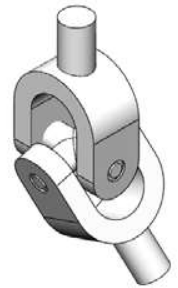


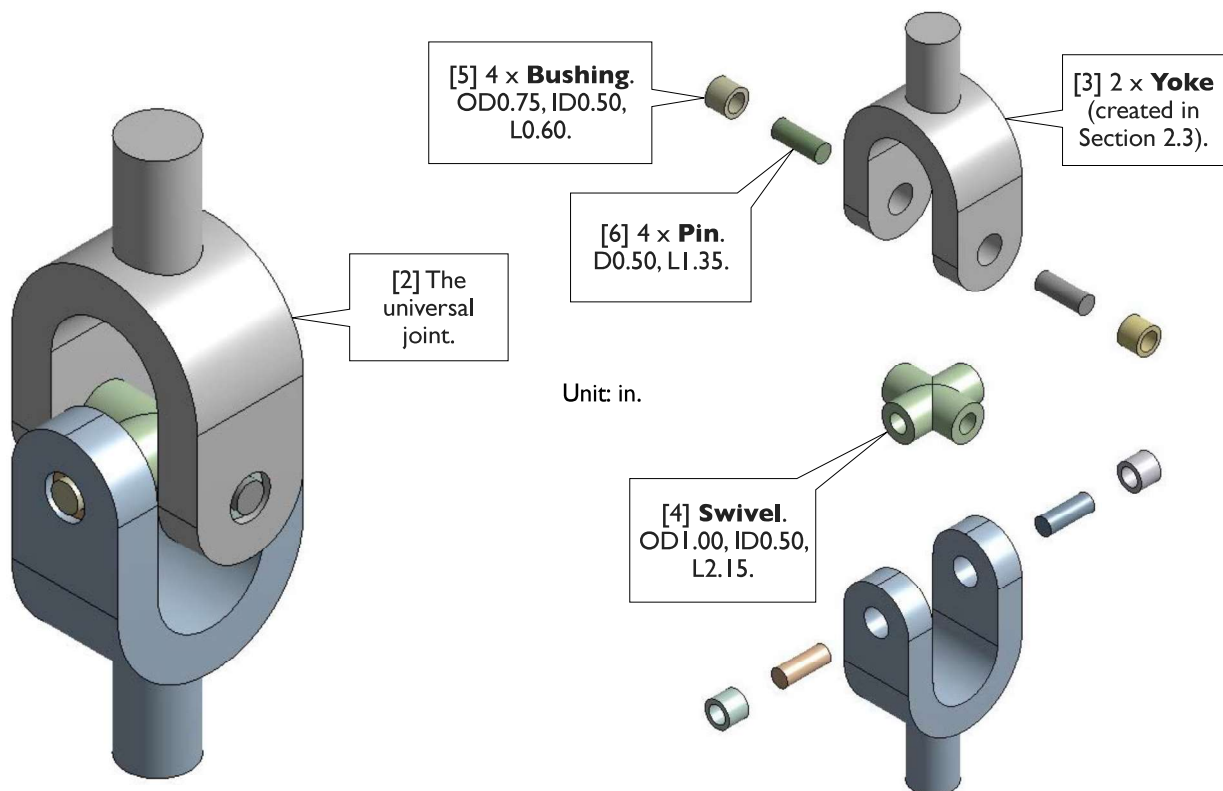
Section 3.2

Universal Joint



3.2-1 Introduction

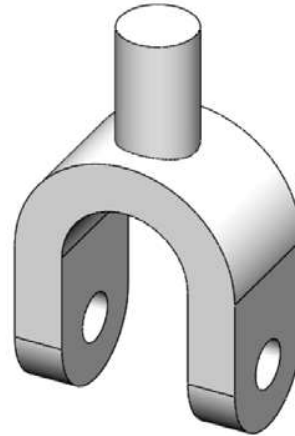
[1] In this exercise, we'll create a universal joint [2]. The assembly consists of four kinds of parts [3-6], of which the **Yoke** [3] was created in Section 2.3.



