Ansys Mechanical Beyond the Basics

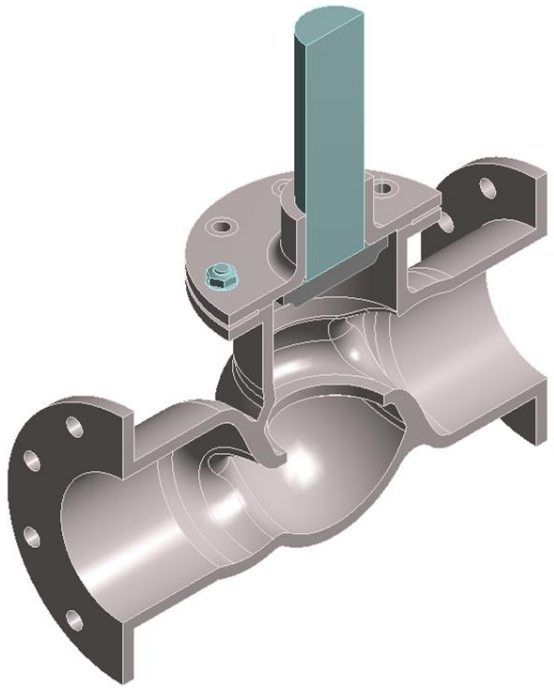
Module 03 Student Step-by-Step Guide:
More Realistic Connections

Release 2021 R2

©2021 ANSYS, Inc. Unauthorized use, distribution, or duplication is prohibited.

Step-by-Step Guide 03: More Realistic Connections

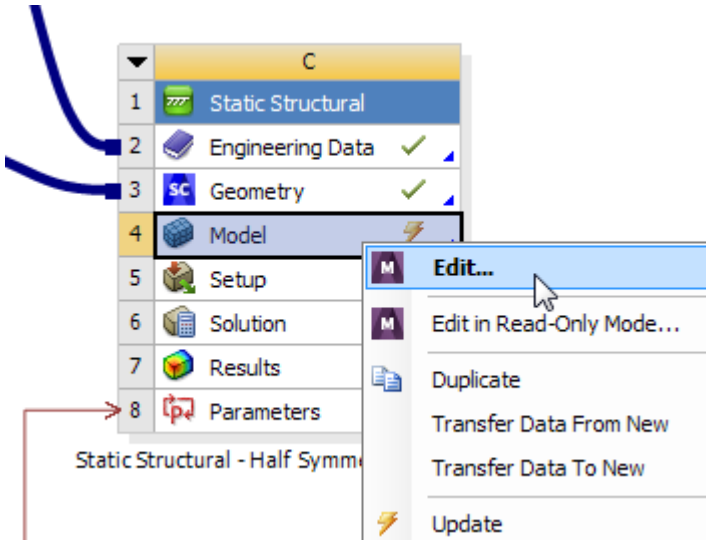
Use this guide to repeat the steps the instructor demonstrated in this module.



©2021 ANSYS, Inc. Unauthorized use, distribution, or duplication is prohibited.

Step-by-Step Guide 03: More Realistic Connections

- Open Ansys Workbench: Windows **Start Menu** button → **All apps** → **Ansys nn.n** → **Workbench nn.n**
- File → Open…
- Browse for archive file **Globe_Valve_SS03_Start.wbpz** → **Open** → **Save** to a convenient location.
- **RMB—Model** cell → **Edit…**



©2021 ANSYS, Inc. Unauthorized use, distribution, or duplication is prohibited.

Step-by-Step Guide 03: More Realistic Connections

- Expand the **Connections** branch
- Expand the **Contacts** branch
- Select contact region **Bonded - Component1\ValveBody1 To Component2\flange1**
- Set detail **Type** to **Frictionless**
- Set detail **Behavior** to **Asymmetric**

©2021 ANSYS, Inc. Unauthorized use, distribution, or duplication is prohibited.

Step-by-Step Guide 03: More Realistic Connections

- Select contact region **Bonded - Component2\flange1 To Component20\bolt**
- Set detail **Type** to **Frictionless**
- Select contact region
  Bonded - Component2\flange1 To Valve Assy\Component3\valverod1
- Set detail **Type** to **Frictionless**

©2021 ANSYS, Inc. Unauthorized use, distribution, or duplication is prohibited.

