

Steel Frame with Solid Elements

www.calculixforwin.com

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Input data: Frame1.step file, material: steel, load = 25,000 lb (one side, half of span)

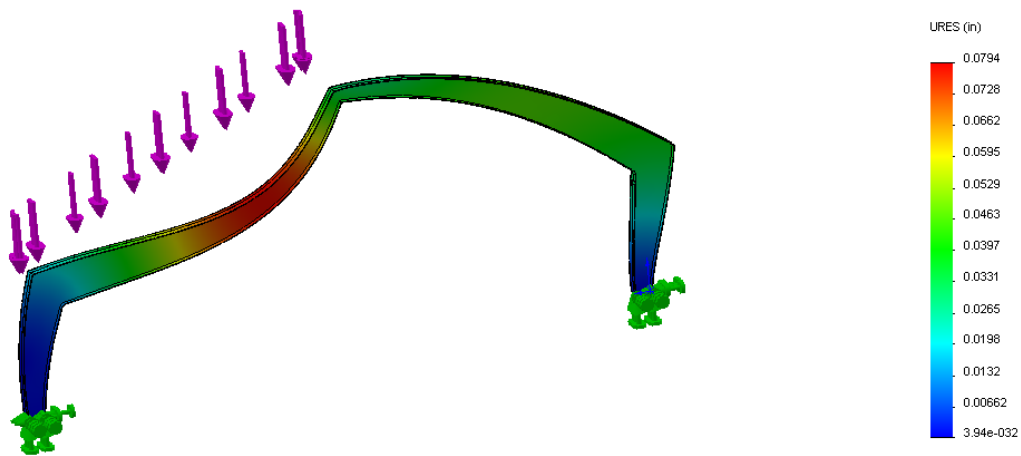


Fig. 1 - SolidWorks Simulation, Max. Displacements (0.08'')

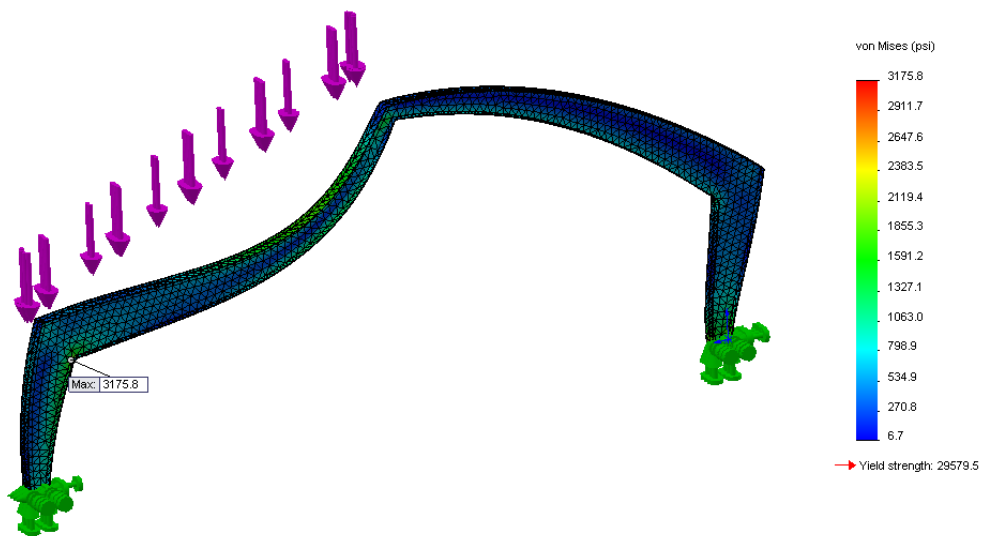


Fig. 2 - SolidWorks Simulation, Von Mises stress (3,176 psi, rough mesh)

