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# Symbolic References

When ThinkDesign commands such as Solid Mating use an entity as a parametric reference, the Symbolic Reference is stored in addition to the absolute reference. As a consequence, the referenced entity can be successfully replaced by any other entity that you consider to be functionally equivalent and that you tagged with the same Symbolic Reference name. You can attach a Symbolic Reference to any of the following parametric entities: solid/component faces, datum planes, solid/component edges, datum axes, solid/component vertices, datum points, profile curves and vertices etc. In this training task you will learn to work with Symbolic References in ThinkDesign..

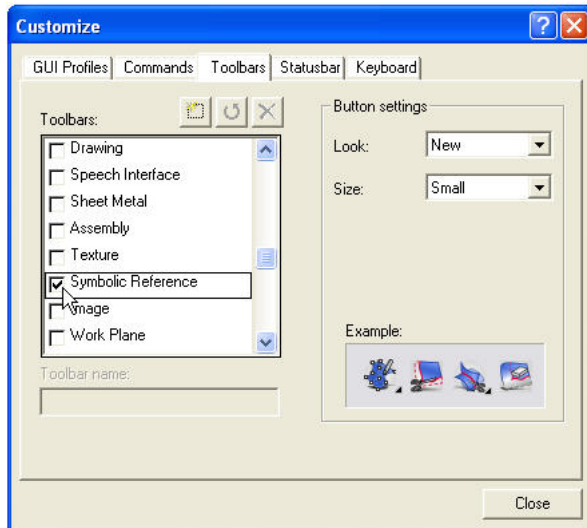
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## 1. Step1 : The beginning

Let's first bring up the Symbolic reference tool bar onto our UI.

- Right click on the tool bar and select Customize.

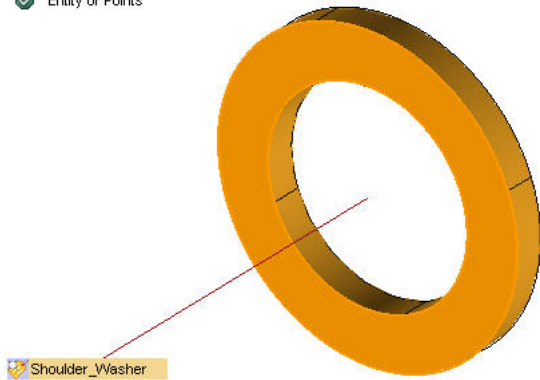
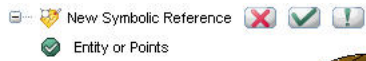


- Under the Toolbar tab, Check Symbolic reference box to bring up the Symbolic reference tool bar.



- **Open** file washer.e3 from the downloaded folder. .
- Start **New Symbolic Reference** command.
- Pick the planar Surface to place the reference and key in Shoulder\_Washer in the mini dialog to name the

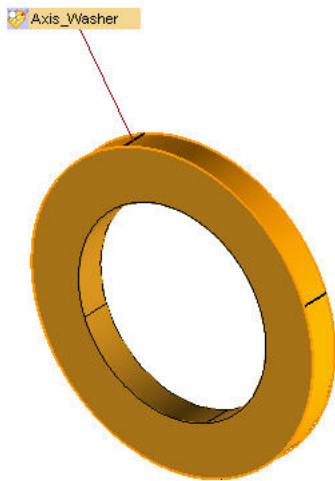
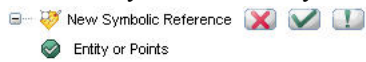
Symbolic reference.



- OK

Add another Symbolic reference, this time called axis\_washer .

- Pick anywhere on the Cylindrical inner surface to place the reference. .



- OK

Check out the History tree to see the entries of the references

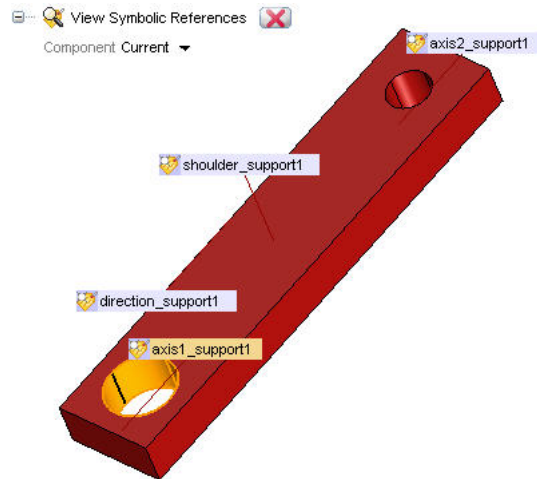


- **Save and Close** the file.