Step-by-Step Guide 03: More Realistic Connections

- **RMB—Contact Tool → Generate Initial Contact Results**
- Expand the **Contact** Tool branch
- Select the **Initial Information** branch and review **the Initial Information Worksheet**

Name	Contact Side	Type	Status	Number Contacting	Penetration (mm)	Gap (mm)	Geometric Penetration (mm)	Geometric Gap (mm)	Resulting Pinball (mm)	Real Constant
Frictionless - Component1\ValveBody1 To Component2\flange1	Contact	Frictionless	Closed	178.	2.8422e-014	0.	2.8422e-014	3.8548e-029	1.898	8.
Frictionless - Component1\ValveBody1 To Component2\flange1	Target	Frictionless	Inactive	N/A	N/A	N/A	N/A	N/A	N/A	0.
Bonded - Component1\ValveBody1 To Component20\bolt	Contact	Bonded	Closed	19.	1.4211e-014	0.	7.1129e-003	0.	0.59851	10.
Bonded - Component1\ValveBody1 To Component20\bolt	Target	Bonded	Inactive	N/A	N/A	N/A	N/A	N/A	N/A	11.
Frictionless - Component2\flange1 To Component20\bolt	Contact	Frictionless	Near Open	0.	0.	0.76671	0.	0.76671	1.9601	12.
Frictionless - Component2\flange1 To Component20\bolt	Target	Frictionless	Inactive	N/A	N/A	N/A	N/A	N/A	N/A	13.
Frictionless - Component2\flange1 To Valve Assy\Component3\valverod1	Contact	Frictionless	Near Open	0.	0.	9.6795e-003	0.	9.6795e-003	4.5671	14.
Frictionless - Component2\flange1 To Valve Assy\Component3\valverod1	Target	Frictionless	Inactive	N/A	N/A	N/A	N/A	N/A	N/A	15.
Bonded - Component2\flange1 To Valve Assy\Component4\seal1	Contact	Bonded	Closed	23.	2.8422e-014	0.	0.	3.1101e-003	1.2115	16.
Bonded - Component2\flange1 To Valve Assy\Component4\seal1	Target	Bonded	Inactive	N/A	N/A	N/A	N/A	N/A	N/A	17.
Bonded - Component2\flange1 To Component21\nut	Contact	Bonded	Closed	13.	1.4211e-014	0.	0.	6.6598e-003	0.97094	18.
Bonded - Component2\flange1 To Component21\nut	Target	Bonded	Inactive	N/A	N/A	N/A	N/A	N/A	N/A	19.
Bonded - Component20\bolt To Component21\nut	Contact	Bonded	Inactive	N/A	N/A	N/A	N/A	N/A	N/A	20.
Bonded - Component20\bolt To Component21\nut	Target	Bonded	Closed	14.	3.5727e-013	0.	1.5453e-002	1.4853e-002	0.26937	21.

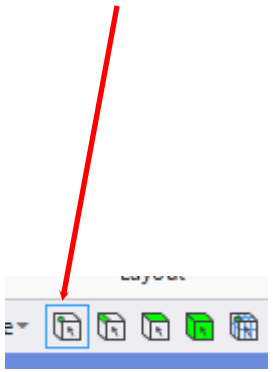
Color Legend

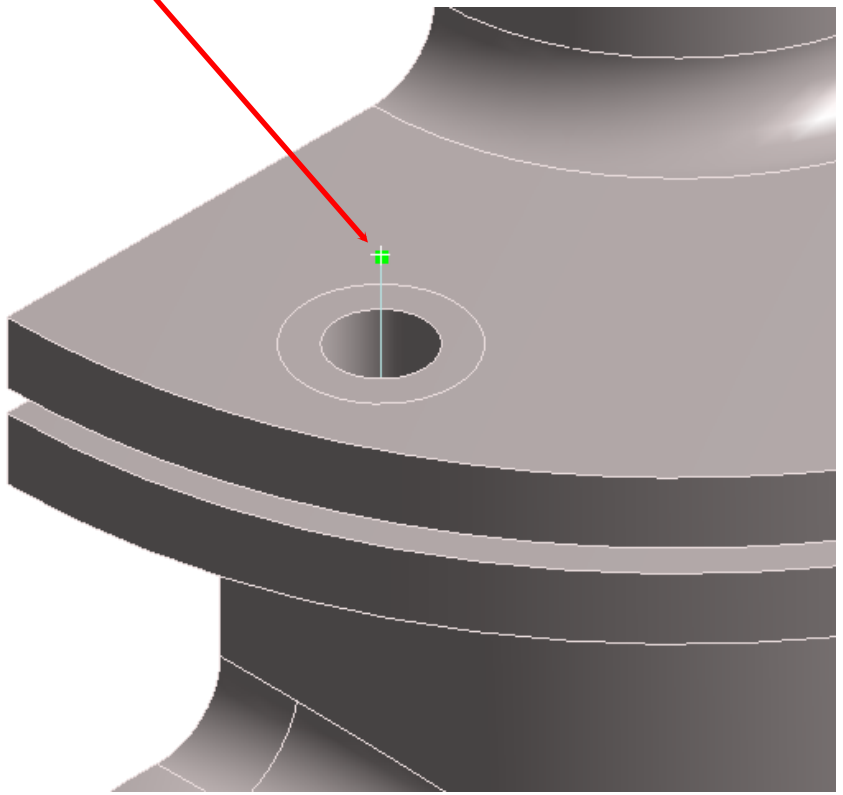
Red	The contact status is open but the type of contact is meant to be closed. This applies to bonded and no separation contact types.
Yellow	The contact status is open. This may be acceptable.
Orange	The contact status is closed but has a large amount of gap or penetration. Check penetration and gap compared to pinball and depth.
Gray	Contact is inactive. This can occur for MPC and Normal Lagrange formulations. It can also occur for auto asymmetric behavior.

