ANSYS Mechanical Getting Started

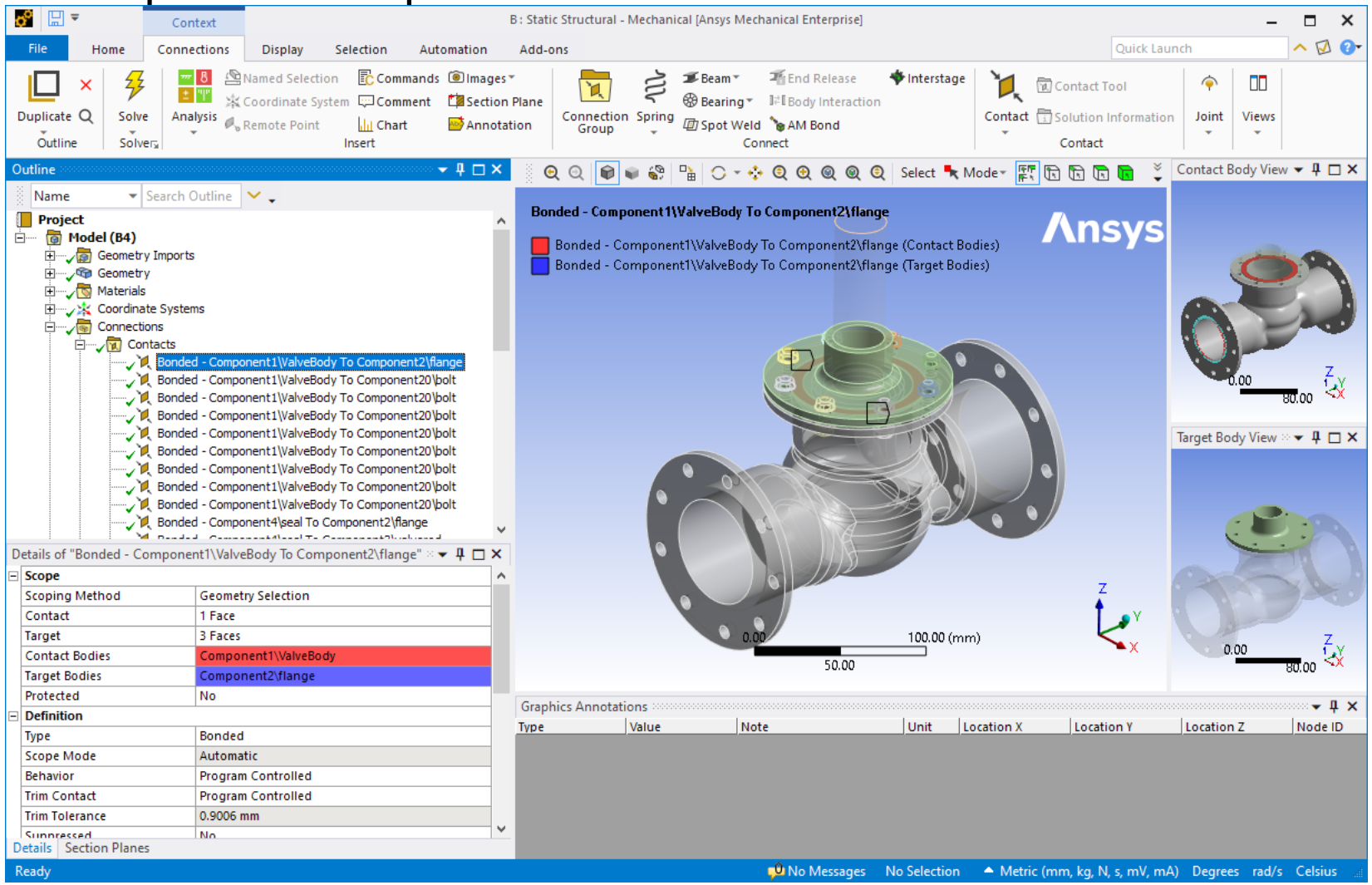
Module 05 Student Step-by-Step Guide: Connections

Release 2023 R1

Please note:
- These training materials were developed and tested in Ansys Release 2023 R1. Although they are expected to behave similarly in later releases, this has not been tested and is not guaranteed.
- The screen images included with these training materials may vary from the visual appearance of a local software session.