Continuing with the references

- **Open** Stirrup1.e3

- Hit **View Symbolic References** command to see the references already placed



Note that you can attach more than one Symbolic Reference to the same entity, but you cannot attribute two Symbolic References with identical names to the same entity.

- 1.Symbolic References can be attached to any face, edge, profile curve, vertex, datum entity
- 2.You don't need to specify how the reference will be used

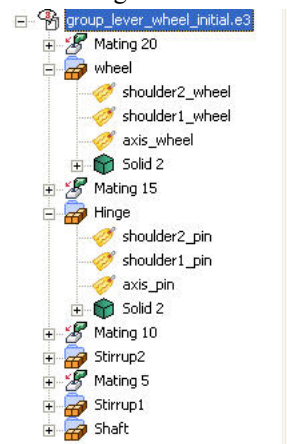
The same name can be shared by different Symbolic References

- Cancel and **Close** the file

Move on....

- **Open** group\_lever\_wheel\_initial.e3

Check out the History tree for the existing Solid mating constraints and Symbolic references.They do not affect the Mating constraints in any way.



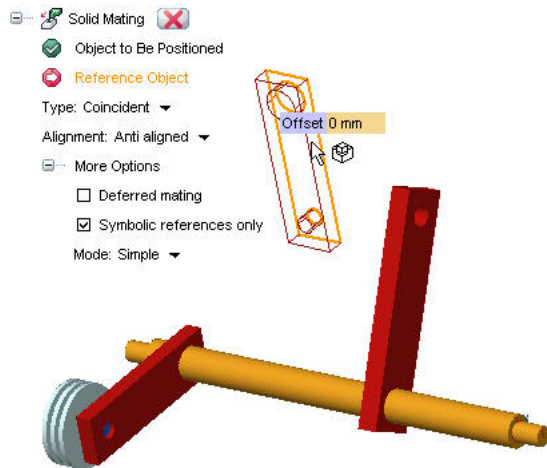
We will now insert and assemble a few components into this assembly.

Start with stirrup2.e3

- Start **X-Reference Component** command.
- Browse to and select stirrup2.e3
- Start **Solid Mating** Command.
- Note to keep Symbolic references only option checked under more options

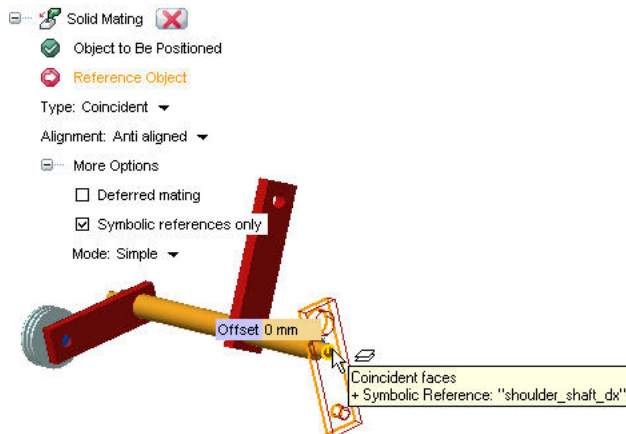
Note: This option allows to select only face/edge/point where defined symbolic references are present. It is useful to simplify mating operations

- Set Type Coincident between shoulder\_support2 of stirrup2 and shoulder\_shaft\_dx of Shaft
- Keep Alignment Anti aligned
- Pick the face of stirrup2 as shown for Object to be positioned.