©2021 ANSYS, Inc. Unauthorized use, distribution, or duplication is prohibited.

Step-by-Step Guide 03: More Realistic Connections

- **RMB—Contacts** → Insert → Manual Contact Region
- Scope detail **Contact** to the vertex at the +Z end of the line body

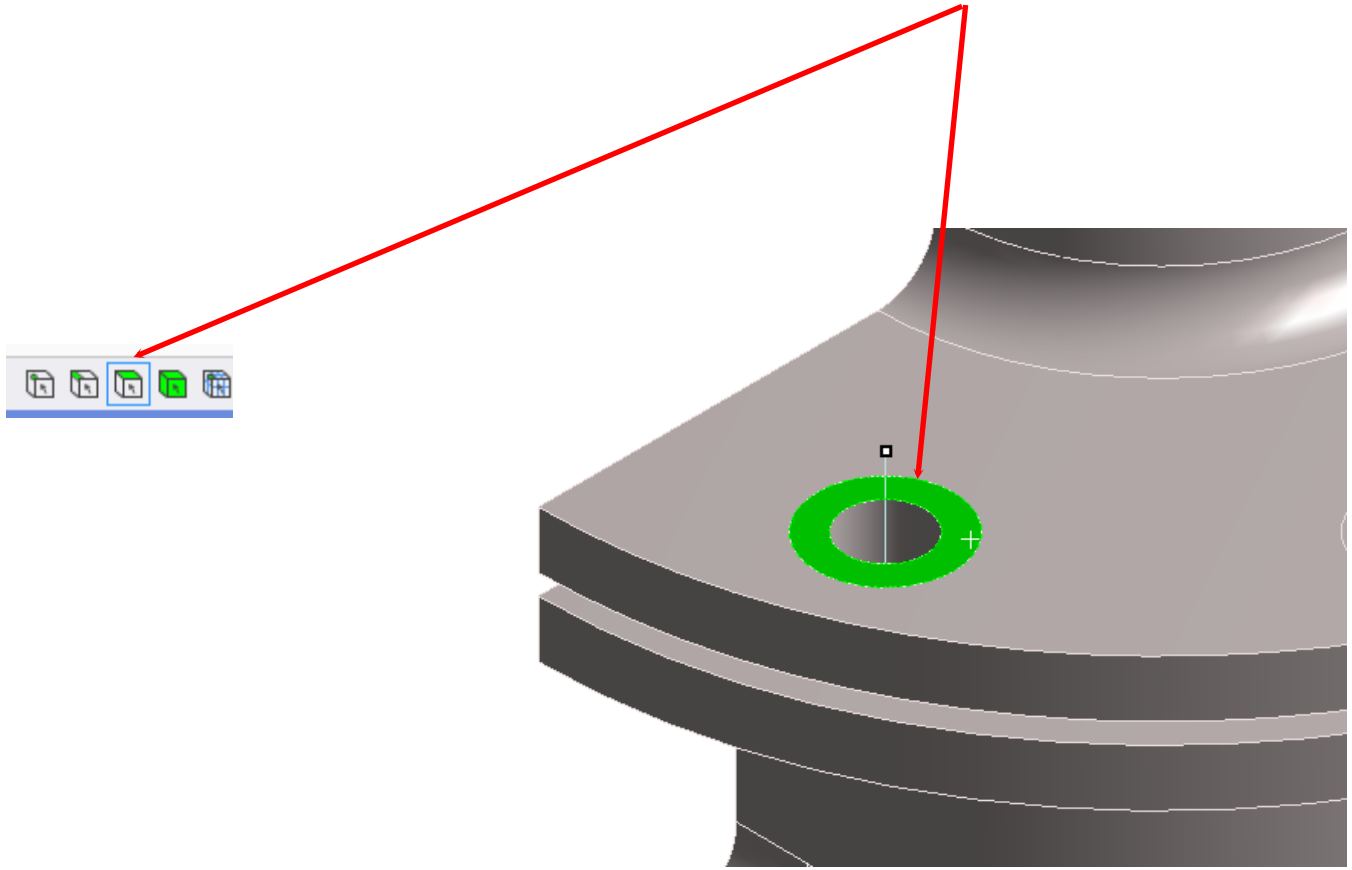




©2021 ANSYS, Inc. Unauthorized use, distribution, or duplication is prohibited.

