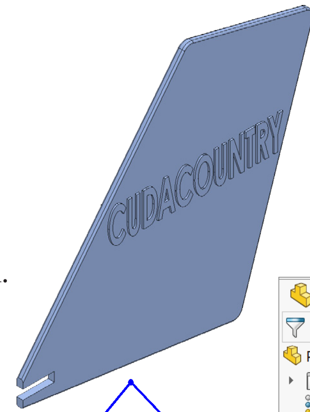
Chapter 22

HAWT
Vane



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**.

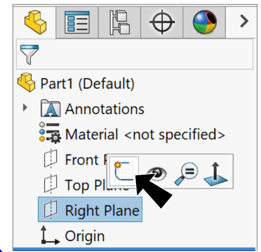


Fig. 1

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

Step 4. Sketch **6 lines starting from Origin** with no right angles, **Fig. 2**.

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

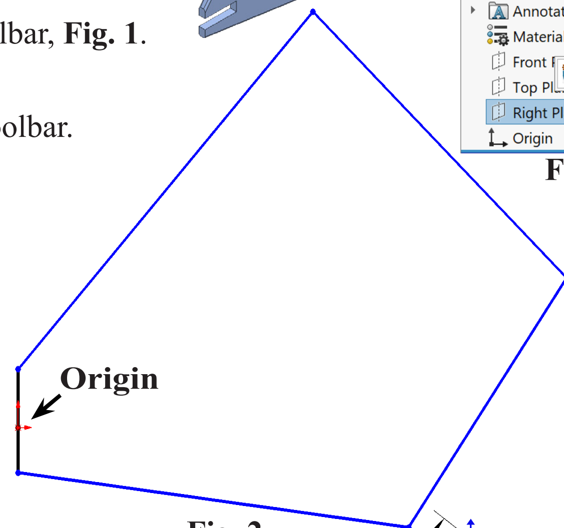


Fig. 2

Step 6. Add dimensions, **Fig. 3**. To dimension angle to imaginary line, click line and endpoint, then click the **right horizontal crosshair** and place dimension.

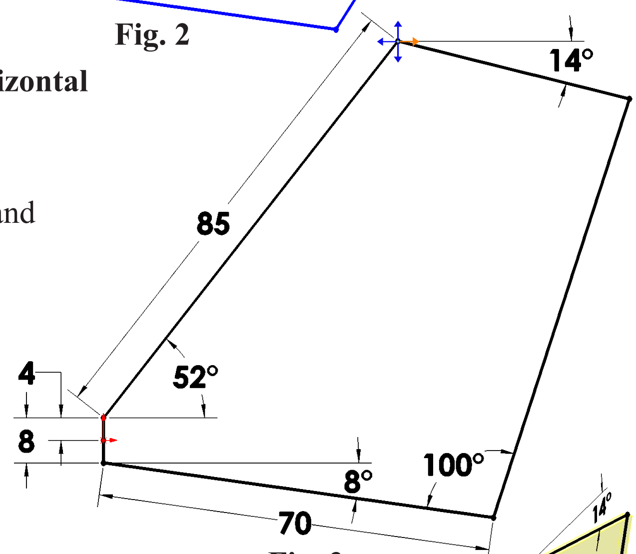


Fig. 3

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 2
click OK.

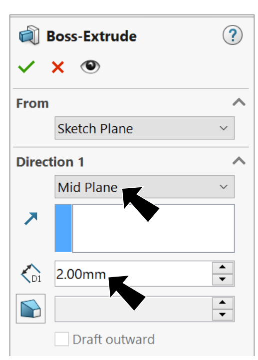


Fig. 4

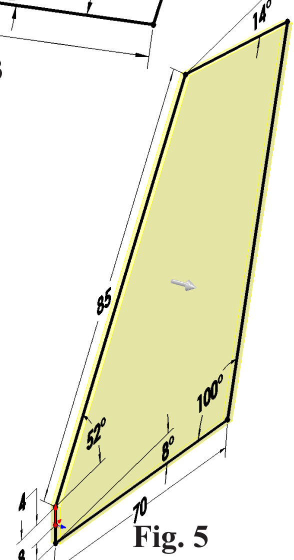


Fig. 5

B. Save as "VANE".

Step 1. Click File Menu > Save As.

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

C. Cut.

Step 1. Click the **side face** and click **Sketch** on the context toolbar, **Fig. 6**.

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

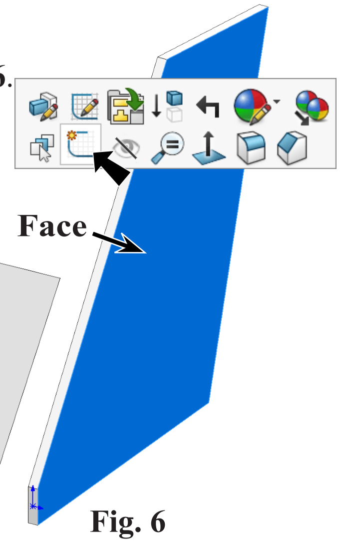


Fig. 6

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

Step 4. Sketch corner rectangle, **Fig. 7**.

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

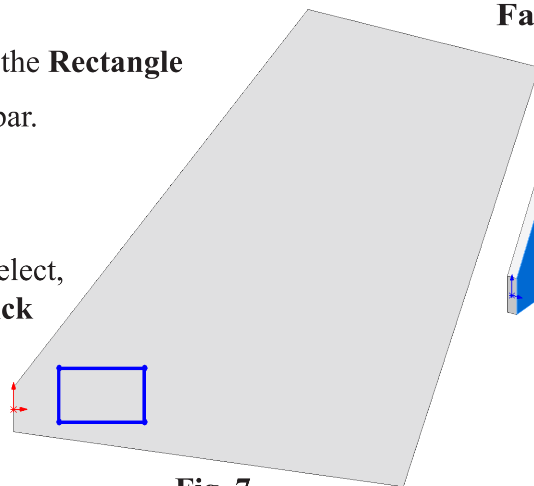


Fig. 7

Step 6. **Ctrl click left line of rectangle and Origin** to select both. Release Ctrl key and click **Make Midpoint** on the context toolbar, **Fig. 8**.

