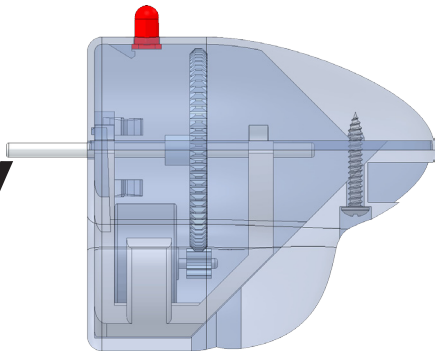
Chapter 13

HAWT

Turbine Assembly



A. Open Turbine Assembly File Insert Motor.

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

Step 2. **Hide both NACELLE** parts. To hide, move cursor over component in graphics area and press **Tab** key to hide., **Fig. 1**.

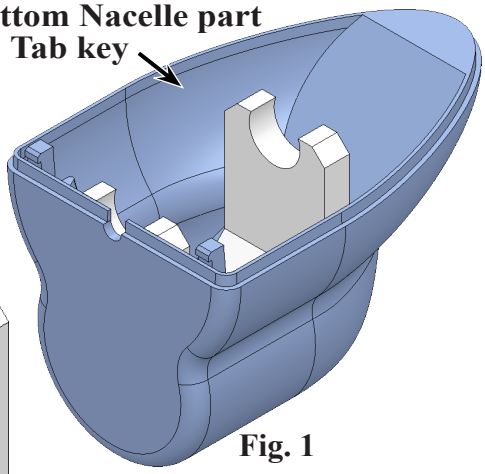


Fig. 1

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

Step 4. Click **MOTOR** file and click Open from the Open dialog box.

Step 5. Click to place Motor as positioned in **Fig. 2**.

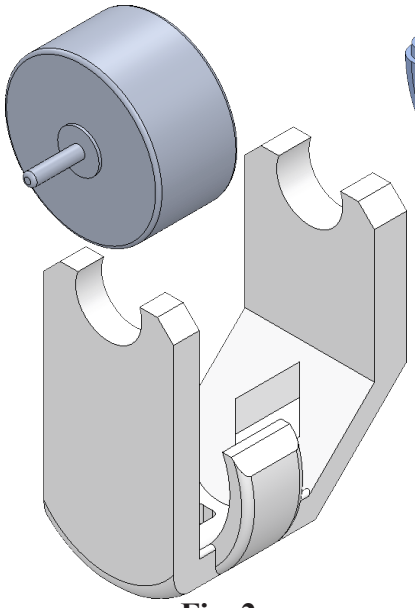


Fig. 2

B. Mate: Motor.

Step 1. Click **Mate** on the Assembly toolbar.

Step 2. Click **cylindrical face of Motor** and **hide outside cylindrical side face of Bearing Housing**, click **inside face of Bearing Housing**. To hide face, hover cursor over face and press **Alt key**, **Fig. 3**.

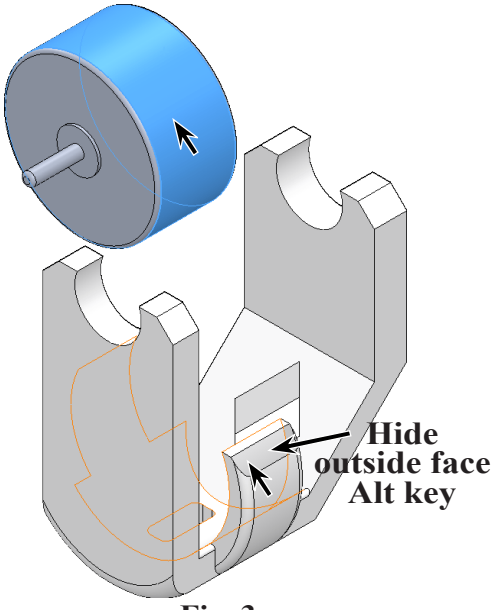


Fig. 3

Step 3. Click **Flip Mate Alignment**, check **Lock Rotation** and Add/Finish Mate in Mate pop-up toolbar to add **Concentric** mate, **Fig. 4** and **Fig. 5**.

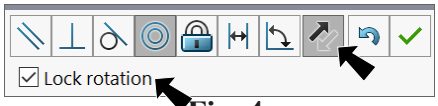


Fig. 4

Tip: If Alt key does not hide face, turn off enhanced graphics performance. Click **Options** on the Standard toolbar. Under System Options, Performance, **uncheck Enhanced Graphics Performance**.

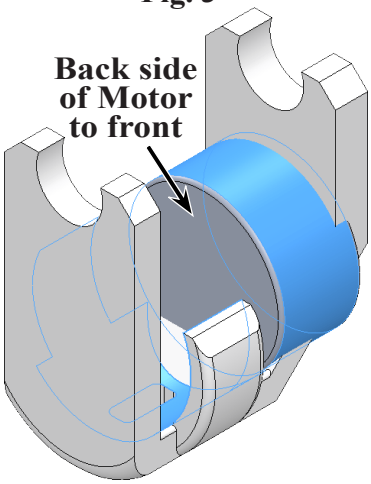


Fig. 5

8/16/22

Step 4. Expand the flyout Feature Manager design tree (click ▸) in the top left corner of the graphics area and click **Front Plane**, expand **MOTOR** and click **Front Plane**, **Fig. 6**.

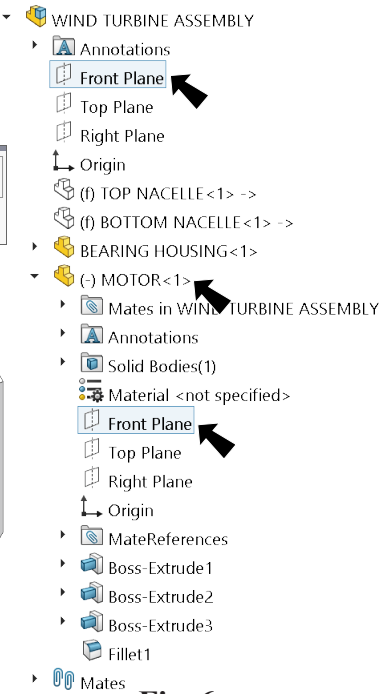


Fig. 6

Step 5. Click **Distance** in Mate pop-up, **Fig. 7**. Set **distance 18** and press ENTER. The back of Motor should set against inside front of Housing, **Fig. 8**. If positioned in opposite direction, click **Flip Dimension** in the Mate pop-up. Click Add/Finish Mate to add Distance mate.

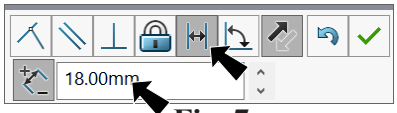


Fig. 7

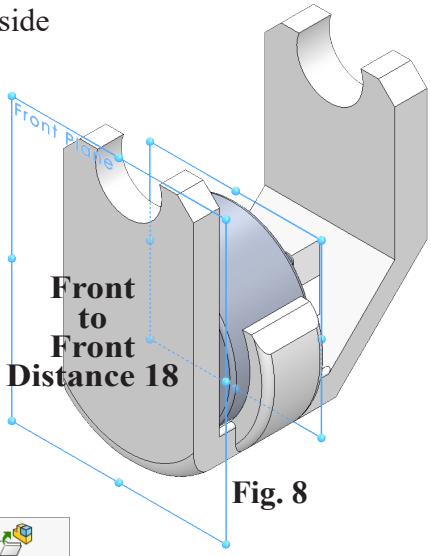


Fig. 8

Step 6. Click OK in the Property Manager.

C. Insert Bearing.

Step 1. Click **Insert Components** on the Assembly toolbar.

Step 2. Click **BEARING** file and click Open from the Open dialog box.

Step 3. Click to place Bearing as positioned in **Fig. 9**.

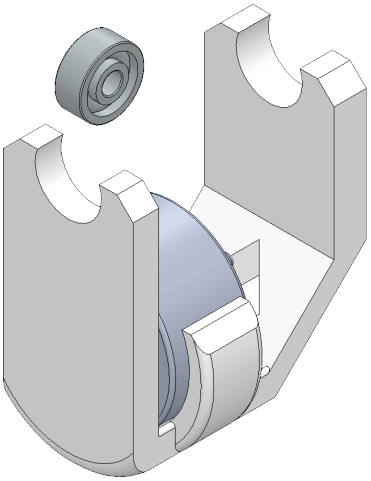


Fig. 9

D. Mate: Bearing.

Step 1. Click **Mate** on the Assembly toolbar.

Step 2. Click a **cylindrical face of Bearing** and **cylindrical face of bearing slot in Housing**, **Fig. 10**.

Step 3. Check **Lock Rotation** and Add/Finish Mate in Mate pop-up toolbar to add **Concentric** mate, **Fig. 11**.