Step-by-Step Guide 03: More Realistic Connections

- Scope detail **Target** to the corresponding imprinted face on the flange



©2021 ANSYS, Inc. Unauthorized use, distribution, or duplication is prohibited.

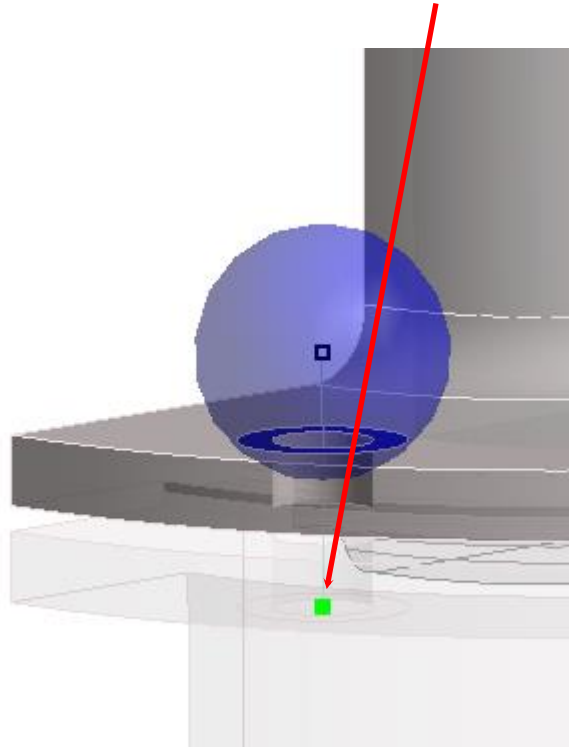
Step-by-Step Guide 03: More Realistic Connections

- Set detail **Formulation** to **MPC**
- Set detail **Pinball Region** to **Radius**
- Set detail **Pinball Radius** to **9 mm**
- **RMB—Bonded - Geom-2\Extracted Beam (Extracted Profile2) To Component2\flange1 → Duplicate**

©2021 ANSYS, Inc. Unauthorized use, distribution, or duplication is prohibited.

Step-by-Step Guide 03: More Realistic Connections

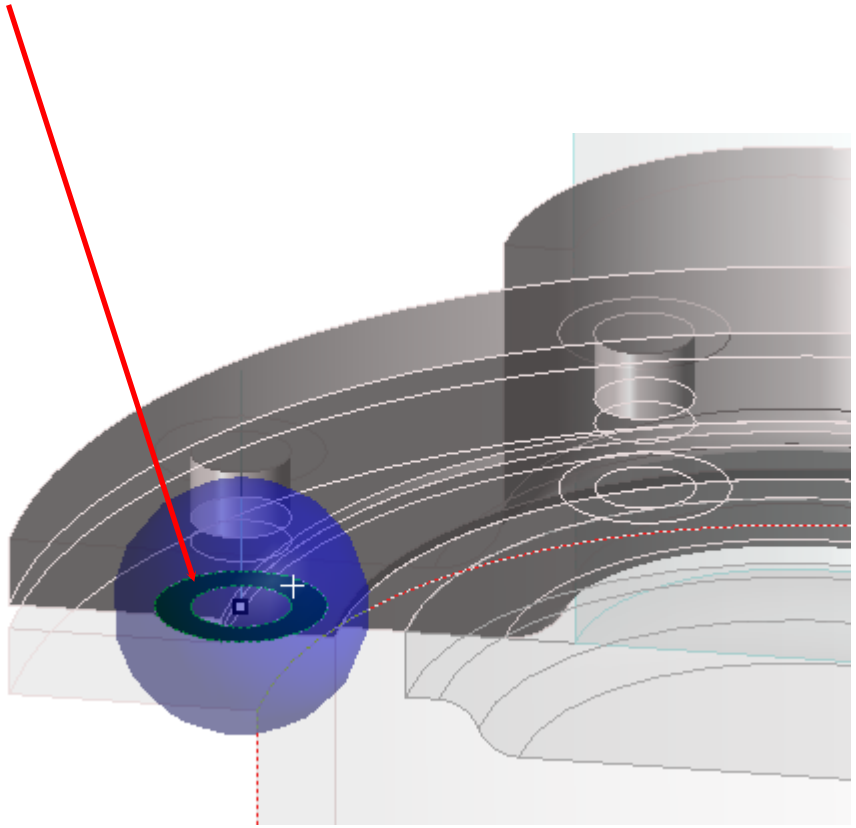
- Select the duplicated contact region
- Edit the detail **Contact** and scope it to the vertex at the −Z end of the line body



©2021 ANSYS, Inc. Unauthorized use, distribution, or duplication is prohibited.