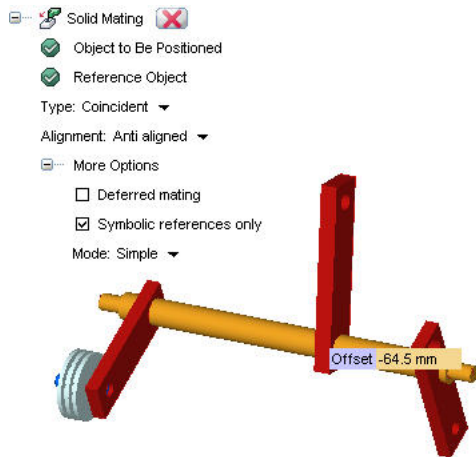


- Pick the face of shaft as shown for Reference Object

Note the pop up that shows the Symbolic reference being used for mating



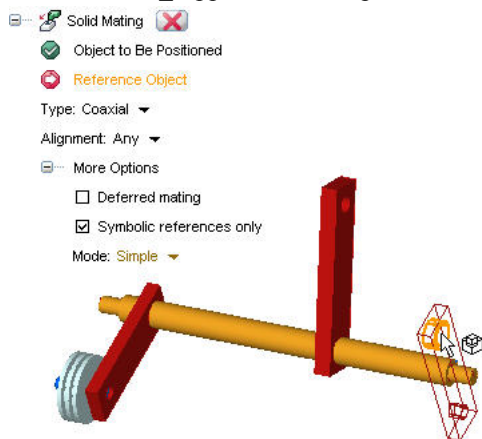
- Set Offset value to -64.5



Cancel

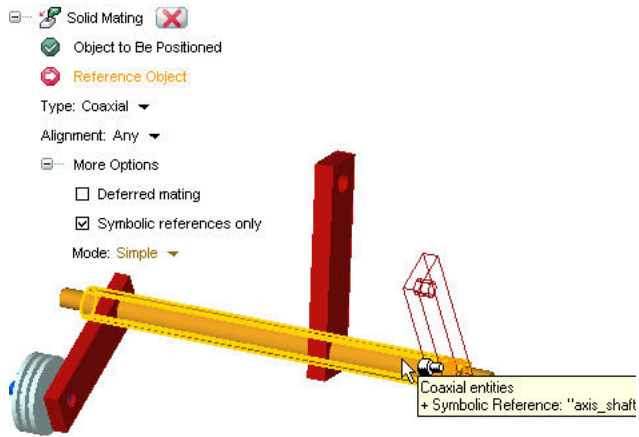
We will now add another Coaxial mating constraint between Symbolic references axis1\_support2 on stirrup2 and axis\_shaft on shaft

- Start **Solid Mating** Command.
- Note to keep Symbolic references only option checked under more options
- Pick axis1\_support2 on stirrup2 as shown for Object to be positioned

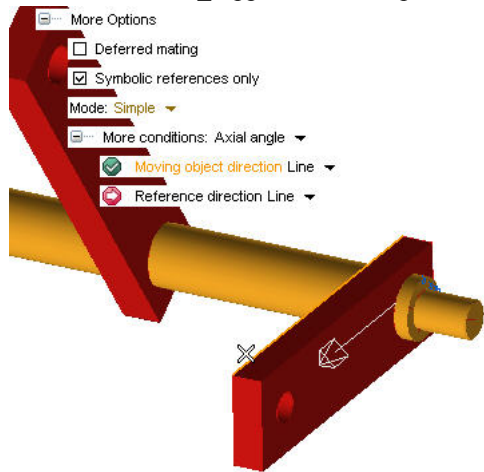


Cancel

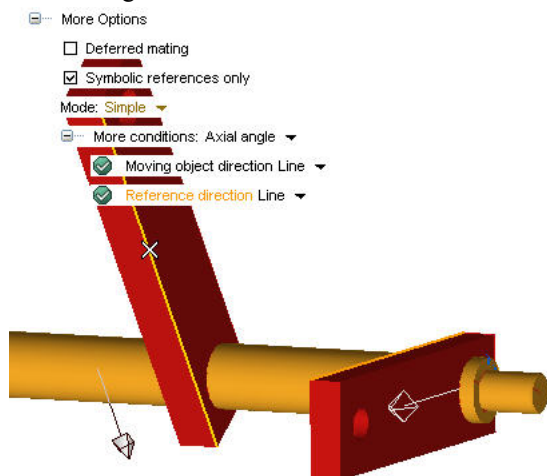
- Pick axis\_shaft on shaft as shown for Reference Object.



