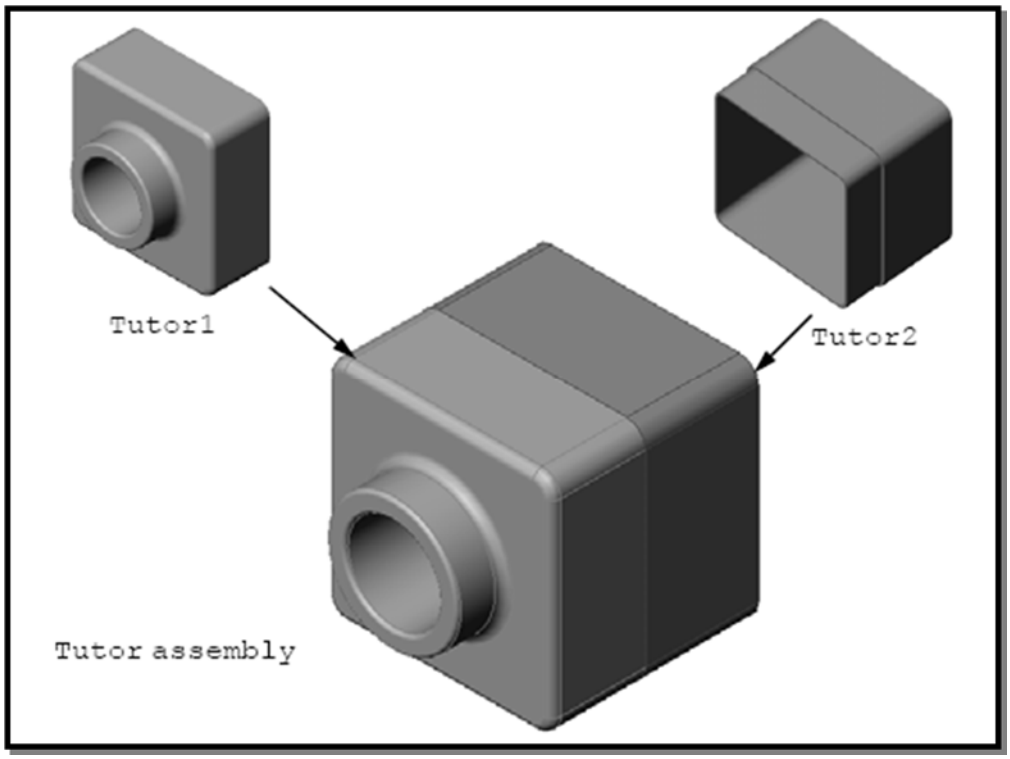
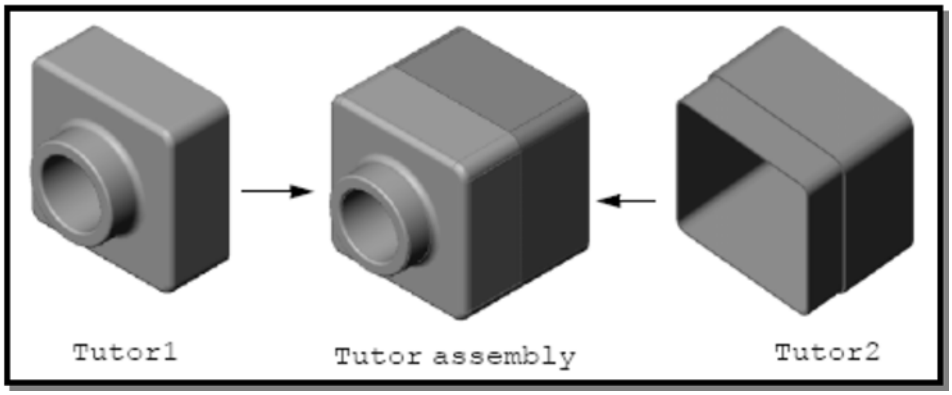
Engr 210 – **Engineering Graphics**
Lab 21: SolidWorks Assembly

In this lab, you will create the part file ***Tutor2***, and then combine it with the part file ***Tutor1*** which you created in the previous lab to create the Assembly as shown.



Creating *Tutor2*

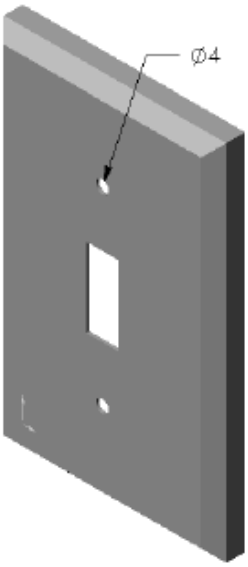
Follow the instructions in Lesson 2– Assemblies in the SolidWorks Online Tutorials. In this lesson you will first create *Tutor2*, and then create an assembly. Save the assembly as Lab21a.



