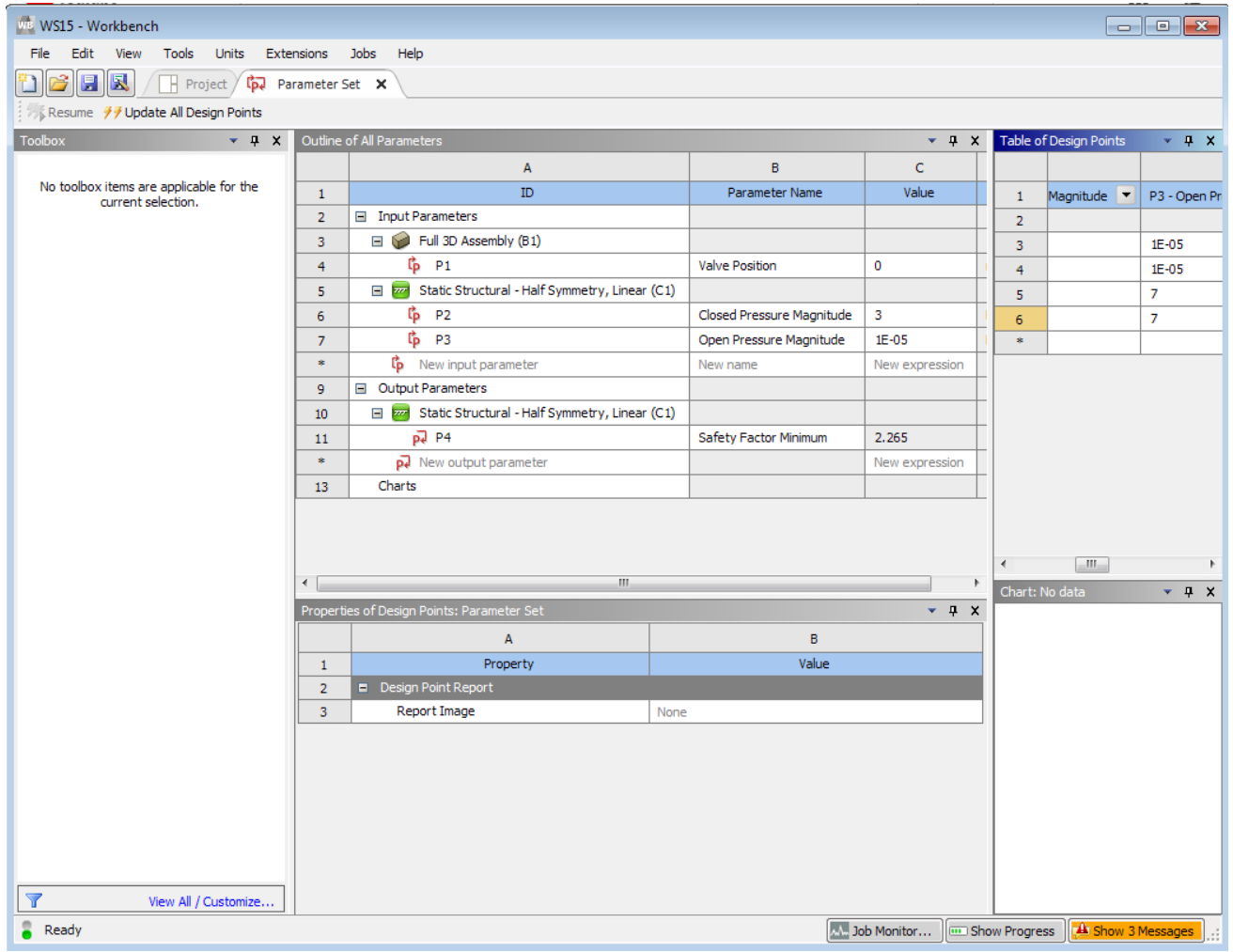
Student Step-by-Step Guide: Parameters and Associativity

