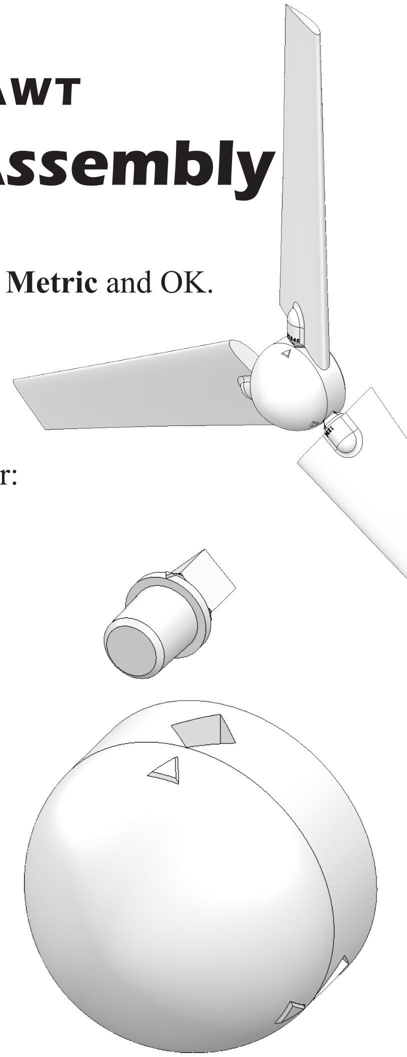
Chapter 20

HAWT
Rotor Assembly



A. Insert Rotor and Pin.

Step 1. Click File Menu > New, click **Assembly Metric** and OK.

Step 2. Select your **ROTOR** file and click Open from the Open dialog box.

Step 3. In the Begin Assembly Property Manager:

click **Keep Visible**, **Fig. 1**.

Click OK in the Property Manager, **Fig. 1**. This will place Rotor origin at the assembly origin and fix the position so Rotor cannot move. This fixed component should have a **(f)** before its name in the Feature Manager (f) ROTOR<1> .

Step 4. Click **Browse** in the Property Manager, **Fig. 1**.

Step 5. Select your **PIN** file and click Open from the Open dialog box.

Step 6. Click approximately where Pin is positioned in **Fig. 2**.

Step 7. Click OK in the Property Manager when done.

Fig. 2

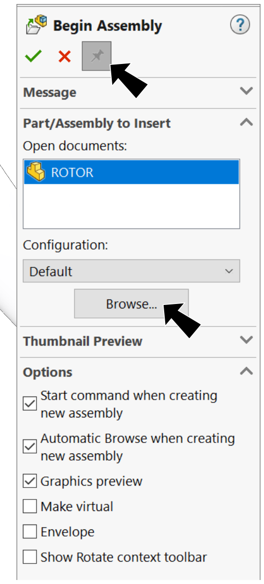


Fig. 1

B. Save as "ROTOR ASSEMBLY".

Step 1. Click File Menu > Save As.

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

C. Mate: Pin.

Step 1. Expand **Rotor** part in the Feature Manager. Expand **Cut-Extrude1**, click **Sketch2** and **Show** on the context toolbar, **Fig. 3**.

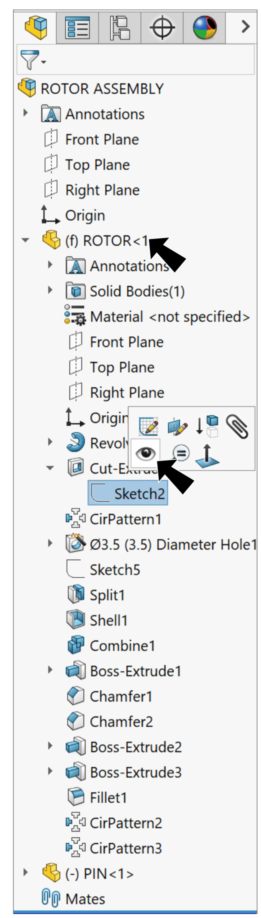


Fig. 3

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Step 2. Click **Mate** on the Assembly toolbar.

Step 3. Click **circle in Sketch2 of Rotor** and **circular edge of Pin**, **Fig. 4**.