Exercise 1

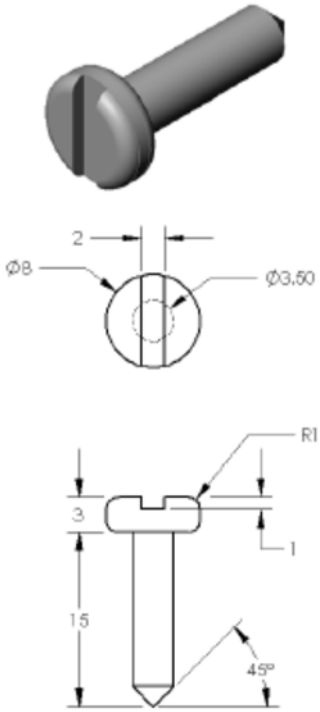
A. Modify switch plate from Lab 20.

1. Open the ***switchplate*** part file created in the previous lab.
2. Modify the diameter of the two holes to **4 mm**.
3. Save the changes.



B. Create a fastener

Create a model of the fastener shown. Save the part file as ***fastener.***



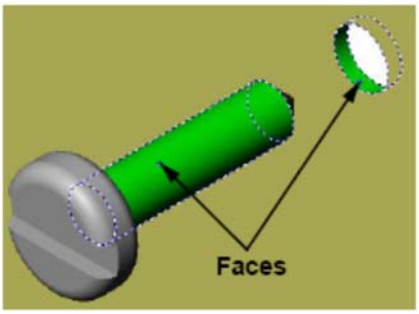
C. Creating an Assembly

1. Create a new assembly. The fixed component is the ***switchplate***.
2. Drag the ***switchplate*** into the assembly window.
3. Drag ***fastener*** into the assembly window.

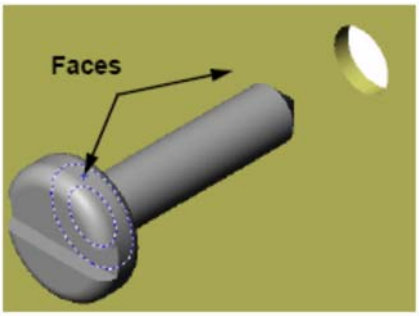
4. Use **Move Component** to position the ***fastener*** in front of the first hole.

   The ***switchplate-fastener*** requires three mates to fully define the assembly.

5. Create a **Concentric** mate between the cylindrical face of the `fastener` and the cylindrical face of the hole in the `switchplate`.

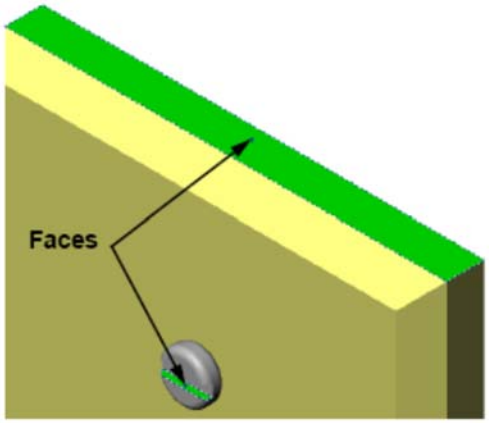


6. Create a **Coincident** mate between the back flat face of the `fastener` and the flat front face of the `switchplate`.



7. Create a **Parallel** mate between one of the flat faces on the slot of the `fastener` and the flat top face of the `switchplate`.

Note: If the necessary faces do not exist in the `fastener`or the `switchplate`, create the parallel mate using the **Faces** appropriate reference planes ineach component.



8. Add a second instance of the `fastener` to the assembly. You can add components to an assembly by dragging and dropping:
    - Hold the **Ctrl** key, and then drag the component either from the FeatureManager design tree, or from the graphics area
    - The pointer changes to  .
    - Drop the component in the graphics area by releasing the left mouse button and the **Ctrl** key.