3.2-2 Open **Yoke**



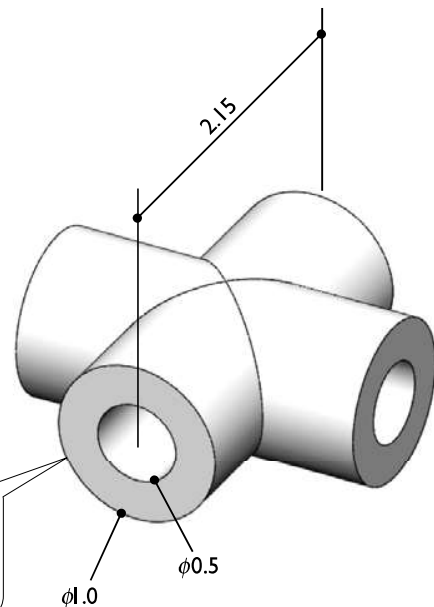
[1] Launch **SolidWorks**. Open the part document **Yoke**, which was saved in Section 2.3.



3.2-3 Create **Swivel**



[1] Click **New** and create a new part. Set up **IPS** unit system with 3 decimal places for the length unit.



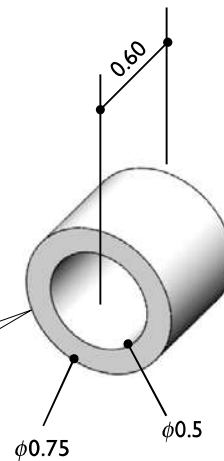
[2] Create a 3D model like this. Use any coordinate system as you like. Save the part with the file name **Swivel**.

3.2-4 Create **Bushing**



[1] Click **New** and create a new part. Set up **IPS** unit system with 3 decimal places for the length unit.

[2] Create a 3D model like this. Use any coordinate system as you like. Save the part with the file name **Bushing**.

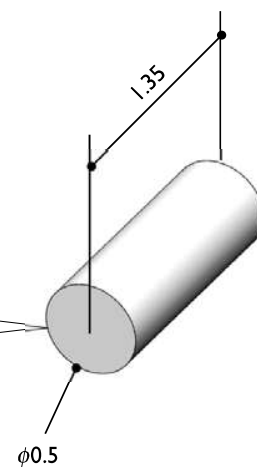


3.2-5 Create **Pin**



[1] Click **New** and create a new part. Set up **IPS** unit system with 3 decimal places for the length unit.

[2] Create a 3D model like this. Use any coordinate system as you like. Save the part with the file name **Pin**.



3.2-6 Create a New Assembly

[1] If you pull down the **Window** menu, you will see that four **Part** documents are opened in the computer memory. We now create an assembly which consists of these four **Parts**.

[2] Click **New**.

[3] Select **Assembly**.

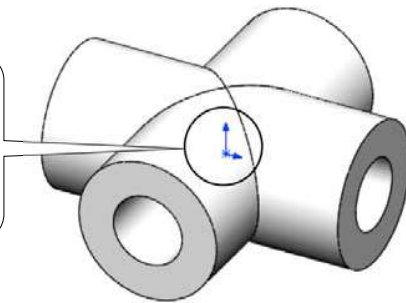
[4] Click **OK**.

[5] In the **Head-Up Toolbar**, turn on **View Origins**.

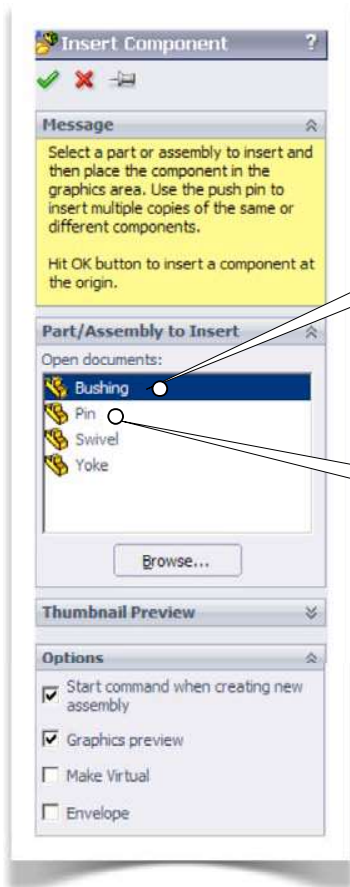
[6] This is the origin of the new assembly. We want to insert the **Swivel** so that the part's coordinate system aligns with the assembly's coordinate system.

