Note that although this DEMO appears to be lengthy, it does not take a large amount of time and since it uses only a limited number of assembly constraints this DEMO should not be used as an optional replacement for the specified in class assignment. The in class assignment provides the student with numerous assembly constraints and allows student initiative to design a unique vehicle.

The following set of instructions are an optional replacement for the “SolidWorks Assembly Modeling Constraints”. This demo should help prepare the students for the Out of Class HW

Student + Instructor:

Demo how to start SolidWorks – Start with verbal summary of most used constraints and the strategies for constraining parts as described in STEP 13 below.

1. Click on the folder on the EEIC website containing the Wind Turbine parts, place it on your Z drive and unzip the folder. Open SolidWorks and select Assembly to assemble the object shown above. Click on File/New/assem and browse to the unzipped files.

2. Select Insert Components/ Insert Components and click on the pin in the dialog box to keep the browse window active, then select the Base.SLDPRT and then double left click or Open and then click on green check mark place the base.

Reduce the display size by zooming out using the mouse wheel. Without any more clicking, move the mouse back to the browse button and click on it. Select the Generator.base, click on open and position the generator with the mouse and left click to lock the position. Repeat this procedure for the tower and the propeller. After left clicking to lock the propeller hit ESC or click on the green arrow in the dialog box to complete the insertion of the parts.

Note that if 2 copies of a part are required, left clicking twice before reselecting the browser will post 2 copies. Note the placement of the parts need not duplicate exactly as shown in the layout to the right.
3. Demonstrate the **first part brought into the assemble is locked in place** and cannot be moved or rotated by clicking on the Move Component / Move Component and then Move Component / Rotate Component. Repeat the above sequence to show that the other component can be moved or rotated **independently** of each other. Use undo and/or ISO as needed to keep the components organized and visible on the screen. Finally show that all components can be rotated together by holding the mouse wheel down and dragging the part with the mouse. Restore orientation. **Thus these “free” parts have X,Y,Z translation and X,Y,Z rotation freedom.**

4. Using the above demonstrated technique, rotate the tower and move it closer to the base. Click on the green arrow to escape the Move Component functionality. Note that you may want to click on area on the screen and then use the mouse wheel to properly zoom into the area where the components which are to be constrained are located.

5. Click on **Mate** and select the **Concentric** constraint and then select the circular pattern on the bottom of the tower and the circular pattern on the base and then hit ESC or click on the green arrow to accept the constraint.

6. **Expand Mates in the Tree** to show where the Concentric constraint has been recorded. By navigating to that constraint, left clicking and selecting the Edit Feature icon, the constraint can be modified at any time in the assembly process. It can also be eliminated by left clicking the Tree entry and selecting Delete.
7. Left click on the tower and drag the mouse to show that the part can be moved up and down and can be rotated, but it remains Concentric with the base. **Change the Display Style to Hidden Lines Visible** and position/zoom the tower and the base so that the lines that are to be mated are visible. Using **Mate / Coincident** select the bottom edge of the key on the tower and the interior bottom edge of the key slot in the base and click on the green arrow to accept. Change the display Style back to Shaded with Edges and set View Orientation to ISO (Ctrl + 7). Demonstrate that the tower is fixed and cannot be rotated using Move Component.

8. 

Select **Mate / Concentric** and select the top of the tower and the interior circular pattern within the generator. Use the mouse to drag the generator above the tower and then click on the Flip Mate Alignment reversal arrows and click on the green arrow to accept.

9. Position the generator and tower as shown below and then change the Display Style to Hidden Lines Visible. Using **Mate / Coincident** select the Edges as shown and accept the constraints using the green arrow.

10. Change the Display mode back to Shaded with edges and demonstrate that the generator is fixed and cannot be rotated using Move / Component.
11. Using Move and Rotate within Move Component position the propeller as shown.

12. Using **Mate / Coincident** select the circular patterns on the propeller and the generator axle and accept the constraint with the green arrow. Be careful not to select either surface which will turn blue if selected.

13. Using Move Component / Move component, demonstrate the propeller is fixed but is free to rotate.
14. SolidWorks supports a quick look at a pictorial section of an assembly (needed in the HW) by first selecting an appropriate plane (Front/Top/Right) and then clicking on the Section View icon as shown below. Accept the Section View by clicking on the GREEN ARROW in the dialog box to the left. The section view can then be positioned using the View Orientation options or the Ctrl key + 7/8 for Isometric or head on views.

15. Click on **Normal To** under View Orientation to better view the created Section. You can **restore** the standard assembly view by clicking on the **Section View icon** (once you have closed the section view dialog box).

16. Summarize by mentioning the most used constraints and the critical strategies

- Concentric
- Mating Surfaces/Edges
- Coincident
- Distance

- **Move** components to be mated close to each other
- **Rotate** one component so the mating surface or edges can be easily viewed
- **Zoom in** so that the surface or edges are easy to select