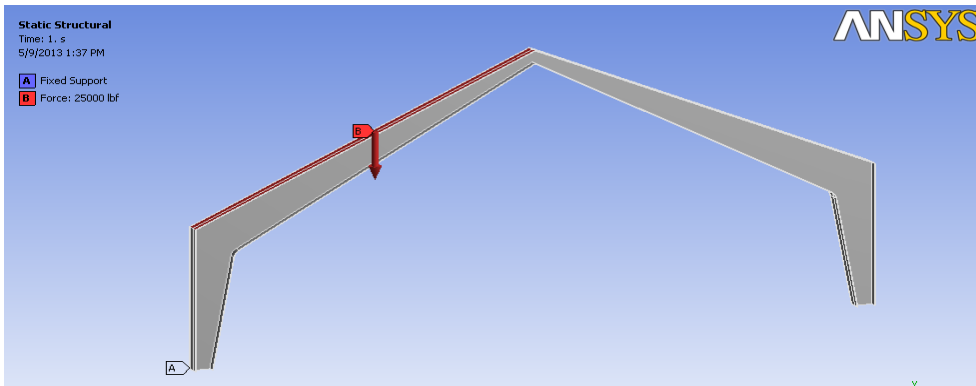


Fig. 3 ANSYS, Load applied

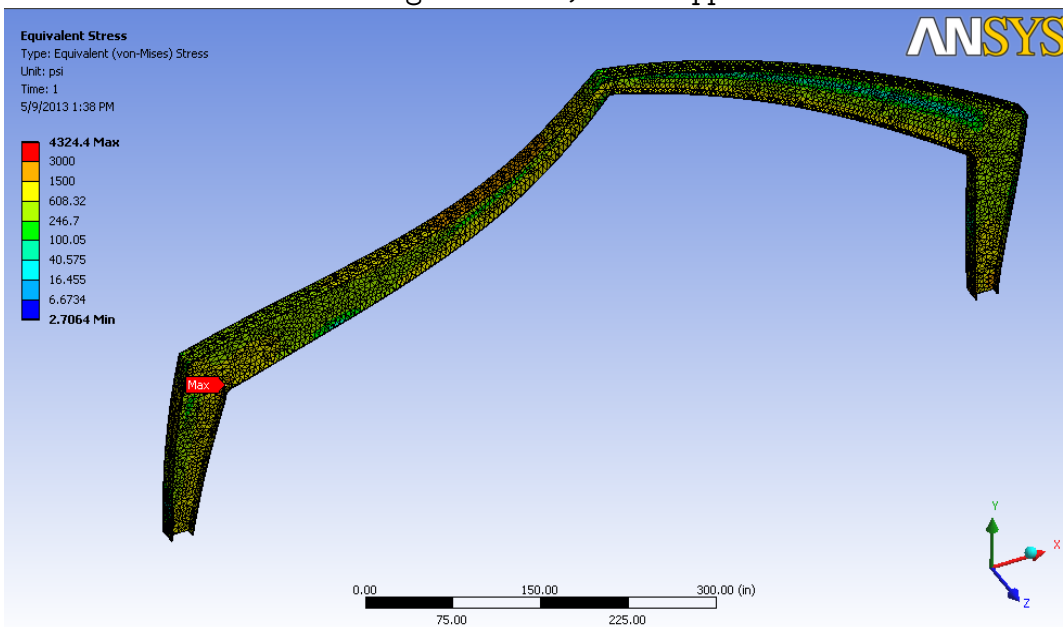


Fig. 4 ANSYS - Von Mises stress (max. 4320 psi, localized)