[7] In the **Property Box**, select **Swivel**.

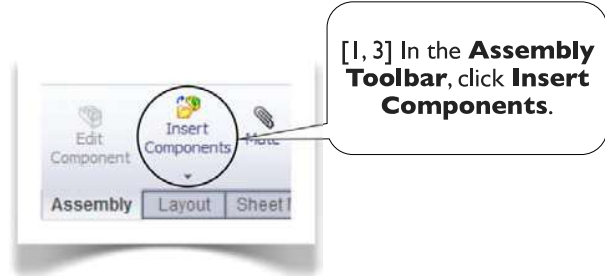
[8] Click the origin. Now the **Swivel** is inserted and fixed in the space. It's okay if your origin is not at the center of the **Swivel**.



3.2-7 Insert **Bushings** and **Pins**

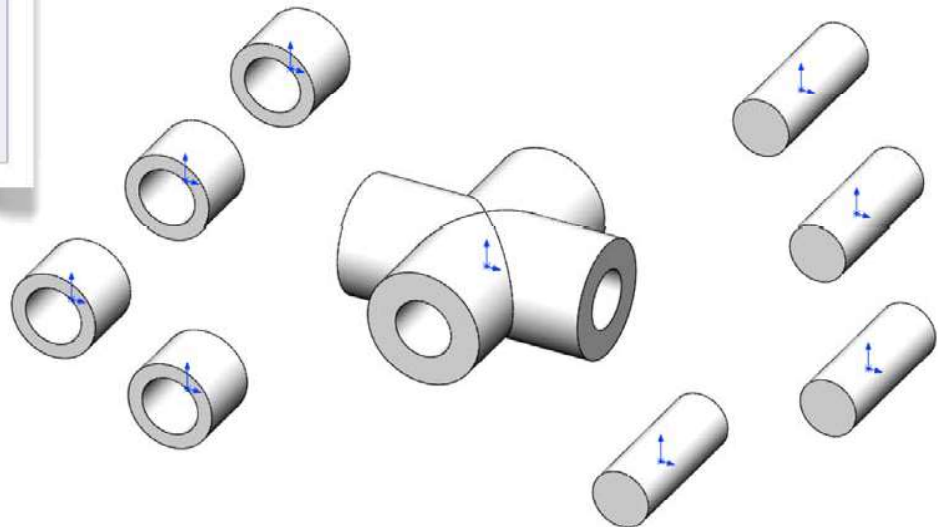


[2] Select **Bushing** and click anywhere in the **Graphics Area** to park the part. Repeat steps [1, 2] three more times.



[1, 3] In the **Assembly Toolbar**, click **Insert Components**.

[4] Select **Pin** and click anywhere in the **Graphics Area** to park the part. Repeat steps [3, 4] three more times.



3.2-8 Assemble **Bushings** and **Pins**

[1] In the **Assembly Toolbar**, click **Mate**.

[2] Create 8 **Concentric Mates**, so that each **Bushing** and each **Pin** aligns with its respective hole. Use your mouse to drag the parts to appropriate positions.

[3] While the **Mate** command is still active, click an outer face of the **Swivel**.

[4] and click the inner face of the corresponding **Bushing**.

[5] The **Coincident** mate is automatically selected. Click **OK** (this has the same effects as clicking **Add/Finish Mate**). Repeat [3, 4] for other 3 **Swivel/Bushing** pairs. Finally, click **OK** to dismiss **Mate** command.