- Expand More Conditions and set Axial Angle
- Pick direction\_support2 on stirrup2 as Moving Object direction Line



- Pick direction\_support1 on stirrup1 as Reference direction Line
- Set Angle to 90



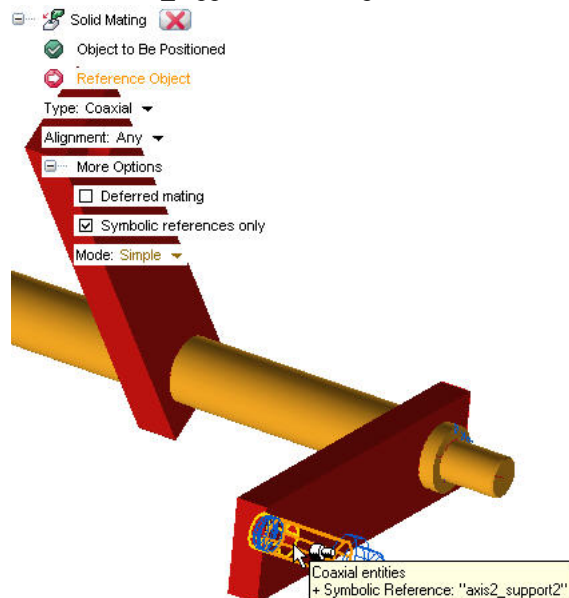
- Cancel

That's terrific. You can add selected edges as symbolic reference for a mating

## 2. Step2 : More matings and Symbolic references

Let's add a few more components to this assembly and mate them using symbolic references.

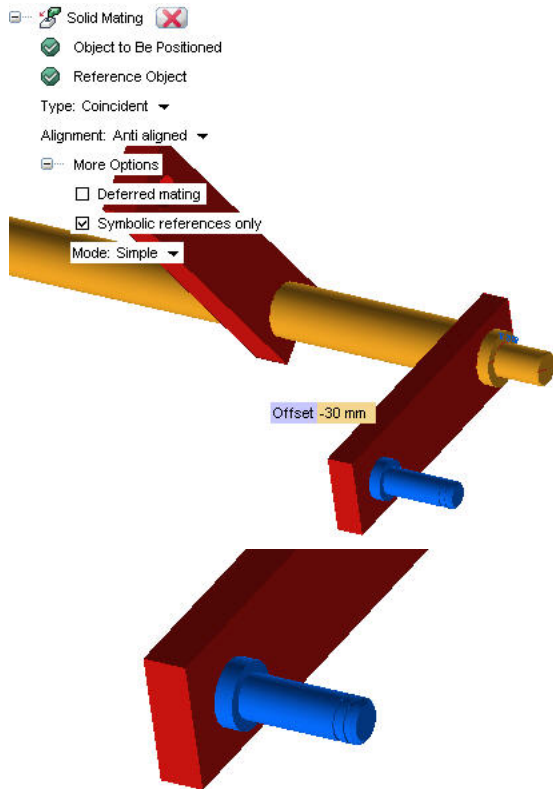
- Start **X-Reference Component** command.
- Browse to and select Hinge.e3
- Start **Solid Mating** Command
- Note to keep Symbolic references only option checked under more options and Type Coaxial.
- Pick axis\_pin on Hinge as Object to be positioned.
- Pick axis2\_support2 on stirrup2 for Reference Object.



Cancel

We will place another Coincident Anti aligned constraint between the two components

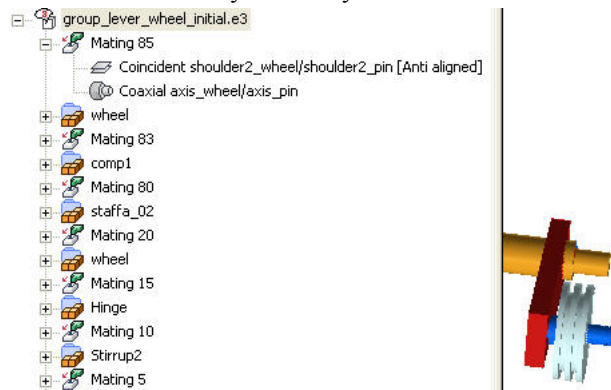
- Start **Solid Mating** Command
- Note to keep Symbolic references only option checked under more options
- Pick shoulder2\_pin on Hinge for Object to be positioned
- Pick shoulder\_support2 on stirrup2 for Reference Object
- Keep Offset -30.