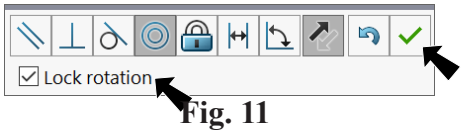


Fig. 11

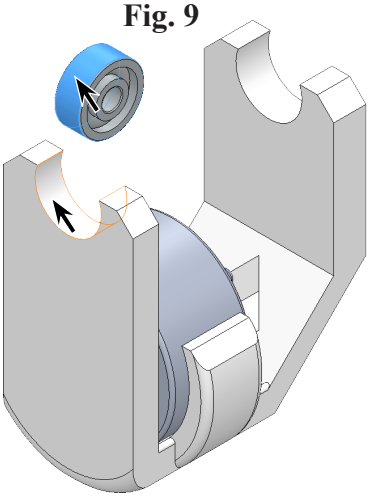


Fig. 10

Step 4. Click **side face of Bearing** and **front face of Housing**, **Fig. 12** and **Fig. 13**.

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

Step 6. Click OK in the Property Manager.

Step 7. Save (**Ctrl-S**).

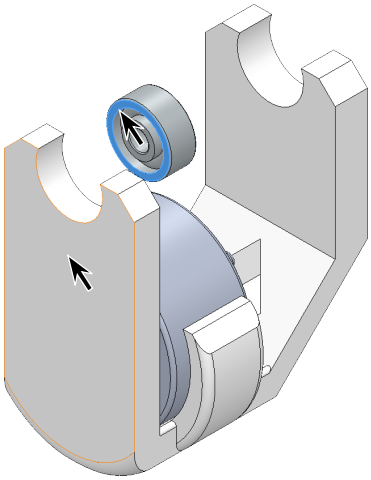


Fig. 12

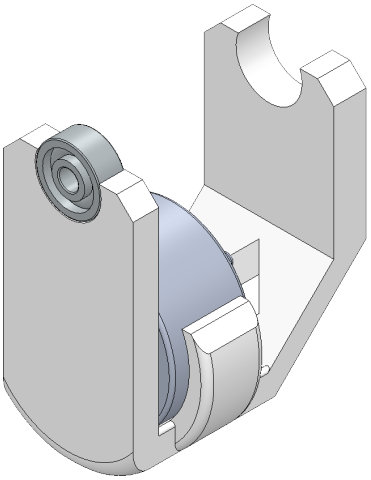


Fig. 13

E. Copy with Mates Bearing.

Step 1. **Right click BEARING part** in the Feature Manager and click **Copy with Mates** on menu, **Fig. 14**.

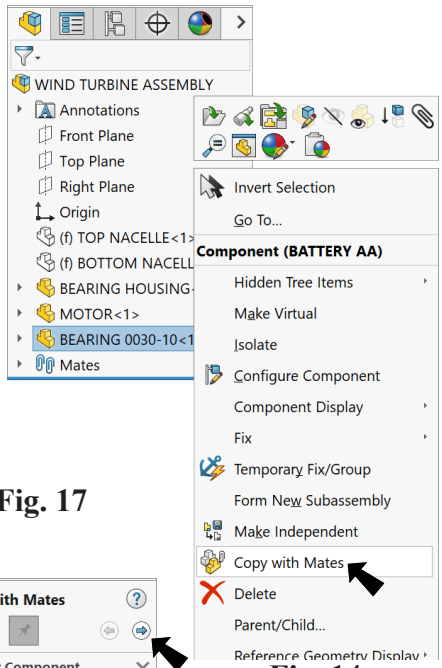


Fig. 14

Step 2. In the Copy with Mates Property Manager:

Step 1: Select Component, **Fig. 15**

Preselected

click **Next**

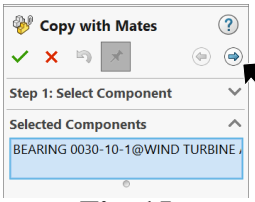


Fig. 15

Step 3. Still in Copy with Mates Property Manager:

Step 2: Mates, **Fig. 16**

under Mates

Concentric3 check **Repeat**

Coincident4 click **rear inside face of Housing**, **Fig. 17**

click OK and click Cancel .

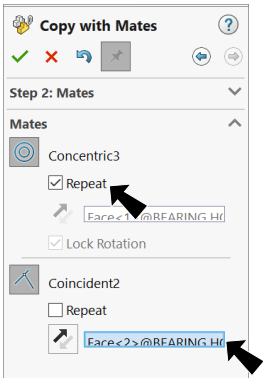


Fig. 16

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

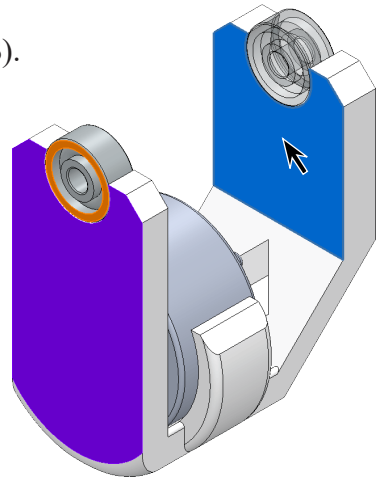
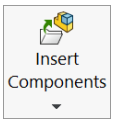


Fig. 17

F. Insert Shaft.

Step 1. Click **Insert Components** 

on the Assembly toolbar.

Step 2. Click **SHAFT** file and click Open from the Open dialog box.

Step 3. Position the Shaft near a Bearing hole, **Fig. 18**. When Shaft snaps into place and cursor changes to indicate Concentric mate  , click to release Shaft.

Step 4. Click Add/Finish Mate  in Mate pop-up toolbar to add **Concentric** mate (No lock).

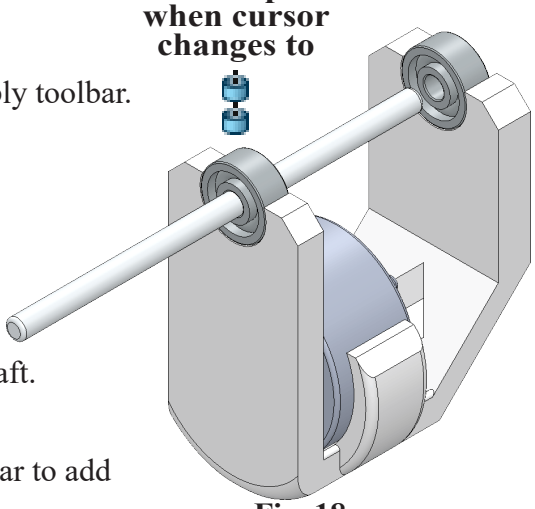


Fig. 18

G. Mate: Shaft.

Step 1. Click **Front Plane**  in the Feature Manager and **Mate**  on the context toolbar, **Fig. 19**.

Step 2. In the flyout Feature Manager design tree expand **SHAFT** and click **Front Plane**  , **Fig. 20**.

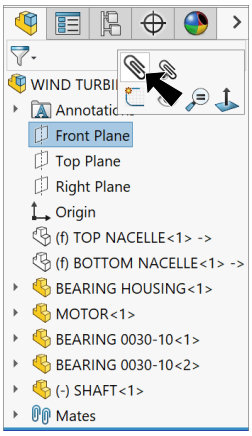


Fig. 19

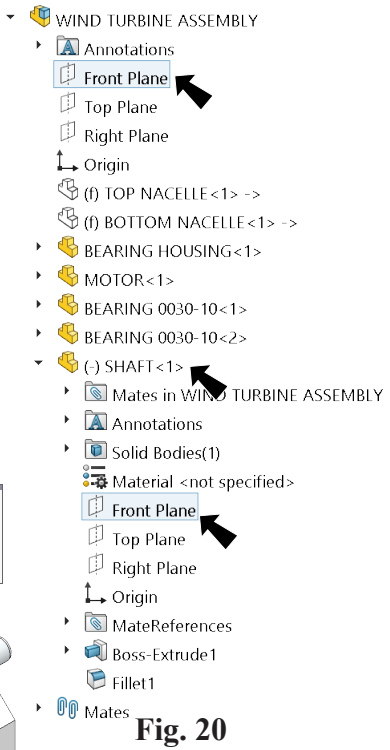


Fig. 20

Step 3. Click **Distance**  in Mate pop-up, **Fig. 21**. Set **distance 16.3** and press ENTER. A short portion of Shaft should positioned outside, **Fig. 22**. If positioned in opposite direction, click **Flip Dimension**  in the Mate pop-up. Click Add/Finish Mate  to add Distance mate.

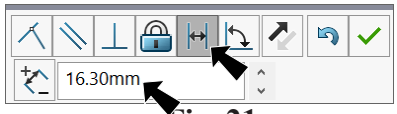


Fig. 21

Step 4. Click OK  in the Property Manager.