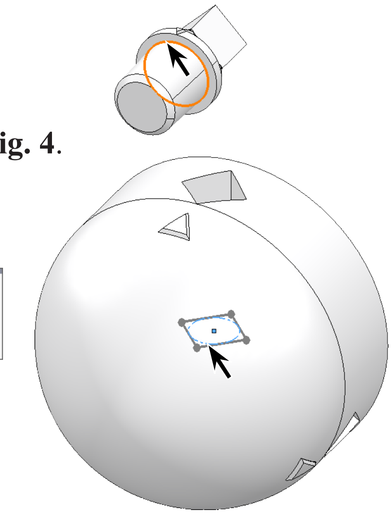


Fig. 4

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

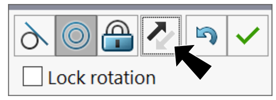


Fig. 5

Step 5. Click **flat side face of square hole in Rotor** and **flat side face of square shaft on Pin**, **Fig. 6**.

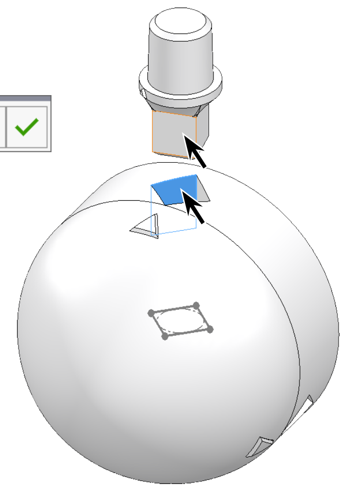


Fig. 6

Step 6. Click **Parallel** and Add/Finish Mate in Mate pop-up, **Fig. 7**.

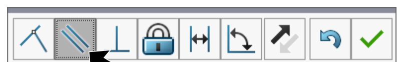


Fig. 7

Step 7. Expand the flyout Feature Manager design tree, click **Top Plane** and expand **Pin** and click **Front Plane**, **Fig. 8**.

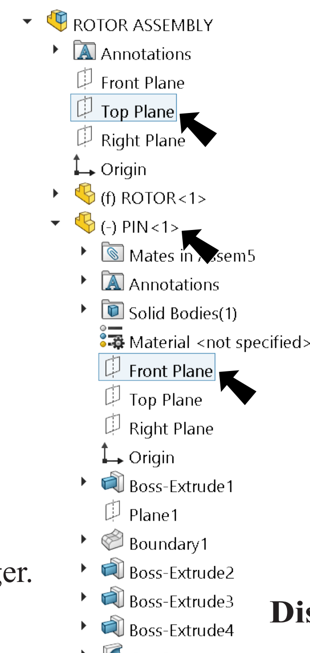


Fig. 8

Step 8. Click **Distance** in Mate pop-up, **Fig. 9**. Set **distance 23** and press ENTER. The Pin should positioned outside, **Fig. 10**. If positioned in opposite direction, click **Flip Dimension** in the Mate pop-up. Click Add/Finish Mate to add Distance mate.

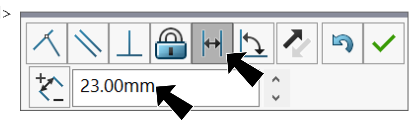


Fig. 9

Top to Front Distance 23

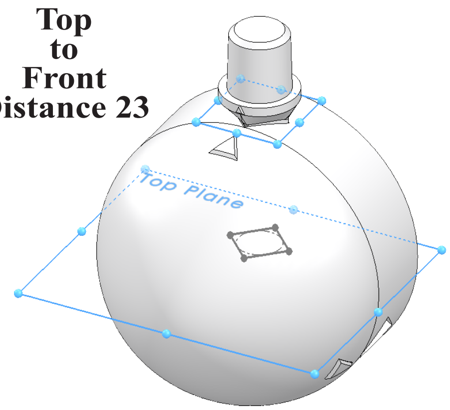


Fig. 10

Step 9. Click OK in the Property Manager.

Step 10. **Hide Sketch2**. To hide, click **Sketch2** in graphics area and **Hide** on the context toolbar, **Fig. 11**.

Dial indicators should align

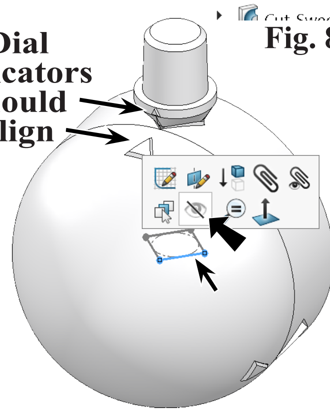
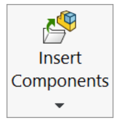


Fig. 11

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

D. Insert Blade 4415.

Step 1. Click **Insert Components** 

on the Assembly toolbar.

Step 2. Click **BLADE 4415** file and click Open from the Open dialog box.