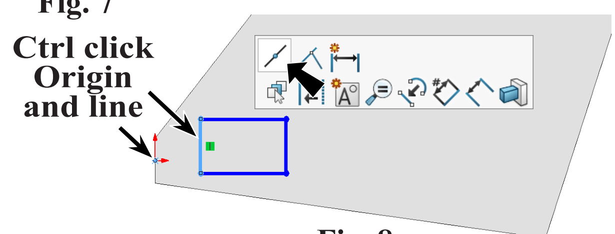


Fig. 8

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

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

Step 9. Click **Isometric** on the Standard Views toolbar. (**Ctrl-7**)

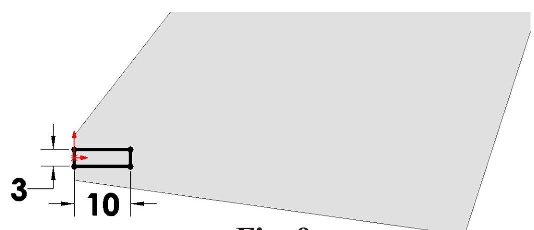


Fig. 9

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

Step 11. Click **Extruded Cut** on the Features toolbar.

Step 12. In the Cut-Extrude Property Manager set:

under Direction 1, **Fig. 10**

End Condition **Through All**

click OK .

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

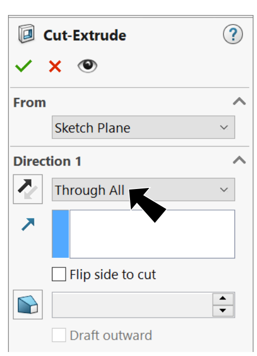


Fig. 10

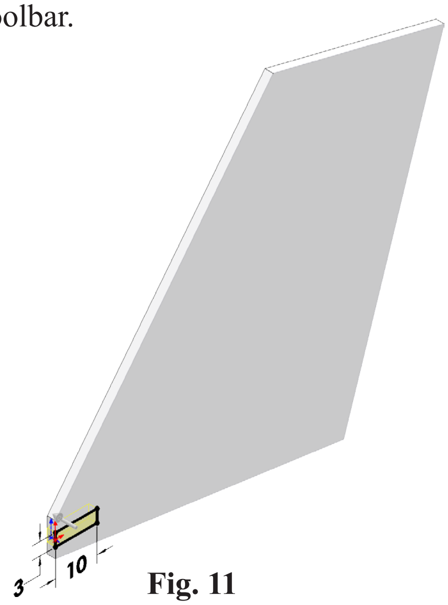


Fig. 11

D. Fillets.

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

Step 2. In the Fillet Property Manager set:
select **FilletXpert**, **Fig. 12**

Radius **3**
click **3 corners**, **Fig. 13**
click **Apply**

Radius **.5**, **Fig. 14**
click **side edges** (2), **Fig. 15**
click OK.

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

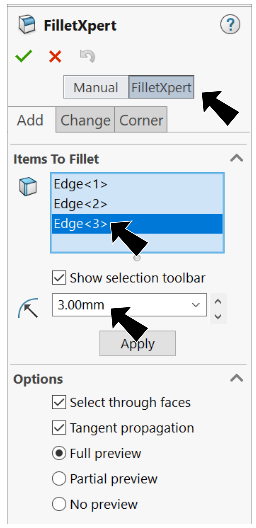


Fig. 12

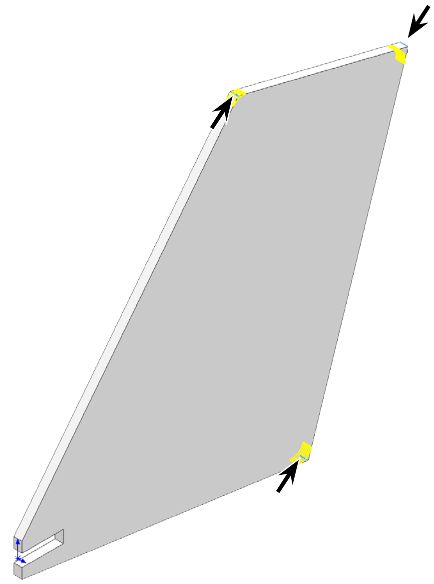


Fig. 13

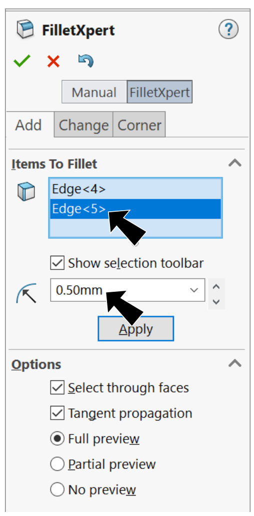


Fig. 14

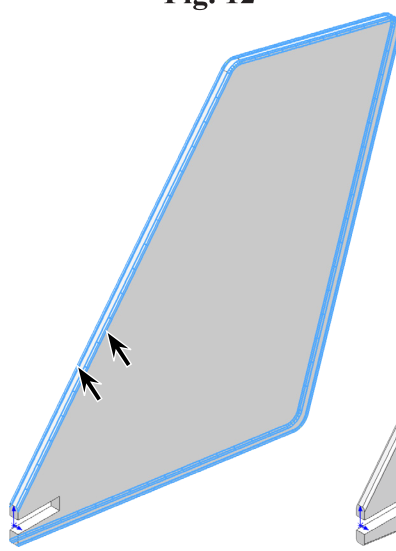


Fig. 15

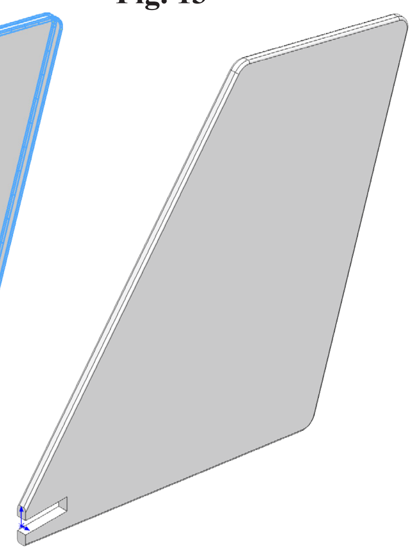


Fig. 16

E. Text.

Step 1. Click the **side face** and click **Sketch** on the context toolbar, **Fig. 17**.

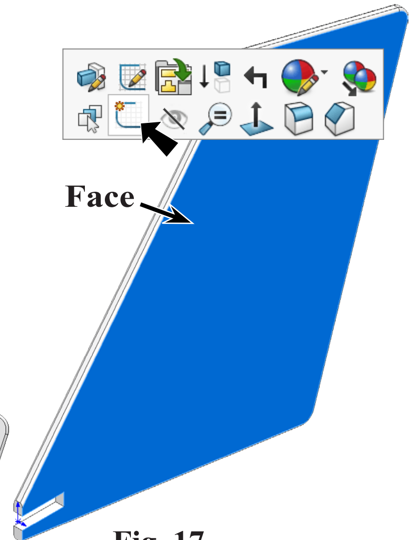


Fig. 17

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 **3 construction lines starting from Origin**, **Fig. 18**. Double click to terminate the chain of lines.