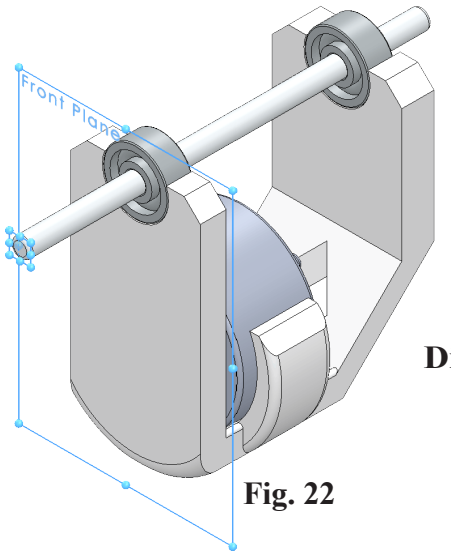
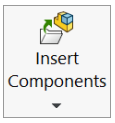


Fig. 22

Front to Front Distance 16.3

H. Insert Gear 10T.

Step 1. Click **Right** on the Standard Views toolbar. **(Ctrl-4)**

Step 2. Click **Insert Components** 

on the Assembly toolbar.

Step 3. Click **GEAR 10T** file and click Open from the Open dialog box.

Step 4. **Position the Gear near Motor shaft, Fig. 23**. When Gear snaps into Shaft and cursor changes to indicate Concentric mate, click to release Gear.

Step 5. Click Add/Finish Mate in Mate pop-up toolbar to add **Concentric** mate (No lock).

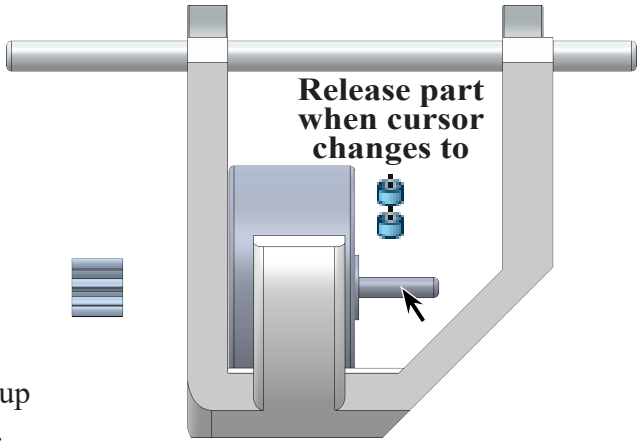


Fig. 23

I. Mate: Gear 10T.

Step 1. Click **Front Plane** in the Feature Manager and **Mate** on the context toolbar, **Fig. 24**.

Step 2. In the flyout Feature Manager design tree expand **Gear 10T** and click **Plane3**, **Fig. 25**.

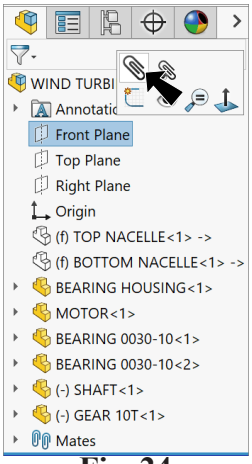


Fig. 24

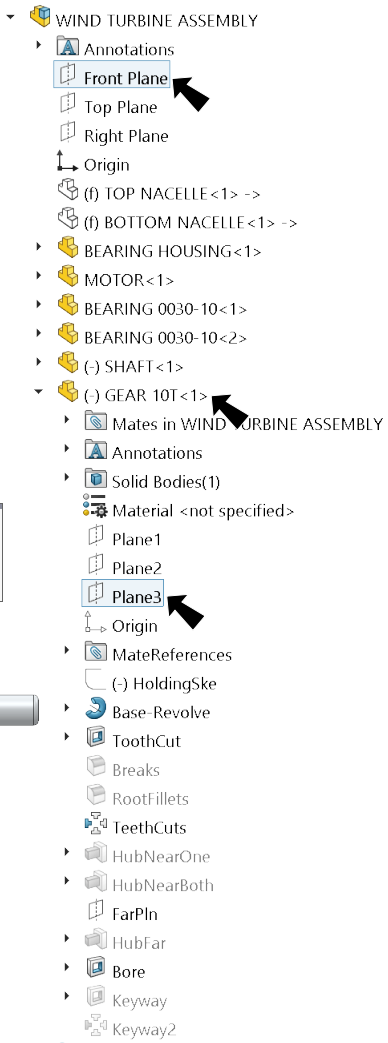


Fig. 25

Step 3. Click **Distance** in Mate pop-up, **Fig. 26**. Set **distance 20** and press ENTER. The Gear should be positioned on the Motor shaft, **Fig. 27**. If positioned in opposite direction, click **Flip Dimension** in the Mate pop-up. Click Add/Finish Mate to add Distance mate.

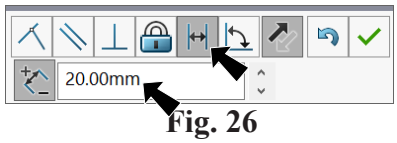
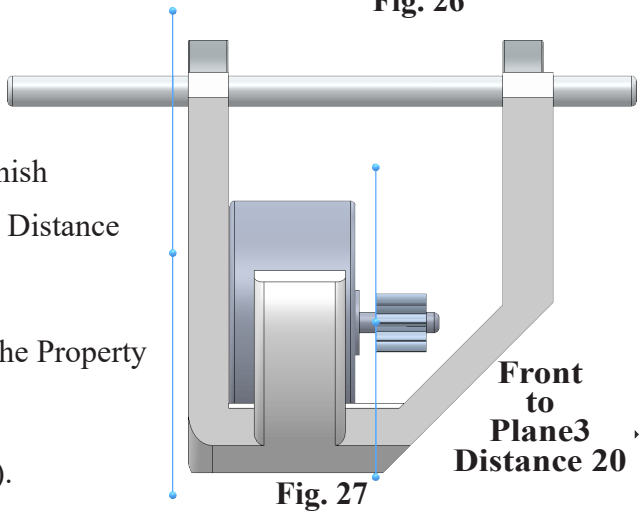


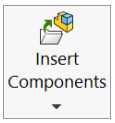
Fig. 26

Step 4. Click OK in the Property Manager.

Step 5. Save **(Ctrl-S)**.


Front to Plane3 Distance 20
Fig. 27

J. Insert Gear 80T.

Step 1. Click **Insert Components** 

on the Assembly toolbar.

Step 2. Click **GEAR 80T** file and click Open from the Open dialog box.

Step 3. Position the Gear near Shaft, **Fig. 28**. When Gear snaps into Shaft and cursor changes to indicate Concentric mate  , click to release Shaft.

Step 4. Check **Lock Rotation** and click Add/Finish Mate  in Mate pop-up toolbar to add **Concentric** mate, **Fig. 29**.

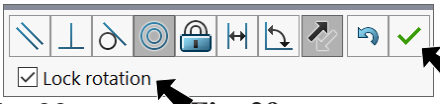


Fig. 29

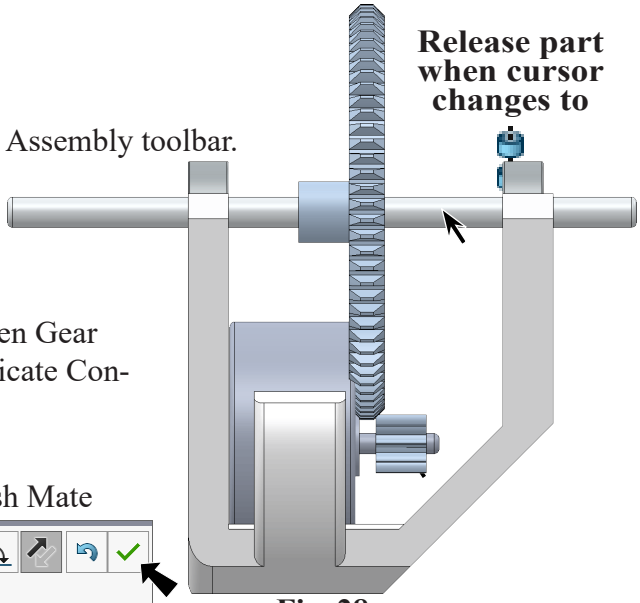


Fig. 28

K. Mate: Gear 80T.

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

Step 2. In the flyout Feature Manager design tree expand **Gear 80T** and click **Plane3**  , **Fig. 31**.