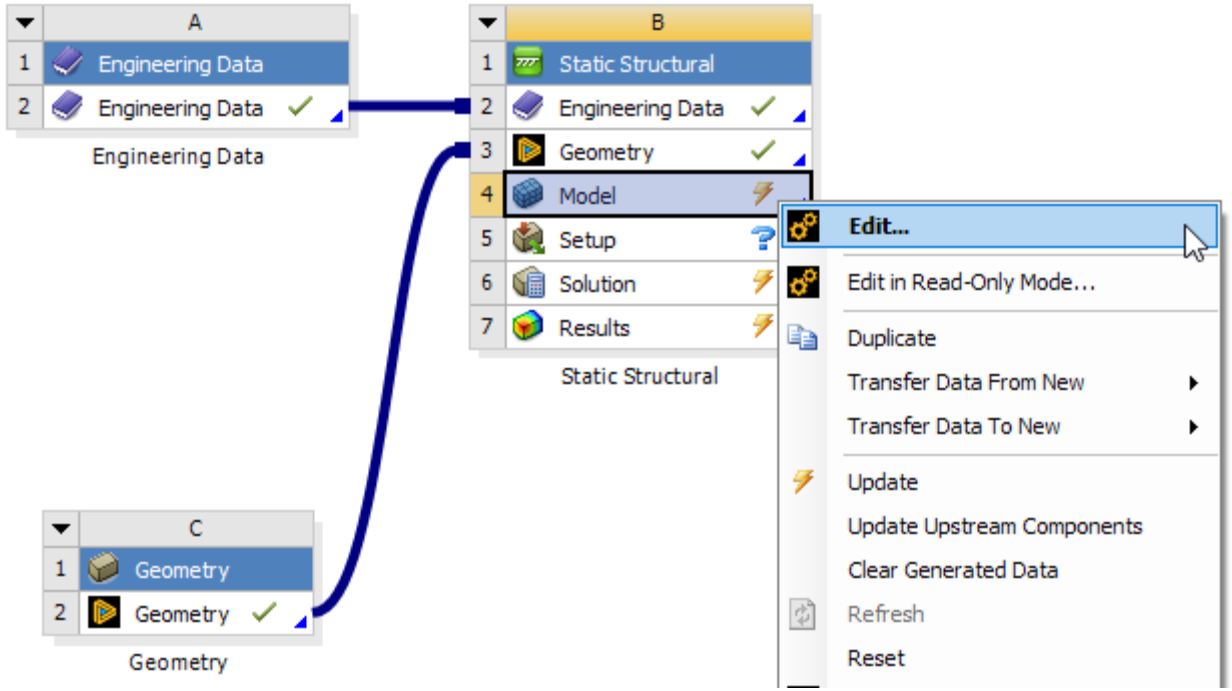
Step-by-Step Guide 05: Connections

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



Step-by-Step Guide 05: Connections

- Open ANSYS Workbench: Windows **Start Menu** button → **All apps** → **ANSYS** nn.n → **Workbench** nn.n
- File → Open…
- Browse for archive file Globe_Valve_SS05_Start.wbpz → Open → Save to a convenient location.
- RMB—Model cell → Edit…



Step-by-Step Guide 05: Connections

- Expand **Connections** branch.
- Expand **Contacts** branch.
- Select first contact region and review detail **Type**.
- Select another contact region and review detail **Type**.
- Click in field **Bonded** and then on down-arrow to review menu of available contact types.
- **RMB—Contacts → Rename Based on Definition**

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- Select **Contacts** branch and review details **Tolerance Slider** and **Tolerance Value**.
- Select first contact region and review graphics display features.

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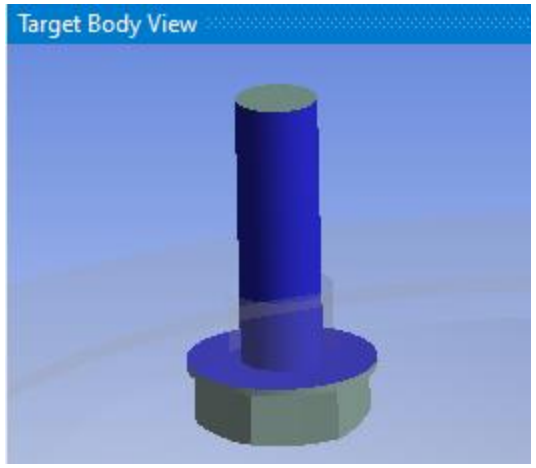
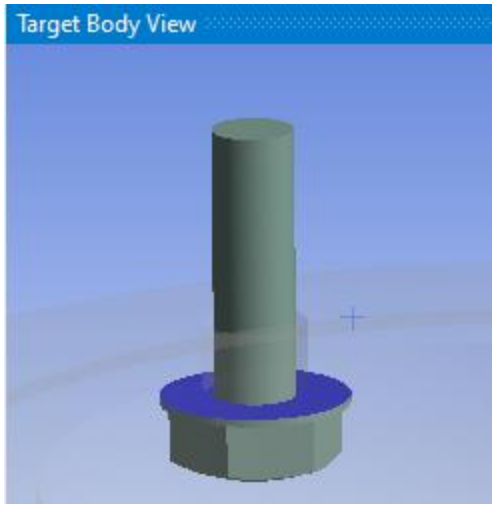
- Review each contact region for appropriateness in representing the actual physical system. Make the following changes:
  - For contact region **Bonded - Component1\ValveBody To Component20\bolt**, there is a physical gap between the bolt shank and the valve body hole. So, these faces need to be removed from the contact region. To do this, click the **2 Faces** field next to detail **Target** to activate edit mode for the target surfaces—the **Apply** and **Cancel** buttons will appear. Next, Go to **Target Body View**, single-click the surface under the bolt head to select it (or press Ctrl key and click the bolt shank face to deselect it), click the **Apply** button next to detail **Target**, and observe that detail **Target** now has the value **1 Face**.