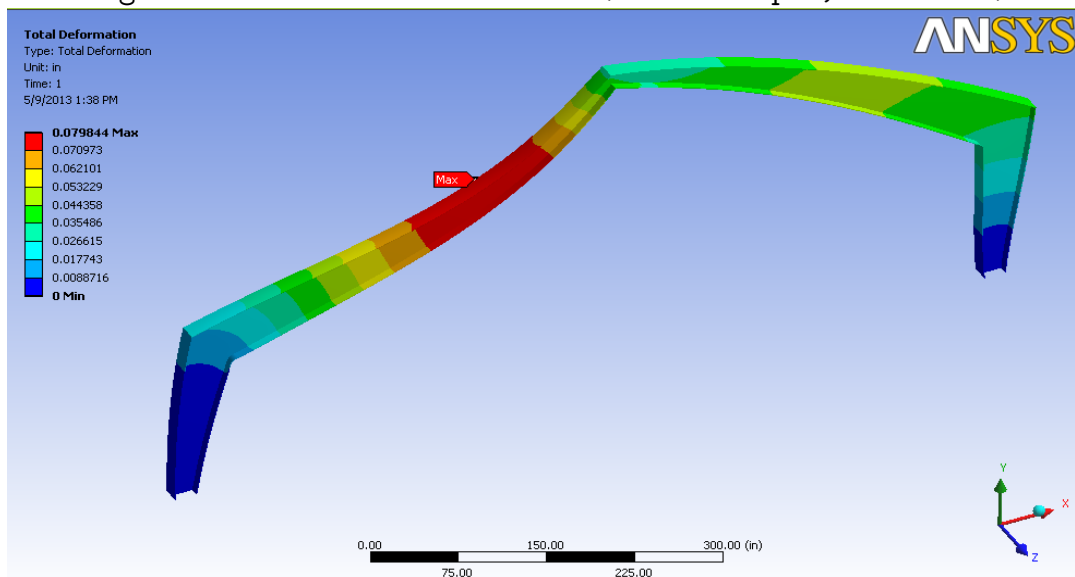


Fig. 5 ANSYS - Max. Displacement 0.08 in

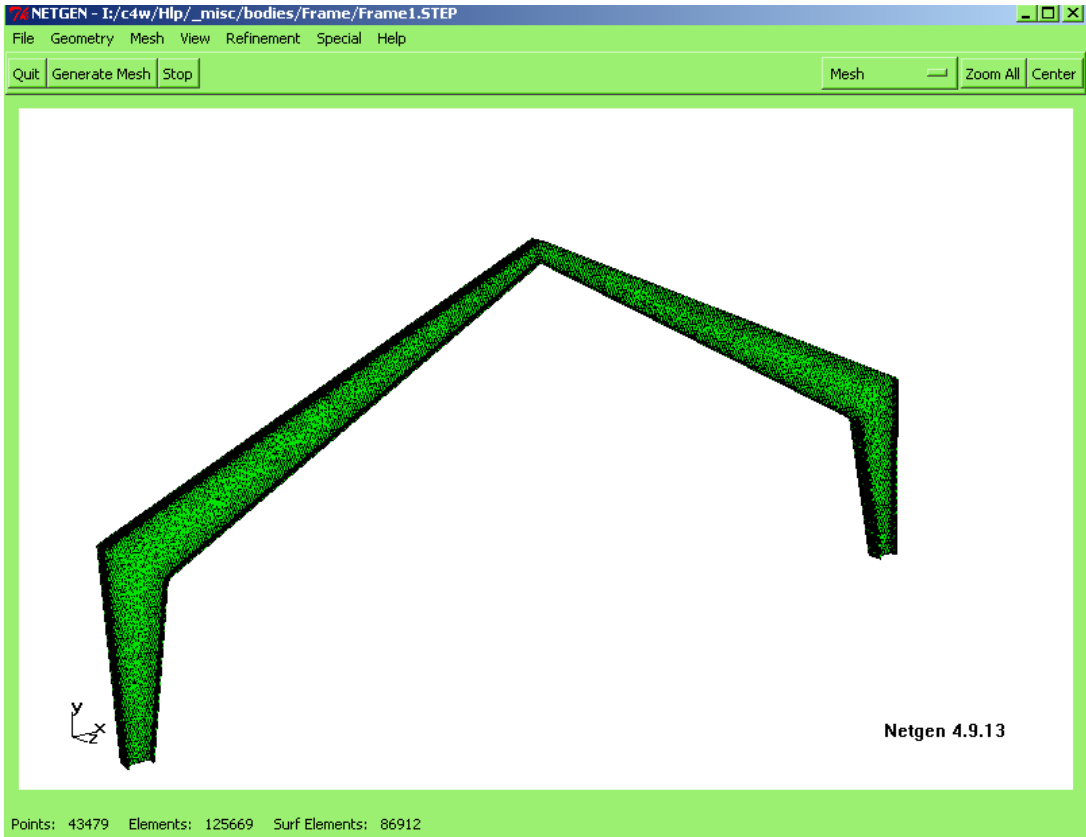