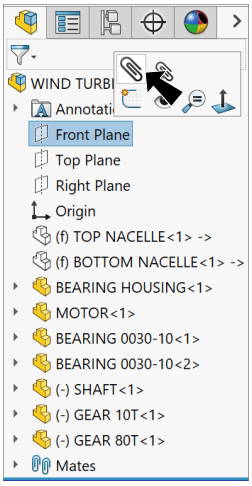


Fig. 30

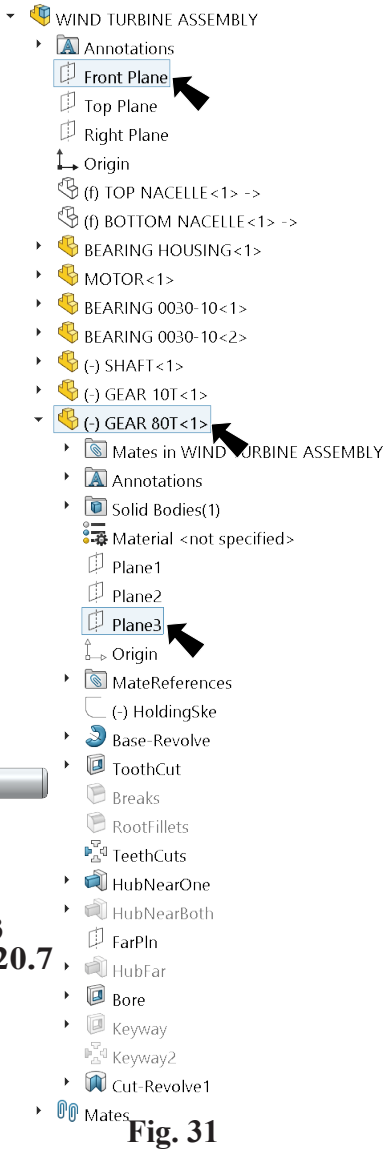


Fig. 31

Step 3. Click **Distance**  in Mate pop-up, **Fig. 32**. Set **distance 20.7** and press ENTER. A short portion of Shaft should positioned outside, **Fig. 33**. If positioned in opposite direction, click **Flip Dimension**  in the Mate pop-up. Click Add/Finish Mate  to add Distance mate.

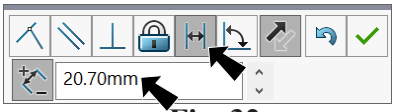


Fig. 32

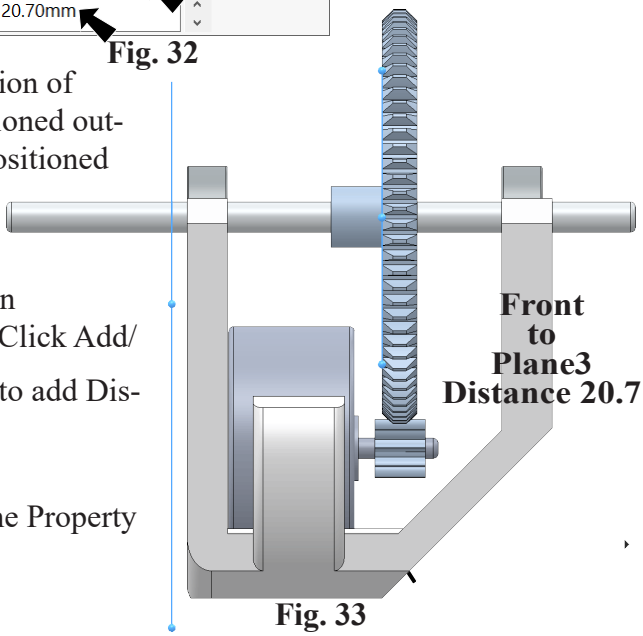


Fig. 33

Step 4. Click OK  in the Property Manager.

L. Gear Mate.

Step 1. Click **Back** on the Standard Views toolbar. **(Ctrl-2)**

Step 2. **Hide Bearing Housing** part. To hide, move cursor over component in graphics area and press **Tab** key to hide, **Fig. 34**.

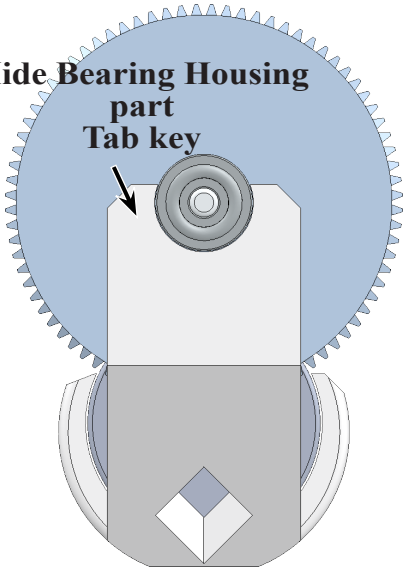


Fig. 34

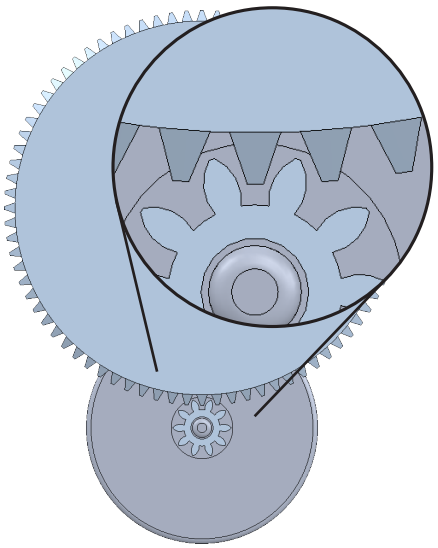


Fig. 35

Step 3. Drag a gear to **align the teeth**, **Fig. 35**.

Step 4. Rotate view to **cylindrical face of gears**, **Fig. 36**. Use **Right Arrow key** **twice**.

Step 5. Click **Mate** on the Assembly toolbar.

Step 6. In the Mate Property Manager:
click **Mechanical tab** , **Fig. 37**
under Mate Type
click **Gear**
under Mate Selections
click **cylindrical root face of Gear 80T tooth** and **cylindrical root face of Gear 10T tooth**, **Fig. 38**
under **Ratio 80 : 10**
click OK .

Tip: Toggle filter Face with **X key**.

Or use **Filter Faces** on the **Selection Filter toolbar (F5)** at the bottom of the graphics area, **Fig. 37**.


Fig. 37

Step 7. Grab a **Gear** and rotate.
Grab the **Shaft** and rotate.

Step 8. Save **(Ctrl-S)**.

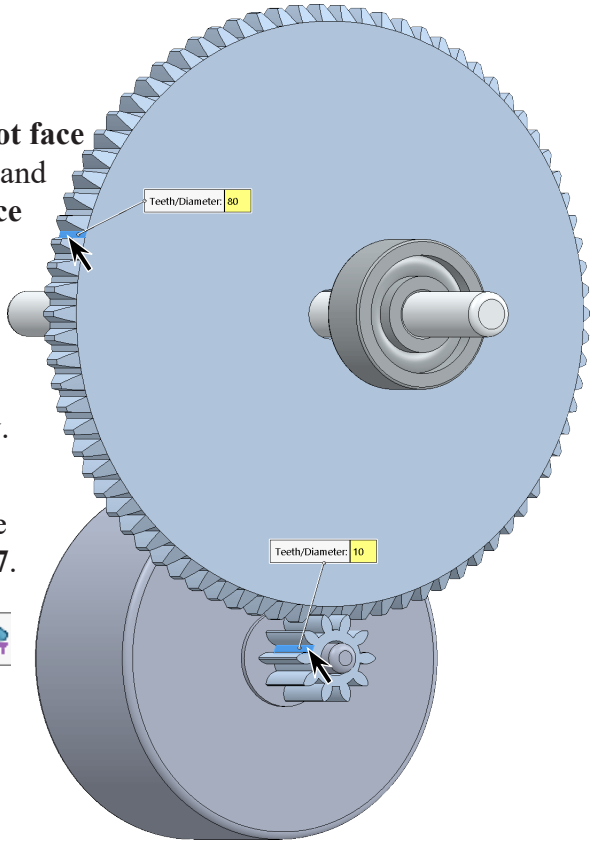


Fig. 38

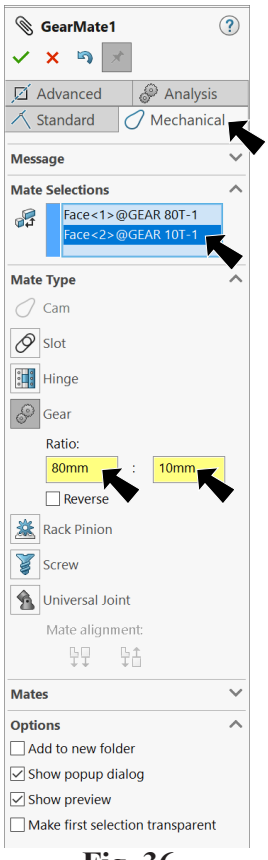


Fig. 36

M. Insert LED Diode.

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

Step 2. Click **Show Hidden Components** on the Assembly toolbar.