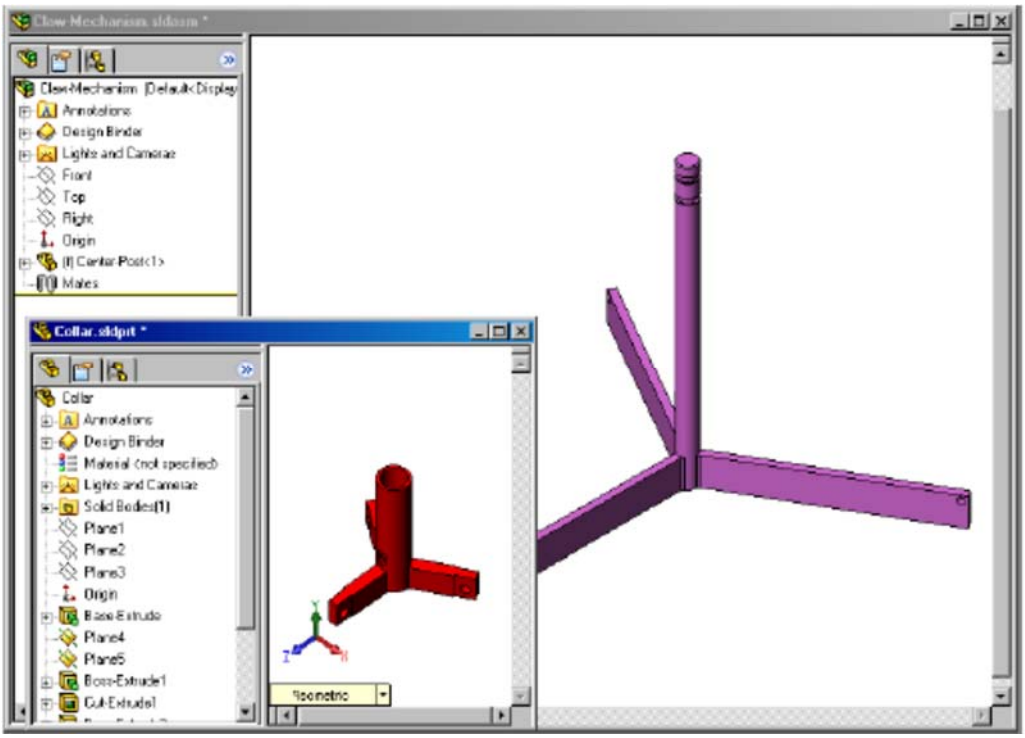
9. Add three **mates** to fully define the second `fastener` to the `switchplate-fastener` assembly.
10. Save the `switchplate-fastener` assembly as Lab21b.

    Create the `switchplate-fastener` assembly.

Exercises 2. Assembling a Mechanical Claw

Obtain a copy of the folder *Assembly-folder* from the instructor. This folder contains the files needed to create an assembly drawing of the claw mechanism shown at the right.

1. Create a new assembly.
2. Save the assembly. Name it `Claw-Mechanism.`
3. Insert the `Center-Post` component (from the *Assembly-folder*) into the assembly. Position the `Center-Post` at the assembly origin. Make sure it is fully constrained.
4. Open the `Collar` part. Arrange the windows as shown below.



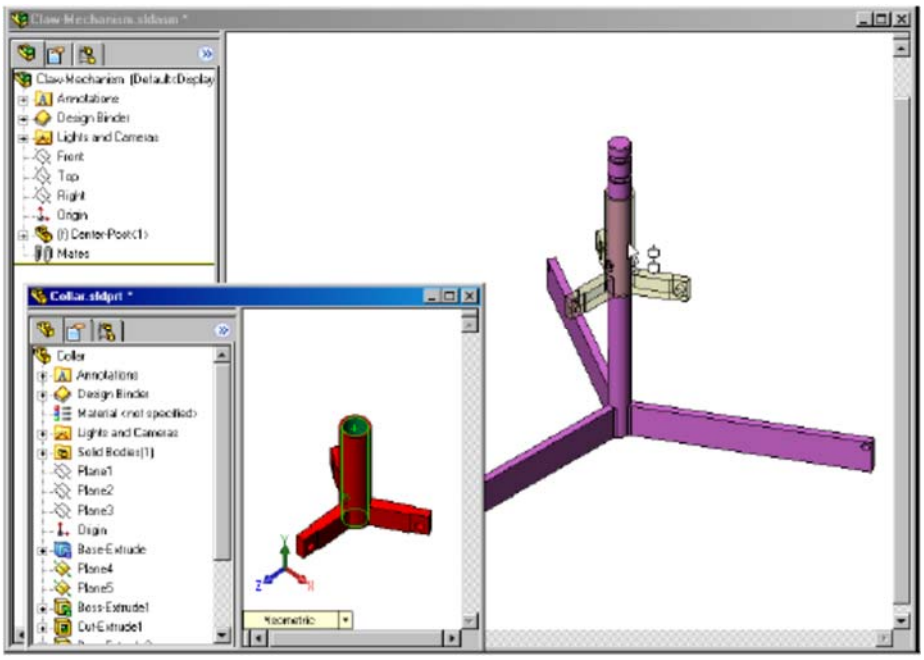
SmartMates

You can create some types of mating relationships automatically. Mates created with these methods are referred to as SmartMates.