Cancel

Let's now bring in Component Wheel into the assembly and mate it using Coaxial and Coincident constraints using Symbolic references as shown

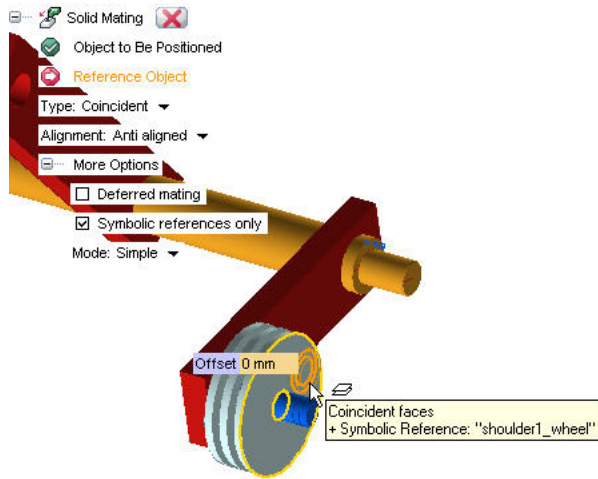
Check out the History for the Symbolic references used



Finally bring in the Washer

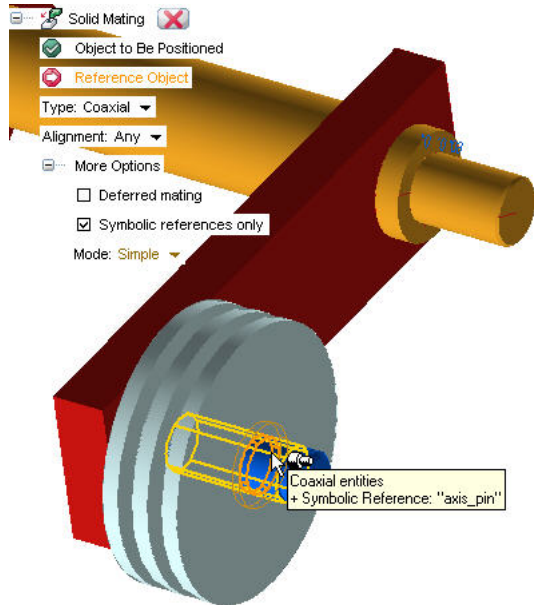
- Start **X-Reference Component** command
- Browse to and select Washer.e3
- Start **Solid Mating** Command.
- Note to keep Symbolic references only option checked under more options and Type Coincident
- Pick Appropriate Symbolic references and mate the washer as shown.



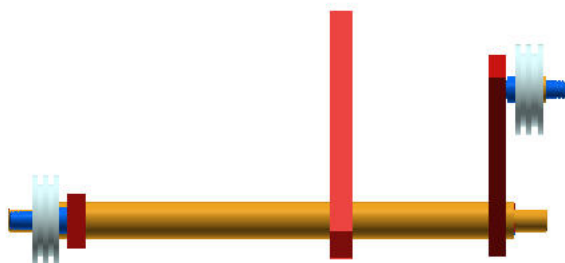


Cancel

- Add another Coaxial constraint between the washer and the wheel and place it firmly.



Your assembly at this stage is as seen here.



### 3. Step3 :Replace Components

When you replace a component involved in one or more mating constraints (no matter whether it is the moving or the reference object), ThinkDesign asks you if the mating event(s) must be kept or removed. If the event(s) is/

are kept, depending on the replacing component, the mating constraints may have to be redefined, unless you used components including the same Symbolic Reference.

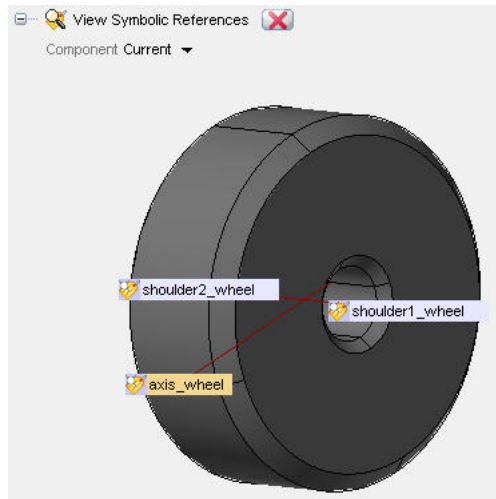
Let us see how we can replace components in an assembly

### Open Wheel3.e3

- See the existing symbolic references by **View Symbolic References** command..