Step-by-Step Guide 03: More Realistic Connections

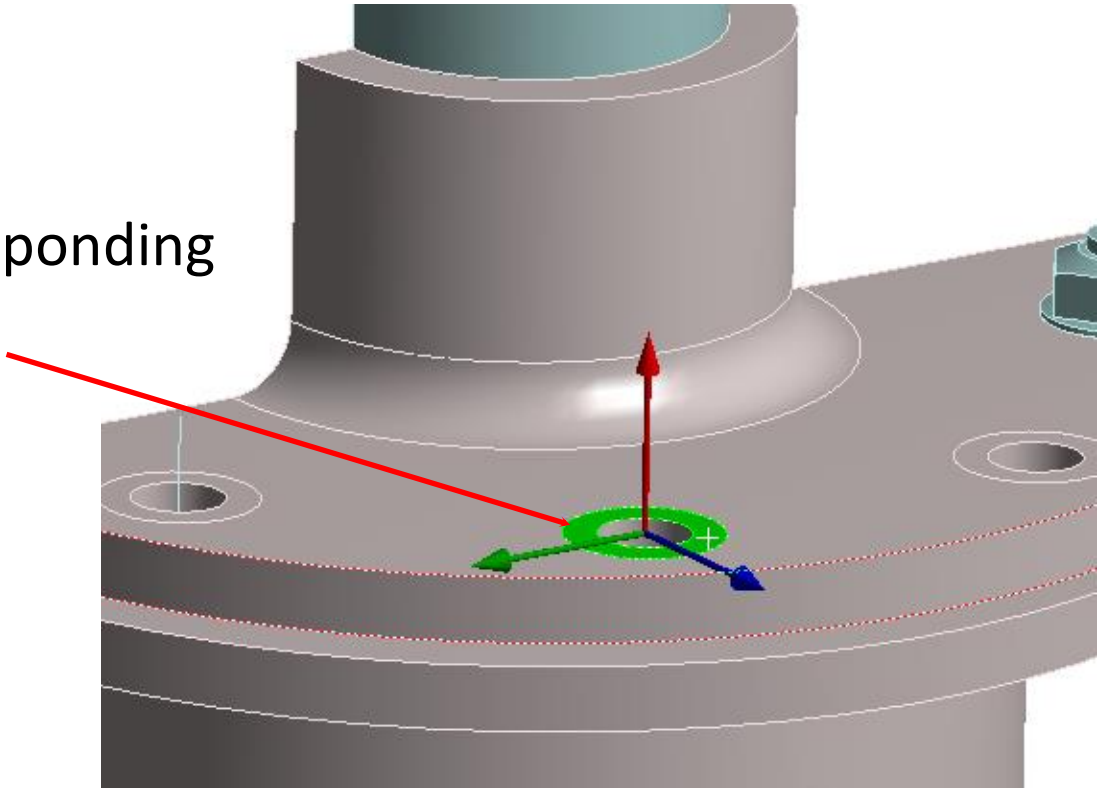
- Edit detail **Target** and scope it to the corresponding imprinted face on the valve body
- Set detail **Pinball Radius** to **6 mm**



©2021 ANSYS, Inc. Unauthorized use, distribution, or duplication is prohibited.

