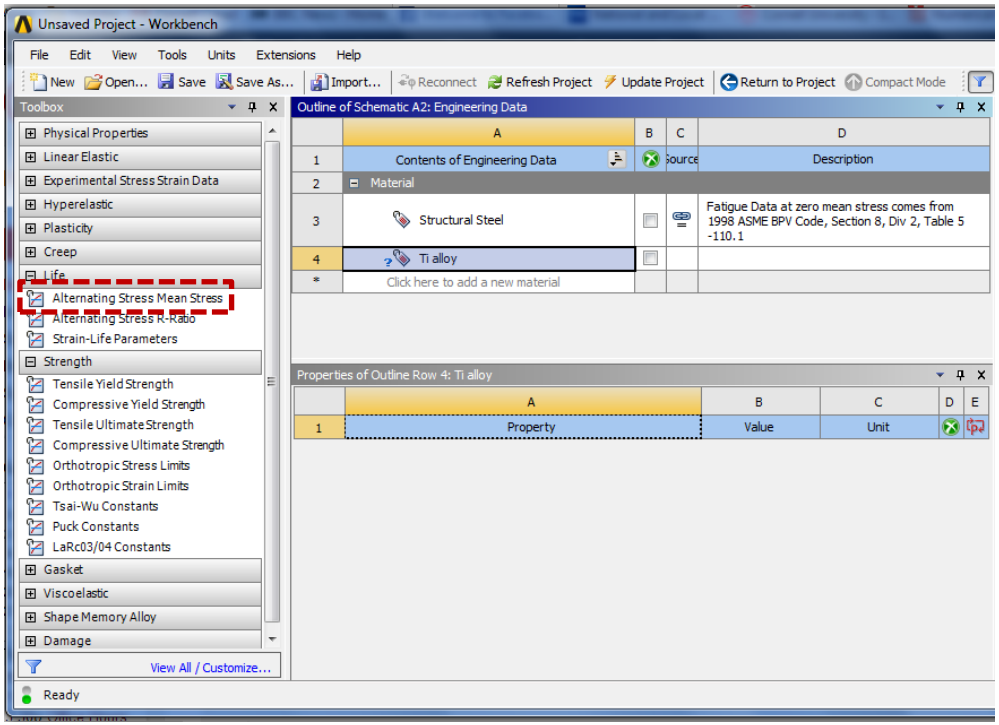
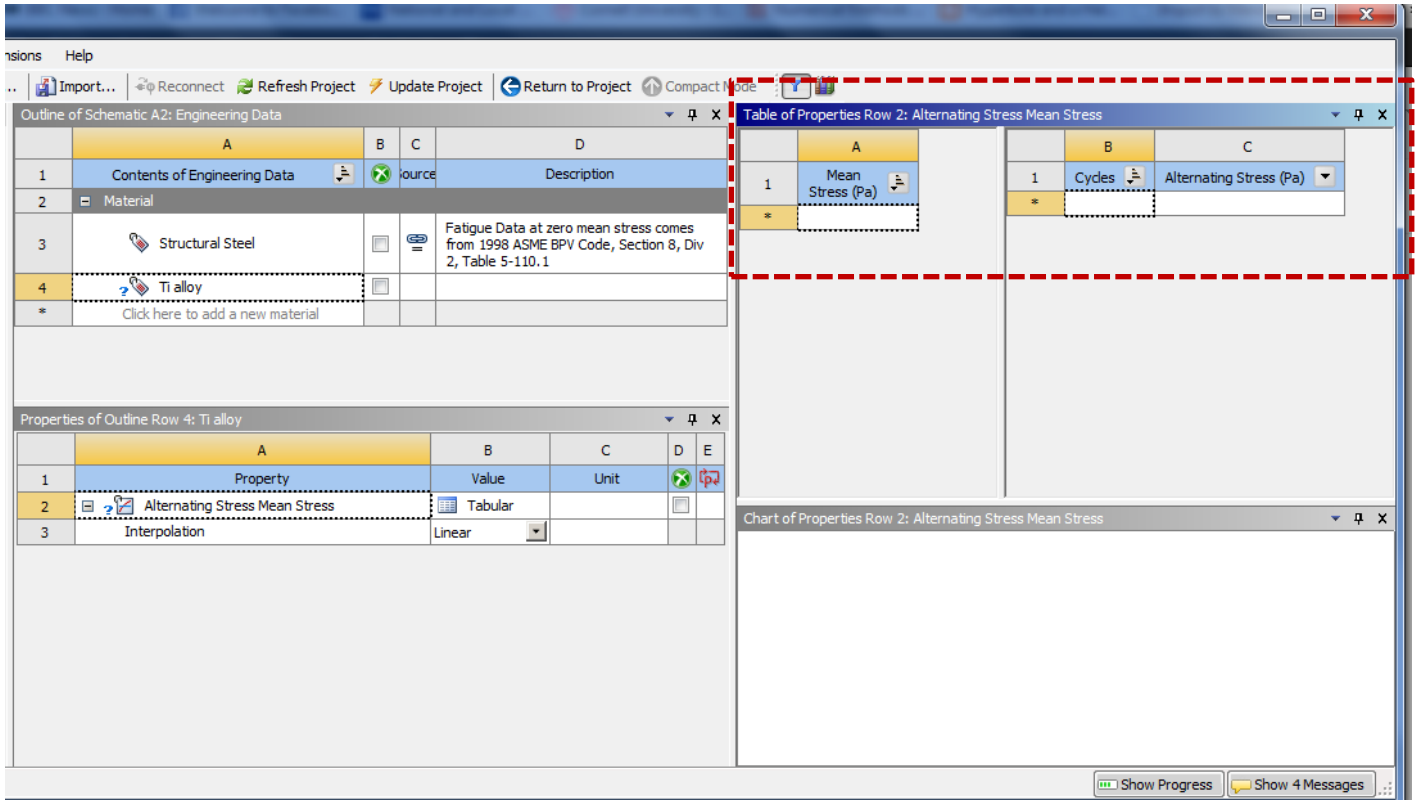
MAE 3250
Fall 2013
Project 3 Fatigue Tutorial

