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Christensen, Georg Kronborg

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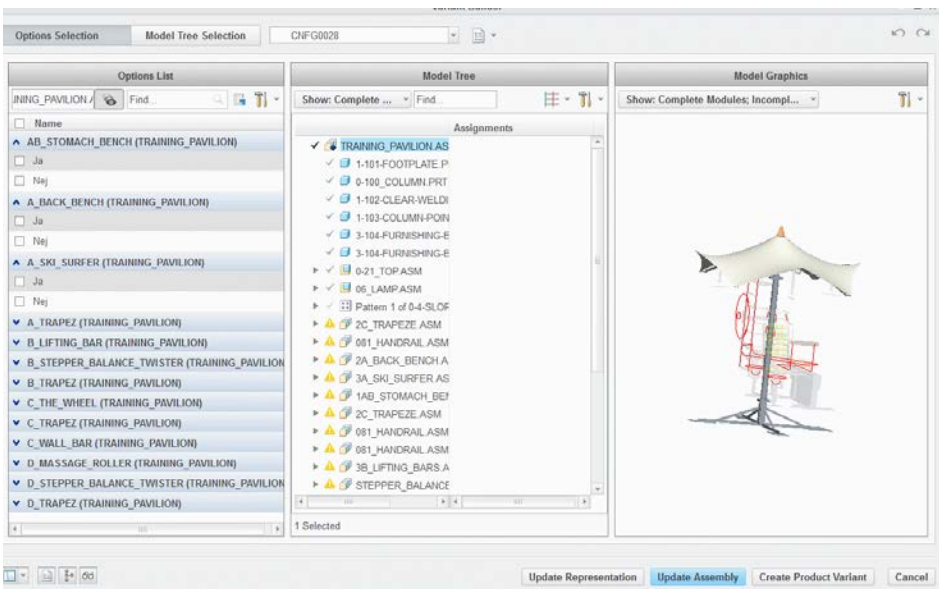
Exercise in Configurable Products using Creo parametric

By *Georg K. Christensen, DTU Mekanik – Konstruktion og Produktudvikling*

Family tables is a long know method with ProEngineer/Creo parametric to make families of products – like families of bolts and roller bearings. Configurable Products expand these possibilities in two major ways: First it makes configurable assemblies possible where one topologically different component can replace another. Secondly it presents the configurable product in an interactive way which enable the user to experiment with product configurations and different variants in an easy way. In this exercise we will replace a circular axel with a hexagonal axel. (some of this functionality has been available as: configurable assemblies in earlier versions of Creo) An example of a practical application of configurable products is shown below where an outdoor Play/Exercise system is transferred from AutoCAD 2D to a 3D configurable product in Creo 3.0.

TRÆNINGS|PAVILONEN DK at www.TrainingPavilion.com



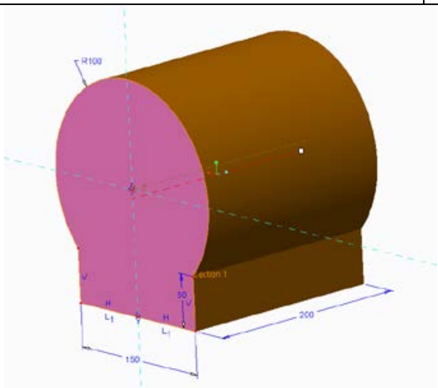
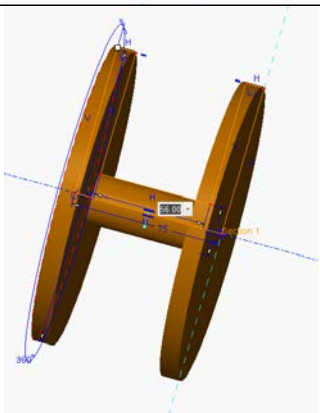
Ref. 1: Jesper Alkestrup, Kai Paludan-Mùller og Kristian Ø. Lund: ”Fra tekniske tegninger til fleksible CAD-modeller”, Gruppe 35 fra Videregående CAD, F2015, DTU.

