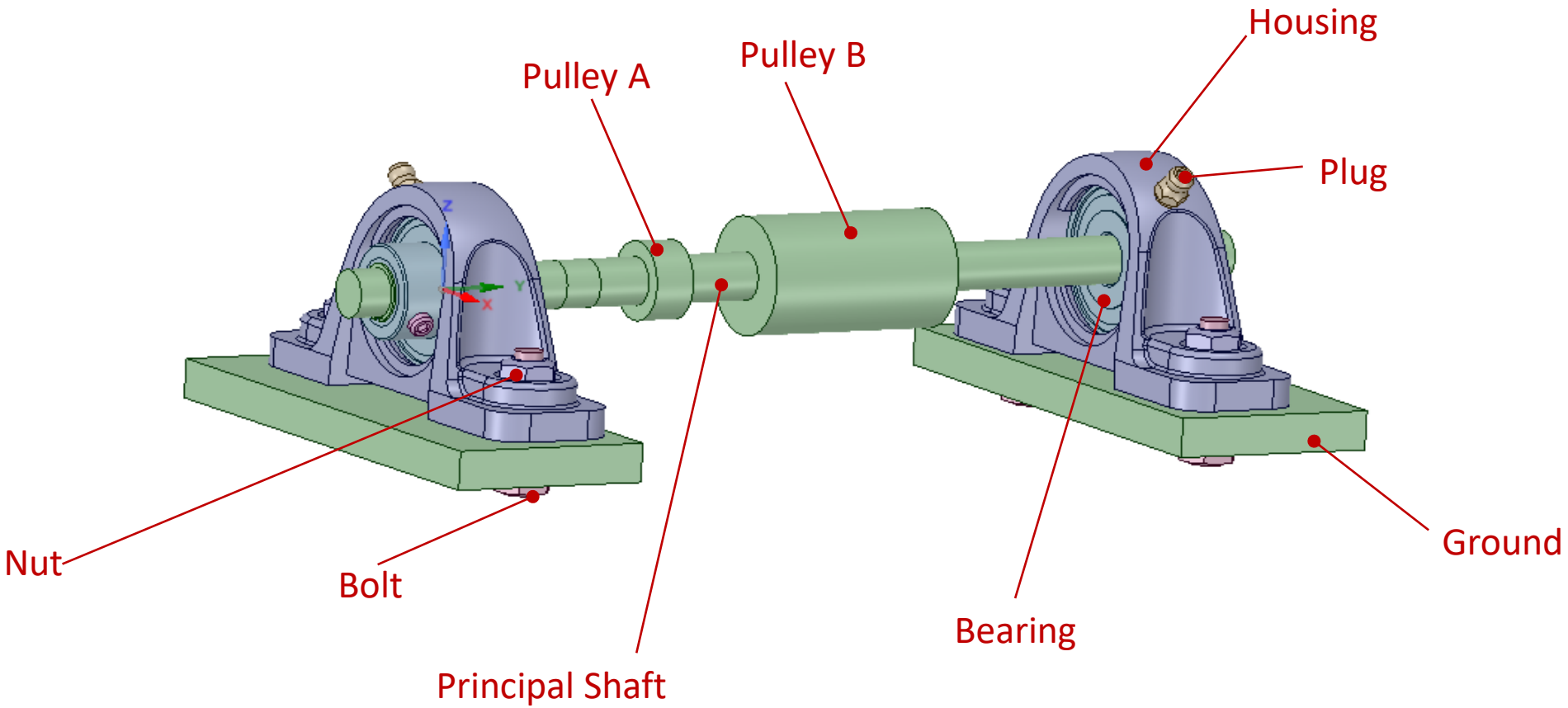
Ansys Mechanical Beyond the Basics

Module 01 Workshop: Improved Modeling Approach

Release 2021 R2

Workshop 01: Improved Modeling Approach



Shaft and Bearing Assembly

Workshop 01: Improved Modeling Approach

- **Model Improvement**
  - **Full 3D geometry; can we reduce the model size, and in doing so, gain better fidelity elsewhere?**

    We'll continue to use full 3D model since there is no possible simplification
  - **Bonded contact everywhere?**

    We'll introduce frictional contact between the rings and the bearings

    We'll define frictionless contact between housings and grounds to allow a potential lift of the housing between the bolts