Fig. 6 - Load STEP file into NETGEN and mesh with default options

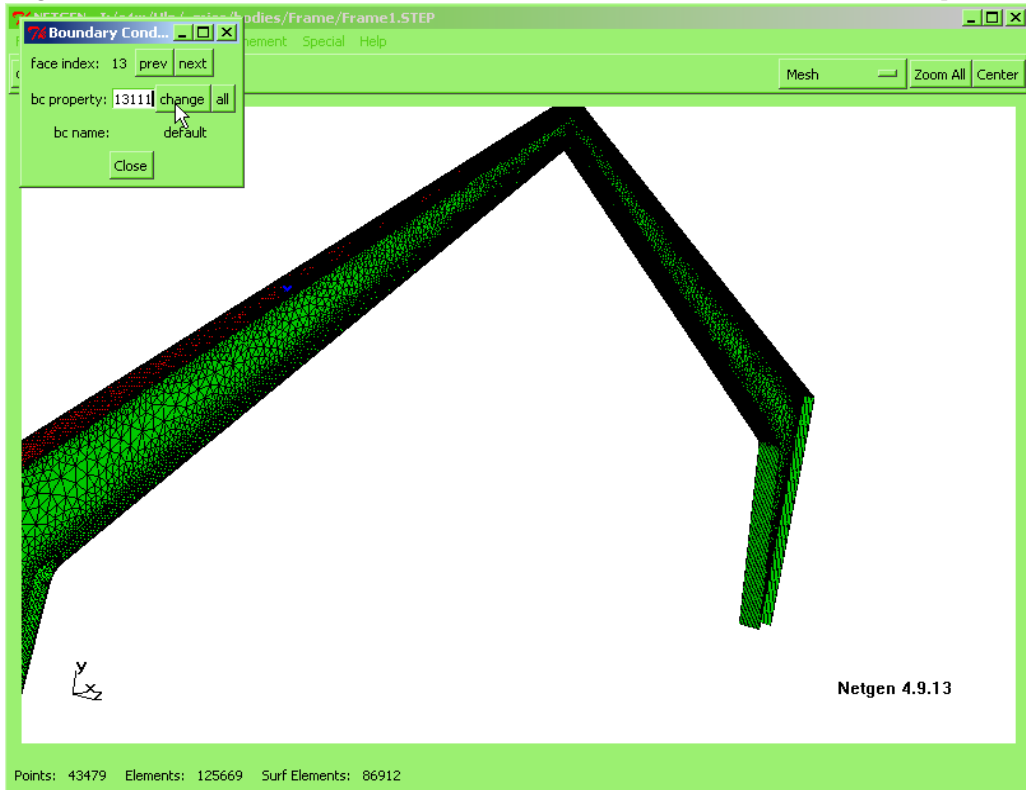


Fig. 7 - Mark faces with changing index number (for load)