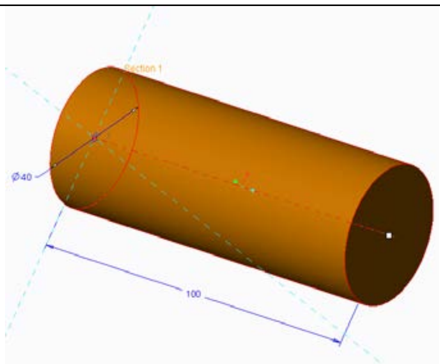
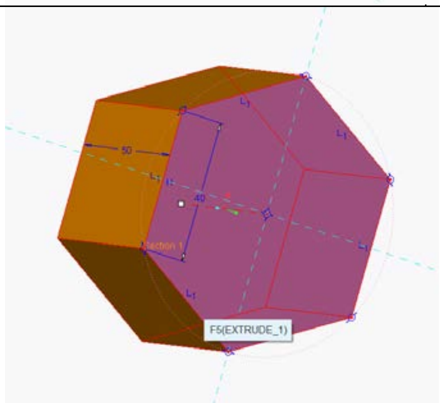
“Trænings pavilion” as modelled in Creo 3.0 (ref 1)

The exercise case is not too practical, but has been selected to introduce the most important features of the configurable product system. In this context the components will be made as simple as possible for fast design – the dimensions of the parts are not critical, but a set of practical dimensions are used.

1) Create a new working directory: Configurable

2) Design the components following the pictures and dimensions of table 1.
   Make a datum center-axis for all components (whether they already exist or not)

Component	Part name	sketch	Example dimensions
The motor	motor		Diameter: 200 mm Foot: 150*50 mm Length: 200
The pulley	pulley		Pulley diameter: 150 mm Center diameter: 25 mm Pulley with: 75 mm Pulley internal with: 56 mm

The cylindrical axel	Cylinder _axel		Diameter: 40 mm Length: 100 mm
The hexagon axel	Hexagon _axel		Side length 40 mm Length 50 mm
Table 1: Parts for the exercise			

3) Now design the assembly. Notice that it's a new type of assembly: Configurable product. See fig. 1 Keep the suggested assembly name: confasm…

4) Assemble the Motor in a default position

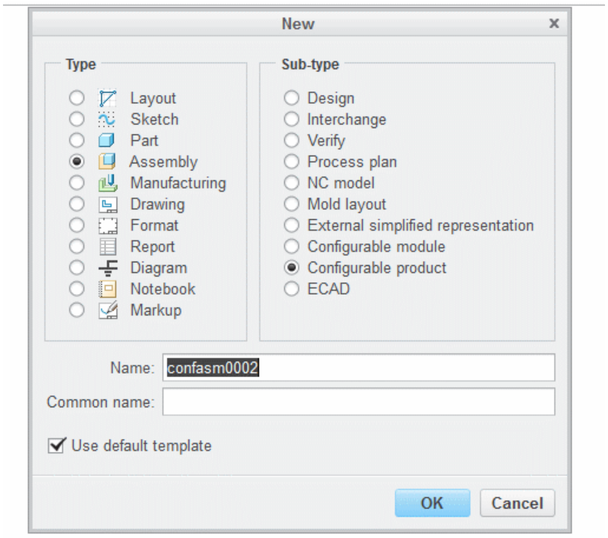
5) Assemble the cylinder_axel using a pin connection

