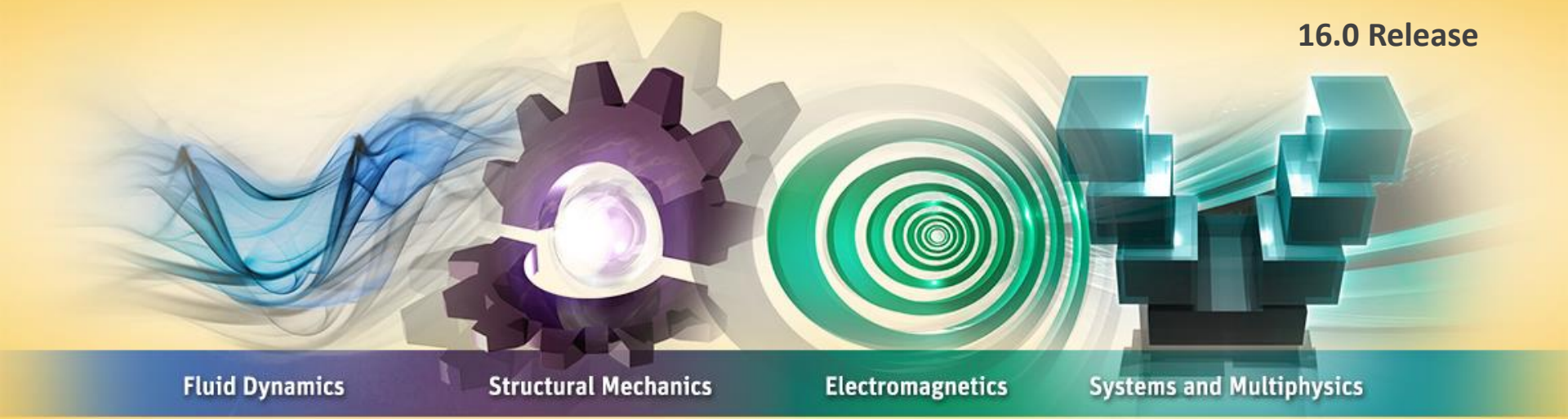
Workshop 6.1
Remote Boundary Conditions

16.0 Release



Introduction to ANSYS Mechanical

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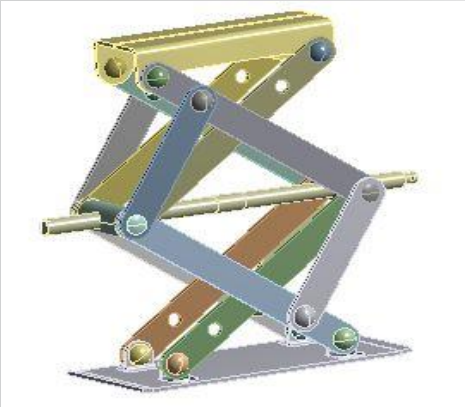
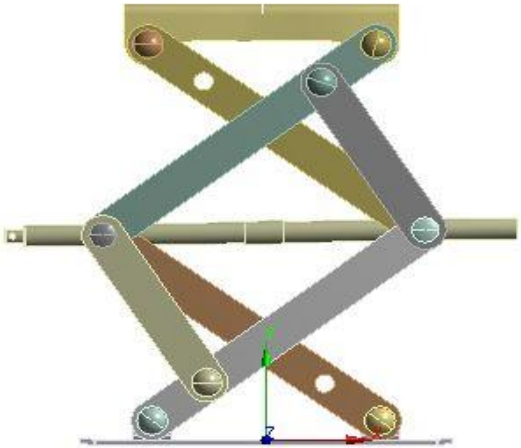
Goals

The goal of this workshop is to analyze the base of the jack assembly shown here. Our assumption is the mechanism has been proven already so we choose to not include the additional parts and model only the base.

- **The weight of a vehicle will be simulated using a point mass.**
- **We'll assume there are lateral loads acting on the jack as well which will be applied using a remote force.**