*Trimetric

Coincident1

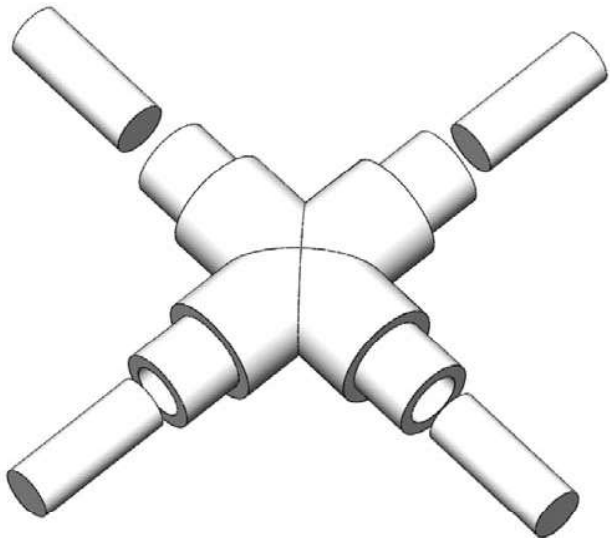
Mates Analysis

Mate Selections

Face<1>@Swivel-1
Face<2>@Bushing-2

Standard Mates

Coincident
Parallel
Perpendicular
Tangent