Step-by-Step Guide 03: More Realistic Connections

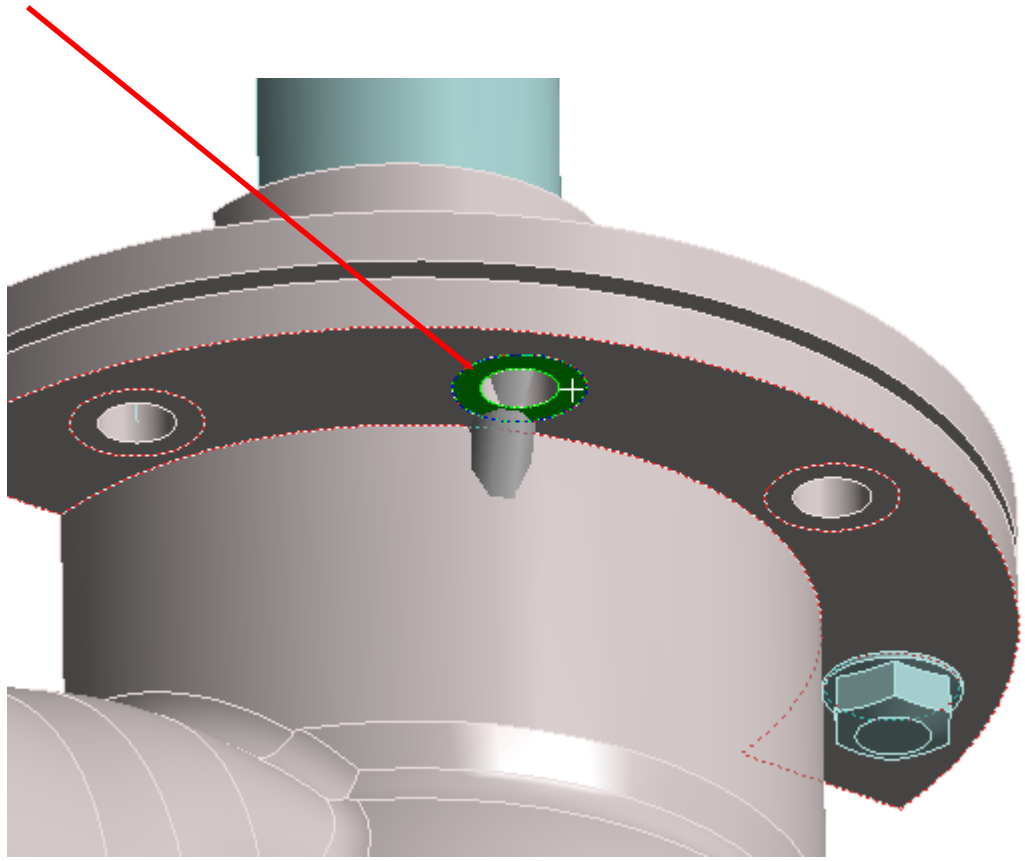
- **RMB—Connections → Insert → Beam**
- Set detail **Material** to **AISI 6150 Steel**
- Set detail **Radius** to **3 mm**
- Scope detail **Reference—Scope** to the corresponding imprinted face on the flange



©2021 ANSYS, Inc. Unauthorized use, distribution, or duplication is prohibited.

Step-by-Step Guide 03: More Realistic Connections

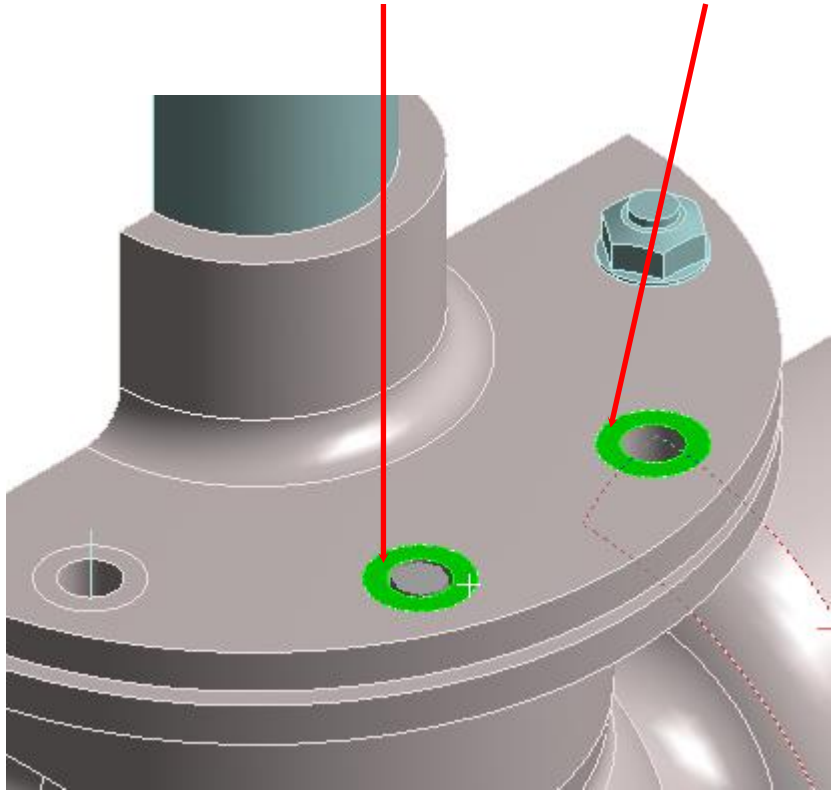
- Scope detail **Mobile—Scope** to the corresponding imprinted face on the valve body



©2021 ANSYS, Inc. Unauthorized use, distribution, or duplication is prohibited.