Step 3. Place as positioned in **Fig. 12**.

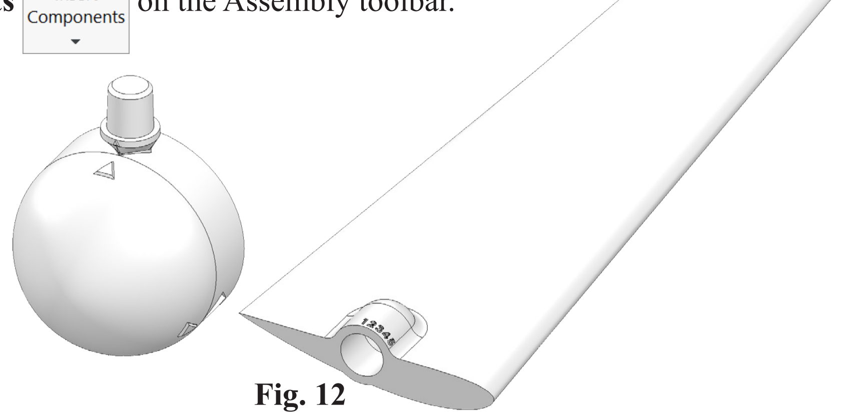


Fig. 12

E. Mate: Blade.

Step 1. Click **Mate** 

on the Assembly toolbar.

Step 2. Click **cylindrical face of Blade** and **cylindrical face of Pin**, **Fig. 13**.

Step 3. Check Add/Finish Mate  in Mate pop-up toolbar to add a **Concentric** mate (**no Lock Rotation**).

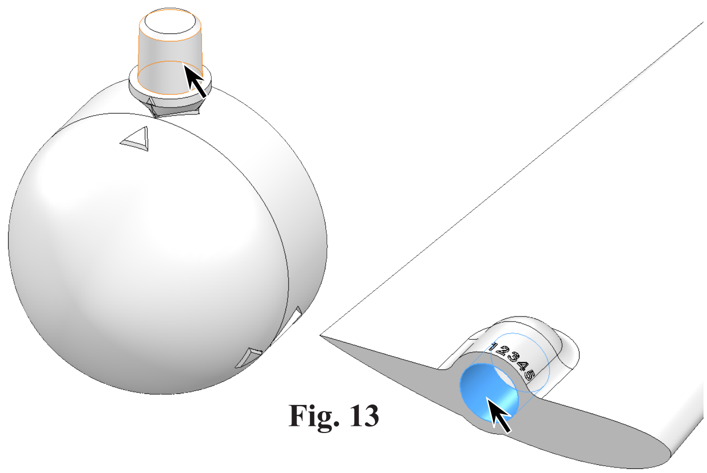


Fig. 13

Step 3. If necessary, pull Blade up off of the Pin (do not click the Blade as it will be selected for a mate), **Fig. 14**.

Step 4. **Hide airfoil face of Blade**, click **bottom face** and click **face of flat on Pin**. To hide face, hover cursor over face and press **Alt key**, **Fig. 14**.