Concentric
Lock
0.59745082in
0deg
Mate alignment:



3.2-9 Assemble **Yokes**

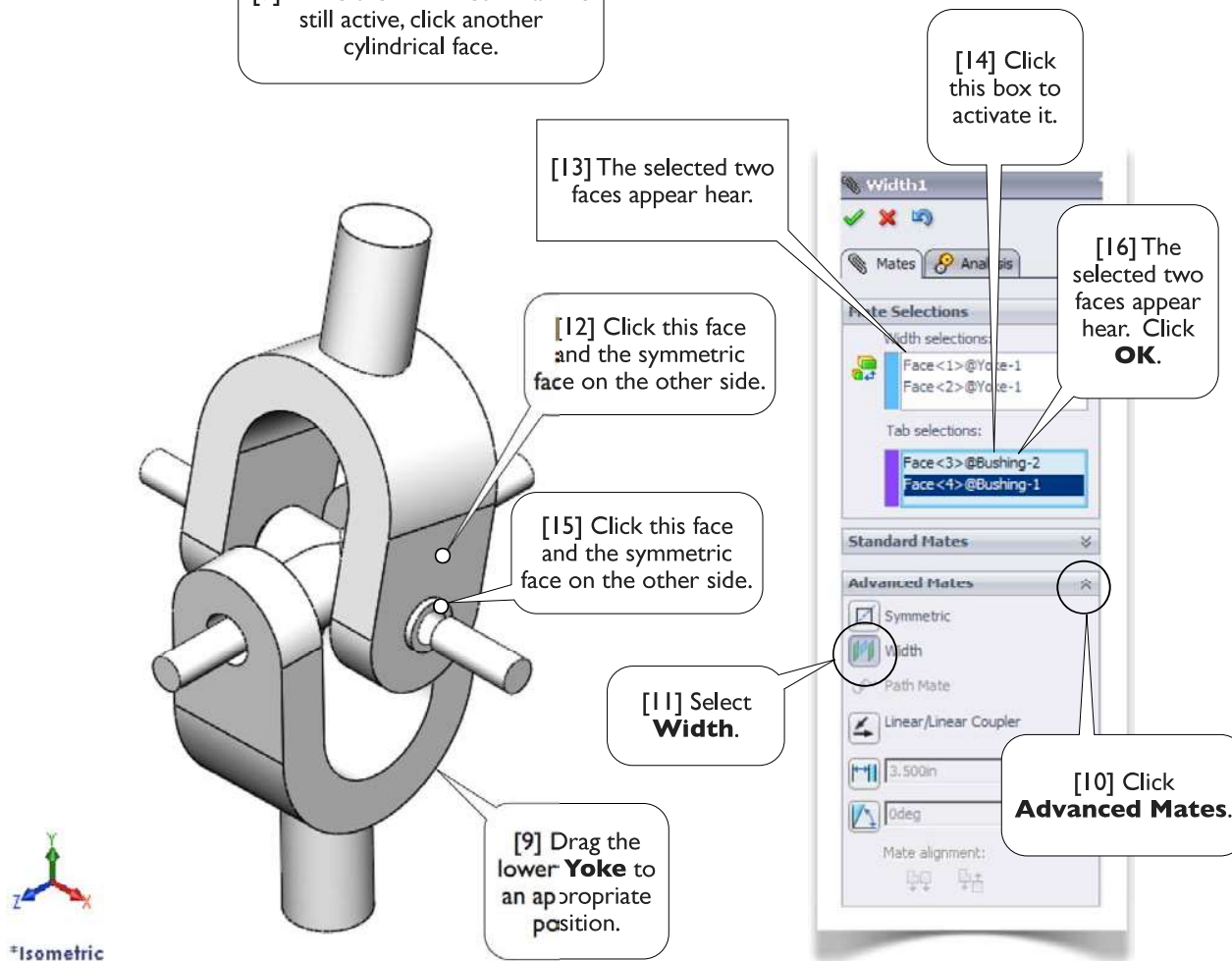
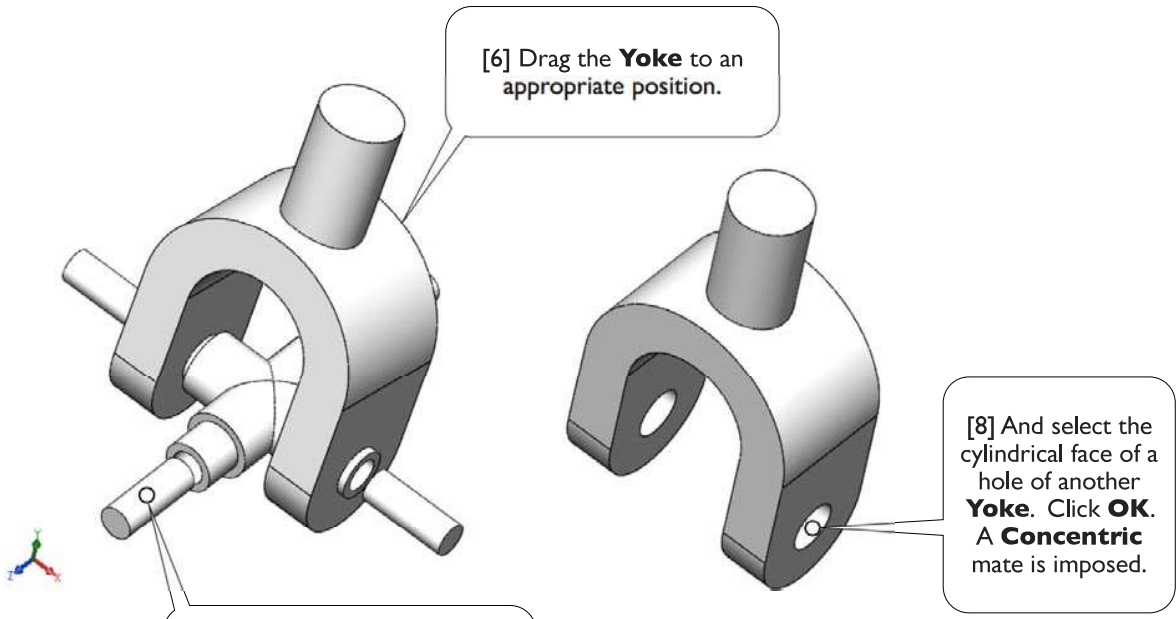
[1] Click **Insert Components**.