Release 2021 R2

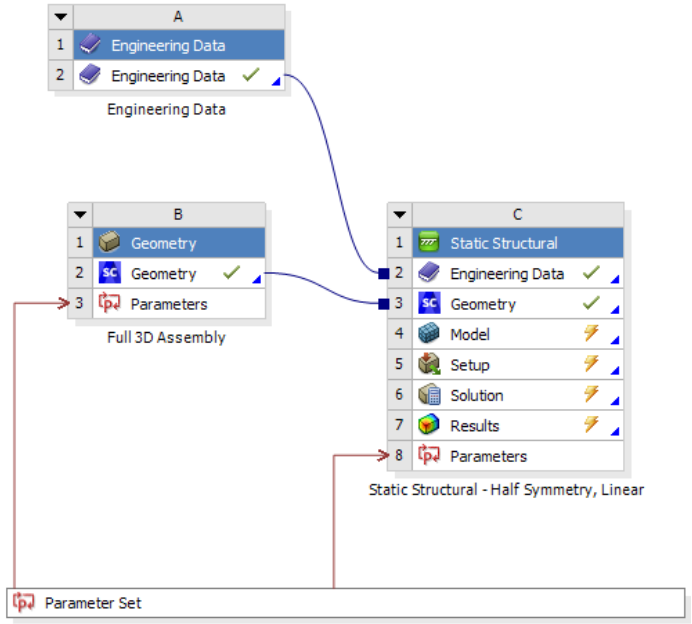
Step-by-Step Guide: Parameters and Associativity

Use this guide to repeat the steps the instructor demonstrated in this module.



Step-by-Step Guide: Parameters and Associativity

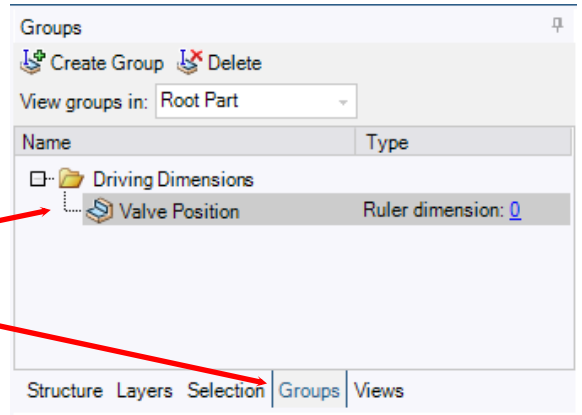
- Open Ansys Workbench: Windows **Start Menu** button → **All apps** → **ANSYS nn.n** → **Workbench nn.n**
- **File → Open…**
- Browse for archive file **Globe_Valve_SS15_Start.wbpz → Open → Save** to a convenient location.
- Review the Project Schematic:

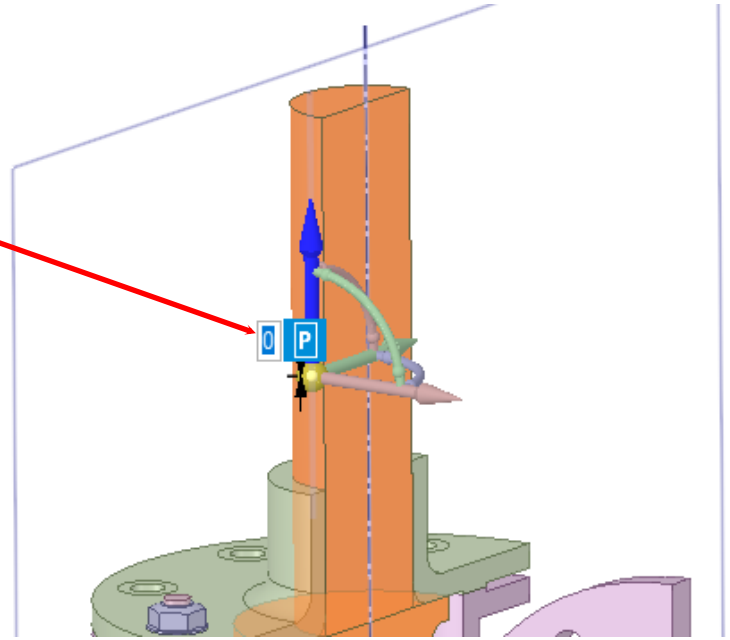


Step-by-Step Guide: Parameters and Associativity

- **RMB—Geometry** (Cell B2) → **Edit Geometry in SpaceClaim…**
- In SpaceClaim, select the **Groups** tab and then select predefined parameter (“Driving Dimension”) **Valve_Position**
- Click in the value entry box for this parameter in the graphics window and test behavior of the parameter by entering a few values. When you’re finished, set the value back to 0.

