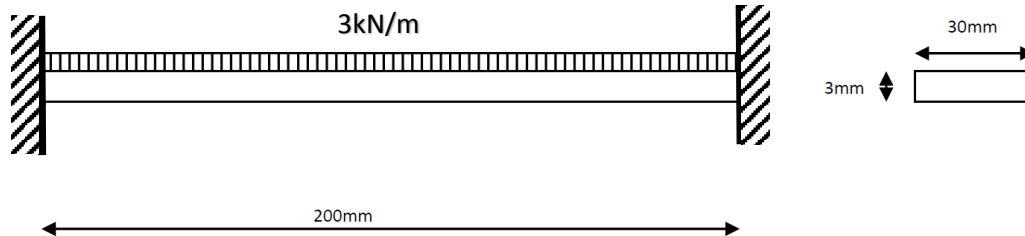
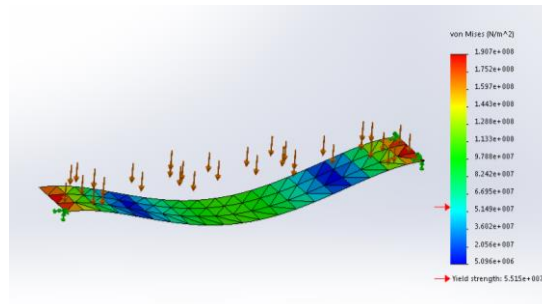


Introduction to Modelling Fatigue in Solidworks

The below 3mm thick aluminium 6061 beam is loaded as shown. We want to understand how this system behaves when loaded once, and secondly, when we could expect to see failure if this was subjected to cyclic loading.



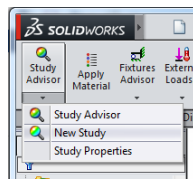
First assess this static loadcase using 10mm shell elements, you should see the below



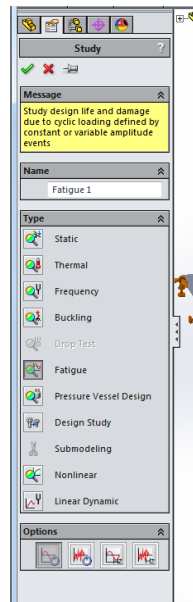
When looking at the elemental stress on the top surface we see a maximum stress of 191MPa at the walls. Is this what you expect? If you have not got this then reassess this structure.

We are now going to carry out a fatigue analysis based on this static analysis.