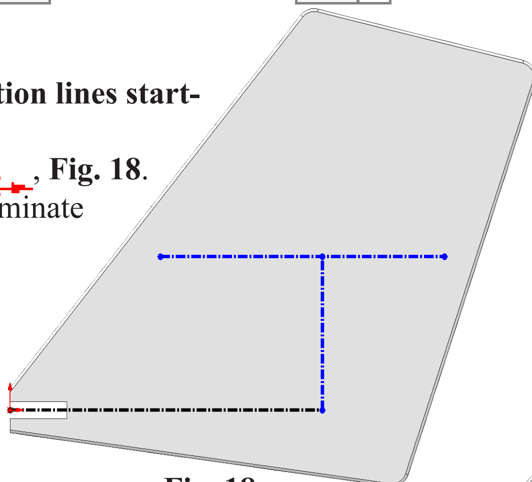


Fig. 18

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

Step 6. Add dimensions, **Fig. 19**.

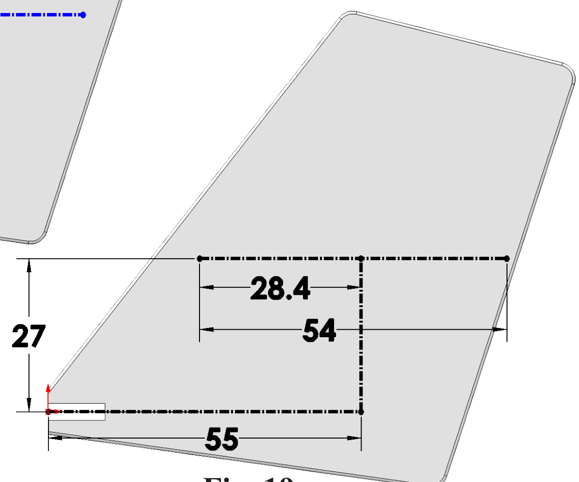


Fig. 19

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

Step 8. In the Sketch Text Property Manager set:

under Curves, **Fig. 20**

click **top horizontal construction line**, **Fig. 21**

under Text

click in the box and key-in **CUDACOUNTRY**

Center Align

uncheck **Use document font** checkbox

Width Factor 55

Spacing 95

click **Font** button.

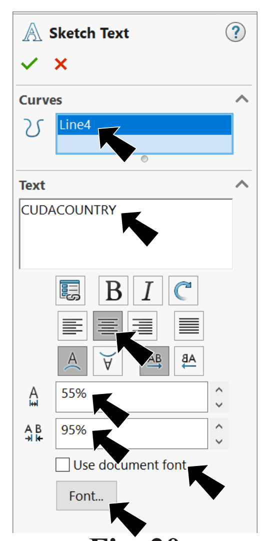


Fig. 20

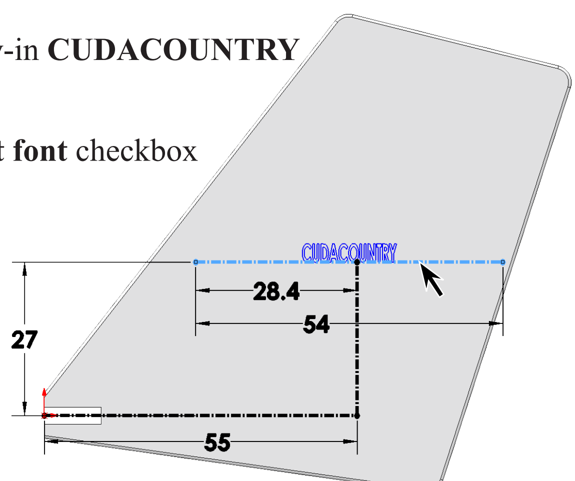


Fig. 21

Step 9. In the Choose Font dialog box select:
under Font, **Fig. 22**
select **Century Gothic**
under Font Style
Bold
under Height
select **Points**
Size 40
click **OK** button
click OK .

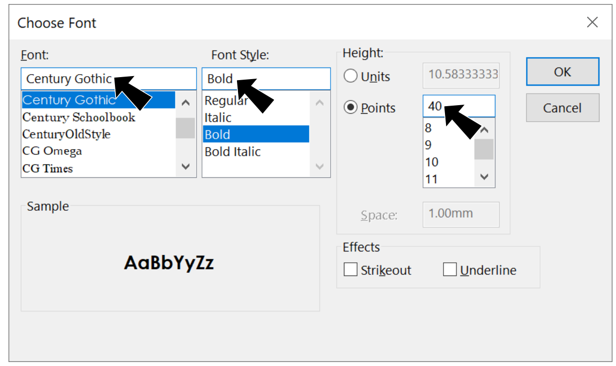


Fig. 22

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

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

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

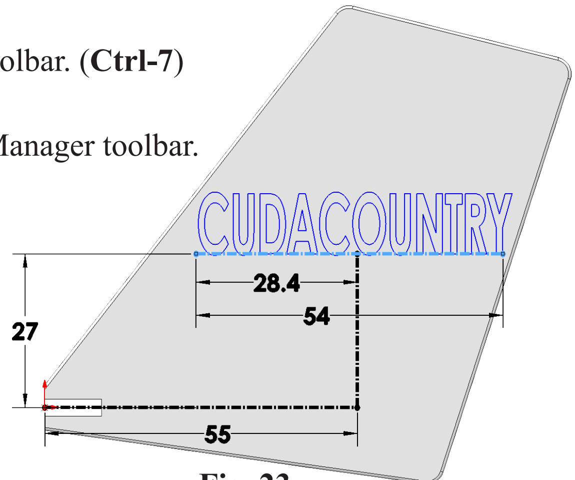


Fig. 23

Step 13. In the Boss-Extrude Property Manager set:
under Direction 1, **Fig. 24**
End Condition **Blind**
Depth **.5**
click OK .