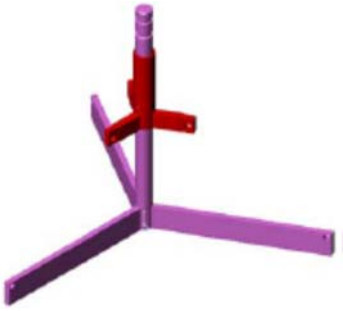
You can create mates when you drag the part in specific ways from an open part window. The entity that you use to drag determines the types of mates that are added.

5. Select the cylindrical face of the `Collar`, and drag the `Collar` into the assembly. Point at the cylindrical face of the `Center-Post` in the assembly window.

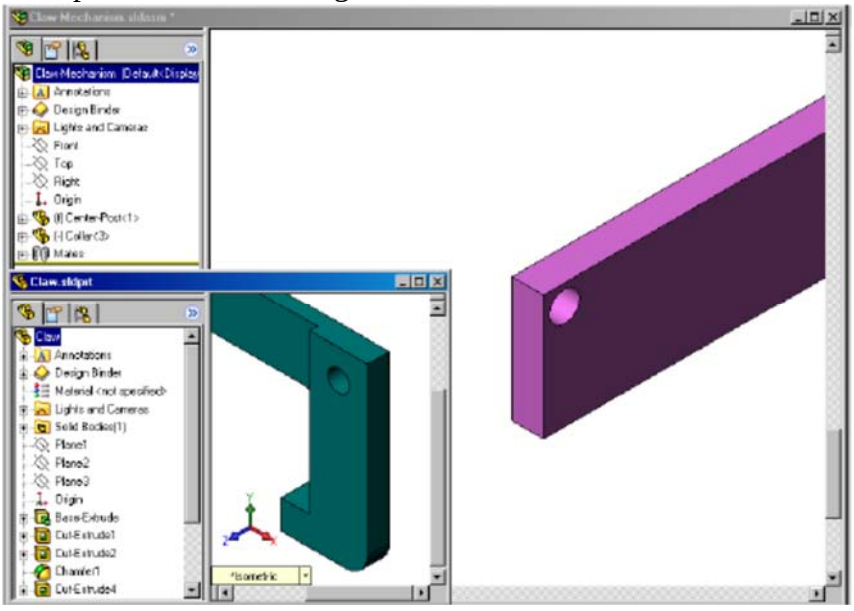
   When the pointer is over the `Center-Post`, the pointer changes to  . This pointer indicates that a **Concentric** mate will result if the `Collar`is dropped at this location. A preview of the `Collar` snaps into place.



6. Drop the `Collar`. A **Concentric** mate is added automatically. Click **Add/Finish Mate** ✔.
7. Close the `Collar` part document.



8. Open the `Claw`.Arrange the windows as shown below.

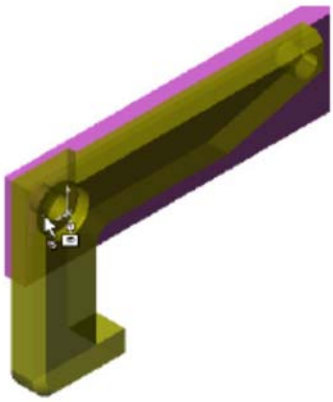


9. Add the `Claw` to the assembly using SmartMates
    - Select the edge of the hole in the `Claw`.

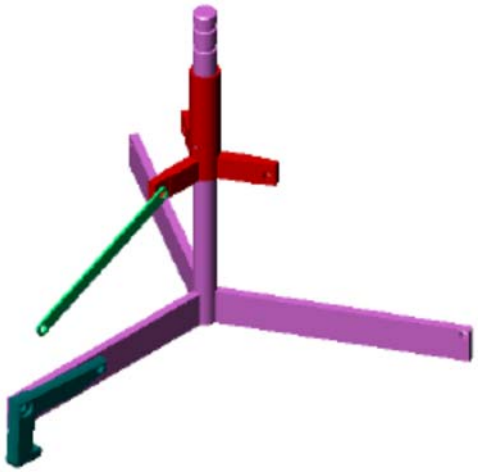
    It is important to select the edge and not the cylindrical face. This is because this type of SmartMate will add two mates:
    - A **Concentric** mate between the cylindrical faces of the two holes.
    - A **Coincident** mate between the planar face of the `Claw`and the arm of the `Center-Post`.