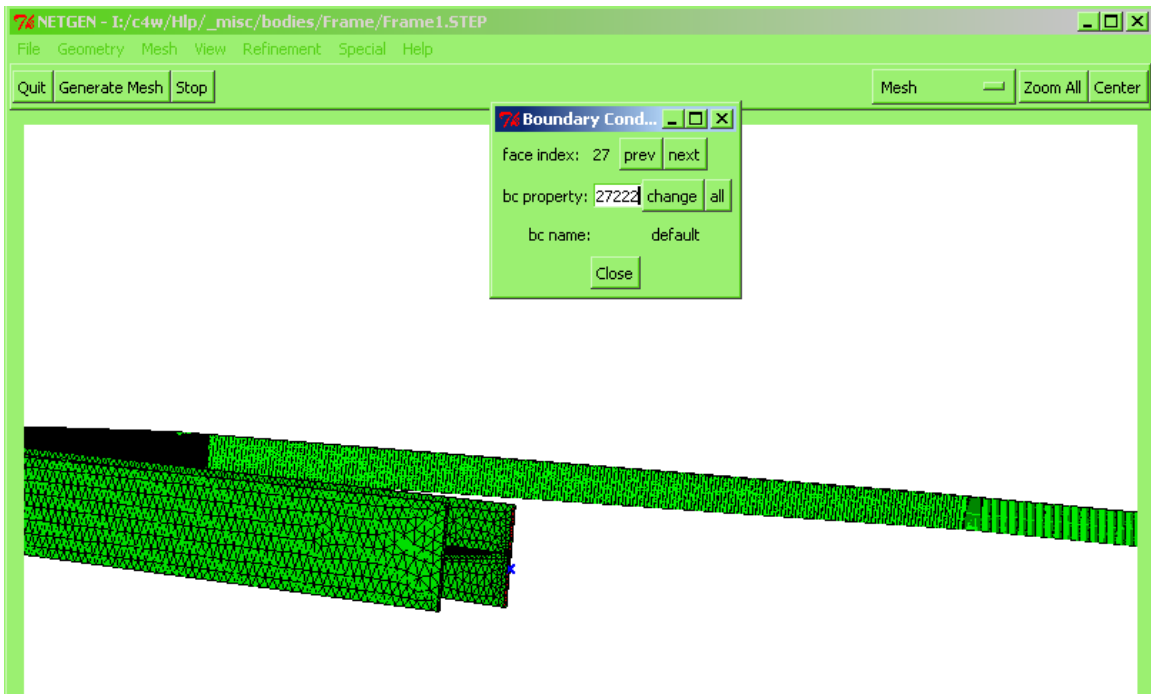