This component is not related to any other parts

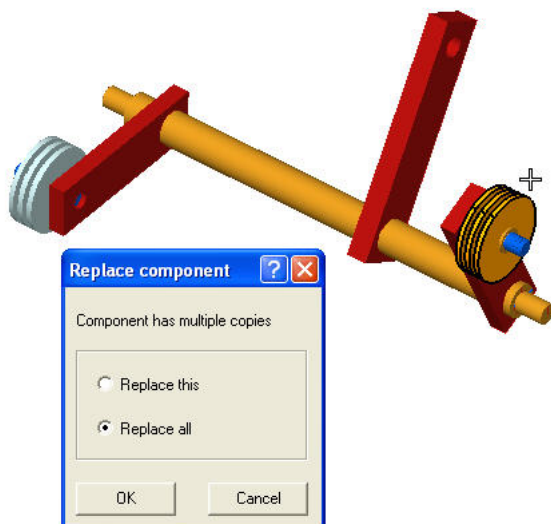
This component is completely different from wheel.e3 . It is different right from the base profile.



- **Close** the file

Come back to group\_lever\_wheel\_initial.e3

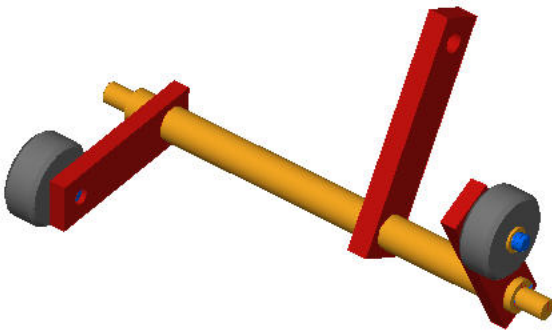
- Start **Replace Component** command.
- Pick Component Wheel
- Say Replace all in the pop up



- Hit OK
- Say Keep mating events in the next pop up.



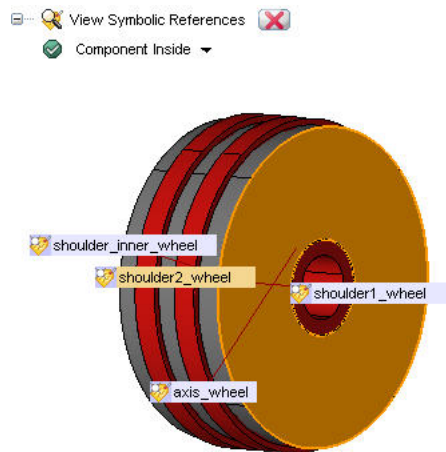
- Hit OK
- In the file open window select wheel3.e3 and hit Open
- Hit Rebuild and watch how the components are replaced by the new ones



Note : For the Replacement to occur neatly,the symbolic references of two components MUST HAVE THE SAME NAME

Let's now make another Replacement,this time a component with a sub assembly

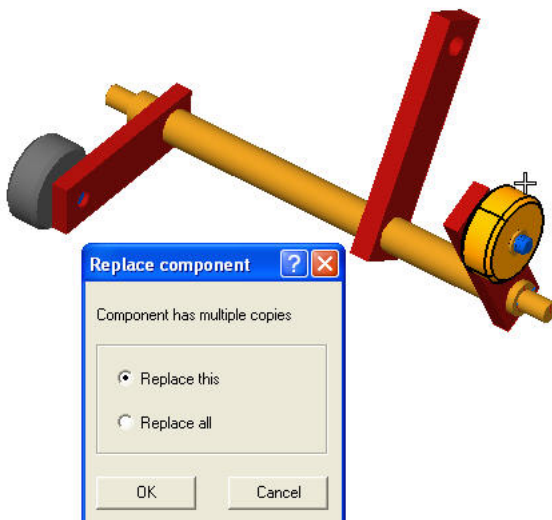
**Open** Group\_wheel.e3 and check the symbolic references that it has.This is a Sub assembly.