Step 3. In the Show Hidden dialog box:
click the hidden components; **Top, Bottom and Housing**, **Fig. 39**
click **Exit Show-Hidden**, **Fig. 40**.

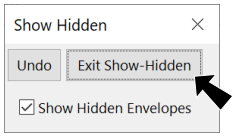


Fig. 40

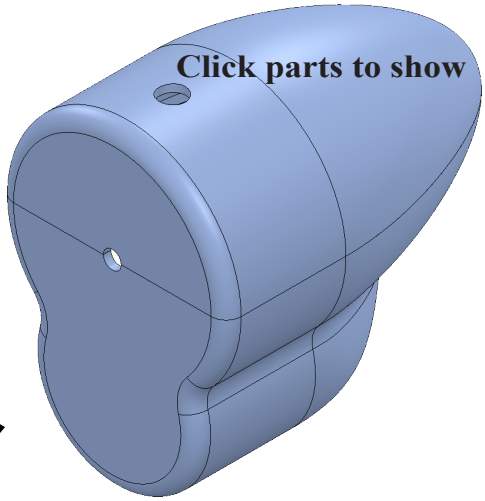


Fig. 39

Step 4. Click **Insert Components** on the Assembly toolbar.

Step 5. Click **LED DIODE** file and click Open from the Open dialog box.

Step 6. Click to place LED Diode, **Fig. 41**.

Step 7. Save (**Ctrl-S**).

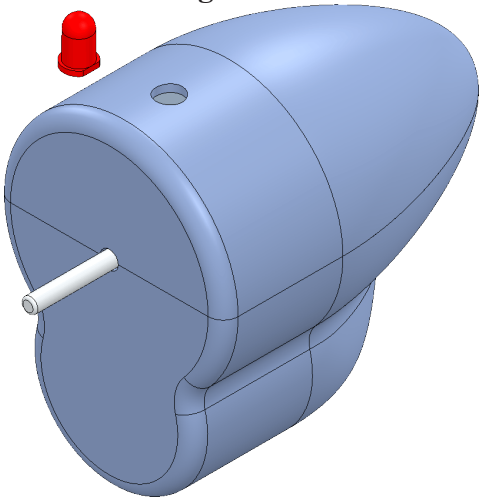


Fig. 41

N. Mate: LED Diode.

Step 1. Click **Mate** on the Assembly toolbar.

Step 2. Click a **cylindrical face of Diode** and **cylindrical face of hole in Top Nacelle**, **Fig. 42**.

Step 3. Check **Lock Rotation** and Add/Finish Mate in Mate pop-up toolbar to add **Concentric** mate, **Fig. 43**.

Fig. 43

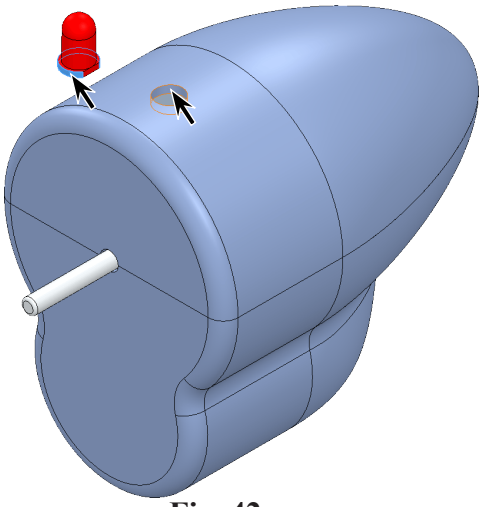


Fig. 42

Step 4. Expand the flyout Feature Manager design tree and click **Top Plane**, expand **DIODE** and **Top Plane**, **Fig. 44**.

Step 5. Click **Distance** in Mate pop-up, **Fig. 45**. Set **distance 20.3** and press ENTER. The top of Diode should extend out top of hole, **Fig. 46**. If positioned in opposite direction, click **Flip Dimension** in the Mate pop-up. Click Add/Finish Mate to add Distance mate.

Fig. 45

Step 6. Click OK in the Property Manager.

Step 7. Save (**Ctrl-S**).

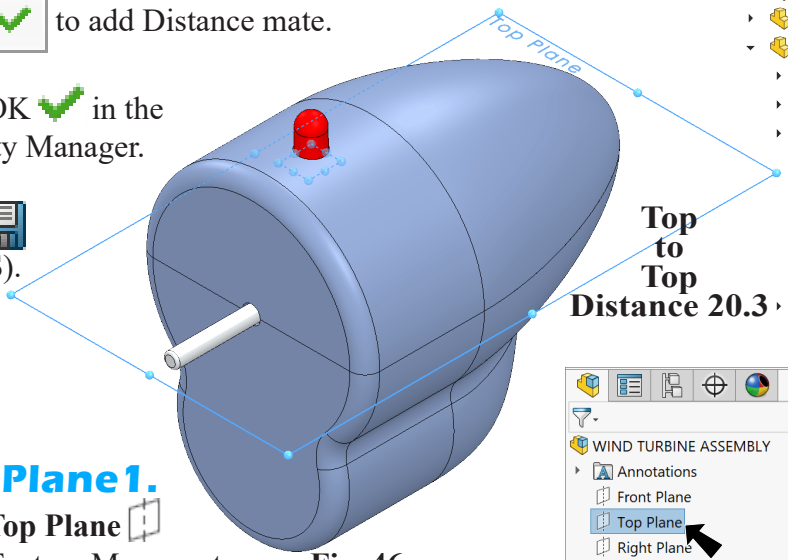
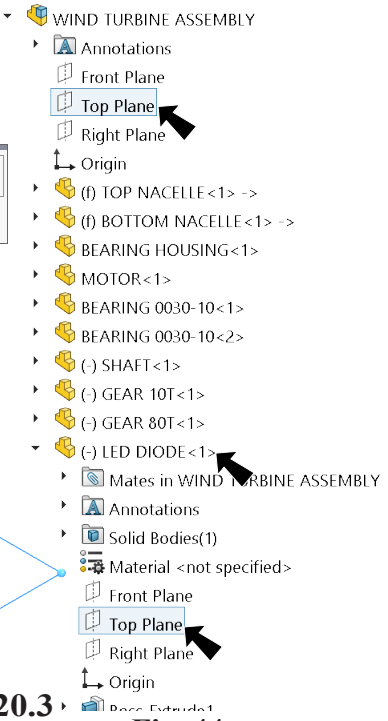


Fig. 46



Top to Top Distance 20.3
Fig. 44

O. Create Plane1.

Step 1. Click **Top Plane** in the Feature Manager to display Plane is graphics area, **Fig. 47**.

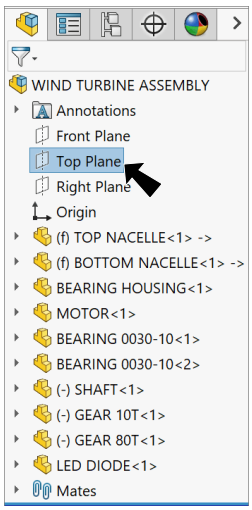


Fig. 47

Step 2. In graphics area **Ctrl drag Top plane down** and release, **Fig. 48**.

Step 3. In the Plane Property Manager set:
under First Reference, **Fig. 49**
Distance **18.5** and press **ENTER**.
The new plane should be **below** Top Plane, **Fig. 47**
under Options
check **Flip normals**
click OK .