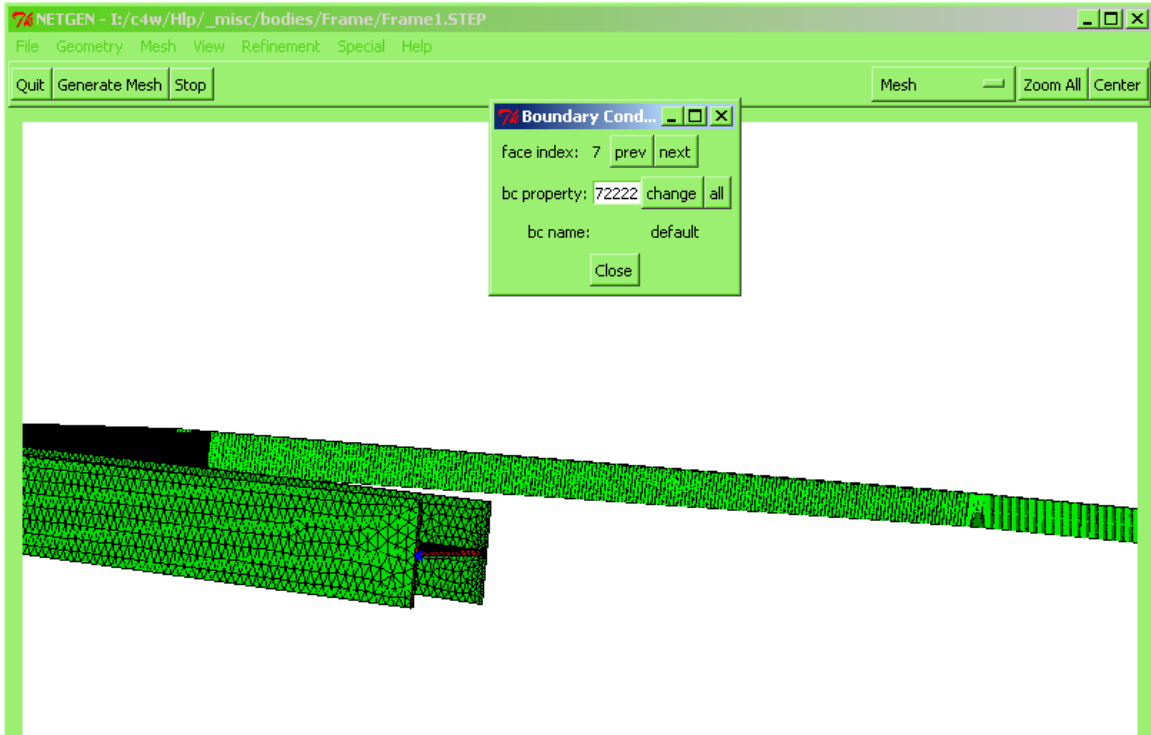