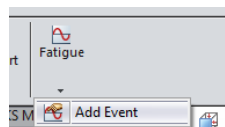
Select a new study



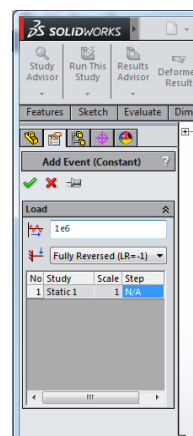
Select fatigue



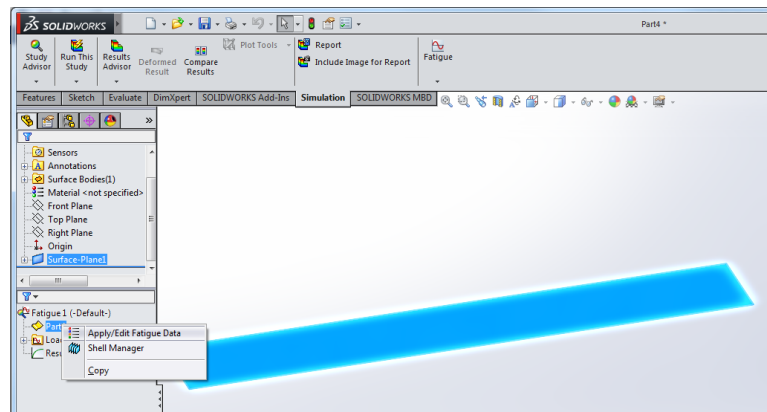
Add your event



We will now load this for 1 million cycles of FULLY REVERSED loading

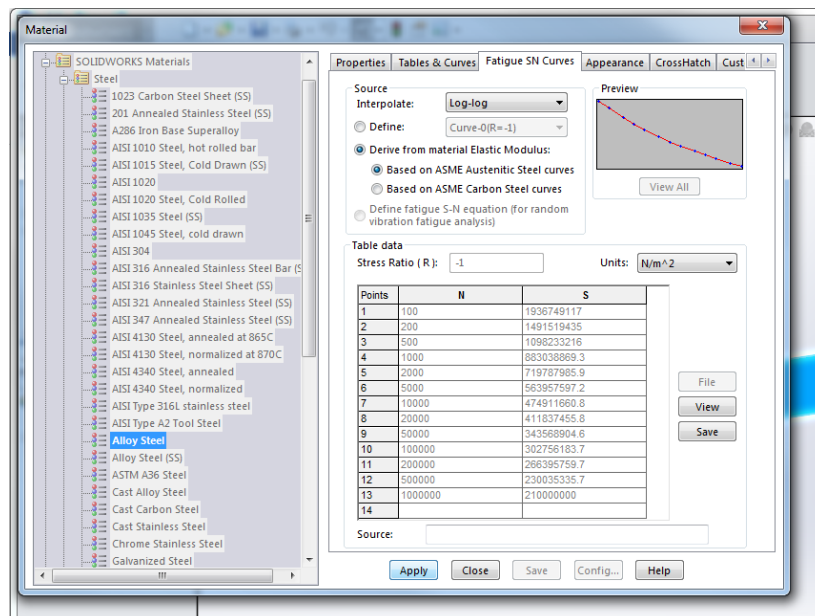


In order to calculate the fatigue life of this component we must first define an Sn curve

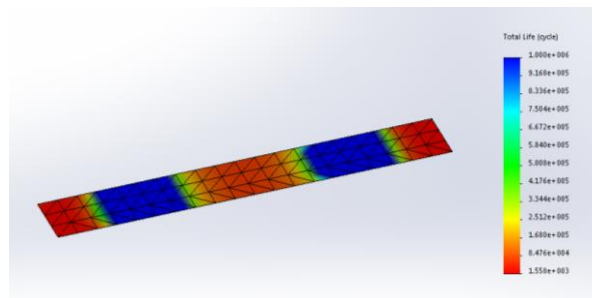


If we have Sn data for the material that you are assessing then you can then enter this here. Alternatively, Solidworks can derive an Sn curve from the material elastic modulus.

Apply, close

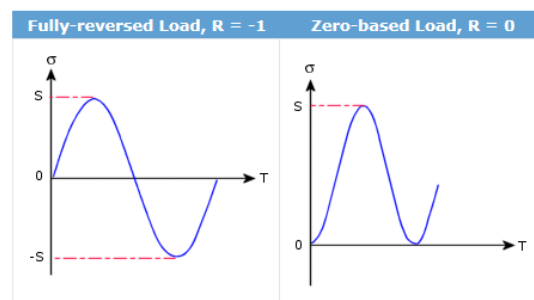


Run this study, you should see the following

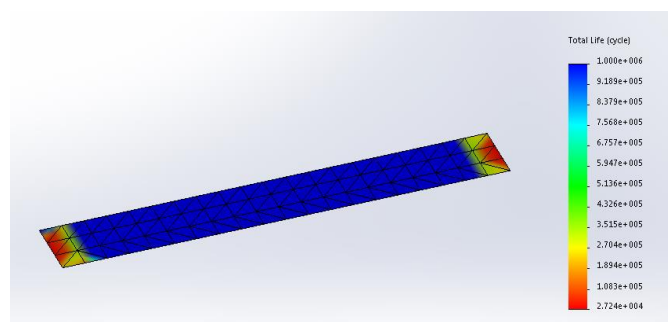


Note that if you plot total life, this analysis predicts that the part will fail at the connections to the wall at about 1,558 cycles. How realistic do you think that this is? How does the mesh size influence this?

Now change this to a zero based load by editing the event, i.e. we now have a non-zero mean stress.



Re-run this analysis and we should now see the below;



Failure is now predicted after 27,240 cycles as our amplitude has halved.