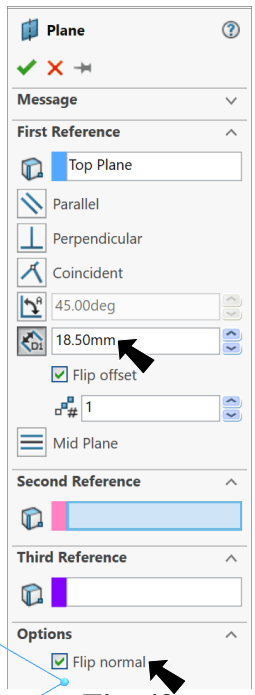


Fig. 49

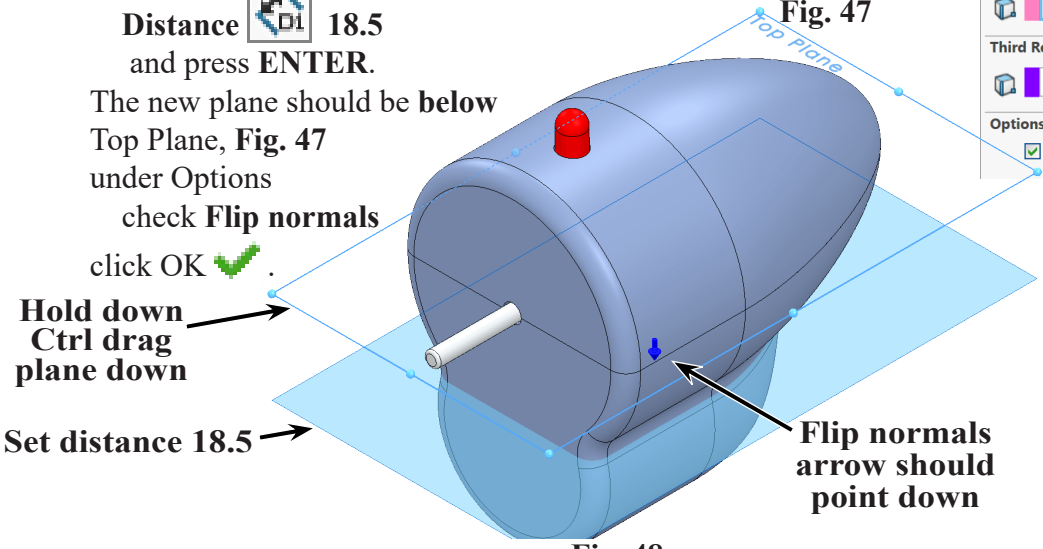


Fig. 48

P. Hole Wizard.

Step 1. Click **Right** on the Standard Views toolbar. (**Ctrl-4**)

Step 2. Change Assembly to **Top Level Transparency**. To change, **right click Assembly** at top of Feature Manager and click **Top Level Transparency** on the context toolbar, **Fig. 50**.

Step 3. Click **Plane1** in the Feature Manager to preselect the plane, **Fig. 51**.

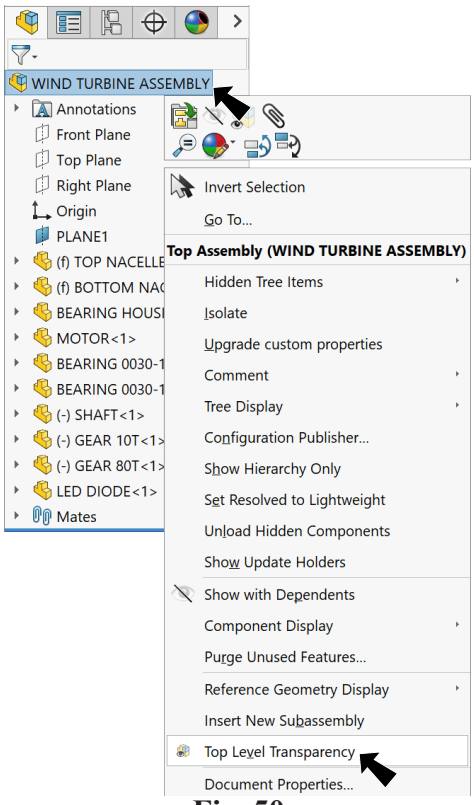


Fig. 50

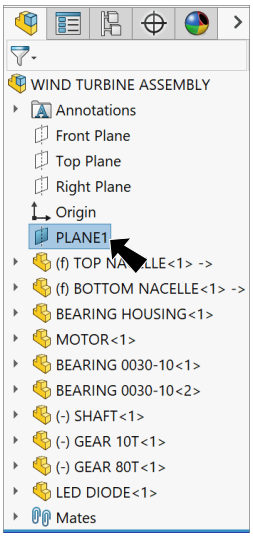


Fig. 51

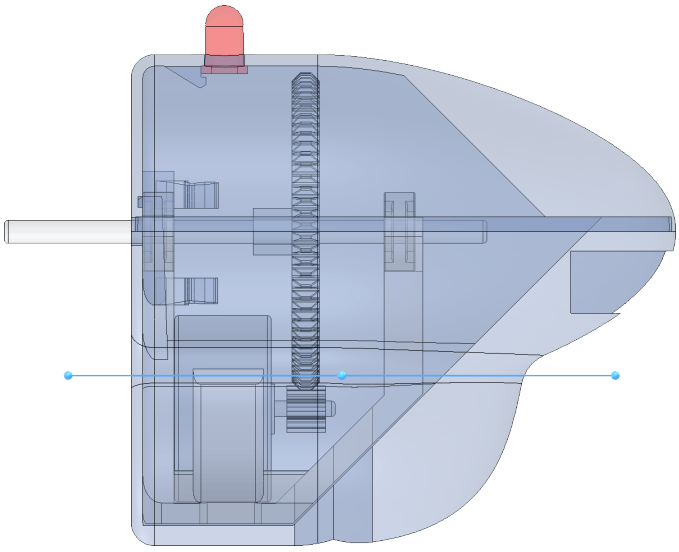
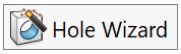


Fig. 52

Step 4. Click **Hole Wizard** 

in the **Assembly Features flyout** 

on the Assembly toolbar.

Step 5. In the Property Manager on the Type tab set:

under Hole Type, **Fig. 53**

select **Counterbore** 

under Standard:

select **ANSI Inch**

under Type:

Pan Cross Head

under Size:

select **#4**

under Fit

Loose

check **Show custom sizing**

Through Hole Diameter **.14**

Counterbore Diameter **.25**

Counterbore Depth **.28**

Angle at Bottom **55º**

under End Condition: **Blind**

Blind Hole Depth **21**

under Feature Scope

check **Propagate feature to parts**

uncheck **Auto-select**

click **Top and Bottom Nacelles** in graphics area, **Fig. 54**.

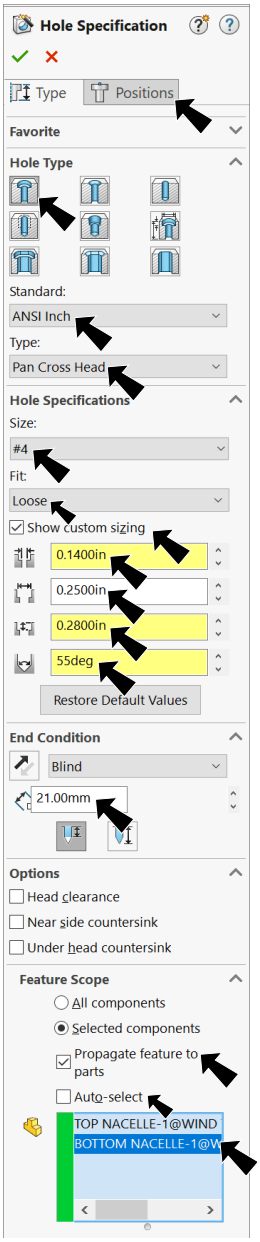


Fig. 53

Step 6. Click **Positions tab** 

at top of Property Manager, **Fig. 53**.

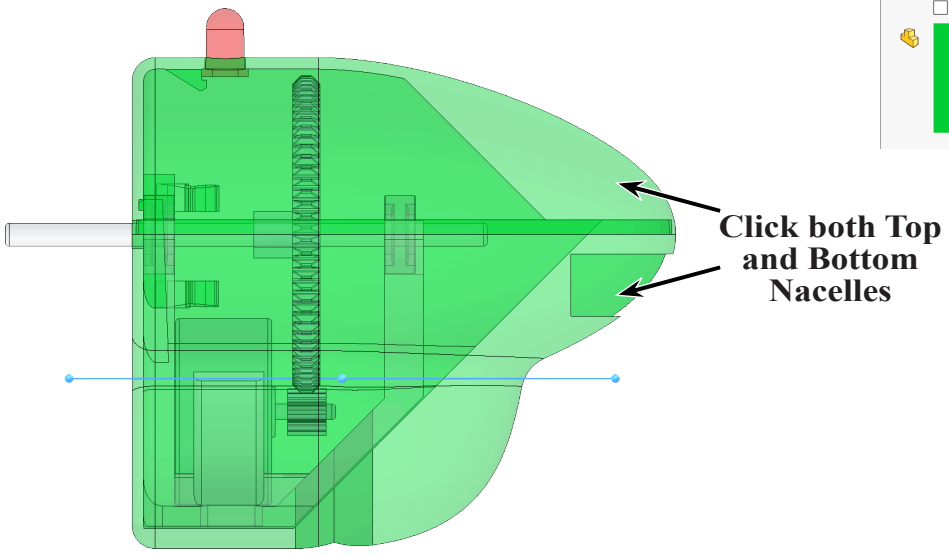


Fig. 54

Step 7. Click **Bottom** on the Standard Views toolbar. **(Ctrl-6)**

Step 8. **Plane1** was preselected as plane/face for hole, so click to **place a Point at rear**, **Fig. 55**.

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

Step 10. **Ctrl click centerpoint of hole** and **Origin** to select both. Release Ctrl key and click **Make Vertical** on the context toolbar, **Fig. 56**.