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

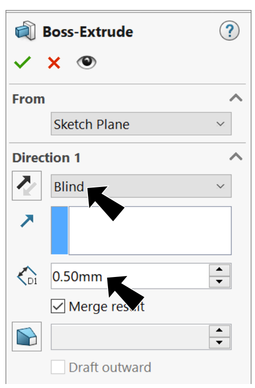


Fig. 24

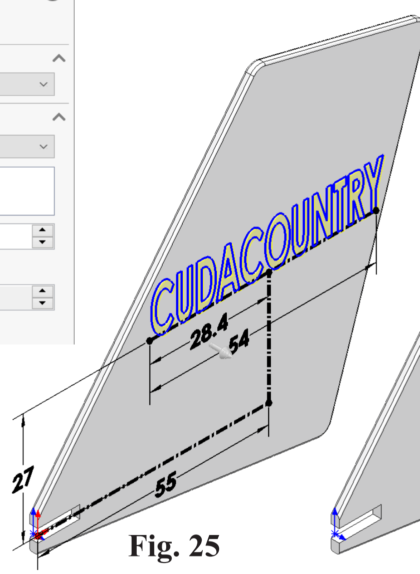


Fig. 25

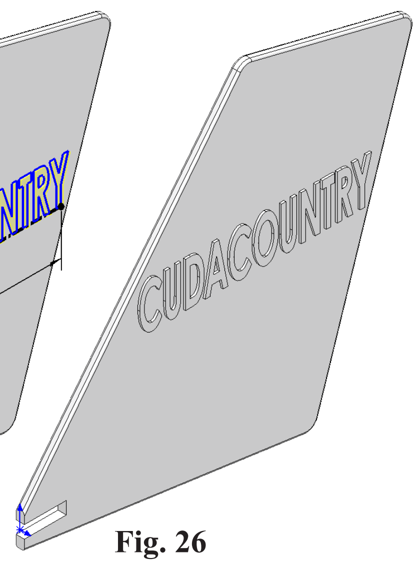


Fig. 26

F. Copy Text Sketch2 onto Back Face.

Step 1. **Copy Sketch3**. To copy, expand **Boss-Extrude1** in the Feature Manager. Click **Sketch3** and copy, **Fig. 27**. Use **Ctrl-C** to copy sketch.

Step 2. Click **Left**  on the Standard Views toolbar. (**Ctrl-3**)

Step 3. Click **face** and paste sketch, **Fig. 28**. Use **Ctrl-V** to paste sketch.

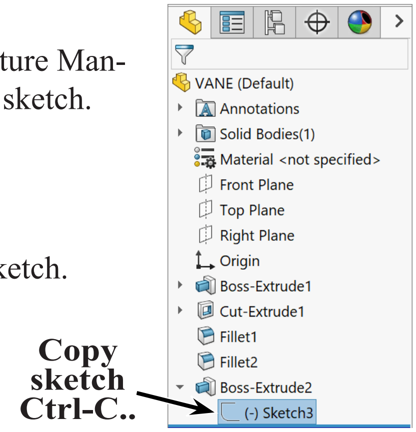


Fig. 27

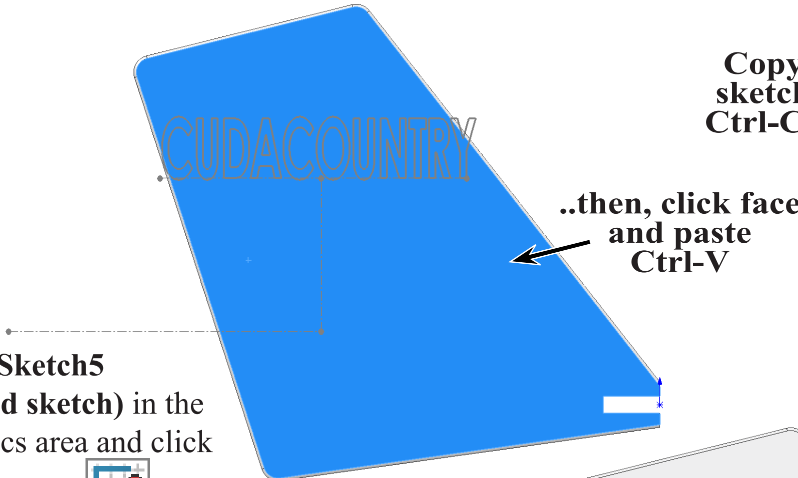


Fig. 28

Step 4. Click **Sketch5 (pasted sketch)** in the graphics area and click **Edit Sketch**  on the Context toolbar, **Fig. 29**.

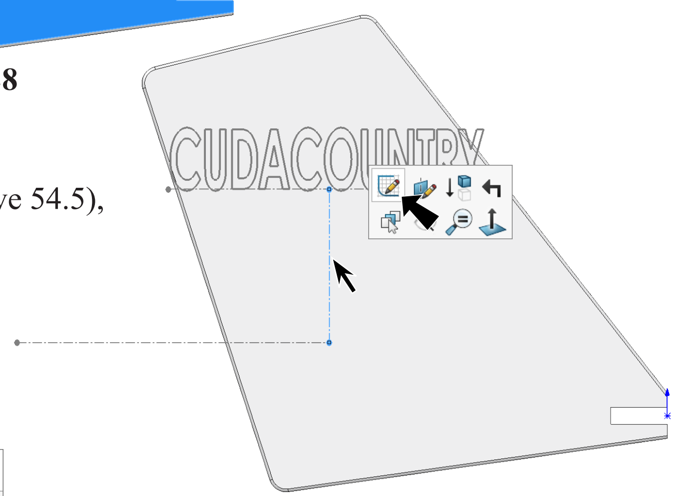


Fig. 29

Step 5. **Change 54 dimension to -54.5** (negative 54.5), **Fig. 30**.