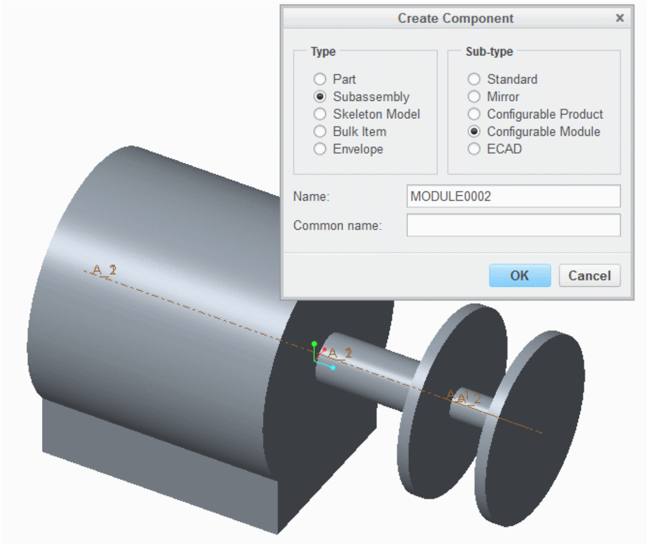
6) Assemble the Pulley using again a pin connection

7) Finally hide the cylinder_axel and assemble the hexagon_axel using a pin connection.

8) Unhide the cylinder_axel

We now have what you could call an "overconfigured" assembly. Furthermore the pulley is only correctly assembled in relation to the cylindrical axel.

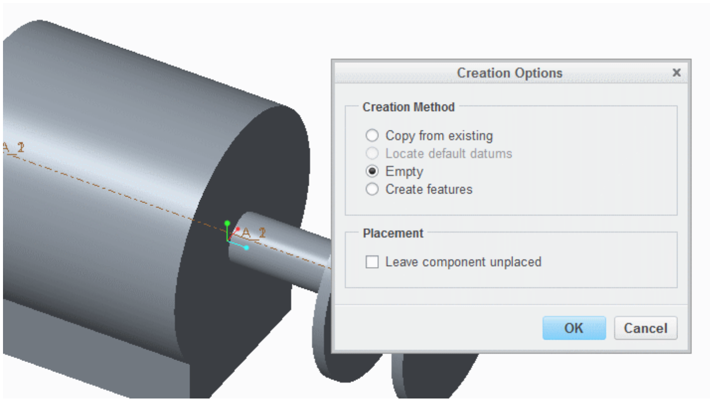




Figur 1 Configurable Product

Figur 2 Configurable Module

9) Create a new component in the assembly. Make it a subassembly and a configurable module (see fig. 2 and 3) Accept the system name but select "Empty" when asked for a coordinate system (something we wouldn't normally do) Following this the assembly model tree should now look like fig. 4.



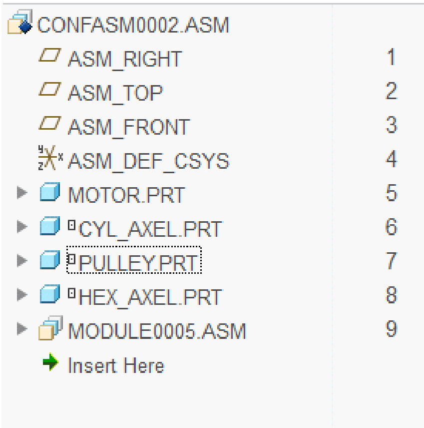


Figure 3 "Empty" creation method

Figure 4 Model tree

We will now transfer our axels to the newly create subassembly, Module000x.

10) First Use Transfer to Module: 

and select the cylindrical axel and transfer it to the new subassem-bly, Module000x. In the reference paring table that pops up – we can see the assembly features used during assembly of the part. Just ignore it for now and press OK. See fig. 5