Fatigue Properties in ANSYS



- Under **Life** category, import **Alternating Stress Mean Stress** by double clicking on it
- Expand it to display a table of properties and interpolation choices

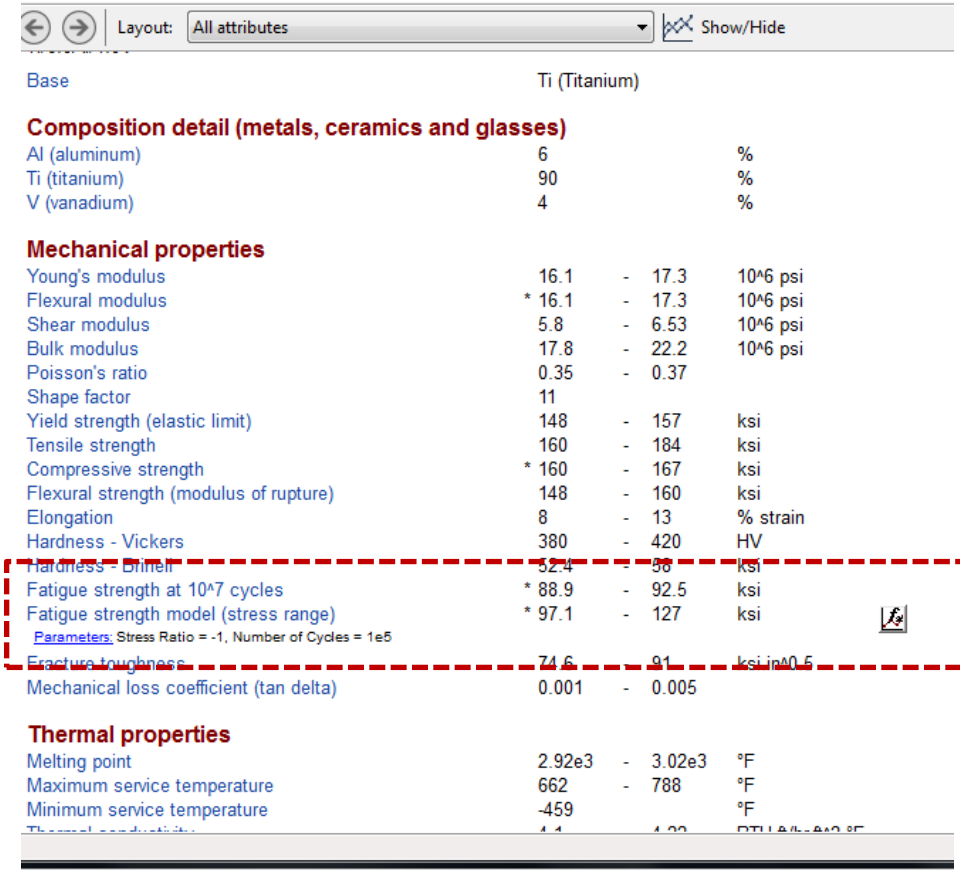
Fatigue Properties in ANSYS



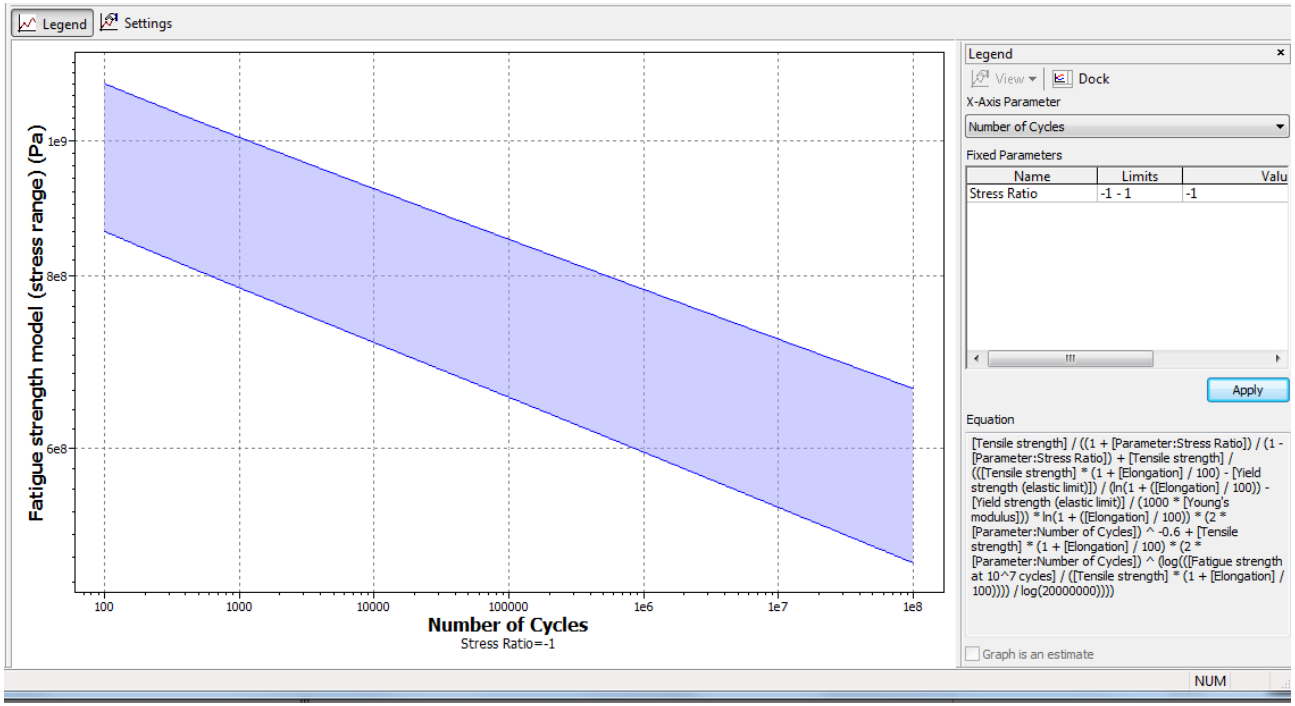
- Input the mean stress value and fatigue data necessary
- Use CES to determine values for number of cycles and alternating stress

Fatigue Properties in CES

- Use CES to determine fatigue data required in ANSYS
  - number of cycles and stress amplitude (alternating stress)
- Make sure to understand what “stress range” refers to and how to obtain the stress amplitude from it
- Specify an R-ratio such that the there is completely reversed loading