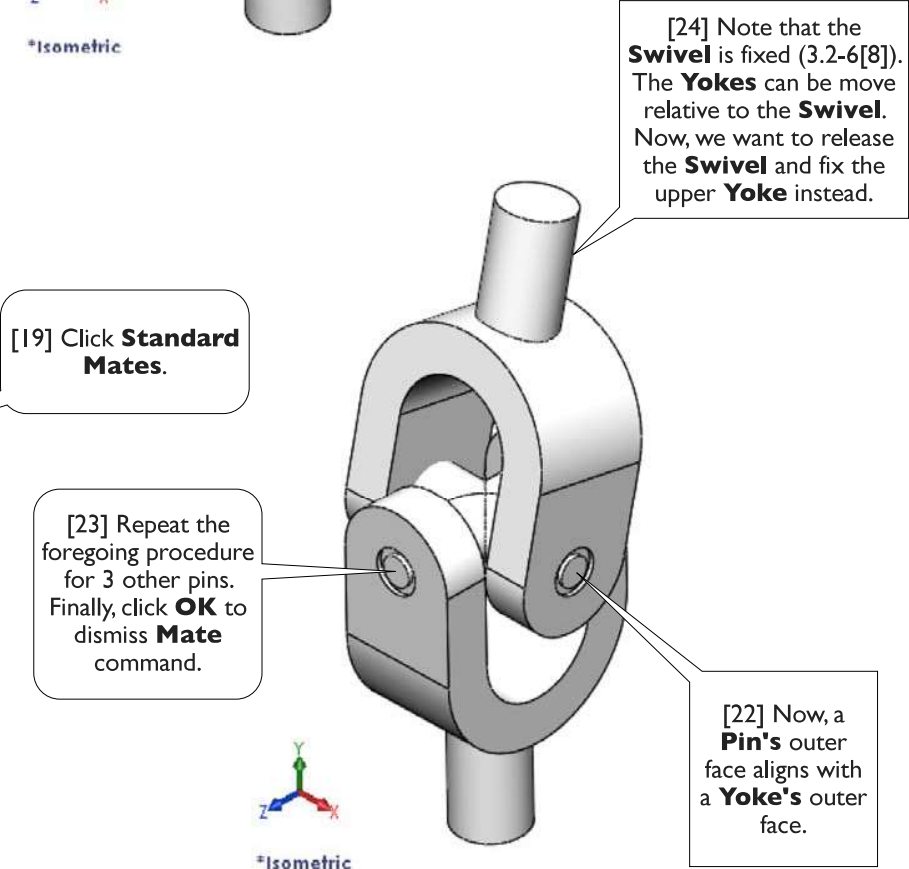
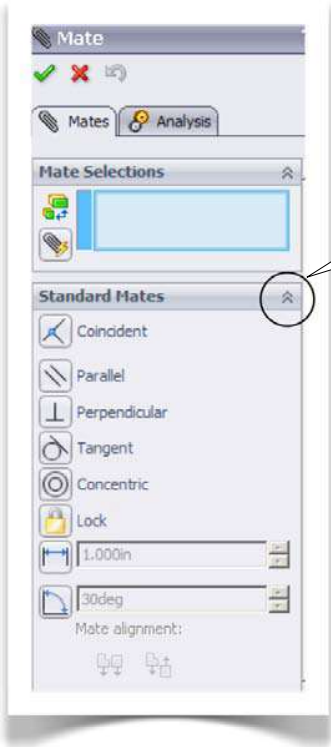
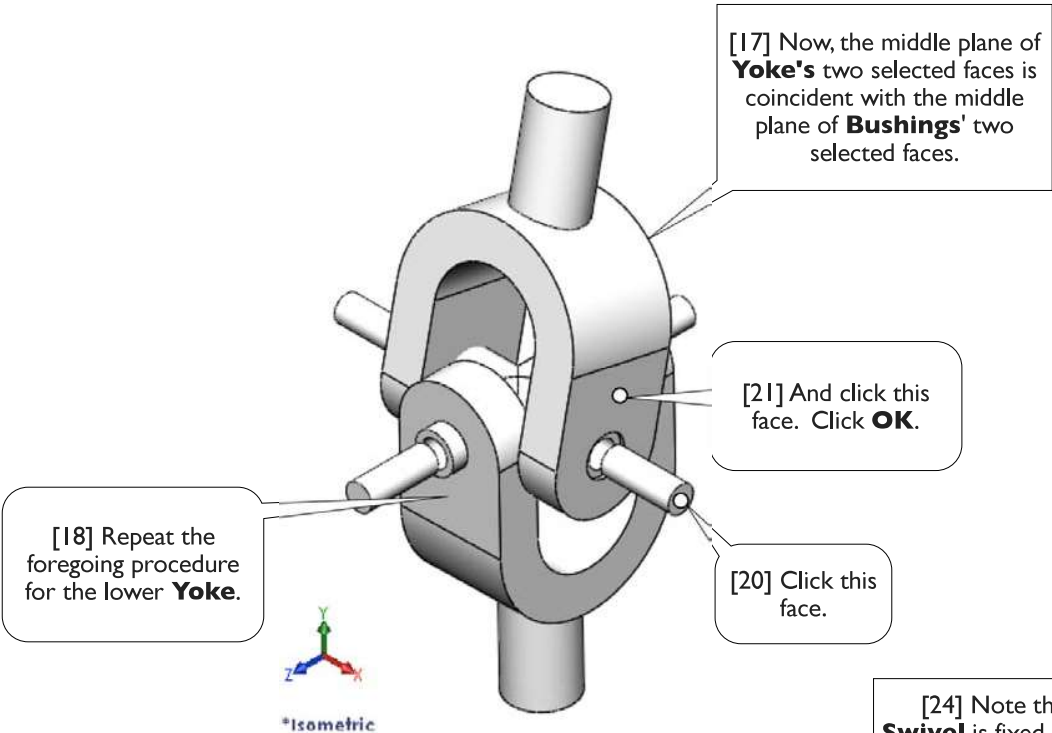
[2] Select **Yoke** and click anywhere in the **Graphics Area** to park the part. Repeat steps [1, 2] one more times.