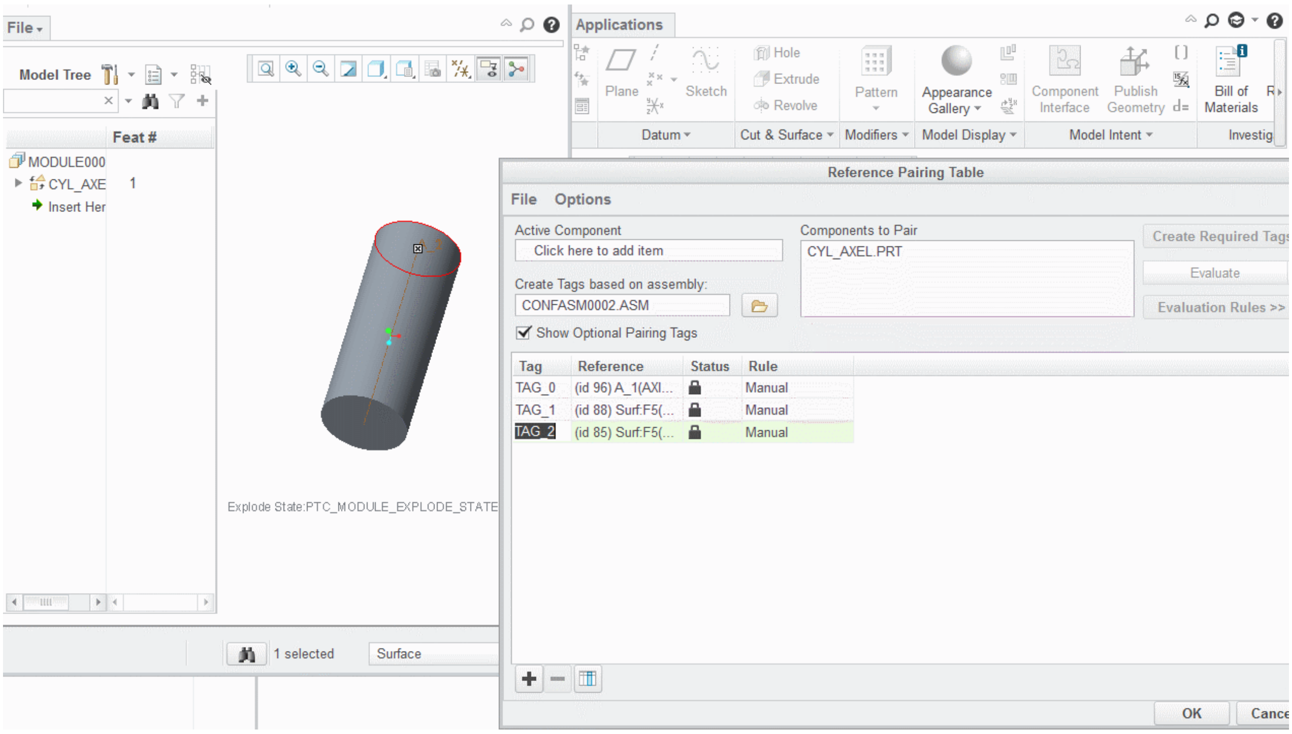


Figure 5: Transfer of cylinder to configurable module

11) Now select the hexagon_axel and transfer it to the Module000x.

12) Again the reference paring table pops up. This time we see both axel components in the parts window. Select the cylinder as the Active component for paring. Examine the Tag list. The tag list from cylinder will now have to be pared to the tags of the hexagon part. Try manually to select the paring references for the cylinder tags. It might create conflicts of double information. In this case use RMB and merge the conflicting rows. After some editing the paring table should look as shown in fig. 6.