Step-by-Step Guide 03: More Realistic Connections

- Select the imprinted faces on the flange corresponding to the current and planned Beam Connections



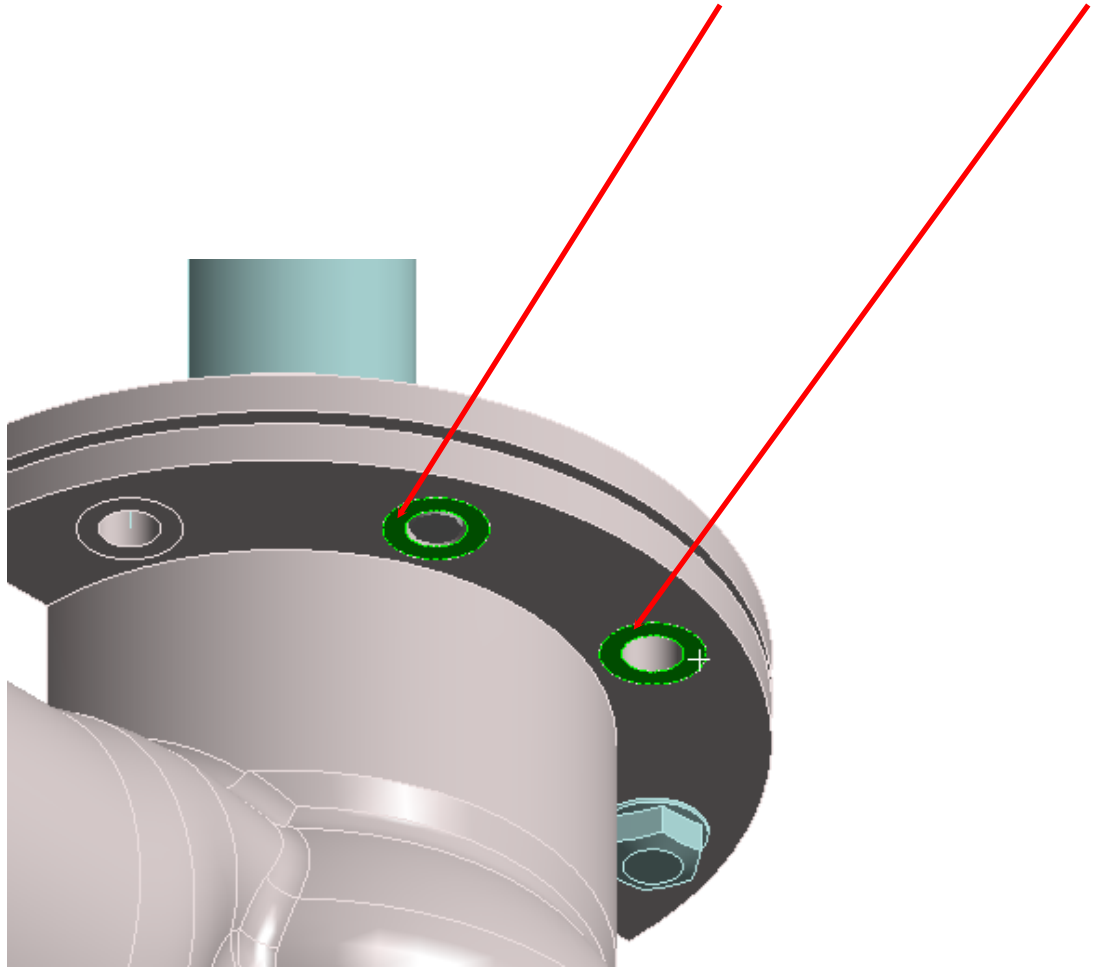
- **RMB—Create Named Selection (N)...**
- Enter name **nut**
- Click button **OK**

©2021 ANSYS, Inc. Unauthorized use, distribution, or duplication is prohibited.

Step-by-Step Guide 03: More Realistic Connections

- Select the imprinted faces on the valve body corresponding to the current and planned Beam Connections

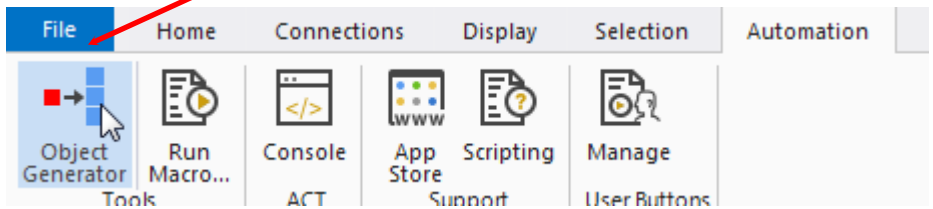
- **RMB—Create Named Selection (N)...**
- Enter name **bolt head**
- Click button **OK**