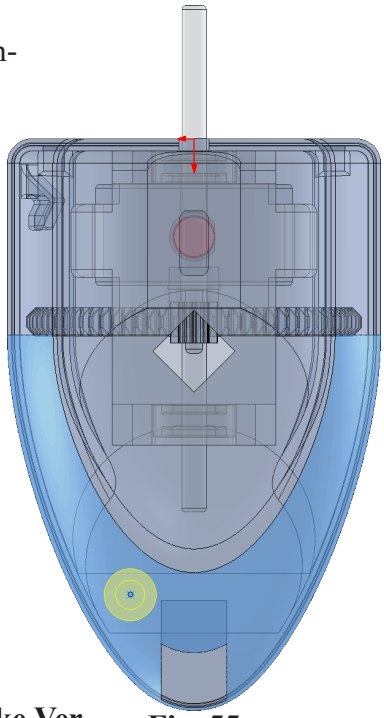


Fig. 55

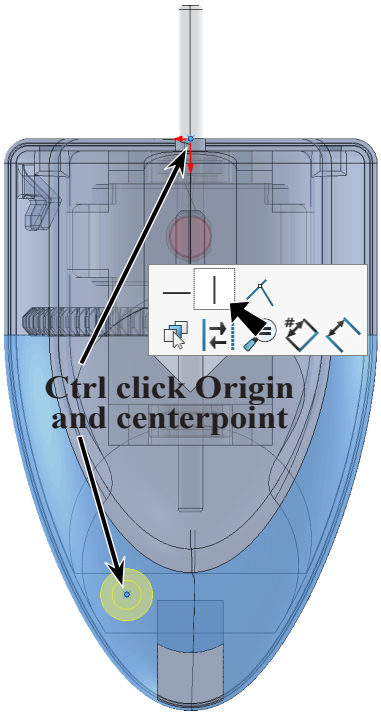


Fig. 56

Step 11. Click **Smart Dimension** **(S)** on the Sketch toolbar.

Step 12. Add **54 dimension**, **Fig. 57**.

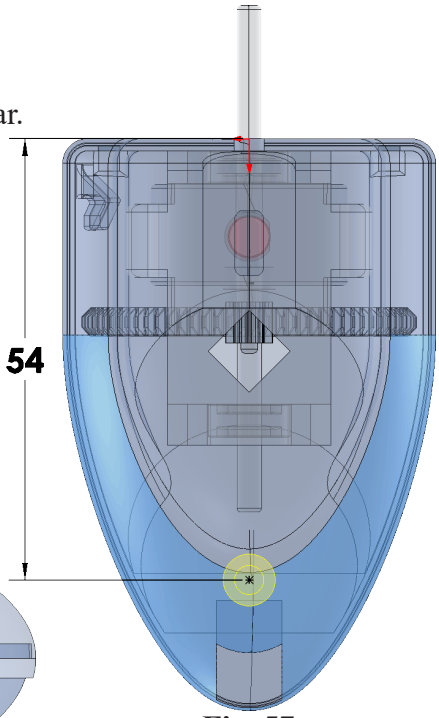


Fig. 57

Step 13. Click **Right** on the Standard Views toolbar. **(Ctrl-4)**

Step 14. Click OK in Hole Property Manager.

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

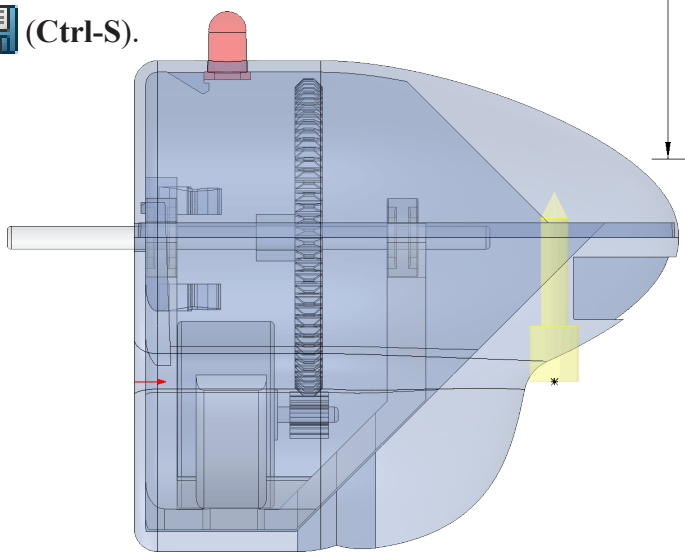


Fig. 58

Q. Insert Screw.

Step 1. If necessary hide Planes. To hide, click View Menu > Hide/Show > Planes, to hide Plane.

Step 2. Click **Isometric** on the Standard Views toolbar. (**Ctrl-7**)

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

Step 4. Click **SCREW** file and click Open from the Open dialog box.

Step 5. Click to place Screw, **Fig. 59**.

Step 6. **Change Transparency of Screw**. To change, click the Screw in graphics area and click **Change Transparency** on the context toolbar, **Fig. 59**.

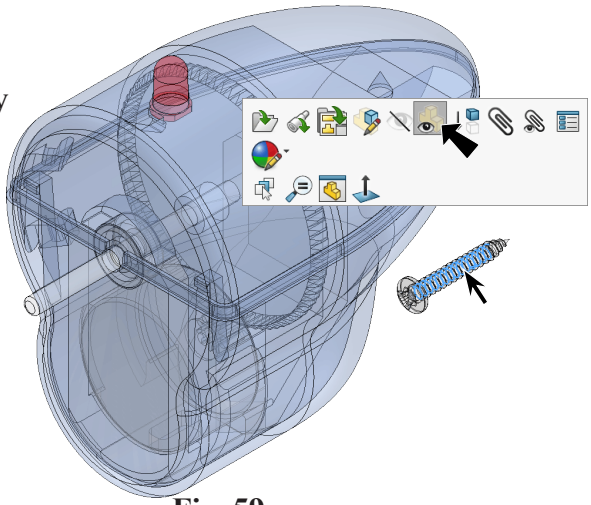


Fig. 59

R. Mate: Screw.

Step 1. Click **Right Plane** in the Feature Manager and **Mate** on the context toolbar, **Fig. 60**.

Step 2. Expand the flyout Feature Manager design tree, expand **SCREW** and click **Right Plane**, **Fig. 61**.

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

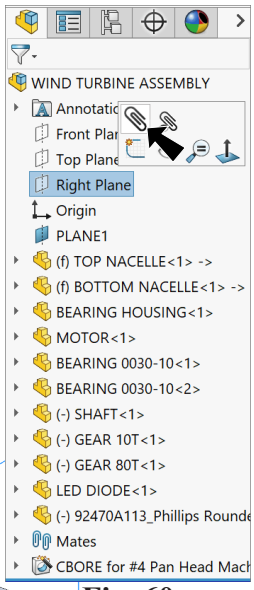


Fig. 60

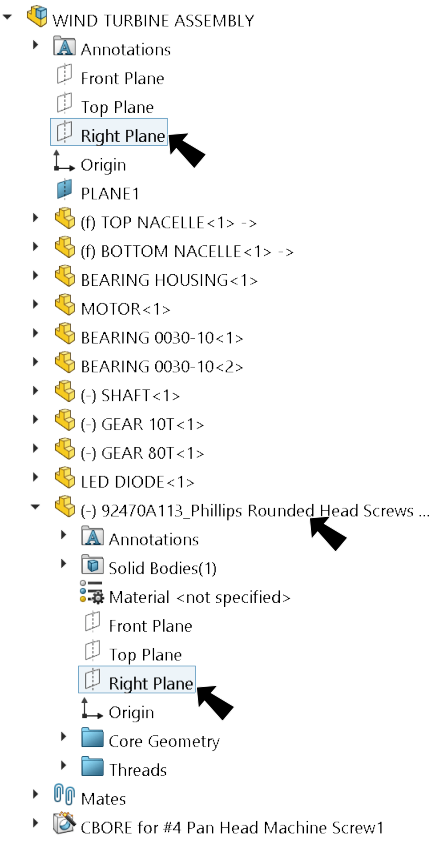


Fig. 61

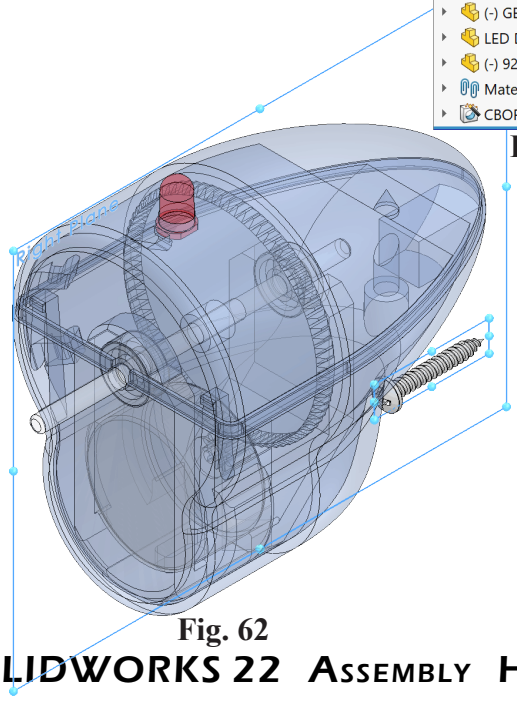


Fig. 62

Right to Right

Step 4. Click **Right** on the Standard Views toolbar. (**Ctrl-4**)

Step 5. In the flyout Feature Manager design tree click **Top Plane**, expand **SCREW** and click **Front Plane**, **Fig. 63**.