Fatigue Properties in CES



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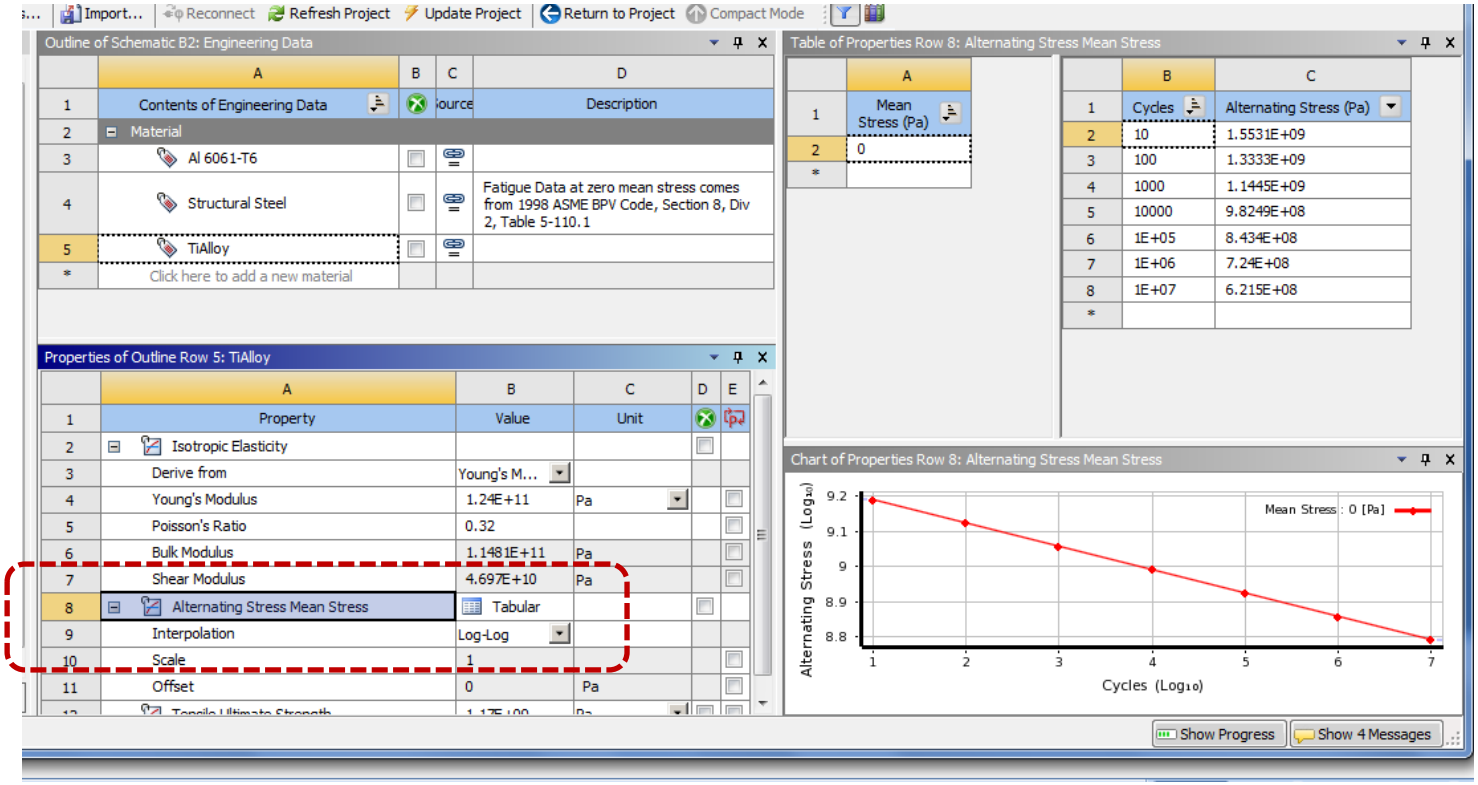
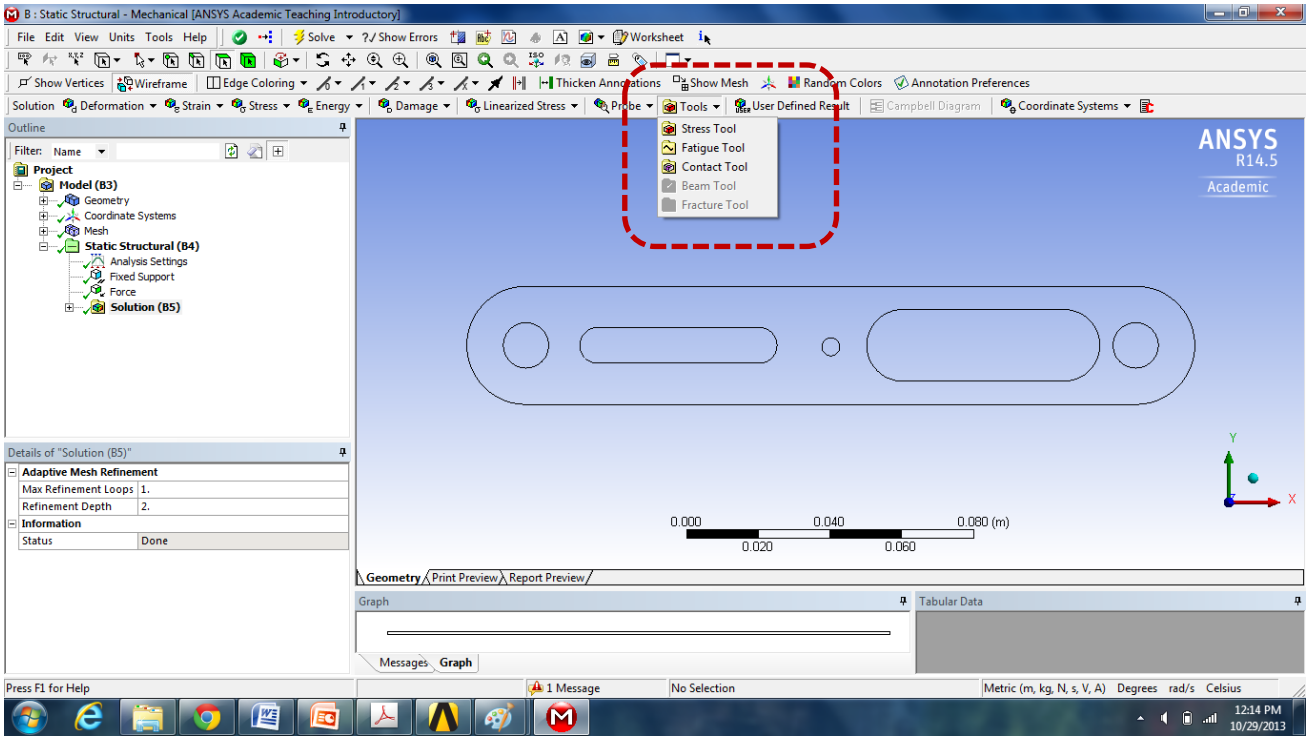
Fatigue Properties in ANSYS