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

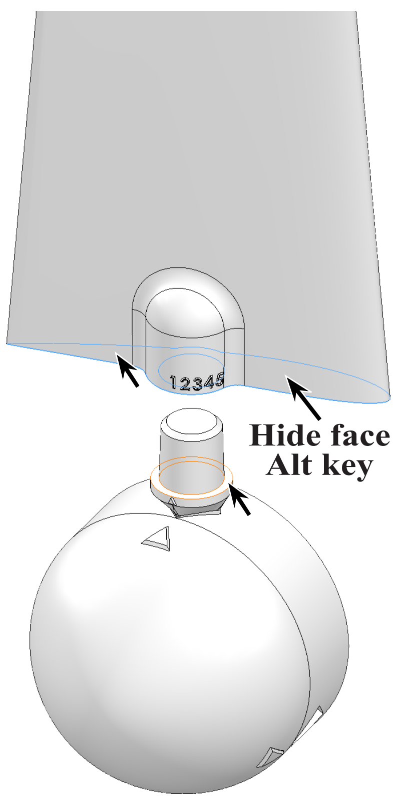


Fig. 14

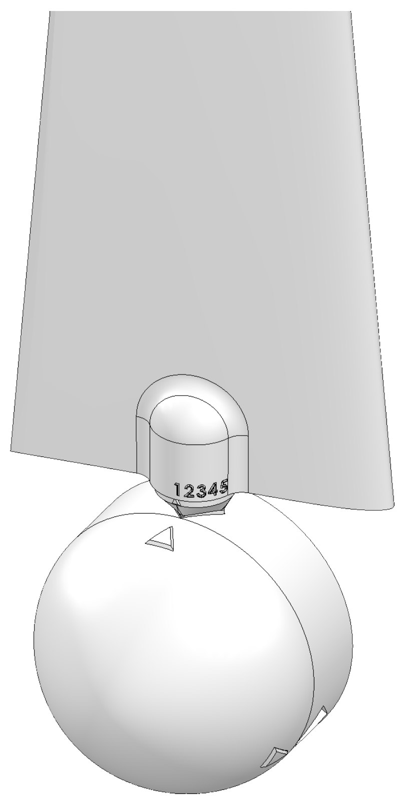


Fig. 15

Step 6. Click **Front** on the Standard Views toolbar. (**Ctrl-1**)

Step 7. Expand the flyout Feature Manager design tree, click **Right Plane** and expand **Blade** and click **Top Plane**, **Fig. 16**.

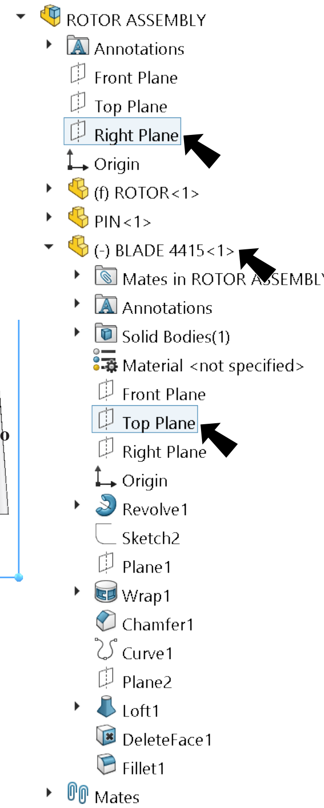


Fig. 16

Step 8. Click **Angle** in Mate pop-up, **Fig. 17**. Set **angle 63** and press ENTER. The Blade should align to 3 on the **Pitch Angle Dial**, **Fig. 18**. If positioned in opposite direction, click **Flip Mate Alignment** in the Mate pop-up. Click Add/ Finish Mate to add Distance mate.

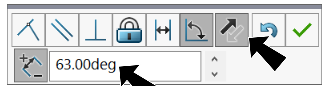


Fig. 17

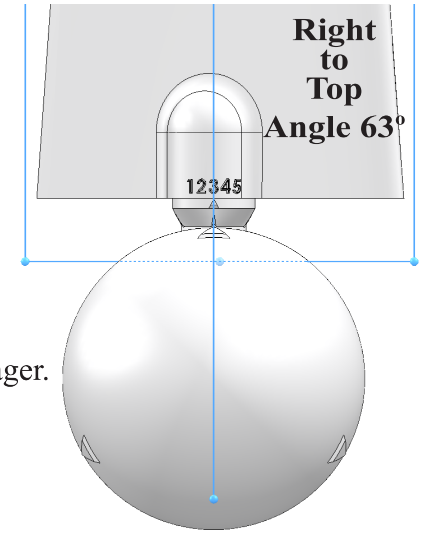


Fig. 18

Step 9. Click OK in the Property Manager.

Step 10. Save (**Ctrl-S**).

F. Circular Pattern.

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

Step 2. Click **Circular Component Pattern** Circular Component Pattern in the **Linear Component Pattern flyout** Linear Component Pattern on the Features toolbar.

Step 3. In the Circular Pattern Property Manager set:
under Components to Pattern, **Fig. 19**
click **Pin and Blade**, **Fig. 20**
under Direction 1
click in **Pattern Axis** box
click **Rotor circular face**
Angle **360**
Number of Instances **3**
check **Equal spacing**
click OK .

