# PowerSHAPE 2016 R1 Tutorials Manual

**Parameterised assembly** 



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#### **Patent Information**

Emboss functionality is subject to patent number GB 2389764 and patent applications US 10/174524 and GB 2410351.

Morphing functionality is subject to patent application GB 2401213.

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# Parameterised Assembly for PowerSHAPE

## **Creating and editing solids**

#### 1.Create a solid from surfaces

If you do not have the licence required for the commands in this tutorial\*, go to the next step in the tutorial and click **Import Data (Parameterised\_assembly.psmodel)**.

View the AVI Import Data Step by step instructions

The model will then be provided with the correct data and you will be able to complete the tutorial.

\*In most cases selecting an icon will inform you that the necessary licence is missing. In some modules of PowerSHAPE the icon(s) may be missing entirely.

1 Click Import Data.



2 The following objects are displayed in the graphics area:



**3** Click the left mouse button and drag a box, as shown below:





5 Click Create solid from selected surfaces or meshes



6 Click anywhere in the graphics window to deselect the objects



#### 2. Rename the solid

- 1 You are now going to give the solid object a specific name.
- 2 Click Show the tree window

The Window Tree is displayed.



- 3 Do the following:
  - $\bigcirc$  Click solid 1 using the right mouse button.
  - 2 Click Rename.



4 Type lifter\_blade, shown in the image below:



5 Press Enter.

# **Creating an assembly**

#### 3. Add and register components

1 Click Resize to Fit × Ø, Ŷ ©,⊄ **-\$** Click Assembly 2 3 Click Create new empty assembly



4 Type Lifters for the Name of new assembly.



#### 5 Click OK.

The feature tree displays the created lifters assembly.



#### 4. Add components to an assembly method 1

1 Click on solid **lifter\_blade**, as shown in the image below:



2 Click **Object > Component > From Solids** from the main menu.

ect		
Workplane	•	
Point		
Line	•	
Arc	•	
Curve	•	
Text	•	
Balloon	•	
Dimension	•	
Mesh	•	
Cloud	•	
Symbol Definition	•	
Symbol		
Surface	•	
Solid	•	
Feature	•	
Wizards	•	
Hatching		
Schedule	•	
Drawing		
View	•	
Assembly	•	
Component	•	From Solids
Relation	•	From Solids with Power Features
Multi-model	•	Add to Assembly
Power Features	•	Add to Assembly Advanced
Parameter		Component Wizard
		component mand

The solid is now registered as a component.

The solid appears in the tree window in the **lifters assembly** model.

Click  $\blacksquare$  to expand the tree if necessary.



#### 5. Add components to an assembly method 2

1 Click the left mouse button and drag a box, as shown below:



**5** Click 
■ to expand the **Lifters** assembly in the feature tree to see the created components.



# **Creating relationships between components**

#### 6. Create the first relationship

1 Click on lifter blade to select it.



2 Click Blank Selected 2.



3 Click Resize to Fit 🚳.





Your model should look like the one shown below:



The Create relation dialog is displayed.

6	Cre	ate relati	on	X	
<b>x</b> (	🗶 🖲 Select first attachment				
<b>x</b> 0	★ ○ Select second attachment				
Relation	type .	40 -		$\hat{\gamma}\hat{\gamma}$	
Distanc	e	=0		Ē	
I	There	are no conf	licts		
Ар	bly	ОК	Help	9	

**Select first attachment** is selected on the **Create relation** dialog, waiting for the *first* attachment to be selected.

5 Click on t\_gib component, shown in the image below.



The colour changes to show the plane attachment has been selected shown in the image below.



**Select second attachment** is selected on the **Create relation** dialog, waiting for the *second* attachment to be selected.

1	Create relation	×	
🖌 🔿 Select first attachment			
🗶 🖲 Select second attachment			
Relation ty	/pe 🥢 🗸	μ	
Distance	=0	÷	
1	There are no conflicts		
Apply	OK Help		

6 Click on u\_couple component,

The colour changes to show the plane attachment has been selected shown in the image below.



When the second attachment is selected the components align to show the chosen attachment.

7 Select the Plane + Plane 🤌 relation type.

🍯 Create rel	ation ×
<ul> <li>Select first attact</li> <li>Select second at</li> </ul>	
Selected Plane to Plane re	elation
Relation type 🛛 🥢 🗸	
Distance =0	
There are no o	onflicts
Apply OK	Help

8 Click the Align or Anti-Align option until 🚺 is displayed.

The component u\_couple updates to reflect the alignment.



- 9 Click Apply.
- 10 Click OK.
- 11 Click Select
- **12** Click anywhere in the graphics window to deselect the model.



**13** Click  $\blacksquare$  to expand the solid tree to see the relation.



#### 7. Create the second relationship

1 Click Add relation using attachments

The Create relation dialog is displayed.

<b>6</b>	Ci	reate rela	ition	×	
🗶 🖲 Select first attachment					
<b>x</b> 0	Select second attachment				
Relation	type	40 4		11	
Distance	2	=0		E+	
I	The	re are no co	onflicts		
Арр	ly	ОК	Н	elp	

**Select first attachment** is selected on the **Create relation** dialog, waiting for the *first* attachment to be selected.