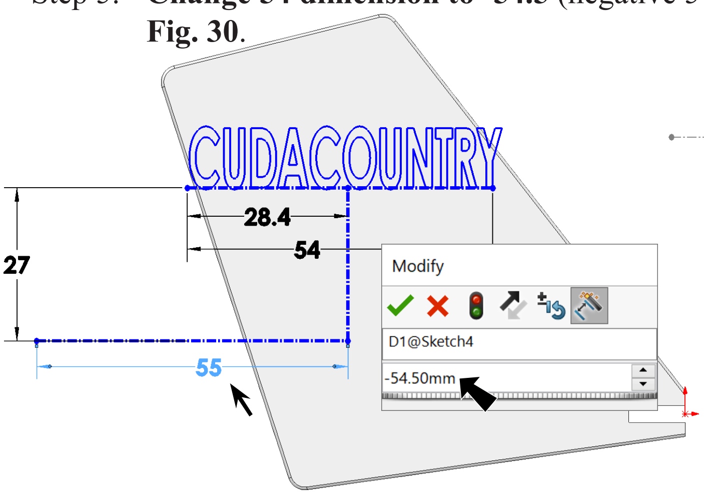


Fig. 30

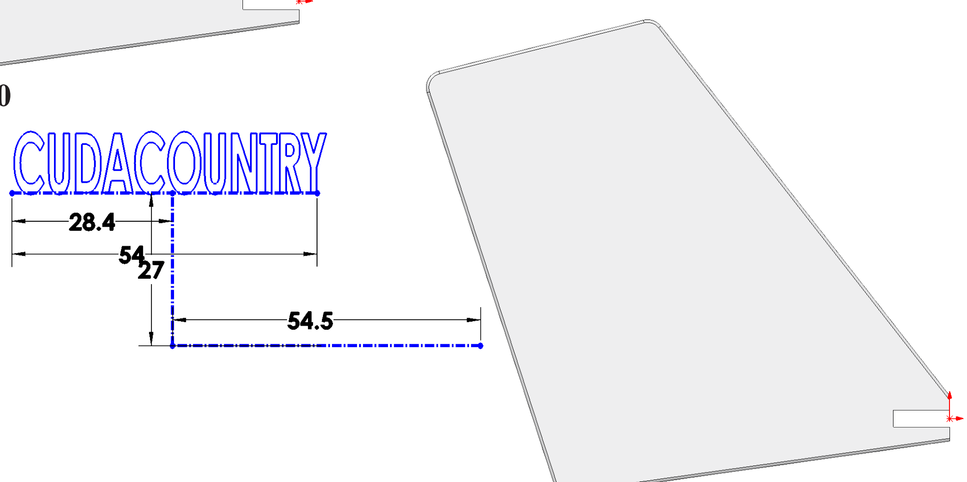


Fig. 31

Step 6. **Ctrl click right endpoint of horizontal line** and **Origin** to select both. Release Ctrl key and click **Make Coincident** on the context toolbar, **Fig. 32**.

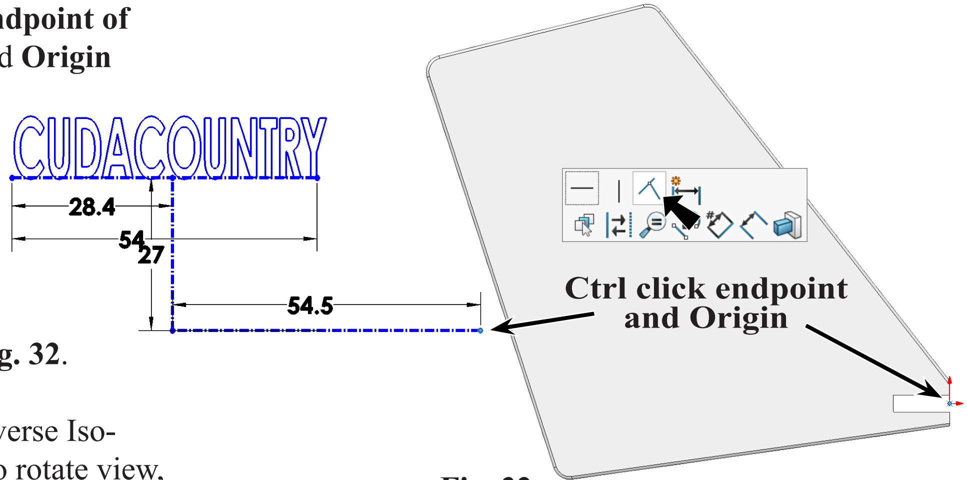


Fig. 32

Step 7. Rotate view to Reverse Isometric, **Fig. 34**. To rotate view, click **Isometric** on the Standard Views toolbar (**Ctrl-7**), then in bottom left corner of graphics area **Shift click the Y axis of the Reference Triad** **three times**.

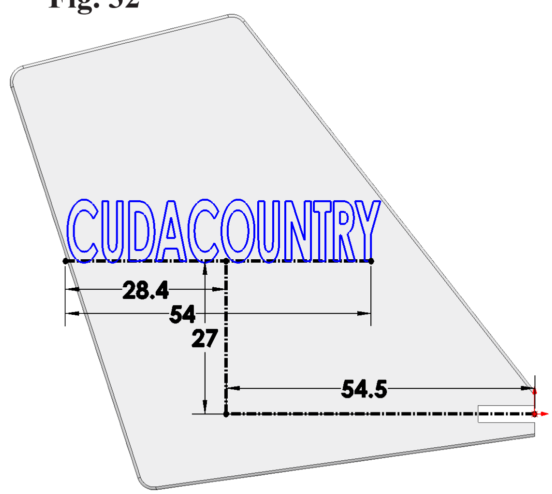


Fig. 33

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. 34**
End Condition **Blind**
Depth **.5**
click OK .

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

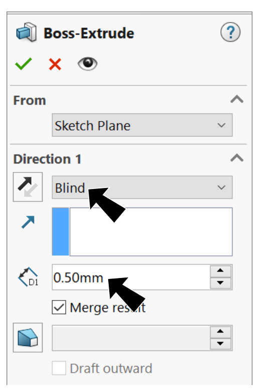


Fig. 34

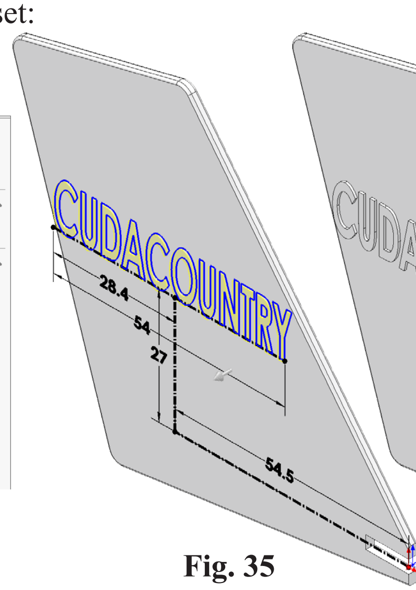


Fig. 35

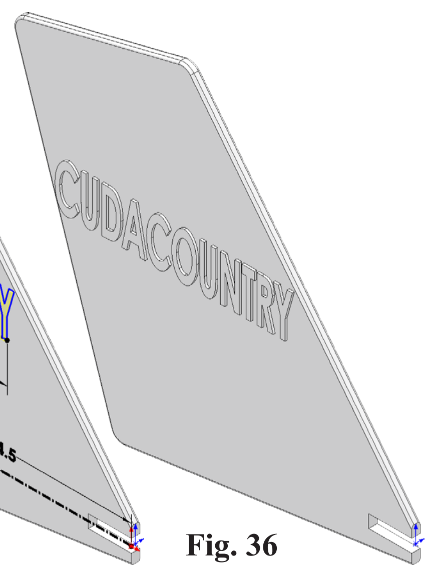


Fig. 36

G. Appearance: Blue Plastic.

Step 1. Click the Vane to select part, click **Appearances Callout** on the context toolbar and click **Vane**, **Fig. 37**.

Step 2. In the Appearances Task pane, expand **Plastic**, click **High Gloss** and in the lower pane select **blue high gloss plastic**, **Fig. 38**.

Step 3. In the Appearances Property Manager set:
under Color, **Fig. 39**
set **RGB values**
R 144
G 166
B 209
click OK .