Details of "Bonded - Component1\ValveBody To Component20\bolt"	
Scope	
Scoping Method	Geometry Selection
Contact	2 Faces
Target	1 Face
Contact Bodies	Component1\ValveBody
Target Bodies	Component20\bolt
Protected	No

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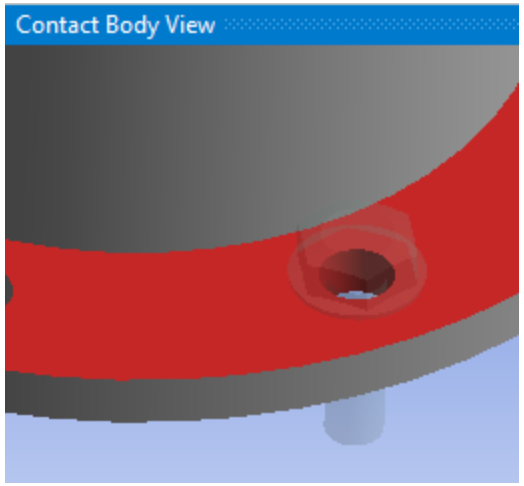
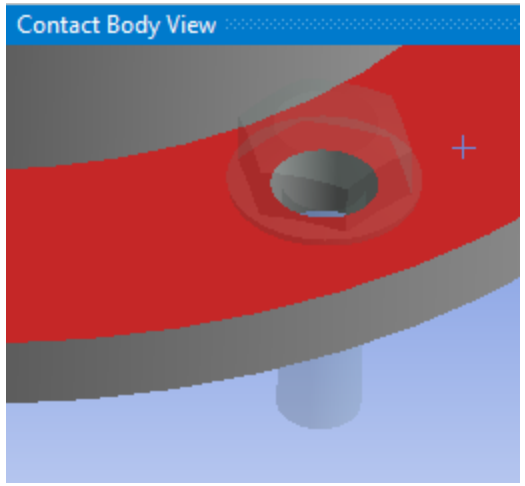
- Make the following changes (continued):
  - Now click the **2 Faces** field next to detail **Contact** to activate edit mode for the contact surfaces—the **Apply** and **Cancel** buttons will appear. Next, Go to **Contact Body View**, single-click the outer annular surface of the valve body to select it (or press Ctrl key and click the cylindrical face to deselect it), click the **Apply** button next to detail **Contact**, and observe that detail **Contact** now has the value **1 Face**.





Details of "Bonded - Component1\ValveBody To Component20\bolt"

Scope	
Scoping Method	Geometry Selection
Contact	1 Face
Target	1 Face
Contact Bodies	Component1\ValveBody
Target Bodies	Component20\bolt
Protected	No

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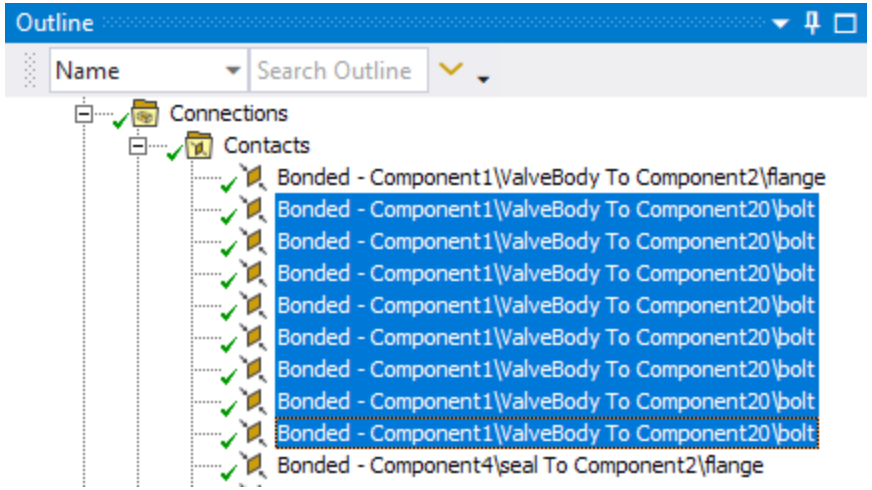
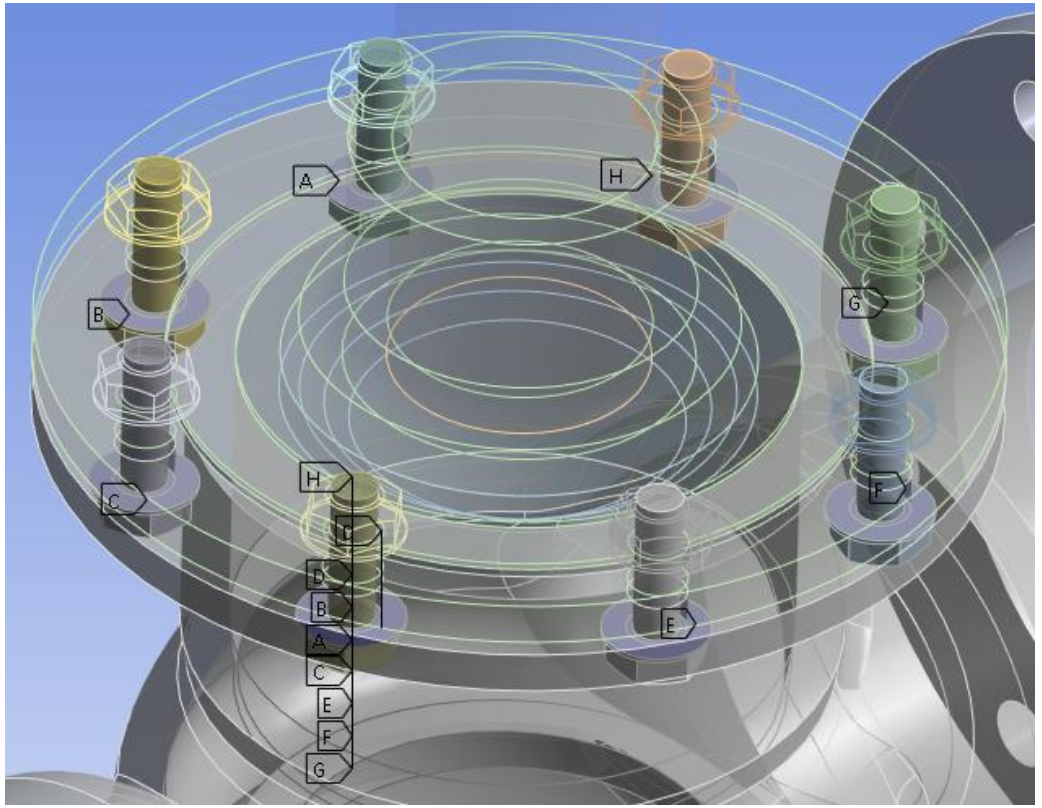
- Make the following changes (continued):
  - Repeat the steps on the last two slides for each of the other 7 contact regions named **Bonded - Component1\ValveBody To Component20\bolt.**