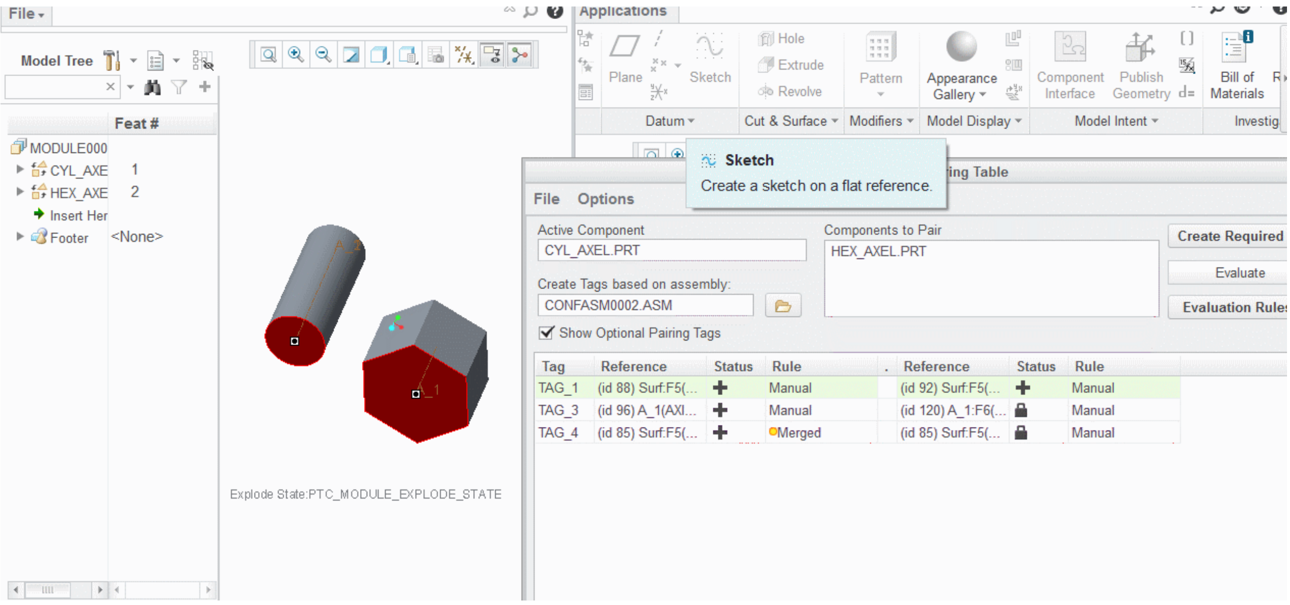
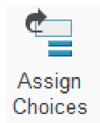


Figure 6. Resulting paring table

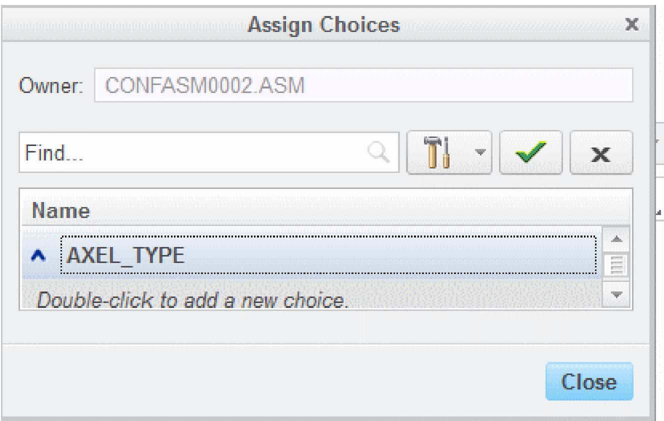
(if you need to examine or correct this "reference paring table" at a later stage you must Open Module again from the model tree)

The components now have the same type of assembly references.

We can now begin to define our product variant and assign component choices for the desired variants. First create the variant. Use: Assign Choices



13) Select Edit and double-click to enter the name of the Option: Axel_type.