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

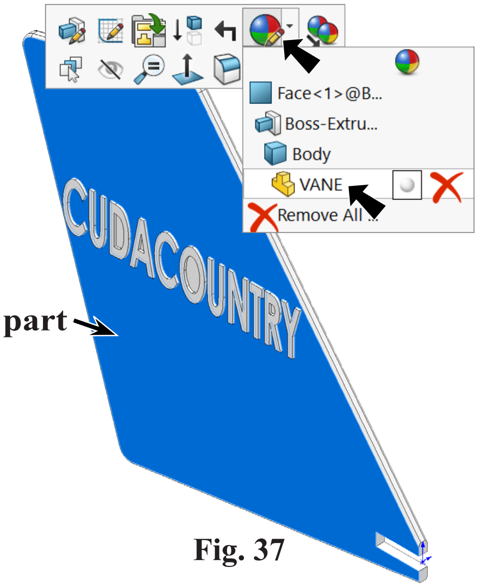


Fig. 37

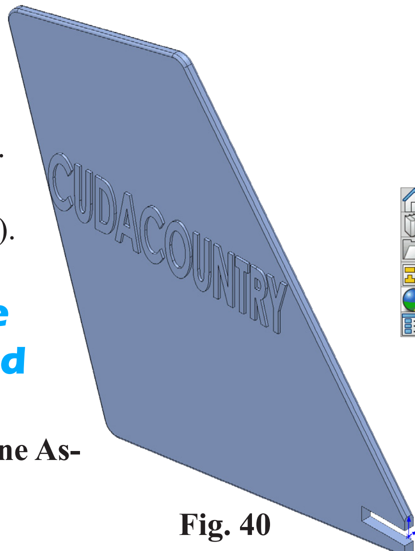


Fig. 40

H. Open Turbine Assembly and Insert Vane.

Step 1. Open your **Turbine Assembly** file.

Step 2. **Isolate Boom**, **Fig. 41**. To Isolate, **right click Boom** in the graphics area and click **Isolate** from the menu.

Step 3. Click **Insert Components** Insert Components on the Assembly toolbar.

Step 4. Insert **VANE** file at end of Boom, **Fig. 41**.

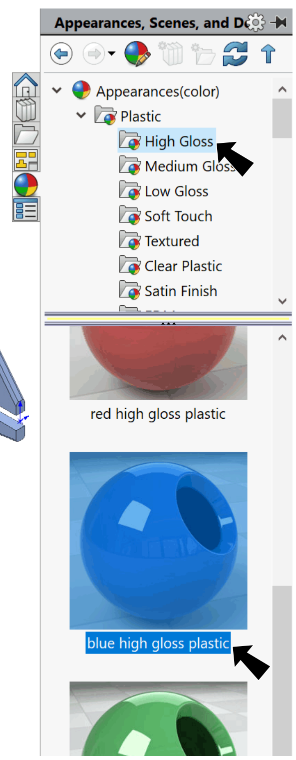


Fig. 38

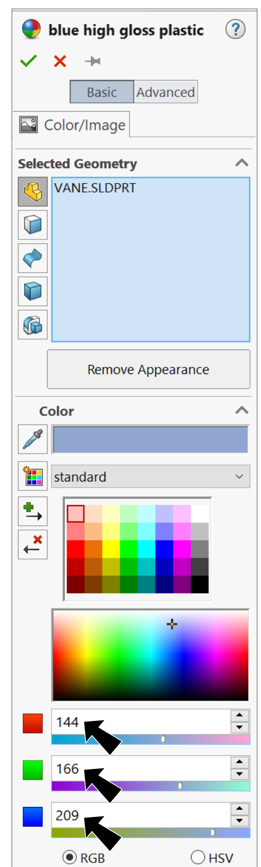


Fig. 39

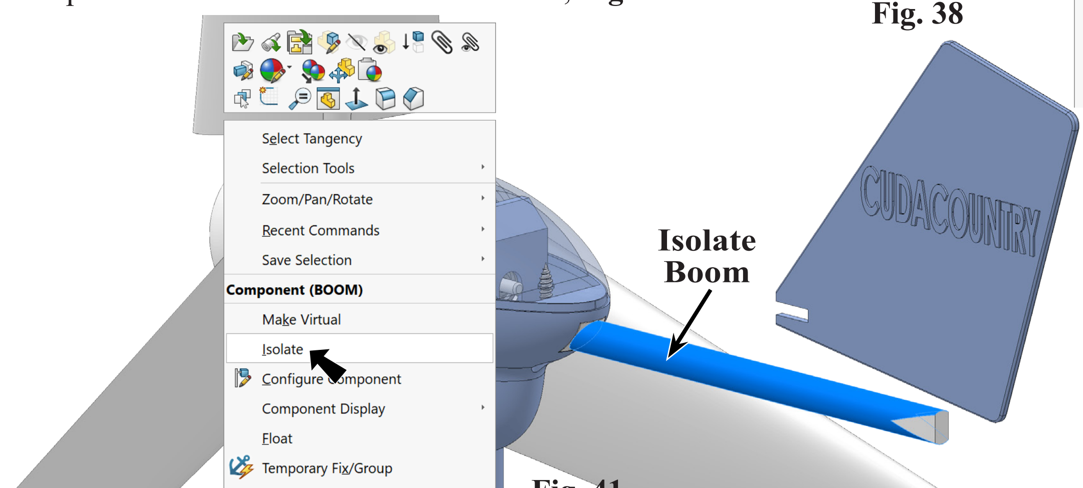


Fig. 41

I. Mate: Vane.

Step 1. Expand **BOOM** in the Feature Manager. Click **Top Plane** and **Mate** on the context toolbar, **Fig. 42**.

Step 2. Expand the flyout Feature Manager design tree, expand **VANE** and click **Top Plane**, **Fig. 43**.

Step 3. Click Add/Finish Mate to add a **Coincident** mate.