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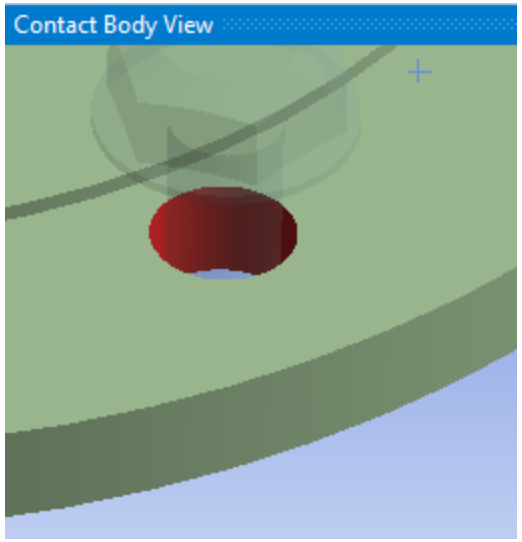
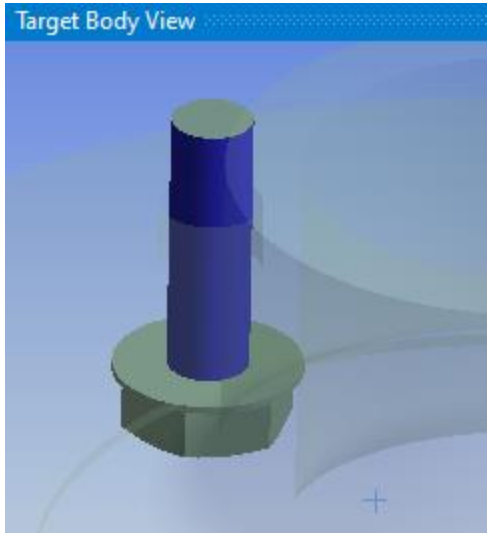
- Observe that the 8 contact regions named **Bonded - Component2\flange To Component20\bolt** are not needed, because there is a significant gap between the outer surfaces of the bolt shanks and the inner surfaces of the corresponding holes, but do not make any changes at this time.
- Select contact region **Bonded - Component1\ValveBody To Component2\flange**.
- Experiment with surface selection in the **Contact Body View** and the **Target Body View**.





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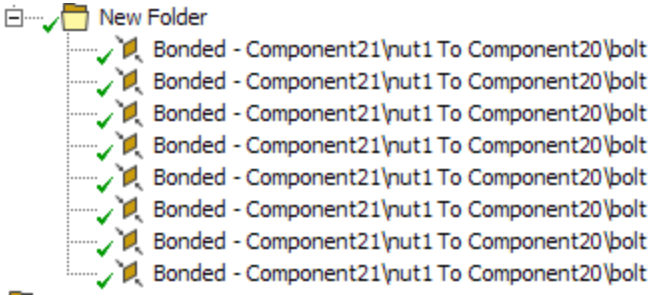
- Select the 8 contact regions named **Bonded - Component21\nut To Component20\bolt**.
- **RMB → Group** on any one of the selected contact regions.
- Enter a name for the new group folder.