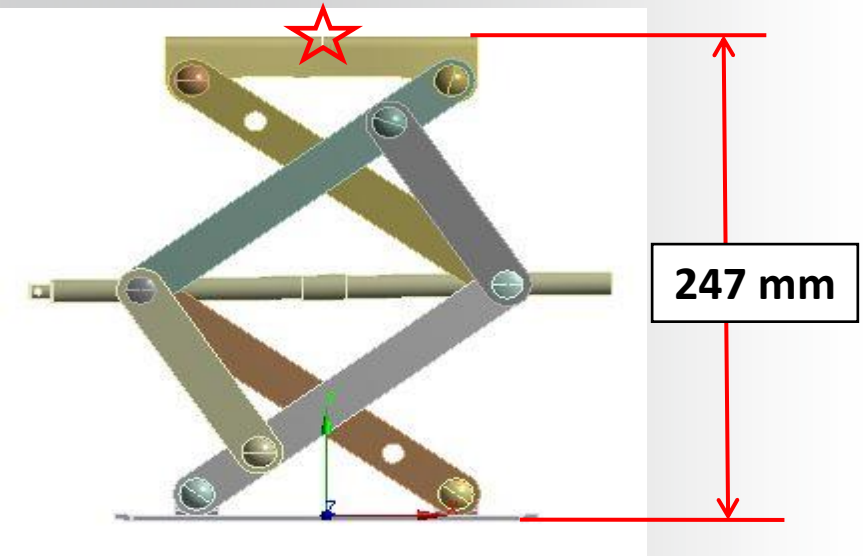


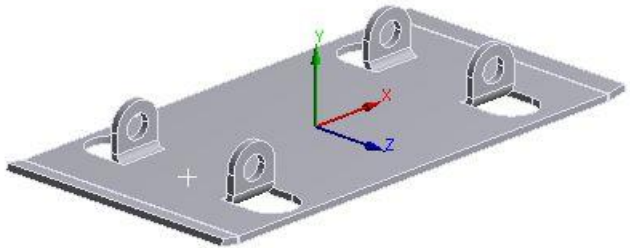


Goals

Since we won't be modeling the entire assembly, we need to know the location where the jack will be contacting the vehicle. We assume this to be the centroid of the top member of the jack assembly.

Centroid = (-2, 247, 0)



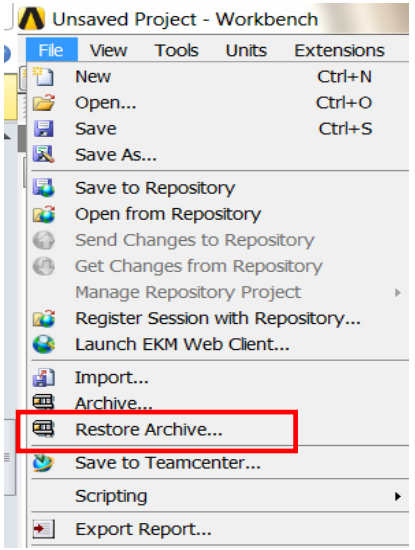


Analysis Model

Project Schematic

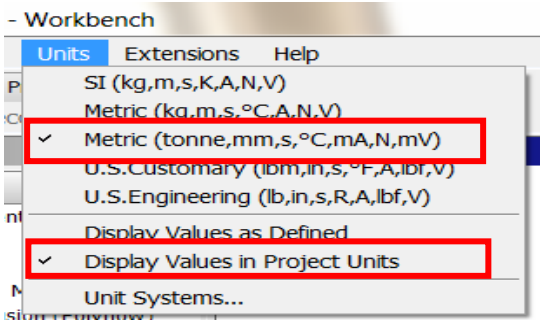
Begin a new Workbench session and, from the Project page, choose “Restore Archive . . . “ and browse to the file “Remote_BC.wbpz” and Open (location provided by instructor).

When prompted, “Save” using the default name in the same location as the archive file.



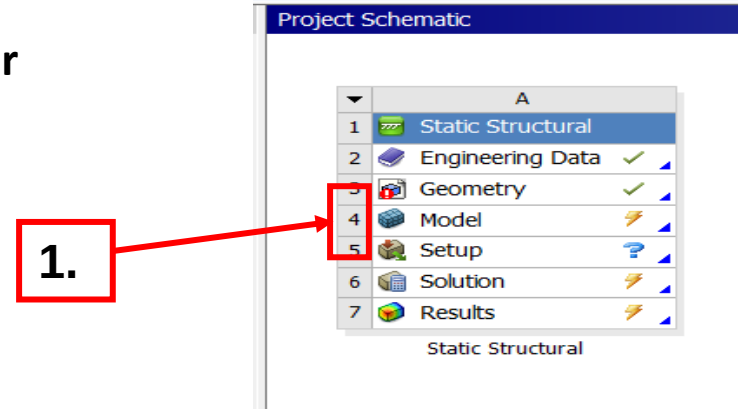
From the “Units” menu verify:

- Project units are set to “Metric (tonne, mm, s, ºC, mA, N, mV).
- “Display Values in Project Units” is checked (on).