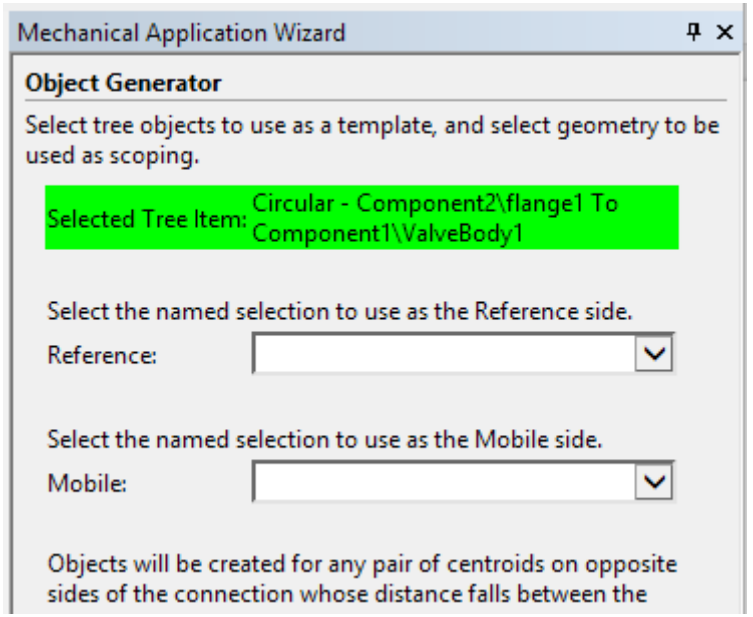


©2021 ANSYS, Inc. Unauthorized use, distribution, or duplication is prohibited.

Step-by-Step Guide 03: More Realistic Connections

- Select beam connection **Circular - Component2\flange1 To Component1\ValveBody1**
- Click toolbar button **Object Generator in the Automation tab**

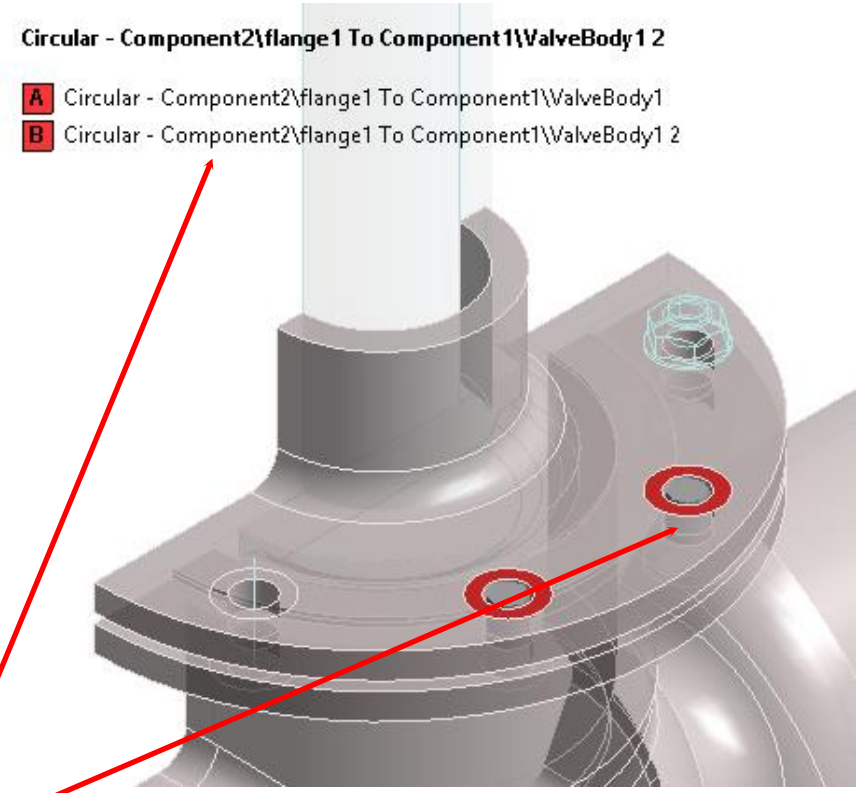




©2021 ANSYS, Inc. Unauthorized use, distribution, or duplication is prohibited.

Step-by-Step Guide 03: More Realistic Connections

- In the **Object Generator** panel:
  - Set **Reference** to named selection **nut**
  - Set **Mobile** to named selection **bolt head**
  - Set **Minimum** to **11 mm**
  - Set **Maximum** to **12 mm**
  - Click button **Generate**



  - Note creation of second Beam Connection **Circular - Component2\flange1 To Component1\ValveBody1 2**

©2021 ANSYS, Inc. Unauthorized use, distribution, or duplication is prohibited.


Ansys