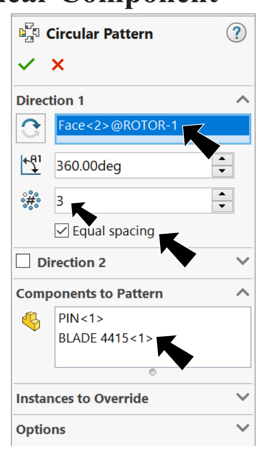


Fig. 19

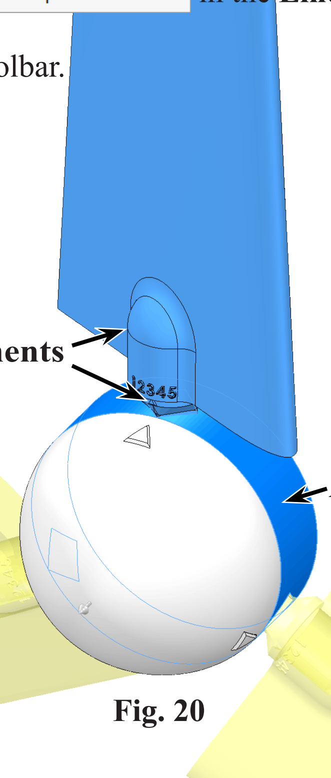


Fig. 20

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

G. Tinker with Pitch Angle (Angle Mate).

Step 1. **Suppress BLADE 4415** part **Angle Mate**. To Suppress, **expand BLADE 4415** part in the Feature Manager and expand **Mates folder**. Click **Angle1 Mate** and **Suppress** on the context toolbar, **Fig. 21**.

Step 2. Drag Blade to rotate to **Blade's pitch angle**, **Fig. 22**.

Step 3. When done, **unsuppress** **Angle1 Mate** on the context toolbar, **Fig. 23**.