- 3 From the flyout, Click View ISO4
- 4 Select the first attachment when it is highlighted on t\_gib, shown in the image below.



5 Click View ISO3



6 Select the second attachment when it is highlighted. on **u\_couple**.



The components change positions and attach.



7 Click the Align or Anti-Align option until 🚺 is displayed.

Your model should look like the one shown below:



- 8 Click Apply.
- 9 Click OK.
- 10 Click Select

**11** Click anywhere in the graphics window to deselect the model.



The solid tree should look like the tree below:



#### 8. Create the third relationship

Click Add relation using attachments <sup>1</sup>
 The Create relation dialog is displayed.

6	Create relation
	ct first attachment ct second attachment
 Relation type Distance	✓ ✓ =0
() Tł	nere are no conflicts
Apply	OK Help

2 Select first attachment is selected on the Create relation dialog, waiting for the *first* attachment to be selected.

3 Select the face on the **t\_gib** component, shown in the image below.



4 Select the face on the **u\_couple** component shown in the image below.



The attachment is highlighted and the components aligned.



- 5 Click the Align or Anti-Align option until III is displayed.
- **6** Type a **Distance** of **d**=**0**.

Create relation	×		
<ul> <li>Select first attachment</li> <li>Select second attachment</li> </ul>			
Selected Plane to Plane relation			
Relation type 🛷 🗸			
Distance d=0			
There are no conflicts			
Apply OK Help			

- 7 Press Enter.
- 8 Click Apply.
- 9 Click OK.



**11** Click  ${}_{\boxplus}$  to expand the feature tree to see the relationships created.



12 Click View ISO1 using the right mouse button



13 From the flyout, click View ISO1



Your model should look like the one shown below:



#### 9. Create the fourth relationship

1 Click Blank Selected wind using the right mouse button.



2 From the flyout, click **Unblank**.







4 Click on t\_gib component.







Your model should look like the one shown below:



- 6 Click Select
- 7 Click on lifter\_blade component.





9 From the flyout, click **Toggle Transparent Views** .





10 Move the cursor over lifter\_blade component, until the Plane-axis Attachment 
 displays.



11 Click on  $\checkmark$  and hold down the left mouse button.

If you click once to select a component, it selects the component and displays the plane and combined attachments when the cursor is moved over the component. (This is required for this example.)



If you click a component twice, the component is selected but displays point attachments when the cursor is moved over the component.

12 Drag the lifter\_blade over u\_couple.



- 14 When the **Combined attachment** *P* displays, release the left mouse button.
- **15** Click anywhere in the graphics window to deselect the model.





18 From the flyout, click Shaded and Wireframe view .



Your model should look like the one shown below:



**19** Click  ${}_{\mathbb{H}}$  to expand the feature tree, to see the relationships created.



#### 10. Create the fifth relationship

1 Click Add relation using attachments 300.



The Create relation dialog is displayed.

6	Create relation	×		
<b>x</b> •	🗶 🖲 Select first attachment			
<b>x</b> 0	★ ○ Select second attachment			
Relatior	i type 🥢 🗸	$\mathbf{M}$		
Distanc	e =0	[←		
j	There are no conflicts			
Арр	oly OK He	elp		

- **2** Select first attachment is selected on the Create relation dialog, waiting for the *first* attachment to be selected.
- 3 Click on the **u\_couple** component when the plane attachment is highlighted.



4 **Select second attachment** is selected on the **Create relation** dialog, waiting for the *second* attachment to be selected.



5 Select the relation type **Angular** 4 option.

🚳 Create relation 🗾
<ul> <li>Select first attachment</li> <li>Select second attachment</li> </ul>
Selected Plane to Plane relation
Relation type 🛷 🗸
Distance
The r 🐴 n conflicts with existing relation
Apply OK Help

**6** Type an **Angle** of a=0.



- 7 Press Enter.
- 8 Click Apply.
- 9 Click OK.

10 Click Select

This ends the Add Relation command.

**11** Click  $\blacksquare$  to expand the feature tree, to see the relationships created.



## Using the parameterised component

#### 11. Modify parameters

1 Click Blank Selected 🔯 using the right mouse button.



2 From the flyout, click **Unblank**.





4 Click on **Lifters** assembly in the tree, using the right mouse button.

The popup menu is displayed.

5 Select Modify Parameters.



- 6 The Parameter List Editor is displayed.
- 7 For a, enter an Expression Value of 30.

8 For d, enter an Expression Value of 60.

🍯 P	arameter List Edito	r ×
Name	Expression	Value
a	30	30degrees
d	60	60mm
Apply	OK Cancel	Help

9 Click Apply.

10 Click OK.

11 Click Resize to Fit



**12** Click anywhere in the graphics window to deselect the model.



**13** Try entering different parameter values to see the component move.

## Summary

You have created a *lifter assembly using the assembly feature tree.* You have done the following:

- Created a solid from surfaces
- Renamed solid objects
- Created an assembly
- Registered components in an assembly
- Registered components using a shortcut
- Created relationships between components
- Modified the parameters of the components