We will now replace one wheel with this sub assembly

**Open** group\_lever\_wheel\_initial.e3

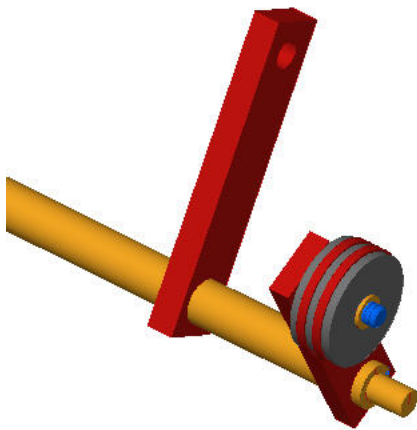
- Start **Replace Component** command.
- Pick Component Wheel3
- Say Replace this in the pop up to specify a single instance of the component



- Hit OK
- Say Keep mating events in the pop up menu.



- Hit OK.
- In the file open window select group\_wheel.e3 and hit Open
- Hit Rebuild and watch how the component is replaced by the new one



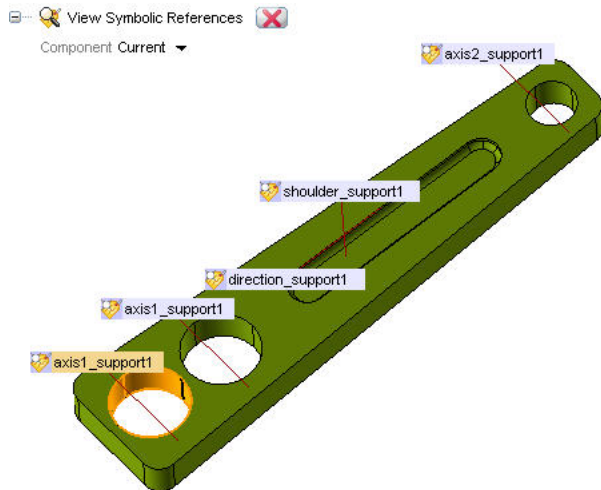
That's very nice. ThinkDesign allows replacing a component with a group of components without problems!

## 4. Step4 :Managing Ambiguities

When replacing components, ThinkDesign tries and looks for equivalent Symbolic References in the new component, updating the constraints whenever equivalent references are found. When more than one Symbolic Reference exists, only one is chosen and you can solve ambiguities that arise by the **Solve Ambiguities** command

**Open** support03.e3

- Use **View Symbolic References** command to check the references.

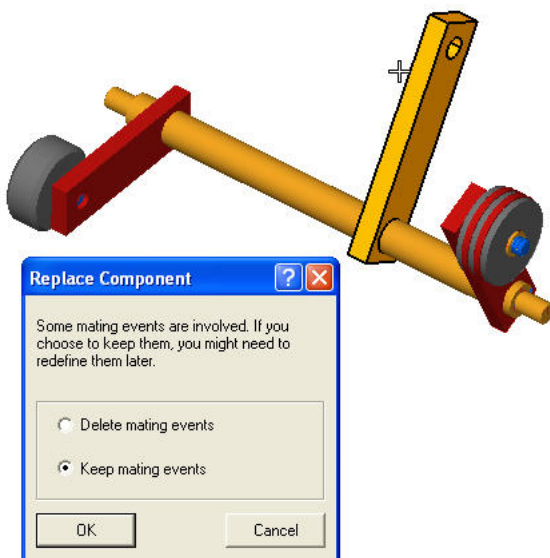


Note : There are two symbolic references called axis1\_support1 ,their insertion points are different and are used to manage different configuration of the assembly.