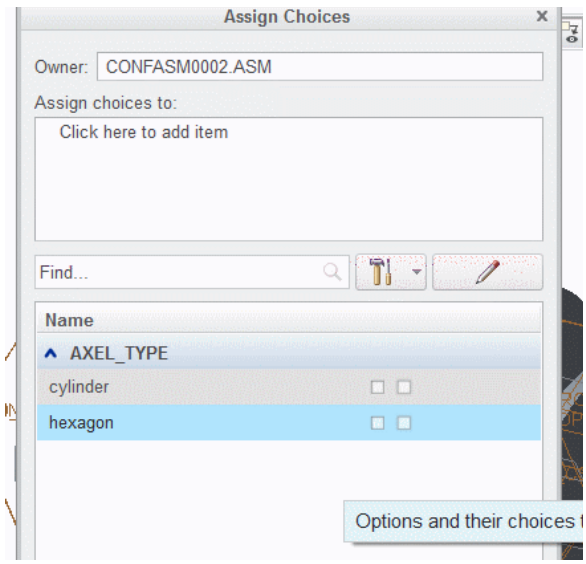


Figure 7: Selecting Options name: AXEL_TYPE

Figure 8: Create two choices: cylinder & hexagon

14) Create two choices for the axel Option: “cylinder” and “hexagon”. Components will then have to be assigned to the choices names.

15) Click at the “assign choices box at the top and select the cylinder_axel . Proceed and make a mark at the first option name □ following the cylinder option. “Accept it” and re-open the selection. Now insert the hexagon_axel and select the first □ following the hexagon option. Close the assign choices dialog box.

If things have gone correctly we can now invoke the variant builder:

And select the motor assembly variant we want. It should look like fig. 9.