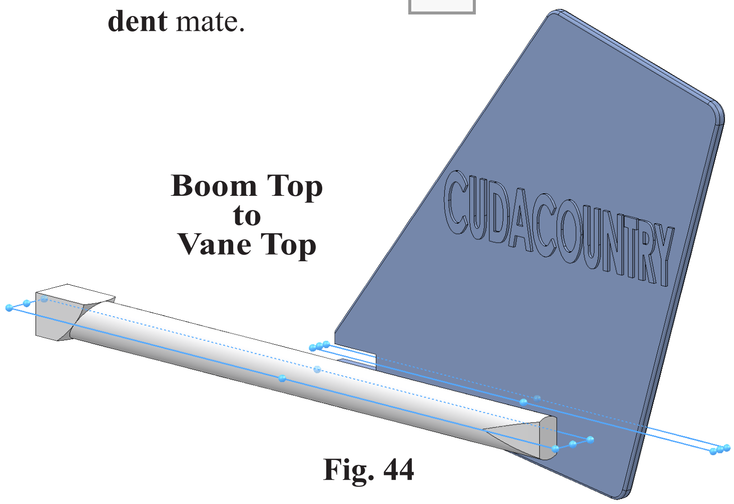


Fig. 44

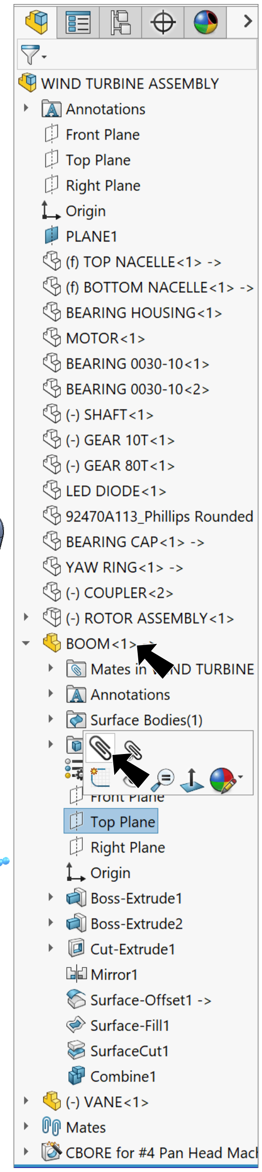


Fig. 42

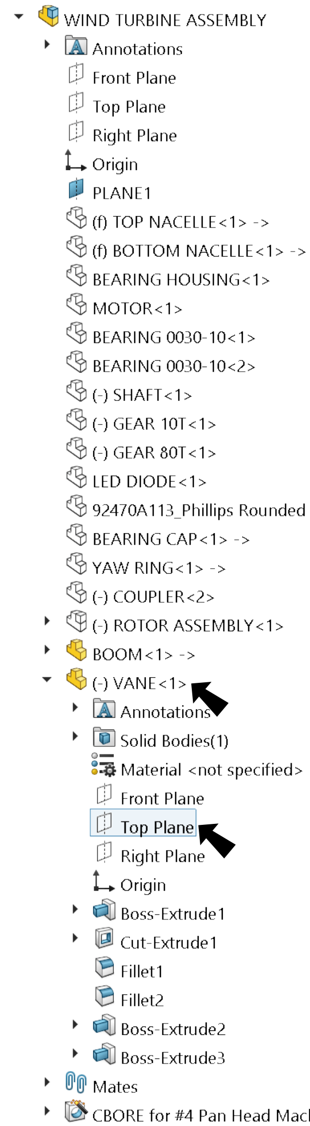


Fig. 43

Step 4. In flyout Feature Manager design tree click **Right Plane**, expand **VANE** and click **Right Plane**, **Fig. 45**.

Step 5. Click Add/Finish Mate to add a **Coincident** mate.

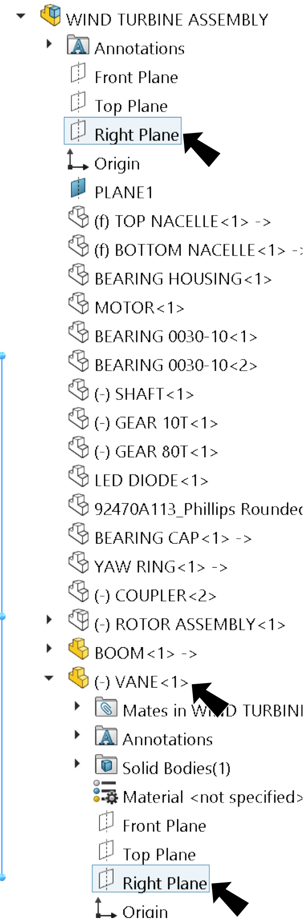


Fig. 45

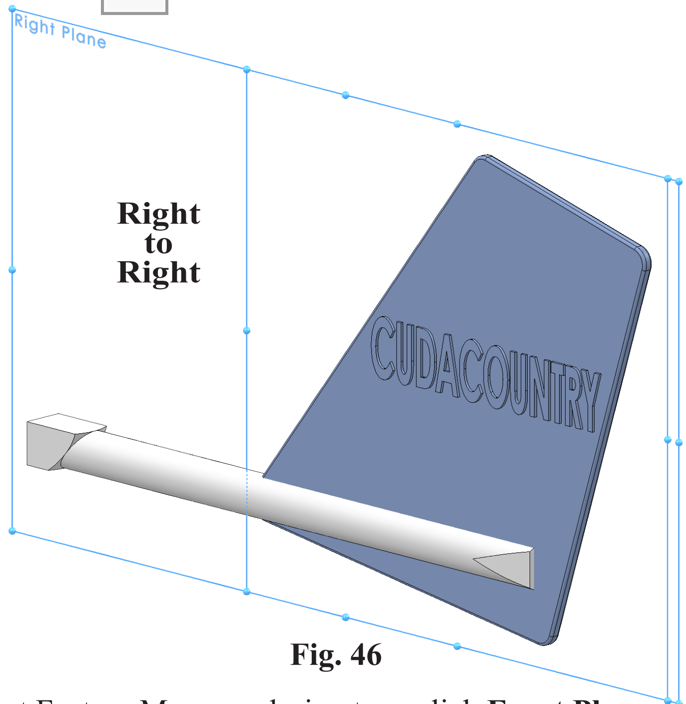


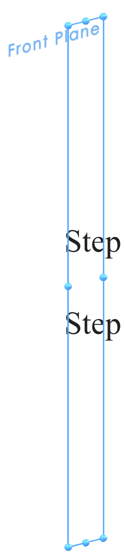
Fig. 46

Step 6. Expand the flyout Feature Manager design tree, click **Front Plane** and expand **VANE** and click **Front Plane**, **Fig. 47**.

Step 7. Click **Distance** in Mate pop-up, **Fig. 48**. Set **distance 152** and press ENTER. The Vane should positioned at end of Boom, **Fig. 49**. If positioned in opposite direction, click **Flip Dimension** in the Mate pop-up. Click Add/Finish Mate to add Distance mate.

Step 8. Click OK in the Property Manager.