- Check the Symbolic references of stirrup1.They are almost similar to support03except that in the latter, direction\_support1 symbolic reference is at a different edge when compared to stirrup1.This symbolic reference introduces one ambiguity that is to be managed

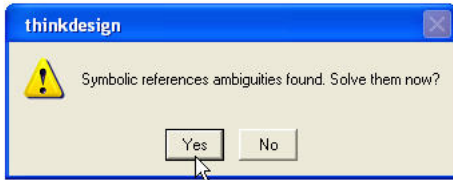
Let's now Replace stirrup1 with support03.e3 in the assembly

- **Open** group\_lever\_wheel\_initial.e3
- Start **Replace Component** command
- Pick stirrup1 as shown.
- Say Keep mating events



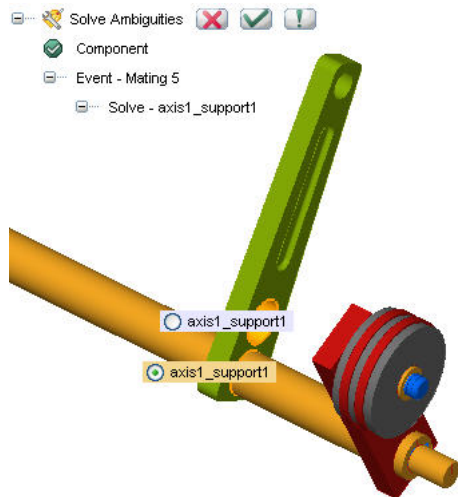
- Hit OK
- Browse to and select the file, support03.e3 in the file selection window.
- Hit Open.

ThinkDesign identifies extra references and flashes a message as shown

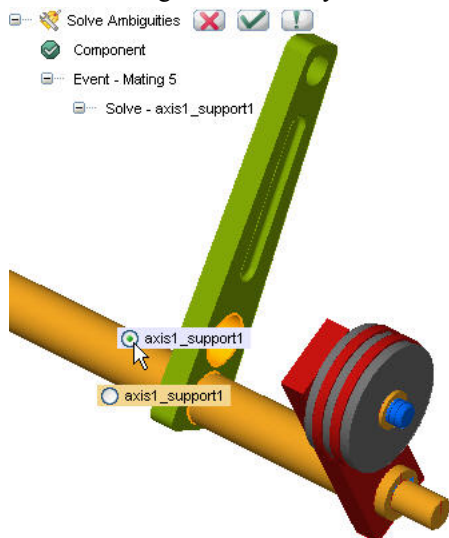


- Hit Yes

ThinkDesign shows you all the symbolic references that you can choose



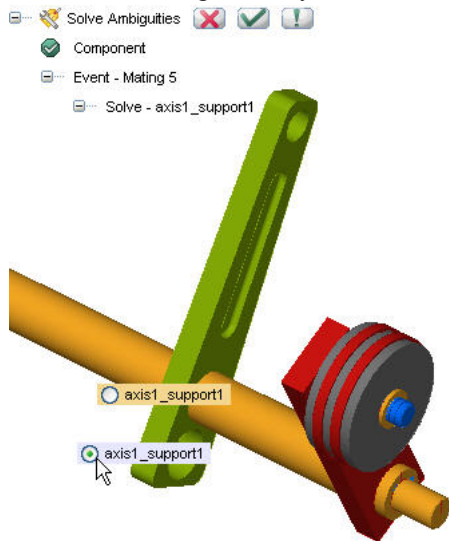
- Put the flag on the other symbolic reference



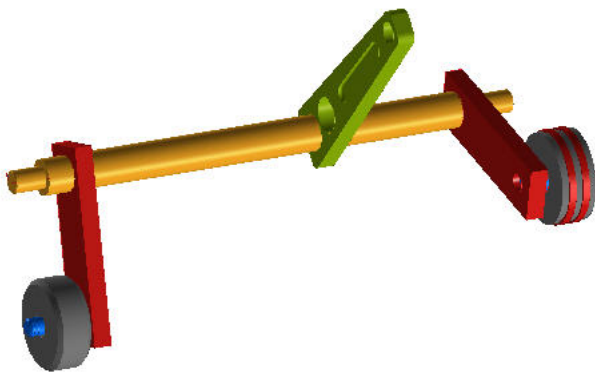
- OK
- Hit Rebuild

After replacement, the ambiguities can still be managed using **Solve Ambiguities** command.

- Start **Solve Ambiguities** command.
- Pick the newly placed Component
- Switch the flag of the Symbolic reference



- OK
- Hit Rebuild for the change to occur.



See the new mating position and check how the ambiguity is managed by ThinkDesign.

Well done !!.

## A.

- Mating of components.



- Introduction to Assemblies.
- An Overview on Symbolic References.