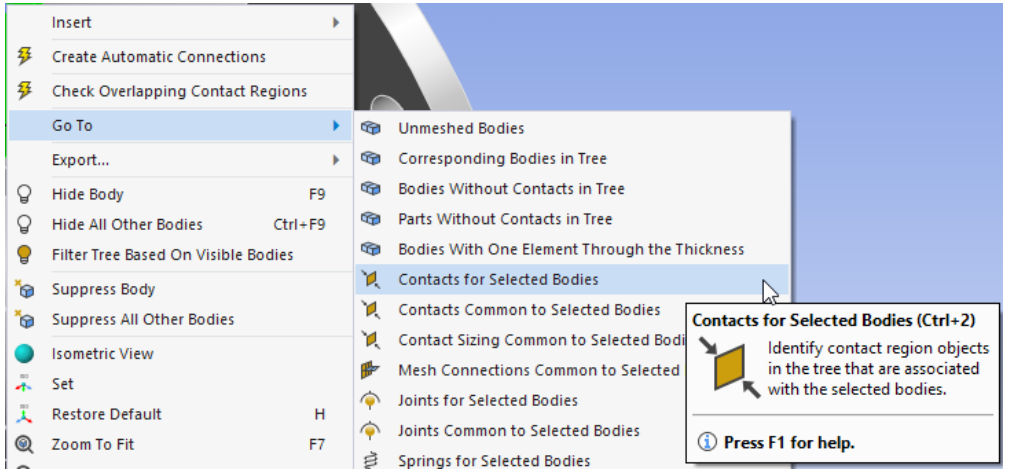


Step-by-Step Guide 05: Connections

- Activate the **Body** filter.

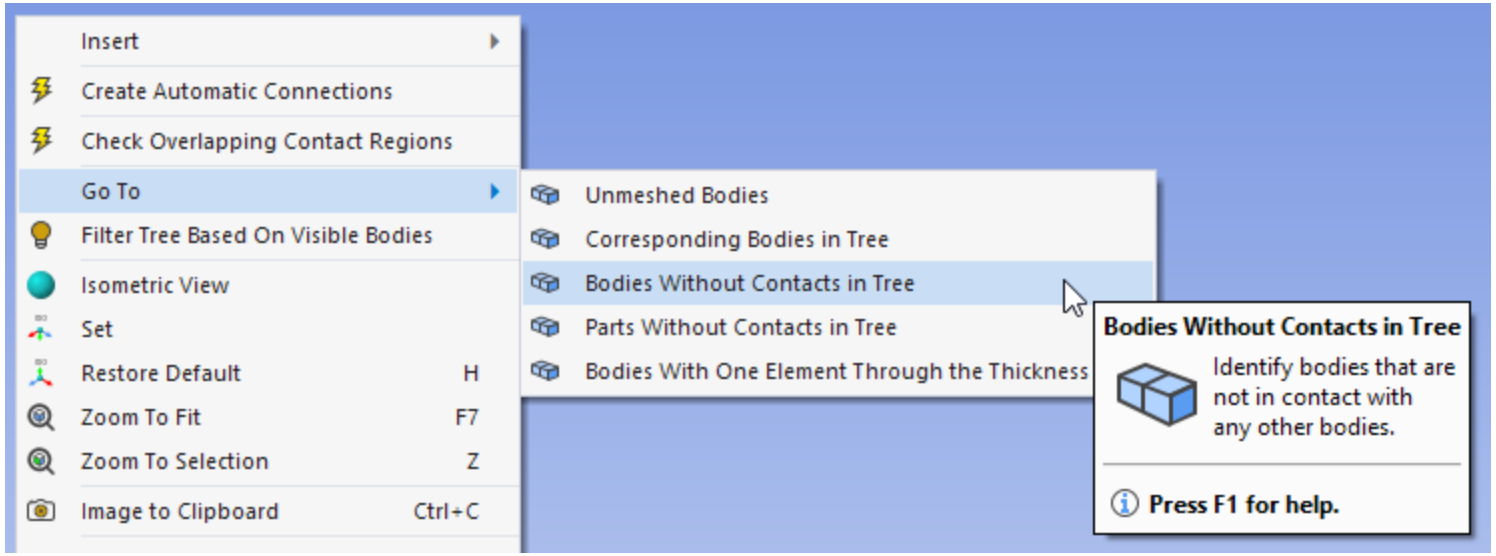
Select part **Component2\flange** in the **Geometry** view.

- In any background area of the **Geometry** view, **RMB → Go To → Contacts for Selected Bodies.**
- Observe selected contact regions under the **Contacts** branch in the **Outline**.