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

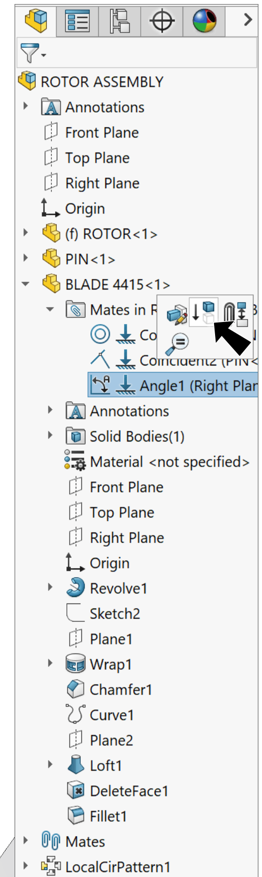


Fig. 21

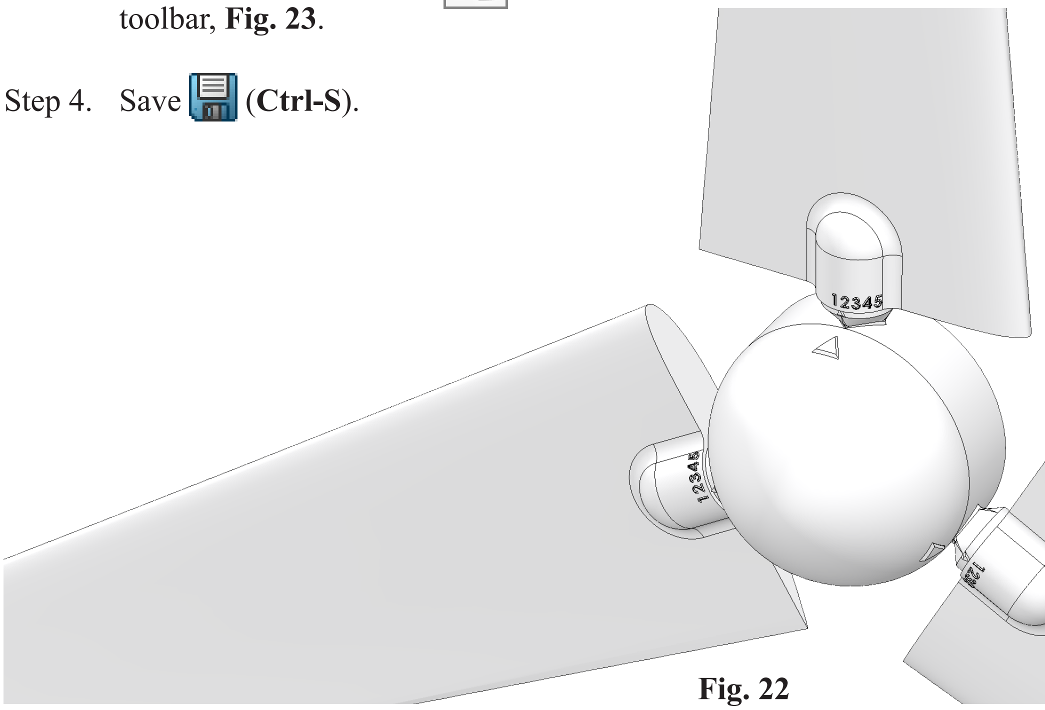


Fig. 22

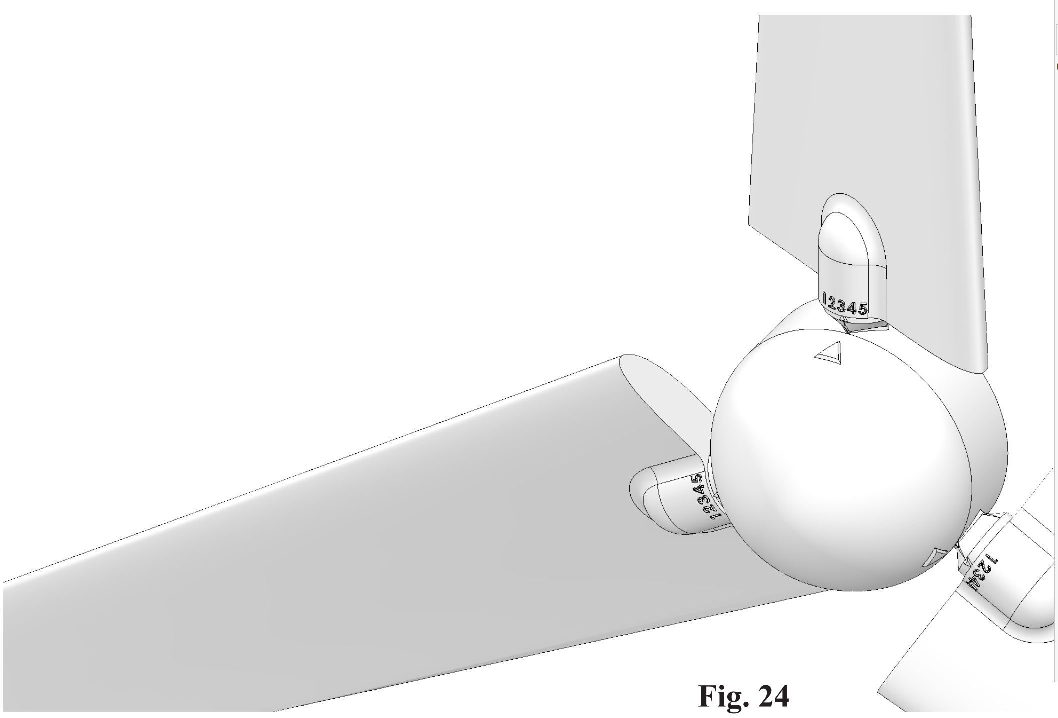


Fig. 24

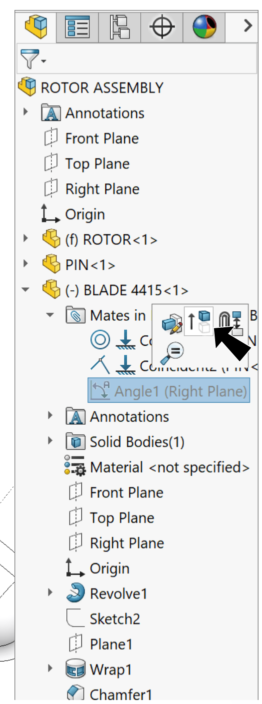
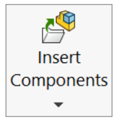


Fig. 23

H. Open Turbine Assembly and Rotor Assembly.

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

Step 2. Click **Insert Components** 

on the Assembly toolbar.

Step 3. Select your **Rotor Assembly** file and place your file in front, **Fig. 25**.

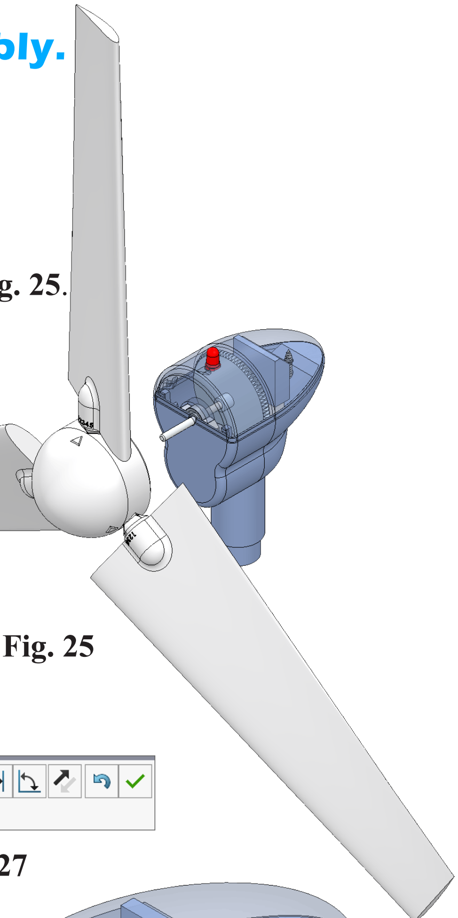


Fig. 25

I. Mate: Rotor Assembly.

Step 1. Click **Mate** 

on the Assembly toolbar.