Fig. 8 - Mark faces with changing index number (supports)

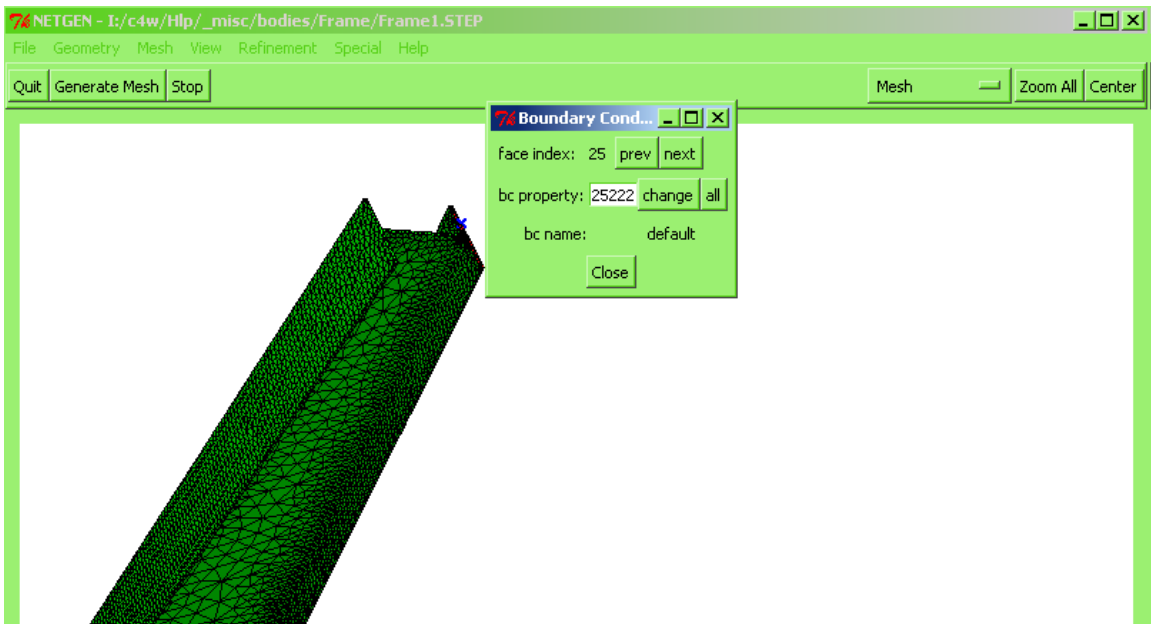
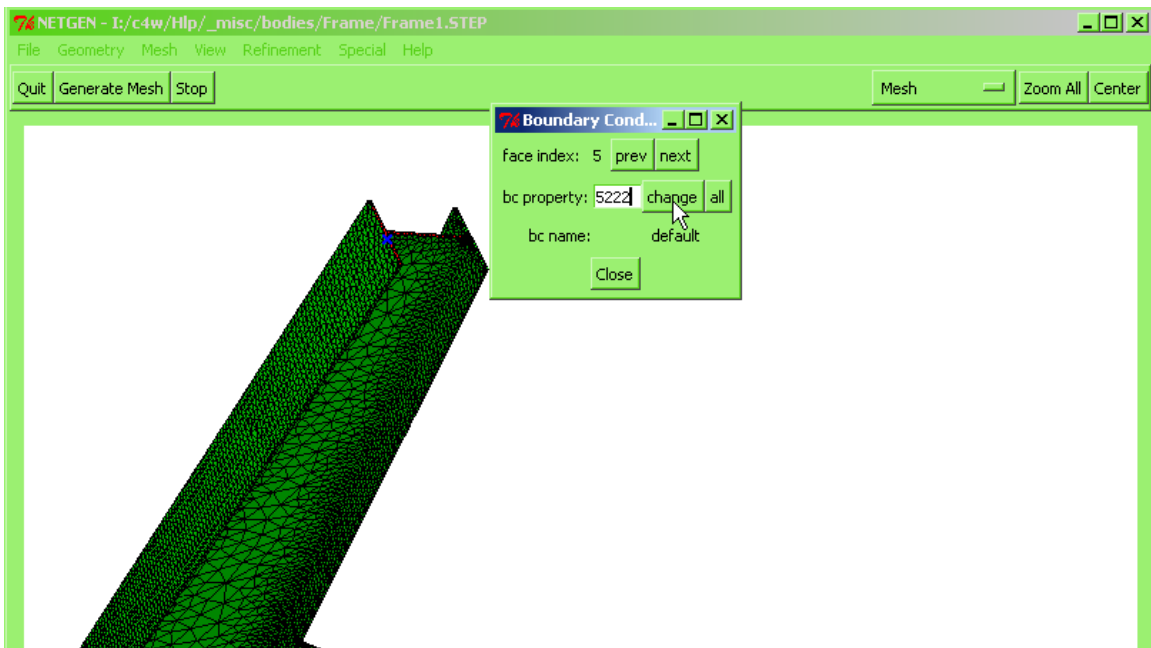


Fig. 9 - Mark faces with changing index number (supports)