- Specify how your data is distributed (ie linear, semi-log, log-log). A good guess is the Log-Log scale.
- **Return to Project** and save your data

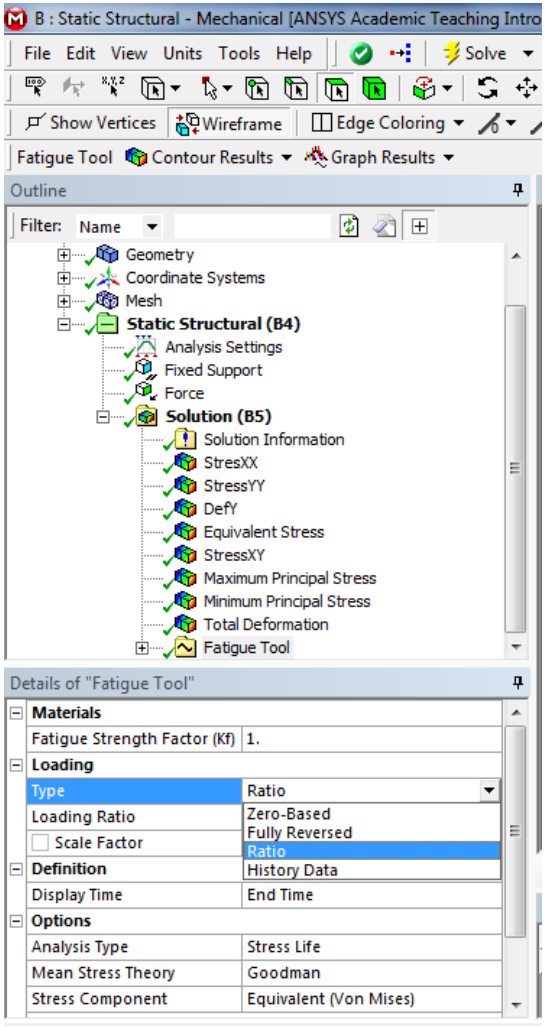
Fatigue Tool in ANSYS



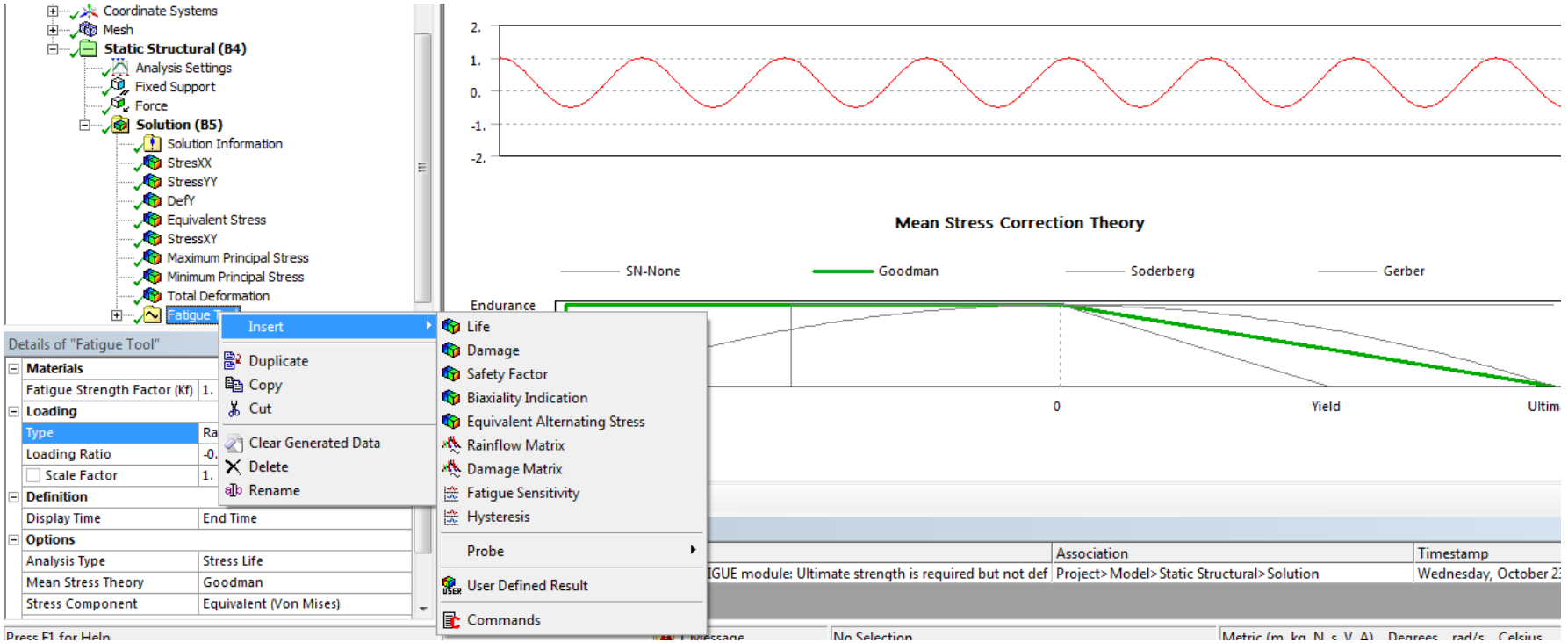
- Complete the static analysis before performing the fatigue analysis
- Once you have a solution to the static analysis, under **Tools**, select **Fatigue Tool**

Fatigue Tool in ANSYS

- Click on **Fatigue Tool**
- Under **Loading Type** in the details window, select **Ratio** and specify fatigue loading ratio
- Under **Mean Stress Theory** select **Goodman**
  - This will require having specified the ultimate tensile strength material property



Fatigue Tool in ANSYS



- Right click on Fatigue tool, and insert desired values to solve
  - Safety factor (make sure to specify the desired number of cycles)
  - Equivalent alternating stress
  - These values will also give an indication of the most susceptible point of failure in fatigue

Fatigue Tool in ANSYS

- Solve for the fatigue properties
  - Should give you an idea for the most susceptible point of failure in fatigue
- Another fatigue tutorial also available online
  - https://confluence.cornell.edu/display/SIMULATION/ANSYS+-+Fatigue+Analysis