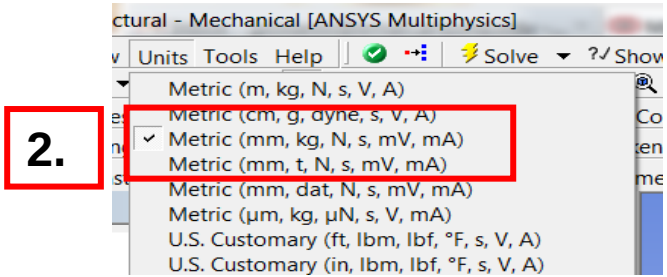


. . . Project Schematic

1. From the Static Structural system double click (or RMB > Edit) the “Model” cell.



2. When Mechanical opens, verify the units are set to “Metric (mm, kg, s, mV, mA)”.



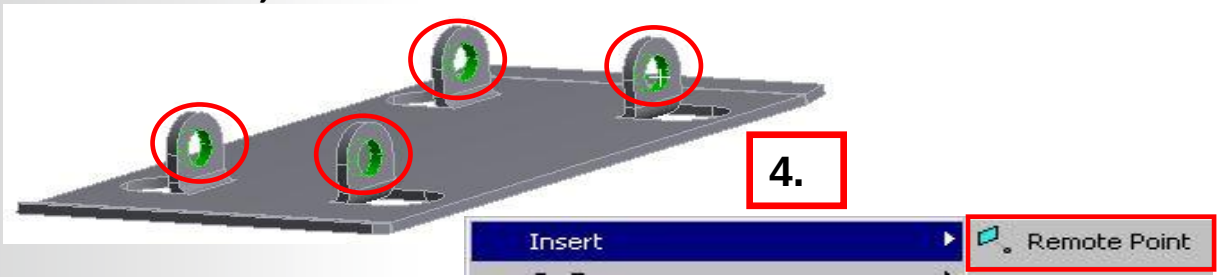
Preprocessing

When Mechanical opens we will have only the base part. Since we'll be using remote conditions as well as a point mass all at the same location, it makes sense to use a remote point as a reference.

- **Note, the use of a remote point means multiple conditions at the same location (like point masses, remote loads, etc.), can all reference that location without duplicating the constraint equations used to apply them.**

3. Highlight the Model branch in the tree.

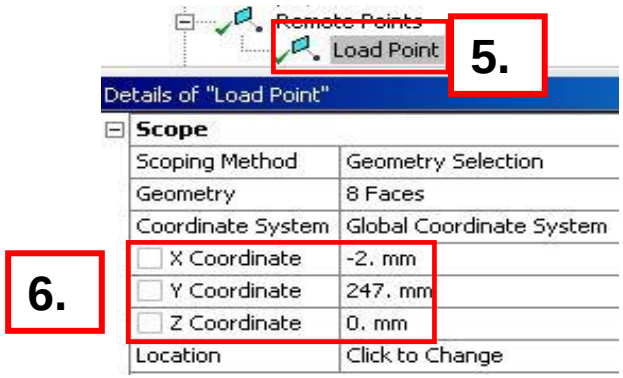
4. Select the 8 split faces shown here, RMB > Insert > Remote Point.



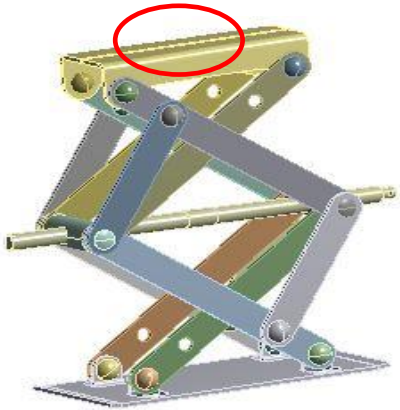
. . . Preprocessing

5. Highlight the remote point, RMB > Rename: “Load Point”.

6. In the Remote Point details enter the location:
   - X = - 2
   - Y = 247
   - Z = 0



As said earlier, this location represents the centroid of the top pad of the jack where the vehicle will make contact when it is lifted.



. . . Preprocessing

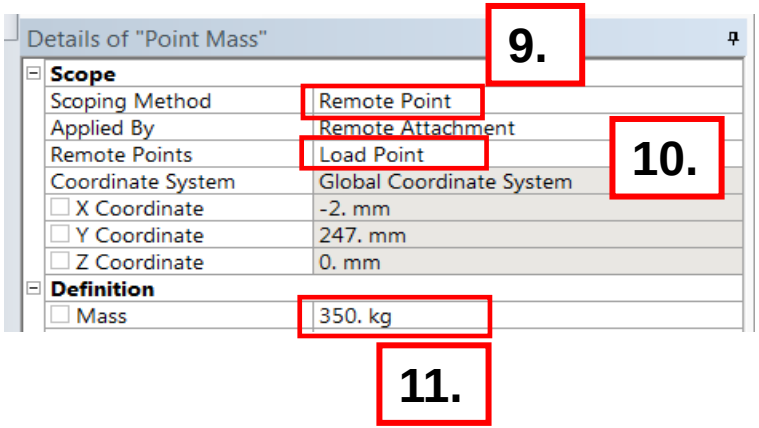
7. Highlight the Geometry branch.