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- **Model Improvement**
  - **Solid body representation of bolts and nuts?**

    We'll replace them with simplified beam representation
  - **Sharing topology among different parts of the assembly?**

    We can use it between the shaft and the pulleys since there is no relative motion between them.
  - **Improving the boundary conditions?**

    We'll replace both force loads with bearing loads to have a better representation of reality

    We'll add bolt pretension to the beam representation of bolts

Workshop 01: Improved Modeling Approach

Leads into M10: Further Geometry Considerations and M12: Enhanced Mesh Techniques

Leads into M11: More Realistic Connections

Leads into M13: Additional Analysis Settings, Loads, and Supports

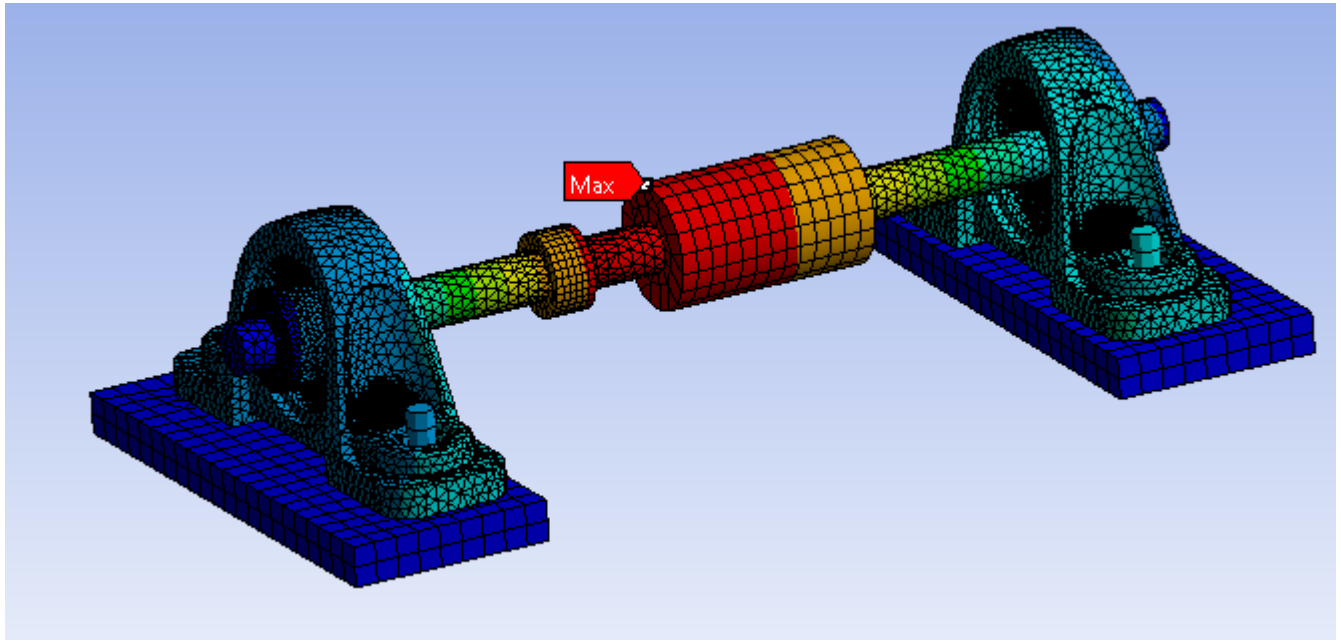
Leads into M14: Expanded Results and Validation

- **What components do I model and why?**
  - Body Suppression for Physics
  - **Simplified Bolt Bodies / Beams for Bolts**
  - **Shared Topology Between Pulleys and Shaft**
- **How do I treat the interfaces among the components?**
  - **Frictional and Frictionless Contact**
  - Contact Parameters Adjustments
- **Can I make more realistic modeling assumptions?**
  - **Boundary Conditions**
  - **Bolt Preload**
  - 3 Load Steps Definition Due to Preload
- **How will I validate the model and the design?**
  - **Contact Results**
  - **Beam / Bolt Results**
  - **Averaged / Unaveraged Stresses**
  - Misalignment Calculation

Workshop 01: Improved Modeling Approach

We'll make all the changes to the model with housings in Stainless Steel

Then, we'll duplicate the model and re run it with housings in Polycarbonate, to compare results, and draw a conclusion

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