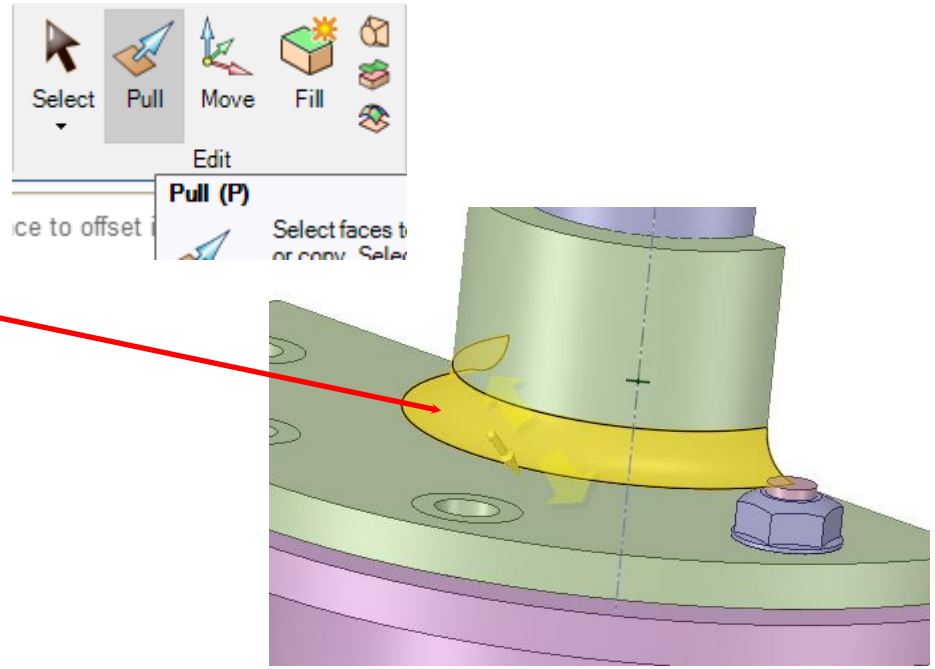
  Note that the value of 0 corresponds to the fully-open valve position and the value of −65.8 mm corresponds to the fully-closed valve position.

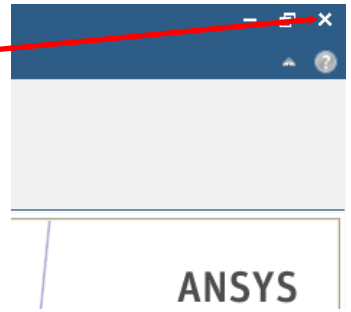




Step-by-Step Guide: Parameters and Associativity

- Select the **Pull** tool (it's on the **Design** tab), then click and drag the surface of the fillet on the top side of the flange and click the **P** box when it appears.
- Observe that a new parameter has been defined and now appears on the Groups tab.
- Use the **Undo** button to remove the new parameter before proceeding.
- **Close** SpaceClaim to return to the Project Schematic.