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



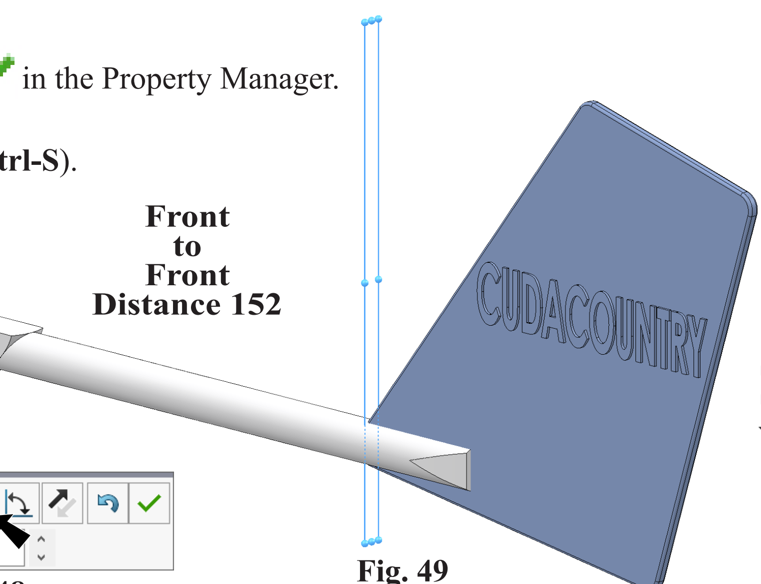


Fig. 49

Fig. 48

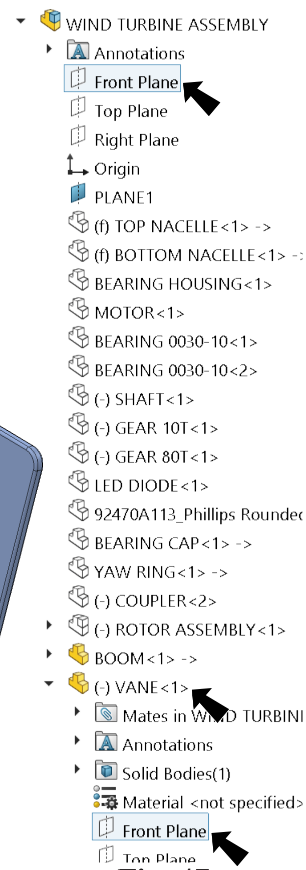


Fig. 47

J. Indent Vane into Boom.

Step 1. Click **Boom** part in the graphics area and click **Edit Part** on the context toolbar, **Fig. 50**.

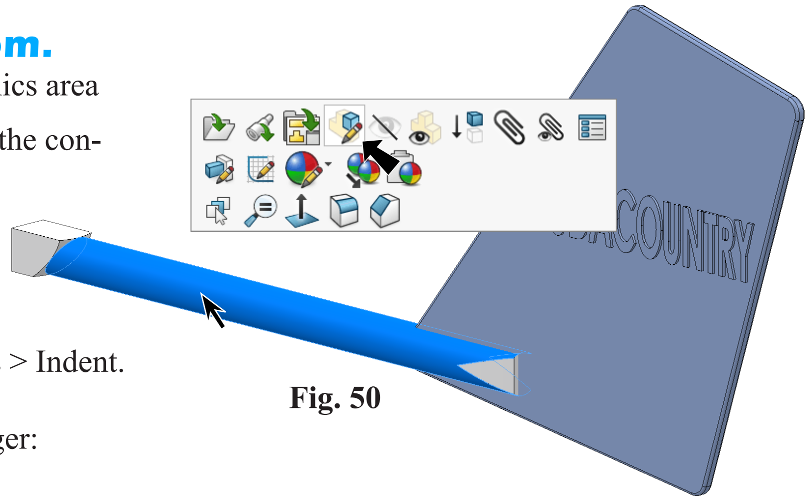


Fig. 50

Step 2. Click Insert Menu > Features > Indent.

Step 3. In the Indent Property Manager:
 under Selections, **Fig. 51**
  Target body:
   click **Boom**, **Fig. 52**
  Tool body region:
   click **Vane**
  check **Cut**
 under Parameters
  Clearance .25
 click OK .

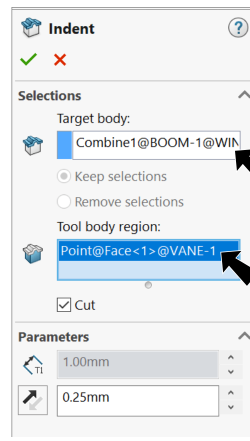


Fig. 51

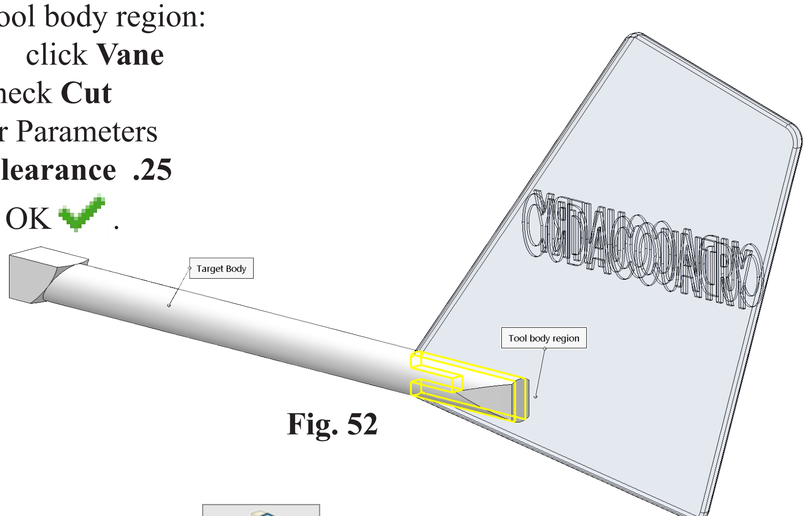


Fig. 52

Step 4. Click **Edit Component** Edit Component on the Features toolbar to **exit**.

Step 5. Exit Isolate. To Exit, click **Exit Isolate** Exit Isolate on the Isolate pop-up toolbar, **Fig. 54**.

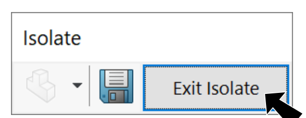


Fig. 53

Step 6. Save All (**Alt-F L**). File Menu > Save All.

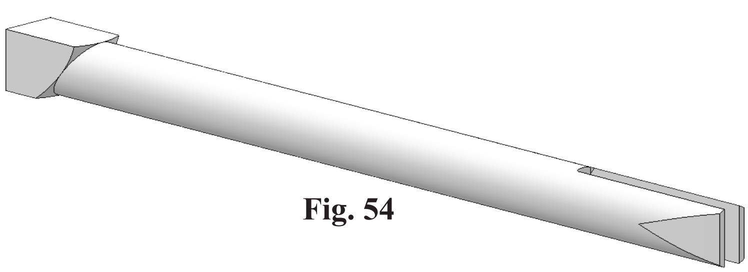


Fig. 54