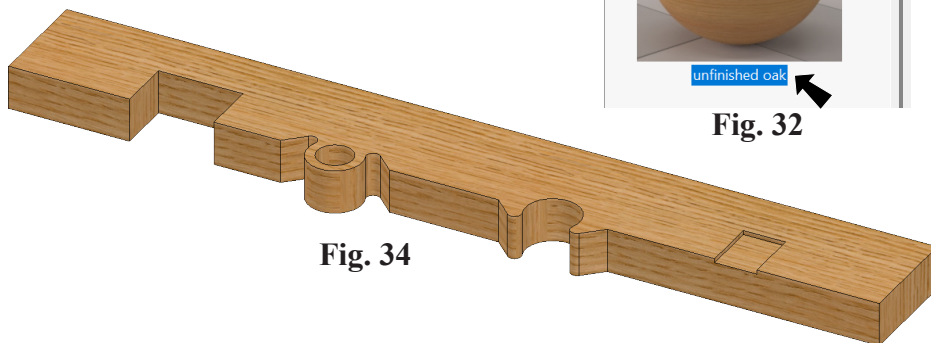


Fig. 34