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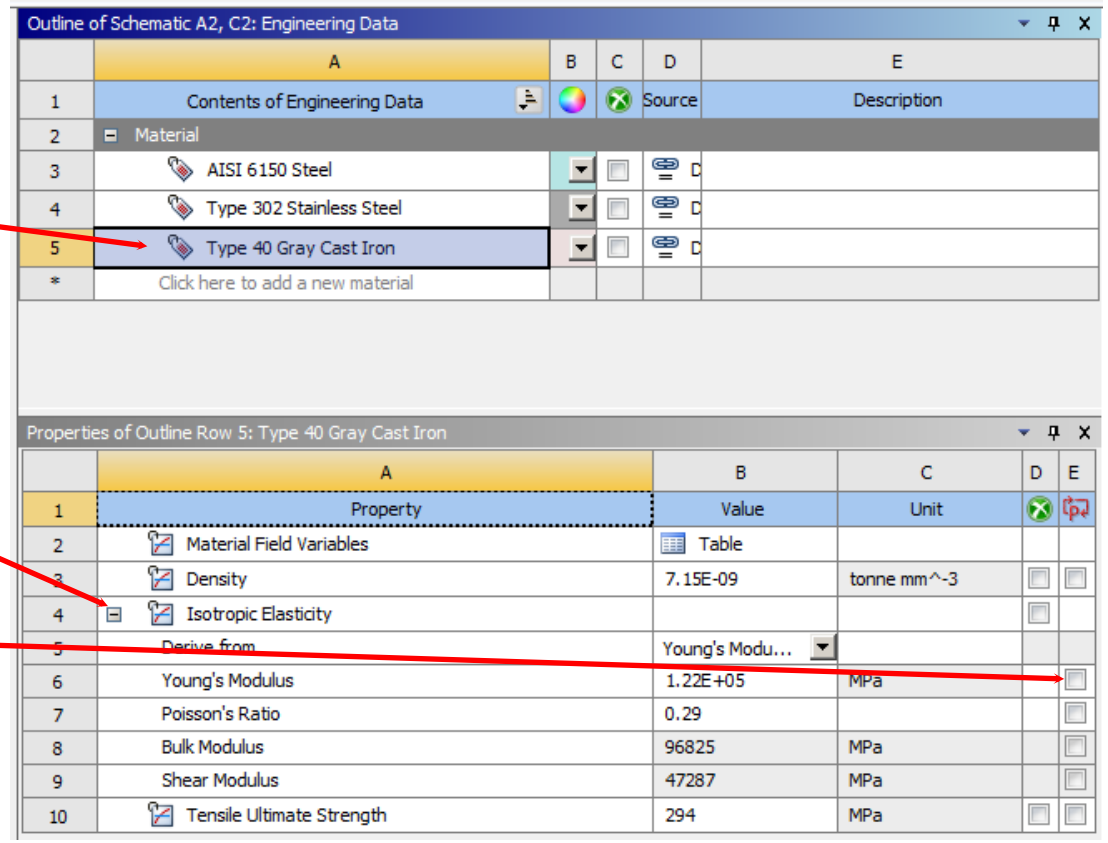
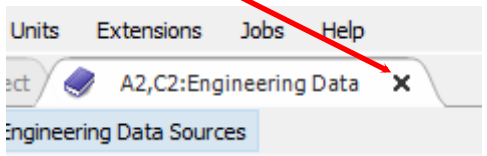
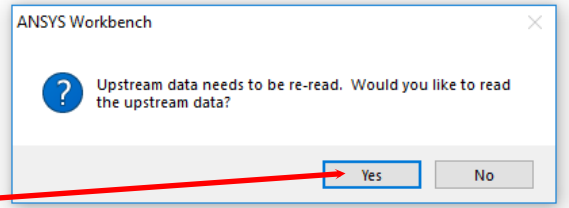
- **RMB—Engineering Data** (Cell A2) → **Edit…**
- Select **Type 40 Gray Cast Iron** in the Outline view
- If necessary, expand the **Isotropic Elasticity** group in the **Properties** view
- Review the several opportunities for promoting parameters
- Close the **Engineering Data** tab to return to the Project Schematic



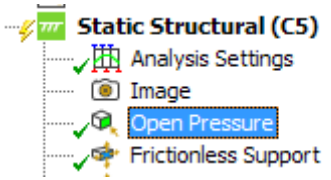


Step-by-Step Guide: Parameters and Associativity

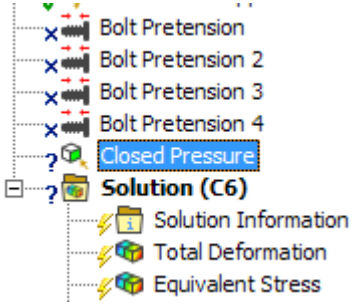
- **RMB—Model** cell → **Edit…**
- When prompted, click **Yes**



- Rename existing load **Pressure** to **Open Pressure** (this load corresponds to the fully-open valve position)