10. Drag and drop the `Claw`onto the edge of the hole in the arm.

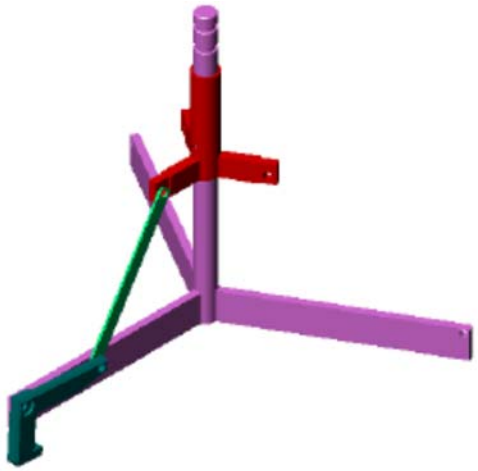
    The pointer looks like this  indicating that a **Concentric** and a **Coincident** mate will be added automatically. This SmartMate technique is ideal for putting fasteners into holes.
11. Close the `Claw`part document.



12. Add the `Connecting-Rod` to the assembly.
    Use the same SmartMate technique you used in steps 9 and 10 to mate one end of the `Connecting-Rod` to the end of the `Collar`.
    There should be two mates:
    - **Concentric** between the cylindrical faces of the two holes.
    - **Coincident** between the planar faces of the `Connecting-Rod` and the `Collar.`

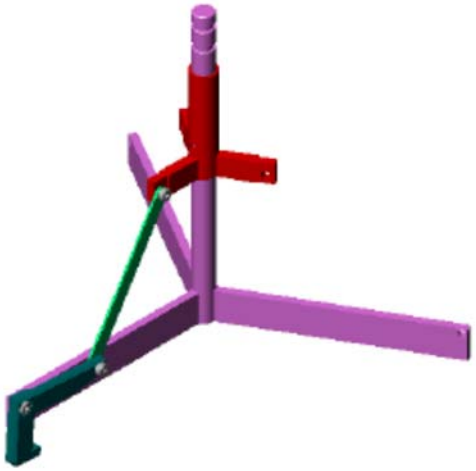


13. Mate the `Connecting-Rod` to the `Claw`.
    Add a **Concentric** mate between the hole in the `Connecting-Rod` and the hole in the `Claw`.
    Do not add a **Coincident** mate between the `Connecting-Rod`and the `Claw`.



14. Add the pins.
    There are three different length pins:
    - `Pin-Long`
    - `Pin-Medium`
    - `Pin-Short`

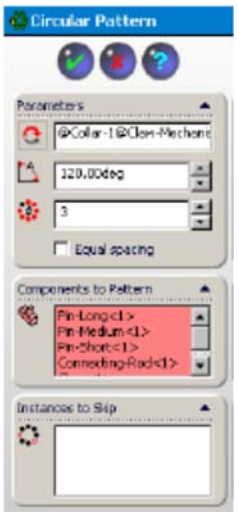
    Use the command **Tools, Measure** to determine which pin goes in which hole.Add the pins using SmartMates.



Circular Component Pattern

Create a circular pattern of the `Claw`, `Connecting-Rod`, and pins.

1. Click **Insert**, **Component Pattern**, **Circular Pattern.** The **Circular Pattern** PropertyManager appears.
2. Select the components to be patterned.
   Make sure the **Components to Pattern** is active, and then select the `Claw`, the `Connecting-Rod`, and the three pins.
3. Click **View, Temporary Axes**.
4. Click in the **Pattern Axis** field. Select the axis that runs down the center of the `Center-Post` for the center of rotation for the pattern.
5. Set the **Angle** to 120º.
6. Set the **Instances** to 3.
7. Click **OK**.
8. Turn off the temporary axes.



Dynamic Assembly Motion

Moving under defined components simulates movement of a mechanism through dynamic assembly motion.

9. Drag the `Collar` up and down while observing the motion of the assembly.
10. Save the assembly as Lab21c and close the assembly.