Step 6. Click **Distance** in Mate pop-up, **Fig. 64**. Set **distance 11.388** and press ENTER. The back of Screw should to down below Assembly Top Plane, **Fig. 65**. If positioned in opposite direction, click **Flip Dimension** in the Mate pop-up. Click Add/Finish Mate to add Distance mate.

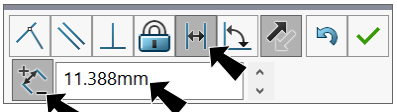


Fig. 64

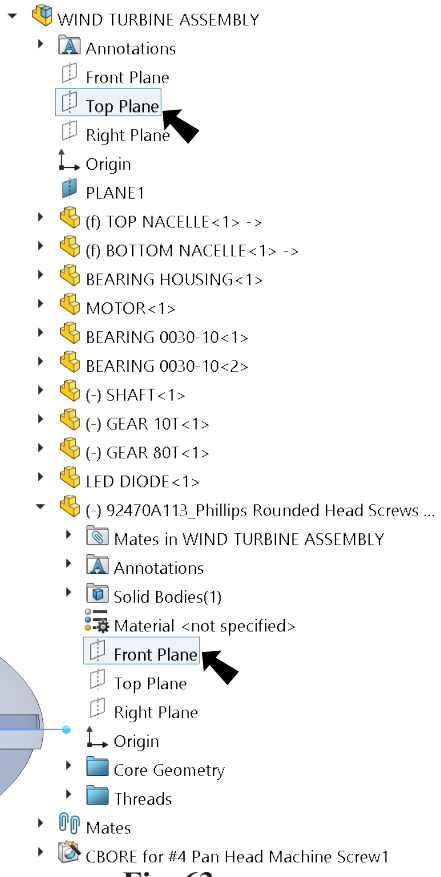
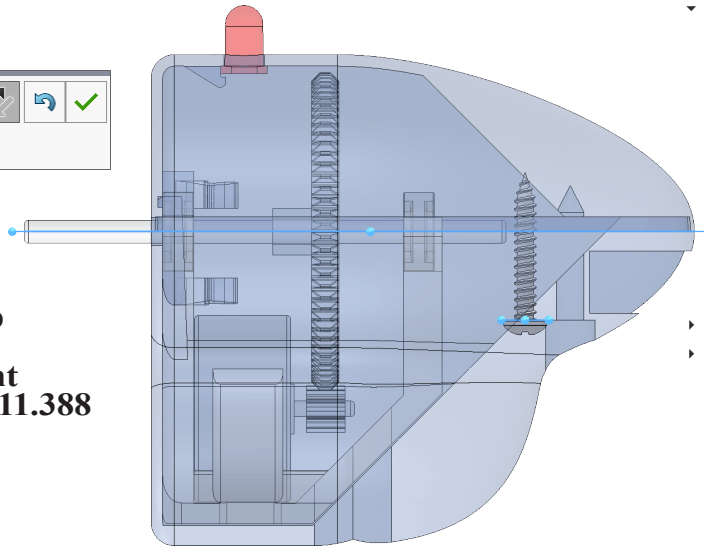


Fig. 63



Top to Front Distance 11.388

Fig. 65

Step 7. In the flyout Feature Manager design tree click **Front Plane**, expand **SCREW** and click **Top Plane**, **Fig. 66**.

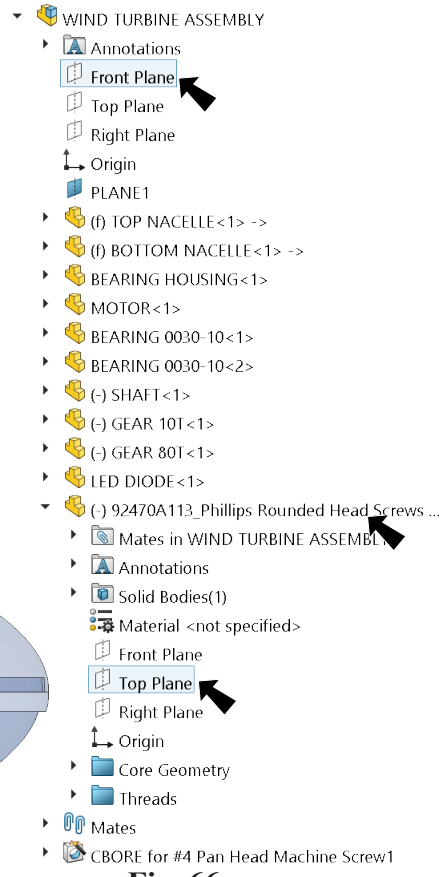


Fig. 66

Step 8. Click **Distance** in Mate pop-up, **Fig. 67**. Set **distance 54** and press ENTER. The Screw should align with counter-bore hole, **Fig. 68**. If positioned in opposite direction, click **Flip Dimension** in the Mate pop-up. Click Add/Finish Mate to add Distance mate.

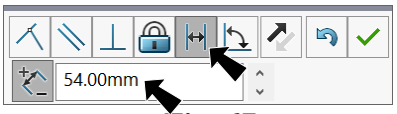


Fig. 67

Step 9. Click OK in the Property Manager.

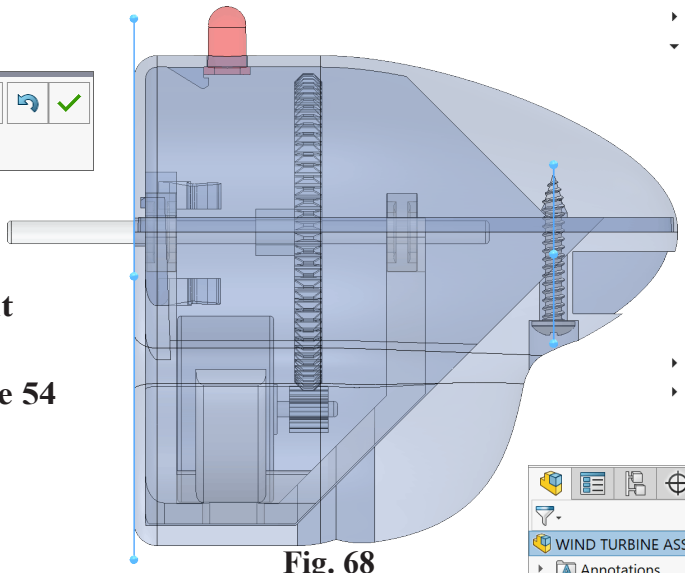


Fig. 68

Step 10. Turn off Assembly **Top Lever Transparency**. To change, **right click Assembly** at top of Feature Manager and click **Top Level Transparency** on the context toolbar, **Fig. 69**.

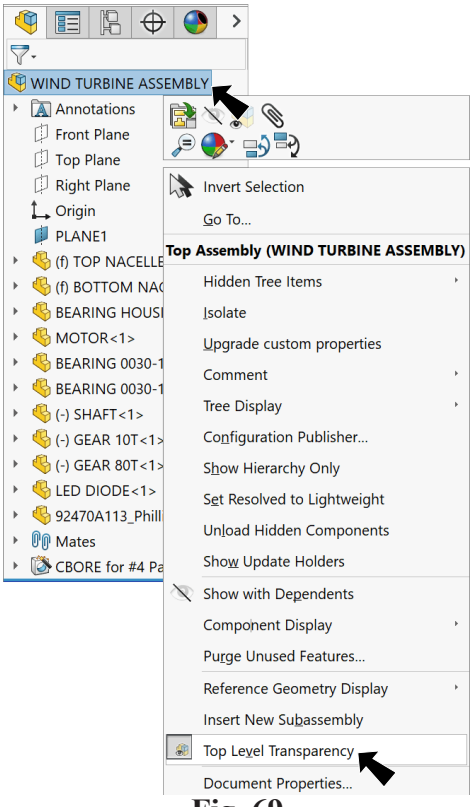


Fig. 69

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