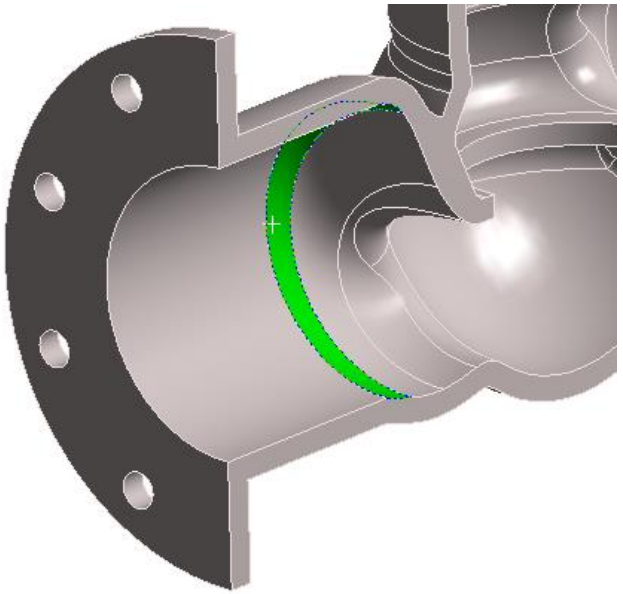


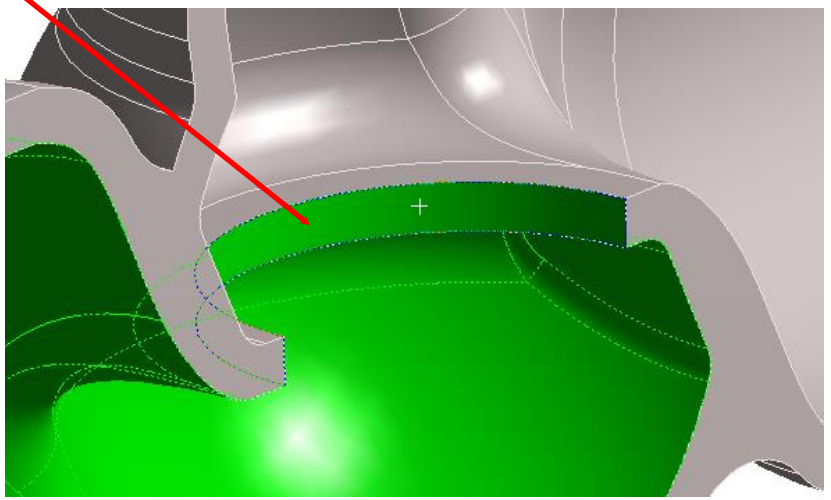
- Define a second pressure load and rename it to **Closed Pressure.**



Step-by-Step Guide: Parameters and Associativity

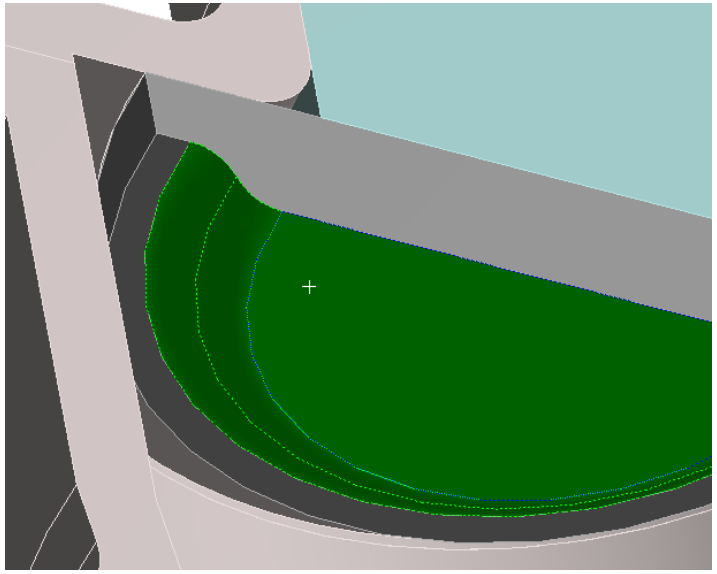
- Scope the Closed Pressure load to the appropriate surfaces for the valve fully-closed position, as follows:
  - Select any internal surface on the downstream end of the valve
  - Extend to Limits
  - Ctrl-select the cylindrical surface at the valve opening