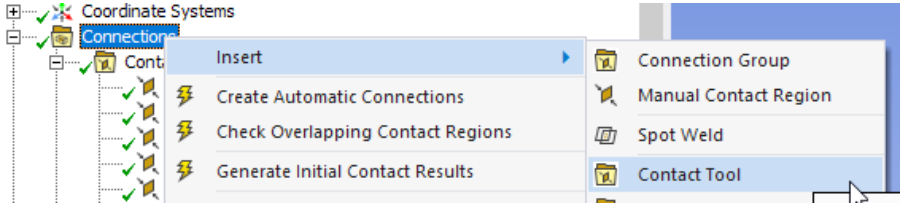
Step-by-Step Guide 05: Connections

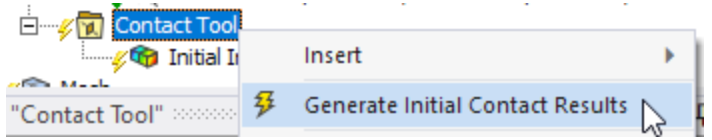
- In any background area of the **Geometry** view, **RMB → Go To → Bodies Without Contacts in Tree**. (This should result in no bodies being selected.)



Step-by-Step Guide 05: Connections

- **RMB—Connections → Insert → Contact Tool**
- **RMB—Contact Tool → Generate Initial Contact Results**
- Select the **Initial Information** branch.
- Review the **Initial Information** worksheet.





Worksheet

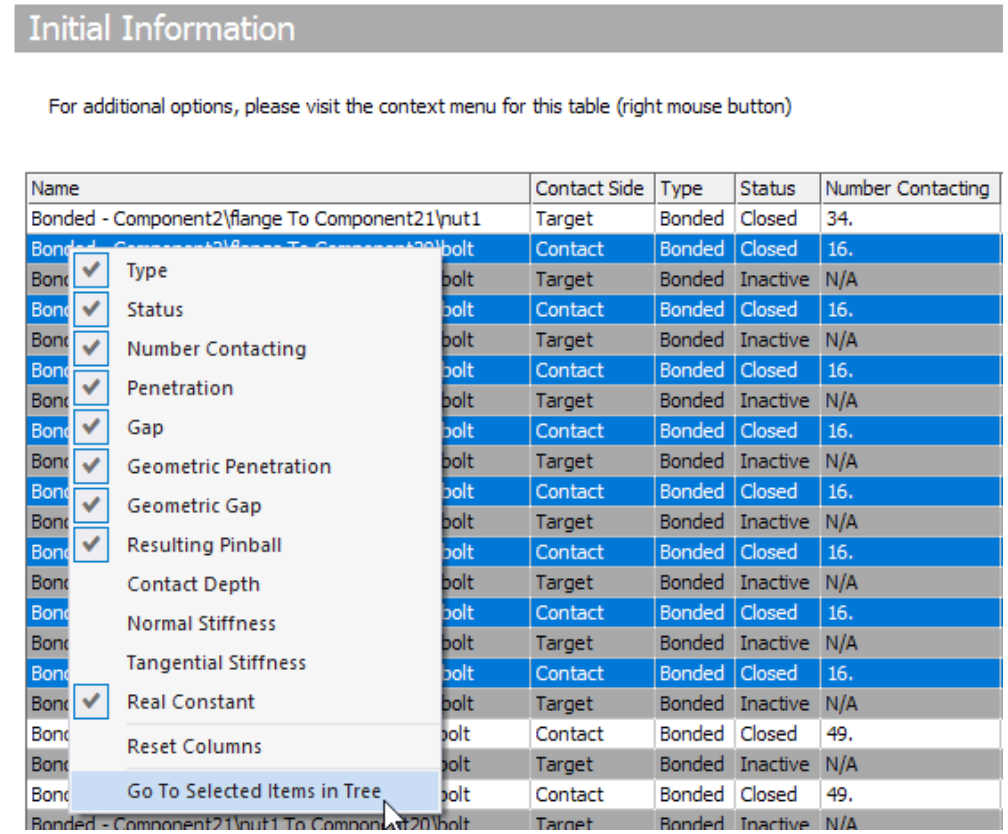
Initial Information

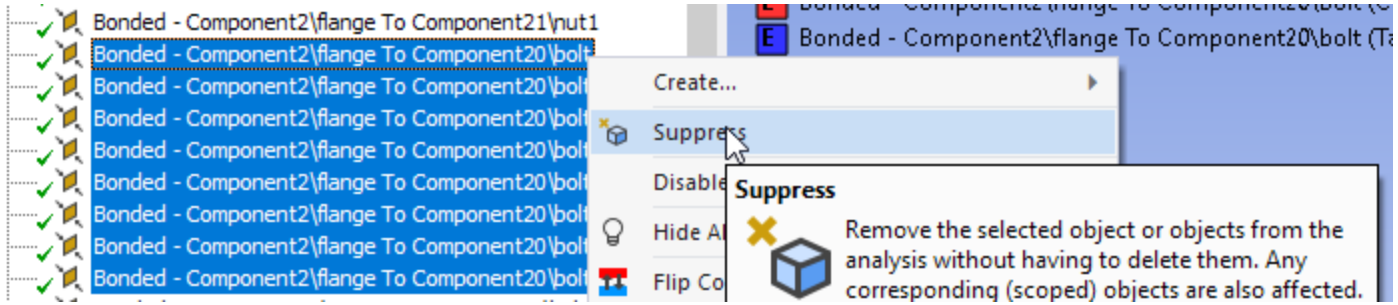
For additional options, please visit the context menu for this table (right mouse button)