Step 2. Click **cylindrical face of Shaft** and **cylindrical face of Rotor**, **Fig. 26**.

Step 3. Check **Lock Rotation** and Add/Finish Mate  in Mate pop-up toolbar to add a **Concentric** mate, **Fig. 27**.

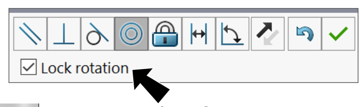


Fig. 27

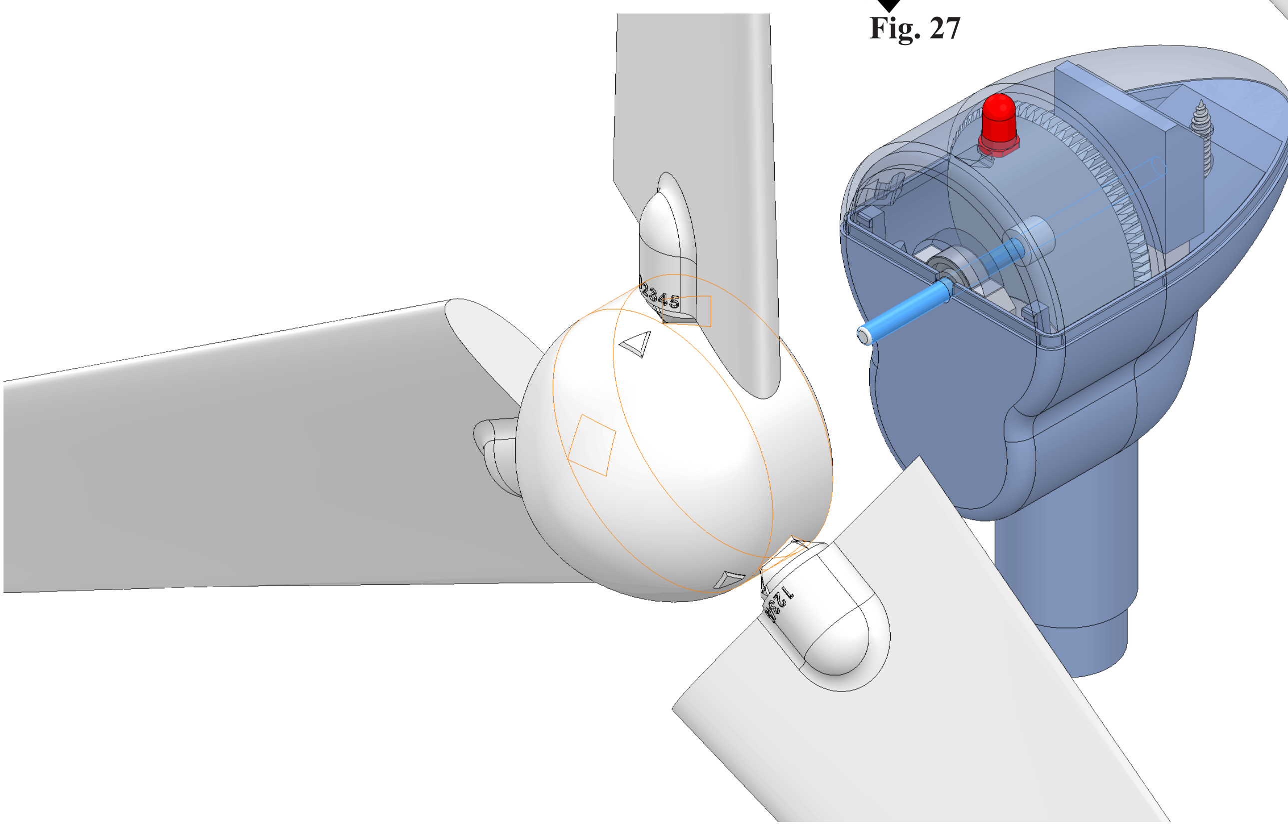


Fig. 26

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

Step 5. Expand the flyout Feature Manager design tree, click **Front Plane** and expand **Rotor Assembly** and click **Front Plane**, **Fig. 28**.