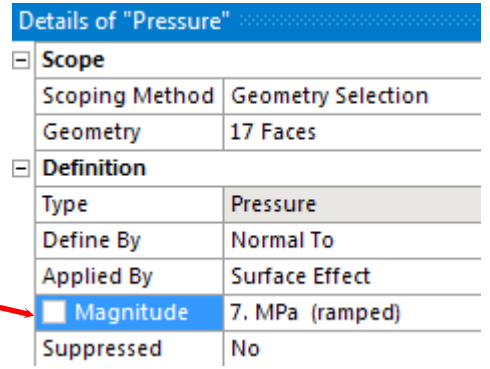
Step-by-Step Guide: Parameters and Associativity

- Scope the Closed Pressure load to the surfaces appropriate for the valve fully-closed position (continued):
  - Ctrl-select 3 faces on the valve seal as shown:



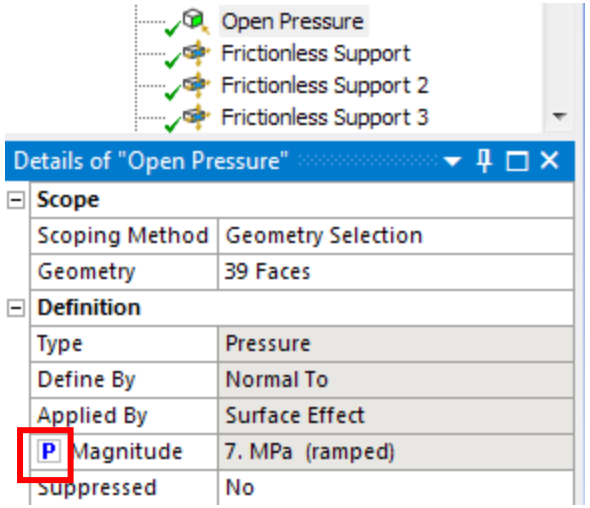
  - Note that there should now be a total of 17 faces selected.

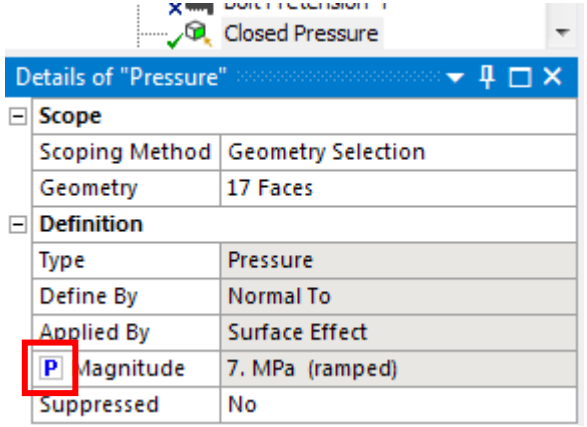
  - Click the yellow **No Selection** field in the Closed Pressure Details panel and then click the **Apply** button.
  - Enter a value of 7 MPa for the Closed Pressure **Magnitude** detail.

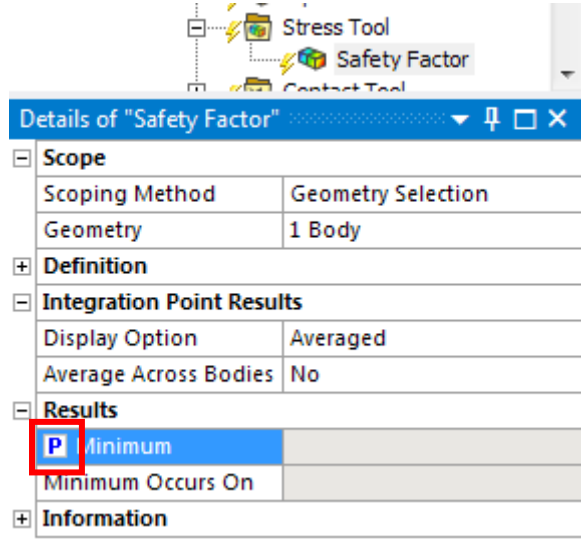


Step-by-Step Guide: Parameters and Associativity

- Review opportunities for promoting parameters under the **Geometry, Mesh, Named Selections, Loads,** and **Results** branches
- While reviewing the Environment branch, **promote** the **Open Pressure Magnitude** and the **Closed Pressure Magnitude**
- While reviewing the Results branch, **promote** the **Minimum Safety Factor**