Name	Contact Side	Type	Status	Number Contacting	Penetration (mm)	Gap (mm)	Geometric Penetration (mm)	Geometric Gap (mm)	Resulting Pinball (mm)	Real Constant
Bonded - Component1\ValveBody To Component2\flange	Contact	Bonded	Closed	151.	0.	2.8307e-003	0.	2.8307e-003	0.6588	21.
Bonded - Component1\ValveBody To Component2\flange	Target	Bonded	Inactive	N/A	N/A	N/A	N/A	N/A	N/A	22.
Bonded - Component1\ValveBody To Component20\bolt	Contact	Bonded	Inactive	N/A	N/A	N/A	N/A	N/A	N/A	23.
Bonded - Component1\ValveBody To Component20\bolt	Target	Bonded	Closed	37.	2.8422e-014	0.	2.8422e-014	1.7065e-027	0.23678	24.
Bonded - Component1\ValveBody To Component20\bolt	Contact	Bonded	Inactive	N/A	N/A	N/A	N/A	N/A	N/A	25.
Bonded - Component1\ValveBody To Component20\bolt	Target	Bonded	Closed	37.	2.8422e-014	0.	2.8422e-014	1.4211e-014	0.23678	26.
Bonded - Component1\ValveBody To Component20\bolt	Contact	Bonded	Inactive	N/A	N/A	N/A	N/A	N/A	N/A	27.
Bonded - Component1\ValveBody To Component20\bolt	Target	Bonded	Closed	37.	2.8422e-014	0.	2.8422e-014	1.4211e-014	0.23678	28.
Bonded - Component1\ValveBody To Component20\bolt	Contact	Bonded	Inactive	N/A	N/A	N/A	N/A	N/A	N/A	29.
Bonded - Component1\ValveBody To Component20\bolt	Target	Bonded	Closed	37.	2.8422e-014	0.	2.8422e-014	1.4211e-014	0.23678	30.
Bonded - Component1\ValveBody To Component20\bolt	Contact	Bonded	Inactive	N/A	N/A	N/A	N/A	N/A	N/A	31.
Bonded - Component1\ValveBody To Component20\bolt	Target	Bonded	Closed	37.	2.8422e-014	0.	2.8422e-014	2.9686e-028	0.23678	32.
Bonded - Component1\ValveBody To Component20\bolt	Contact	Bonded	Inactive	N/A	N/A	N/A	N/A	N/A	N/A	33.
Bonded - Component1\ValveBody To Component20\bolt	Target	Bonded	Closed	37.	2.8422e-014	0.	2.8422e-014	1.4211e-014	0.23678	34.
Bonded - Component1\ValveBody To Component20\bolt	Contact	Bonded	Inactive	N/A	N/A	N/A	N/A	N/A	N/A	35.
Bonded - Component1\ValveBody To Component20\bolt	Target	Bonded	Closed	37.	2.8422e-014	0.	2.8422e-014	1.4211e-014	0.23678	36.
Bonded - Component1\ValveBody To Component20\bolt	Contact	Bonded	Inactive	N/A	N/A	N/A	N/A	N/A	N/A	37.
Bonded - Component1\ValveBody To Component20\bolt	Target	Bonded	Closed	37.	2.8422e-014	0.	2.8422e-014	4.9799e-028	0.23678	38.

Step-by-Step Guide 05: Connections

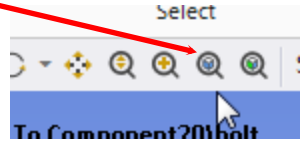
- Observe 8 contact regions coded in orange at the bottom of the table, and Ctrl-select all of them in the **Initial Information** table
- **RMB → Go To Selected Items in Tree** on any one of the selected contact regions.
- **RMB → Suppress** on any one of the 8 contact regions now selected in the **Outline Tree**



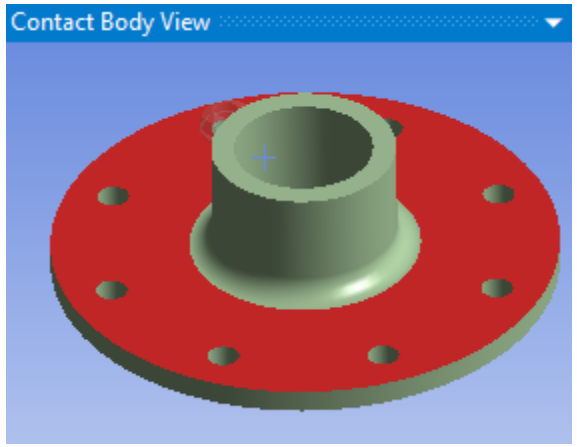


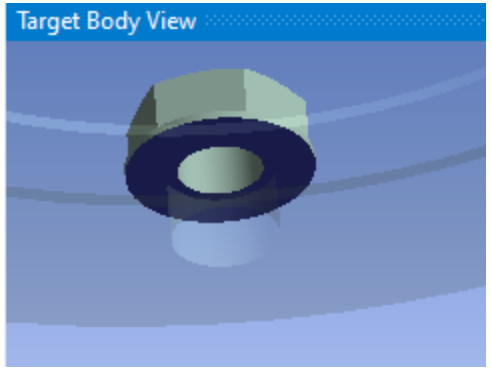
Step-by-Step Guide 05: Connections

- Click the **Zoom to Fit** toolbar button.



