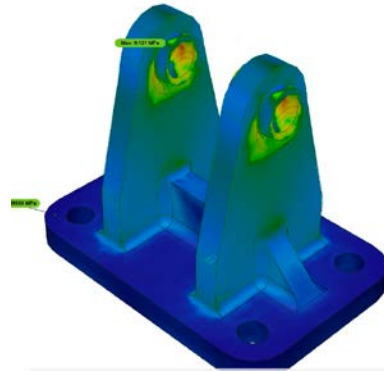


Lesson: Defining materials and properties

In this lesson, you learn the importance of accessing and how to create a custom material in the Fusion 360 materials library to ensure the mechanical properties are properly captured in the design.

Learning Objectives:

- Change the material of the model.
- Duplicate and edit a library material.
- Set a study material.

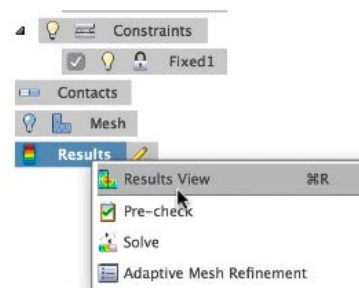


The completed exercise

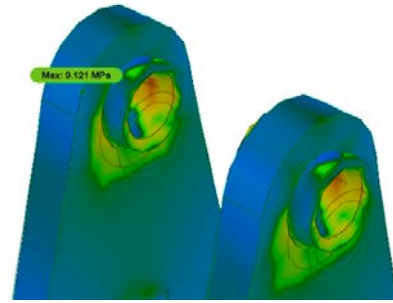
1. Open the file Lift Point – Materials.f3d then save it to your current project. Material plays a critical role in analyzing a design. Steel is the default material. To change this, right click in the workspace and select Physical Material; this will open the Physical Material library. Investigate all the options. Navigate to Stainless Steel then drag and drop it onto one of the collars. Since there are two instances of this part in the assembly they will both be updated with the material. Click Close.



2. Navigate to the Simulation Environment and note that the model already has loads and constraints applied to it but the analysis has not been done. Right click on Results and choose Results View then choose Yes to begin running an analysis. Again, choose Solve Locally then click Solve. It will take a moment to display the results of the analysis.



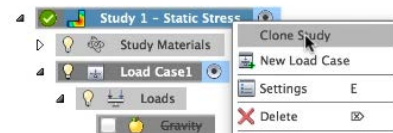
3. Close the Results Details dialog box. Change the graphical output from Safety Factor to Stress. Note the 9.121 Max stress value. Click Simulation>Display to return to the material appearance. Select Simulation>Study Materials to see the components and materials used in the study. You can change the material used in the study if desired.



4. Click Simulation>Material>Material Properties. Select a material to see its properties. To create a custom Material, click Simulation>Material>Manage Physical Materials. Select a material and review its properties using the Identity, Appearance, and Physical tabs. Click the pencil icon next to the material to save it to your Favorites, right click and select Duplicate, then right click the new material and rename it. Double click the new material to activate the properties and change the desired values. Investigate the options available. Click OK to create the material and note that it has been added to the library.

Information	
Basic Thermal	
Thermal Conductivity	1.670E+02 W/(m·K)
Specific Heat	0.897 J/(g·°C)
Thermal Expansion Coefficient	23.600 µm/(m·°C)
Mechanical	
Young's Modulus	68.900 GPa
Poisson's Ratio	0.33
Shear Modulus	25864.000 MPa
Density	2.700 g/cm³
Damping Coefficient	0.00
Strength	
Yield Strength	275.000 MPa
Tensile Strength	310.000 MPa
<input type="checkbox"/> Thermally Treated	

5. Right click Load Case1's Results and choose Results View to see the results. Right click Study 1 and select Clone study to create an exact copy.



6. Click Simulation>Material>Study Materials, change the Materials Library to Favorites Library, and change the collar's Study Material to the new material you created in step 4. Click OK. Click Solve and then in the control panel click Solve. Note that the values have changed compared to the original steel analysis.