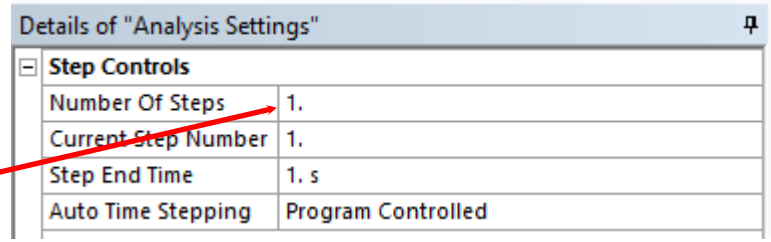


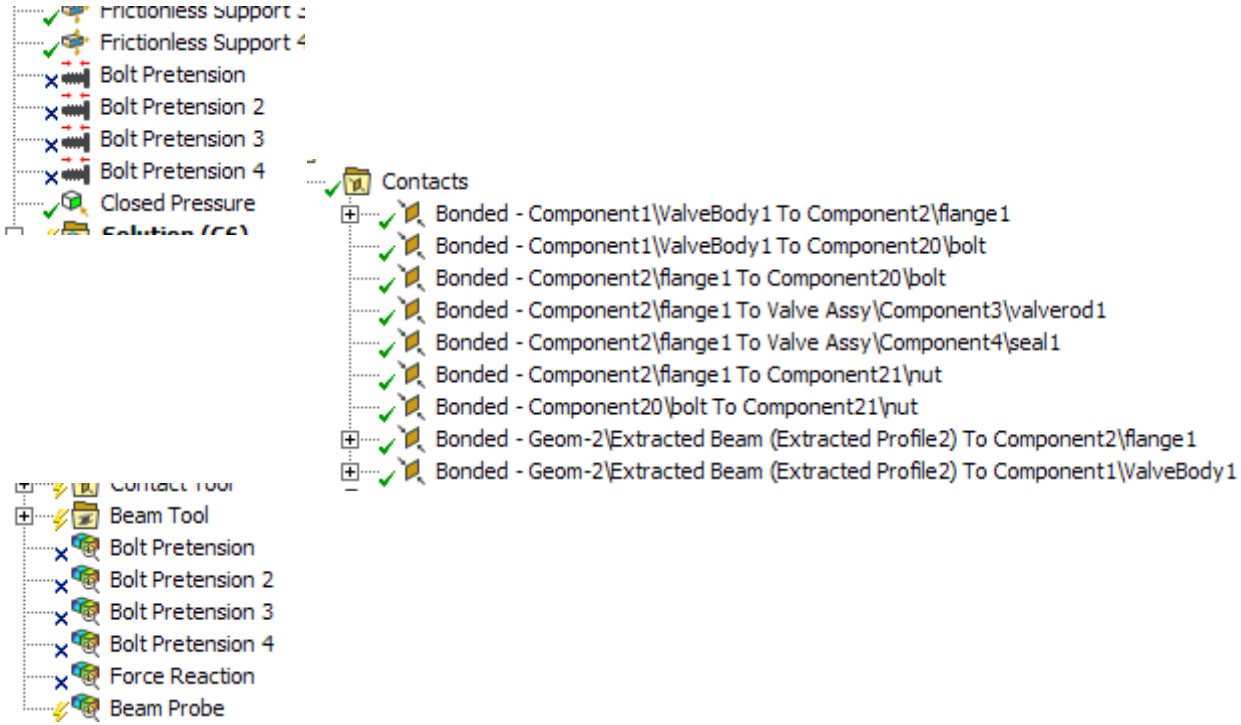




Step-by-Step Guide: Parameters and Associativity

- Observe the following changes that have been made to the model from the end of Module 14:
  - Number of Steps = **1**
  - **Suppressed** 4 Bolt Pretension loads
  - Changed 3 Frictionless contact regions to **Bonded** (this makes the analysis model linear again)
  - **Suppressed** several results objects that became invalid after making the changes above
- Close **Mechanical**





Step-by-Step Guide: Parameters and Associativity

- **RMB—Parameter Set** cell → **Edit…**
- Review parameter definitions in the **Outline of All Parameters** view:

Outline of All Parameters

	A	B	C	D
1	ID	Parameter Name	Value	Unit
2	Input Parameters			
3	Full 3D Assembly (B1)			
4	P1	Valve Position	30.72	mm
5	Static Structural - Half Symmetry, Linear (C1)			
6	P2	Open Pressure Magnitude	7	MPa
7	P5	Closed Pressure Magnitude	7	MPa
*	New input parameter	New name	New expression	
9	Output Parameters			
10	Static Structural - Half Symmetry, Linear (C1)			
11	P4	Safety Factor Minimum		
*	New output parameter		New expression	
13	Charts			

Step-by-Step Guide: Parameters and Associativity

- Enter design points in the **Table of Design Points** as follows:
  - DP 0: Valve Position = 0 mm, Open Pressure Magnitude = 3 MPa, Closed Pressure Magnitude = 10E−06 MPa
  - DP 1: Valve Position = 0 mm, Open Pressure Magnitude = 7 MPa, Closed Pressure Magnitude = 10E−06 MPa
  - DP 2: Valve Position = −65.8 mm, Open Pressure Magnitude = 10E−06 MPa, Closed Pressure Magnitude = 3 MPa
  - DP 3: Valve Position = −65.8 mm, Open Pressure Magnitude = 10E−06 MPa, Closed Pressure Magnitude = 7 MPa

Table of Design Points

	A	B	C	D	E	F	G	H
1	Name	P1 - Valve Position	P2 - Open Pressure Magnitude	P5 - Closed Pressure Magnitude	P4 - Safety Factor Minimum	Retain	Retained Data	Note
2	Units	mm	MPa	MPa				
3	DP 0 (Current)	0	3	1E-05		☑		
4	DP 1	0	7	1E-05		☐		
5	DP 2	-65.8	1E-05	3		☐		
6	DP 3	-65.8	1E-05	7		☐		
*						☐		

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- Check boxes in the **Retain** column for **DP 1, DP 2,** and **DP 3** (the box for **DP 0** should already be checked)

Table of Design Points

	A	B	C	D	E	F	G	H
1	Name	P1 - Valve Position	P2 - Open Pressure Magnitude	P5 - Closed Pressure Magnitude	P4 - Safety Factor Minimum	Retain	Retained Data	Note
2	Units	mm	MPa	MPa				
3	DP 0 (Current)	0	3	1E-05		☑		
4	DP 1	0	7	1E-05		☑		
5	DP 2	-65.8	1E-05	3		☑		
6	DP 3	-65.8	1E-05	7		☑		
*						☐		

- Click the **Update All Design Points** toolbar button

- Observe updated information in the **Safety Factor Minimum** and **Retained Data** columns as each design point solution is completed

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- When all design point solutions have completed, observe that results for **Safety Factor Minimum** are now available and that green check marks have appeared in the **Retained Data** column for each design point

Table of Design Points

	A	B	C	D	E	F	G	H
1	Name	P1 - Valve Position	P2 - Open Pressure Magnitude	P3 - Closed Pressure Magnitude	P4 - Safety Factor Minimum	Retain	Retained Data	Note
2	Units	mm	MPa	MPa				
3	DP 0 (Current)	0	3	1E-06	2.1563	☑	✓	
4	DP 1	0	7	1E-06	0.92413	☑	✓	
5	DP 2	-65.8	1E-06	3	2.2851	☑	✓	
6	DP 3	-65.8	1E-06	7	0.97935	☑	✓	
*						☐		

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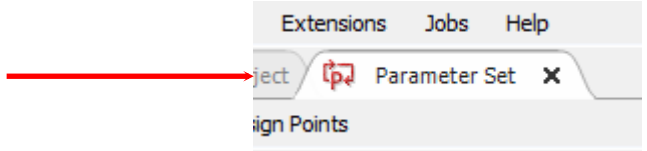
- **RMB—DP 1** (Cell 4) → **Set as Current**
- Close the **Parameter Set** tab



- **RMB—Model** cell → **Edit…**
- Observe that the valve is in the fully-open position
- Confirm that the **Open Pressure** and **Closed Pressure** loads have been applied properly
- Review any results that interest you
- Close **Mechanical**

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- **RMB—Parameter Set** cell → **Edit…**
- **RMB—DP 3** → **Set as Current**
- Close the **Parameter Set** tab
- **RMB—Model** cell → **Edit…**
- Observe that the valve is in the fully-closed position
- Confirm that the **Open Pressure** and **Closed Pressure** loads have been applied properly
- Review any results that interest you


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