- Select one of the contact regions named **Bonded - Component2\flange To Component21\nut1** and examine the relative sizes and shapes of the contact (red) and target (blue) surfaces.



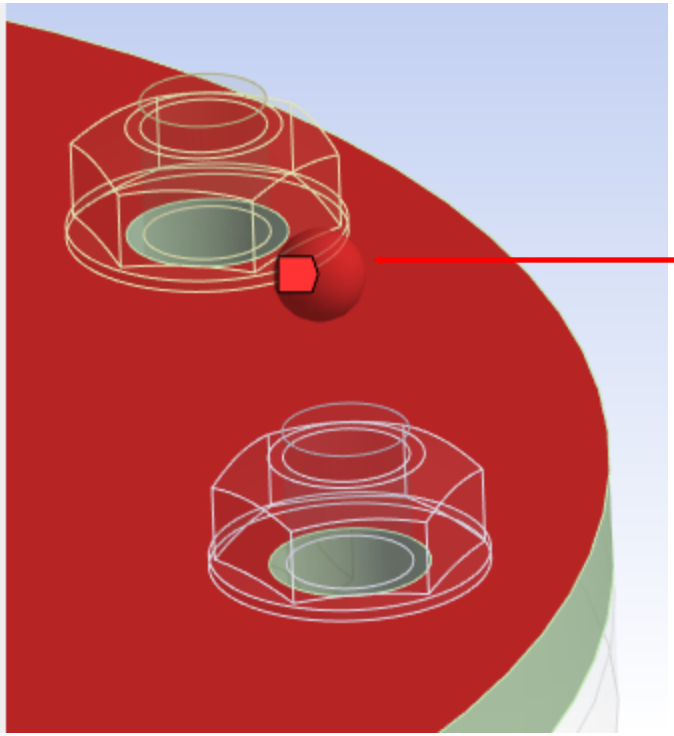


Step-by-Step Guide 05: Connections

- Change the value of detail **Pinball Region** to **Radius**.
- Change the value of detail **Pinball Radius** to **2 mm**.
- Observe the red sphere in the **Geometry** view representing the specified size of the pinball region

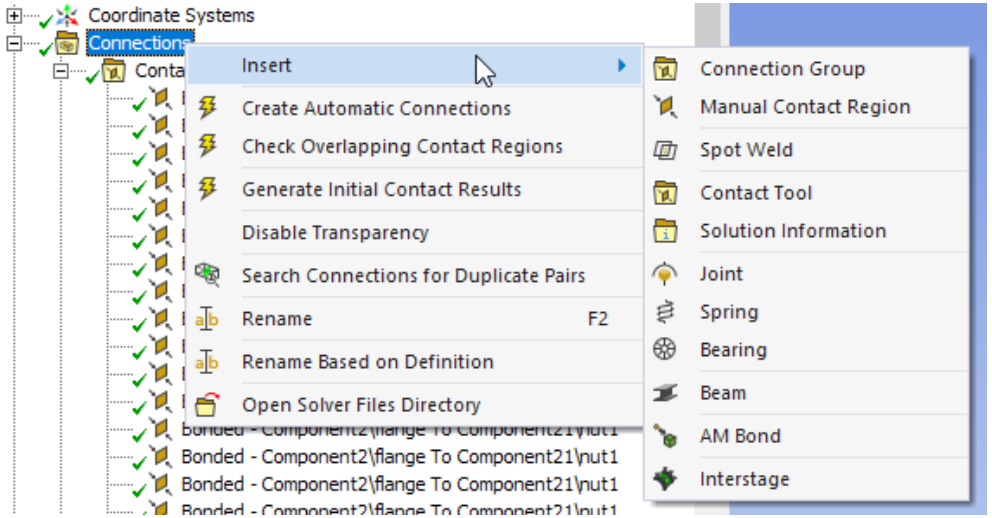
Details of "Bonded - Component2\flange To Component21\nut1"

Behavior	Program Controlled
Trim Contact	Program Controlled
Trim Tolerance	0.9006 mm
Suppressed	No
Display	
Element Normals	No
Advanced	
Formulation	Program Controlled
Small Sliding	Program Controlled
Detection Method	Program Controlled
Penetration Tolerance	Program Controlled
Elastic Slip Tolerance	Program Controlled
Normal Stiffness	Program Controlled
Update Stiffness	Program Controlled
Pinball Region	Radius
Pinball Radius	2. mm
Geometric Modification	
Contact Geometry Correction	None
Target Geometry Correction	None



Step-by-Step Guide 05: Connections

- Select the **Initial Information** branch.
- Observe the **Resulting Pinball** column of data.
- Select the same contact region as above named **Bonded - Component2\flange To Component21\nut1**.
- Change the value of detail **Pinball Region** back to **Program Controlled**.
- **RMB—Connections → Insert** and observe the options available for other types of connections.



End of presentation