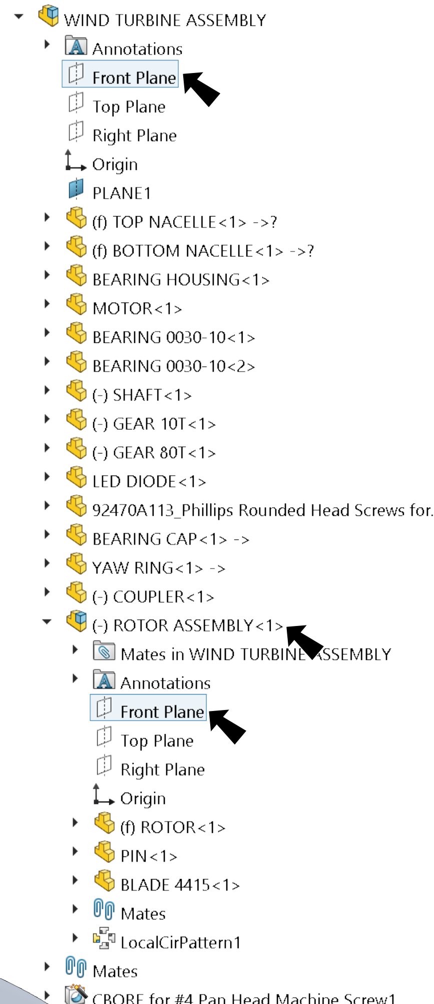


Fig. 28

Step 6. Click **Distance** in Mate pop-up, **Fig. 29**. Set **distance 6** and press ENTER. The Rotor should positioned just outside, **Fig. 30**. If positioned in opposite direction, click **Flip Dimension** in the Mate pop-up. Click Add/Finish Mate to add Distance mate.

Step 7. Click OK in the Property Manager.

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

Fig. 29

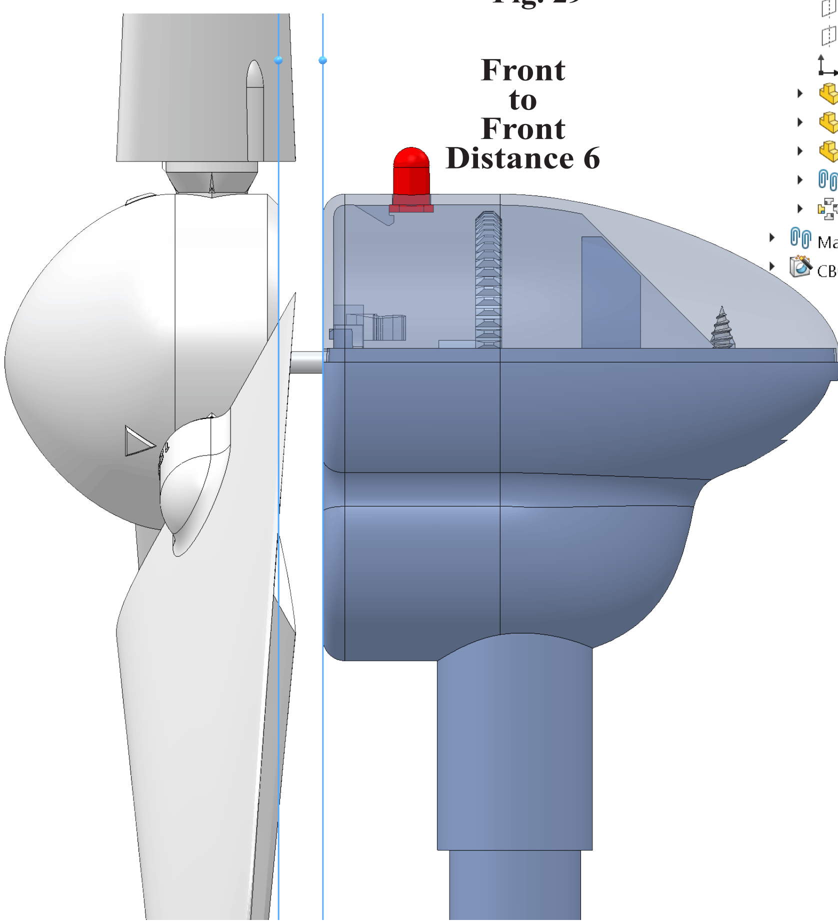


Fig. 29