[3] Click **Mate**.

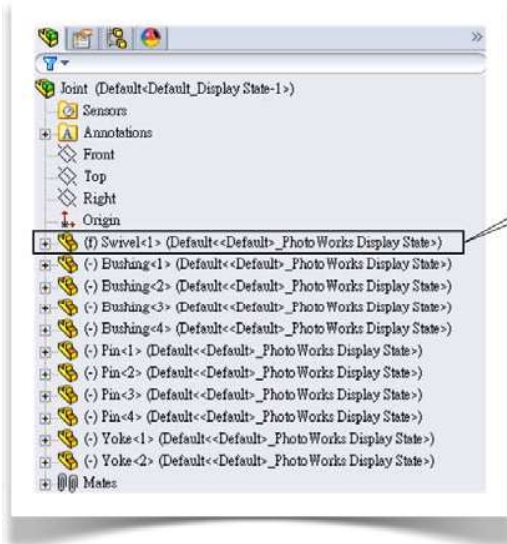
[4] Select any cylindrical face.

[5] And select the cylindrical face of a hole of a **Yoke**. Click **OK**. A **Concentric** mate is imposed.





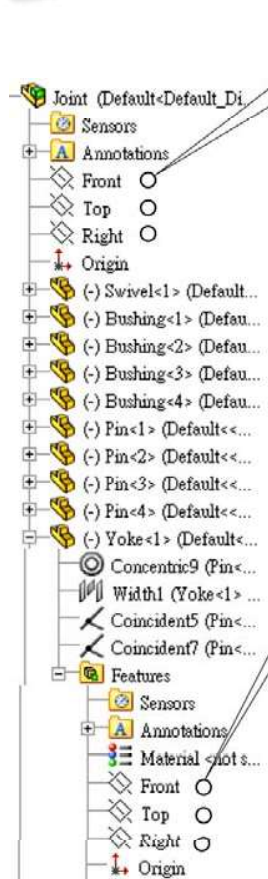
3.2-10 Fix Upper Yoke



[1] An **(f)** before the **Swivel** indicates that the **Swivel** is fixed. Right-click the **Swivel** and select **Float** from the **Context Menu**. The **(f)** sign turns to **(-)** sign, indicating that it is not fixed any more. Using your mouse, you can move every part of the assembly. Let's fix the upper **Yoke**. To do that, you could simply right-click **Yoke<1>** and select **Fix** from the **Context Menu**. Another way is to create three **Coincident Mates** [2-4].



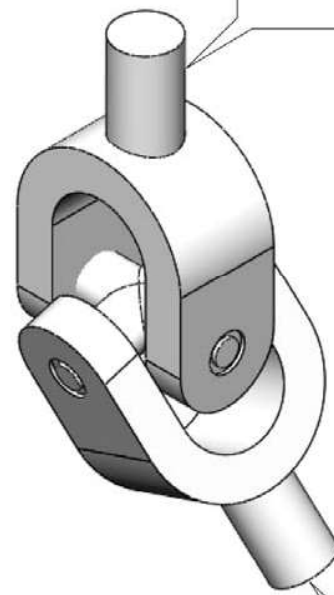
[2] Click **Mate**.



[3] Click **Front** plane of the assembly.

[4] Click **Front** plane of the upper **Yoke (Yoke<1>)**. And click **OK**. Repeat [3, 4] for **Right** plane and **Top** plane. Click **OK** to dismiss **Mate** command.

[5] Now, the upper **Yoke** is fixed in the space.



[6] Use your mouse to move the lower **Yoke**.

[7] Save the assembly with the file name **Joint**. Exit **SolidWorks**.