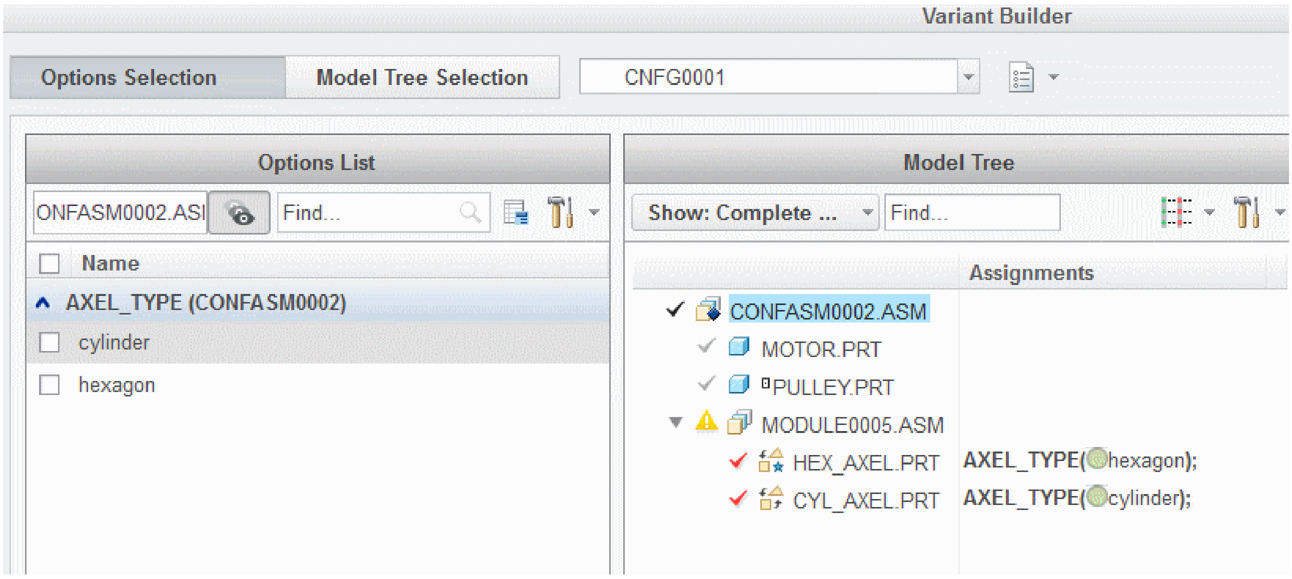


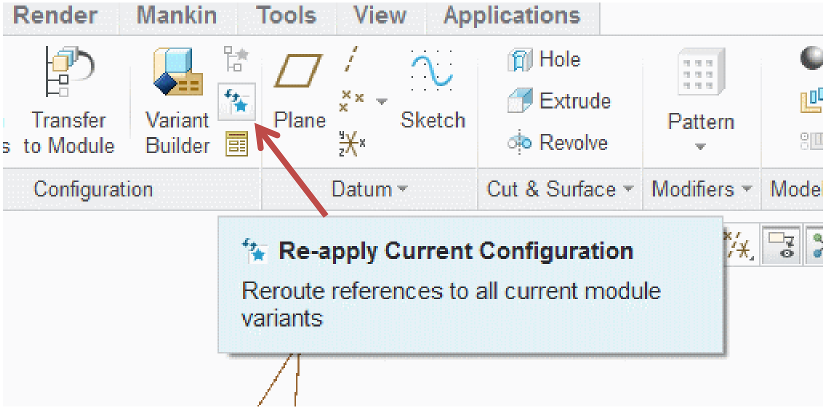
Figure 9 Section of the variant builder

In the options list make a selection of e.g the cylinder □ and notice that the cylinder is selected in the model tree column. Try the hexagon variant, but notice that only one variant is allowed for AXEL_TYPE at a time, so un-click the selection box for cylinder first.

If things seem to work we can open the selected product variant by selecting: “Update Representation” and leave without saving. By this you might get a representation witch is not connected fully. This is because the insertion of a new axel will require update to other components than the axel itself. In this case the pulley. First we let the system identify the involved components:

16) Click Re-apply

And Show ALL affected children



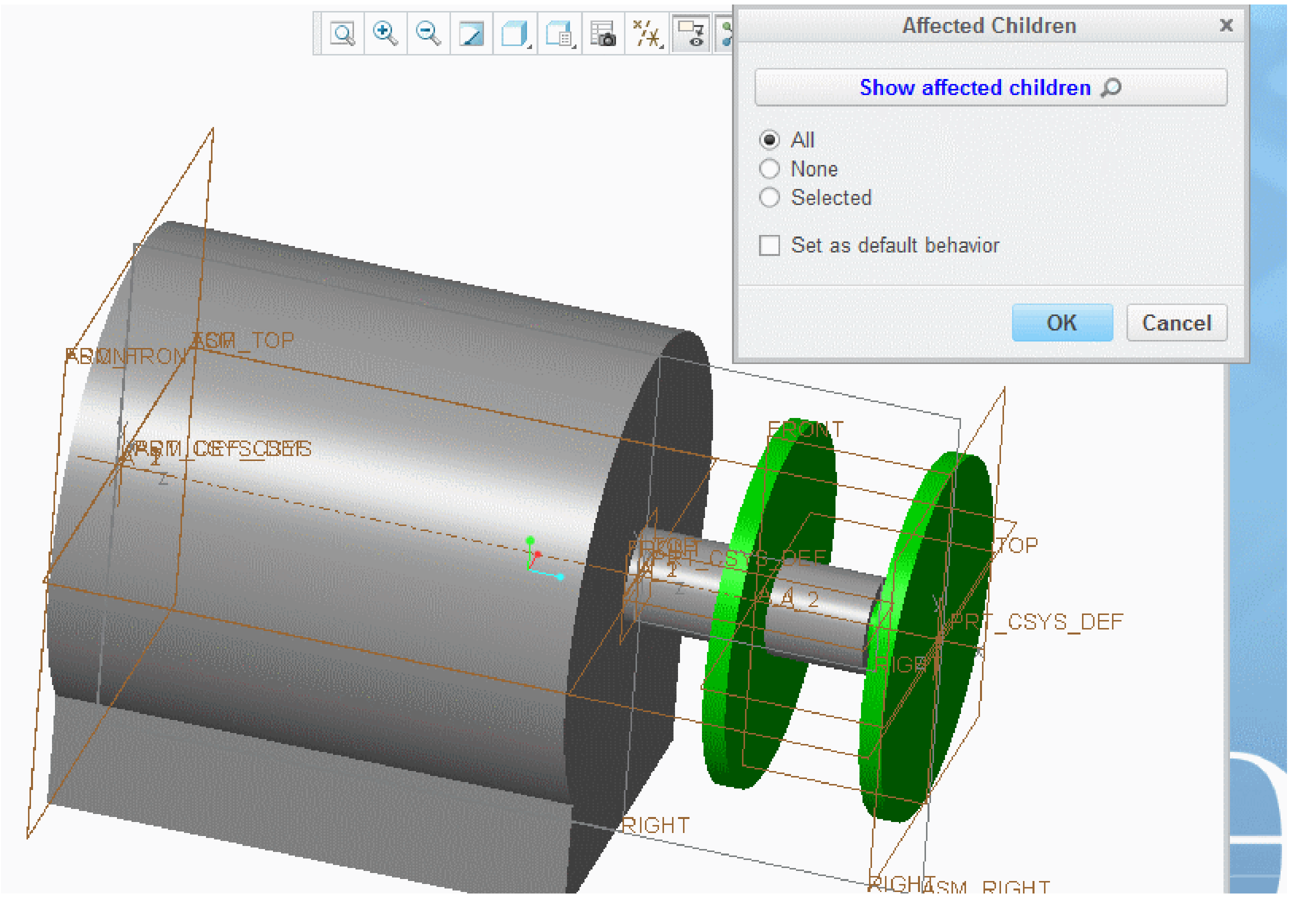
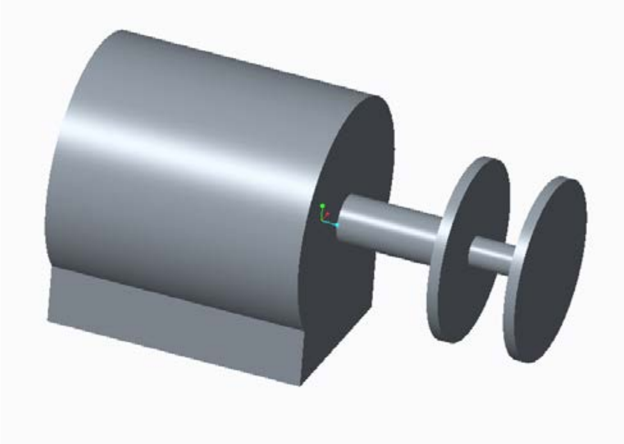
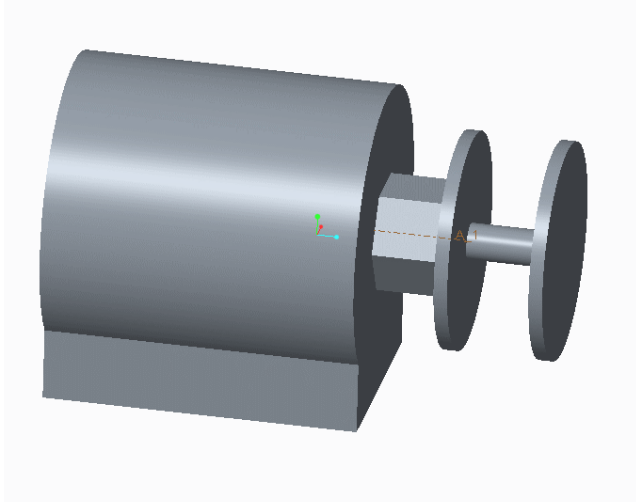


Figure 10 System identification of the affected components.

17) Click OK.

18) Regenerate the model (Ctr-G)

This will create the updated models required. The Updated models of the motor drive variants are shown in table 2

	
Motor drive using a cylindrical shaft	Motor drive using a hexagonal shaft
Table 2: Configurable products	

This concludes the exercise.