8. RMB > Insert > Point Mass.

9. In the point mass details change the Scoping Method to “Remote Point”.

10. In the Remote Points field choose “Load Point” from the list.

11. Enter a mass of 350 kg in the details.

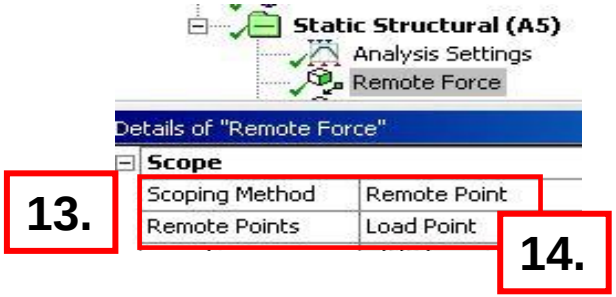


. . . Preprocessing

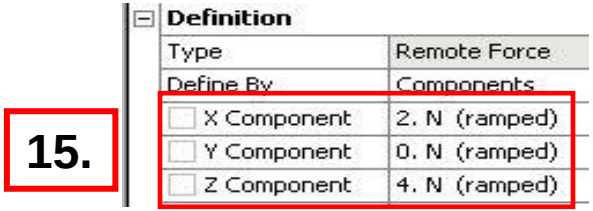
12. Highlight the Static Structural branch, RMB > Insert > Remote Force.

13. In the details change the Scoping Method to “Remote Point”.

14. Select “Load Point” from the drop down list of remote points.



15. In the details enter the following loads:
    - X Component = 2
    - Y Component = 0
    - Z Component = 4

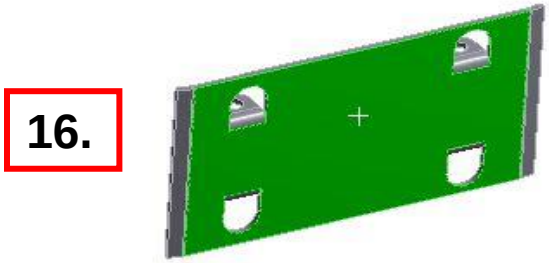


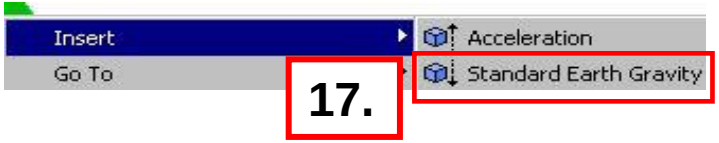
. . . Preprocessing

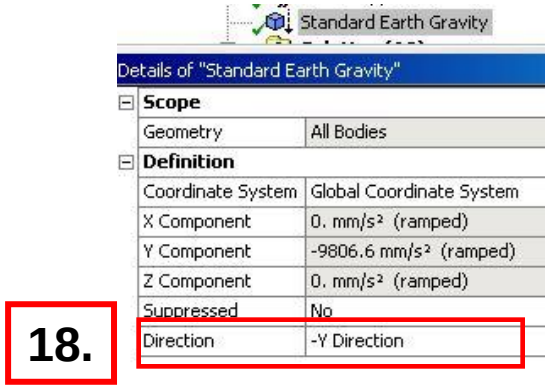
16. Highlight the bottom face of the part, RMB > Insert > Fixed Support.

17. Highlight the Static Structural branch, RMB > Insert > Standard Earth Gravity.

18. Specify –Y direction for gravity.



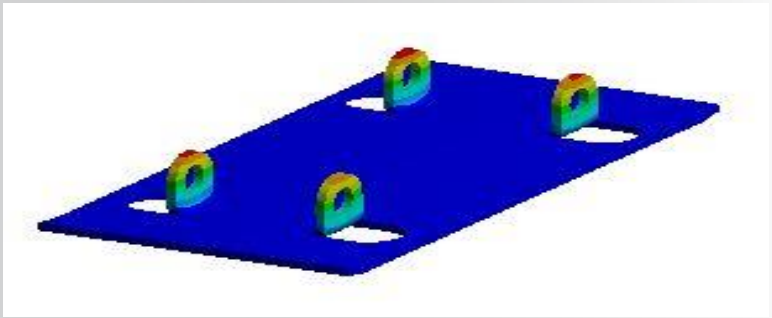


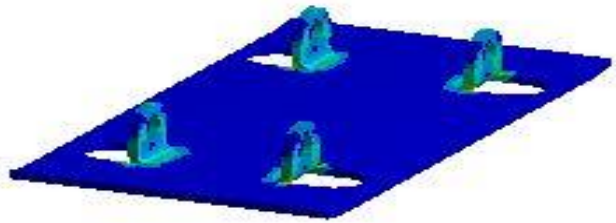


Postprocessing

Solve the model.

When the solution is complete various displacement plots can be used to verify the loading.





In this workshop we've shown how remote boundary conditions can be used to simplify the geometry model making for a more efficient solution.