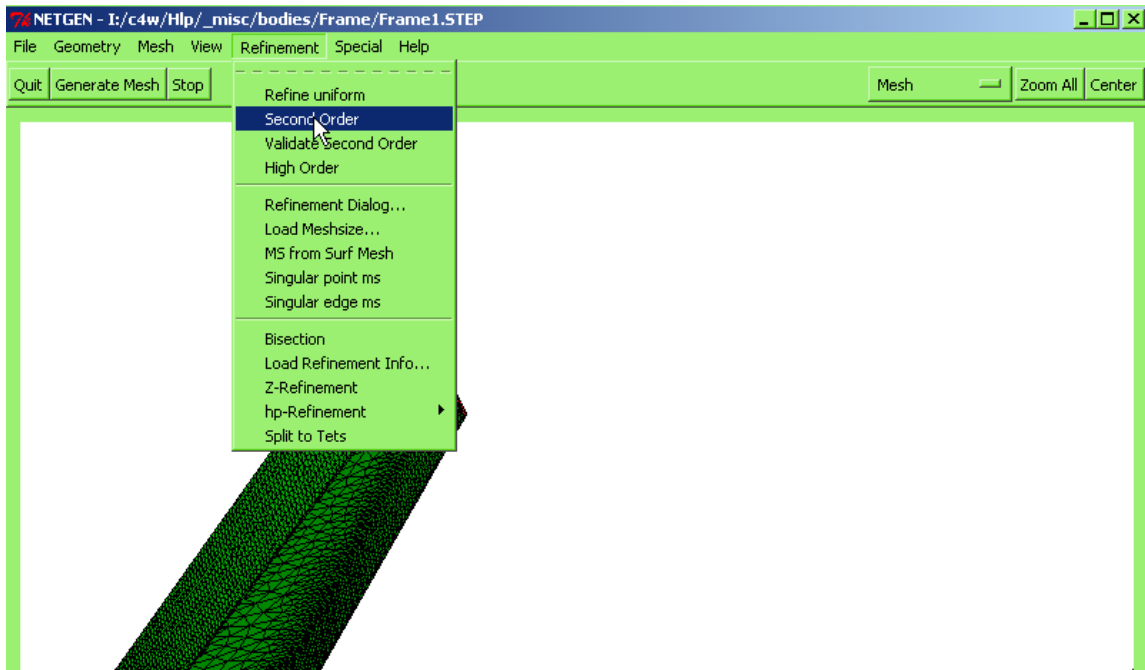


Fig. 9 Make elements as second order (add mid-nodes)

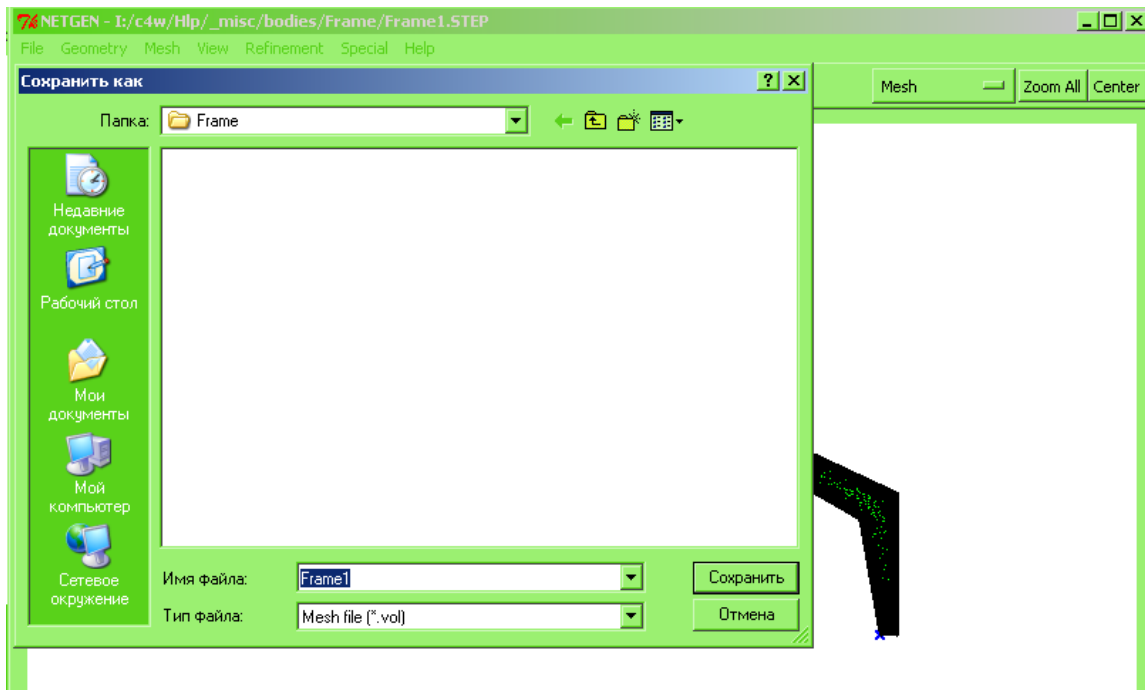


Fig. 10 Save as .VOL mesh

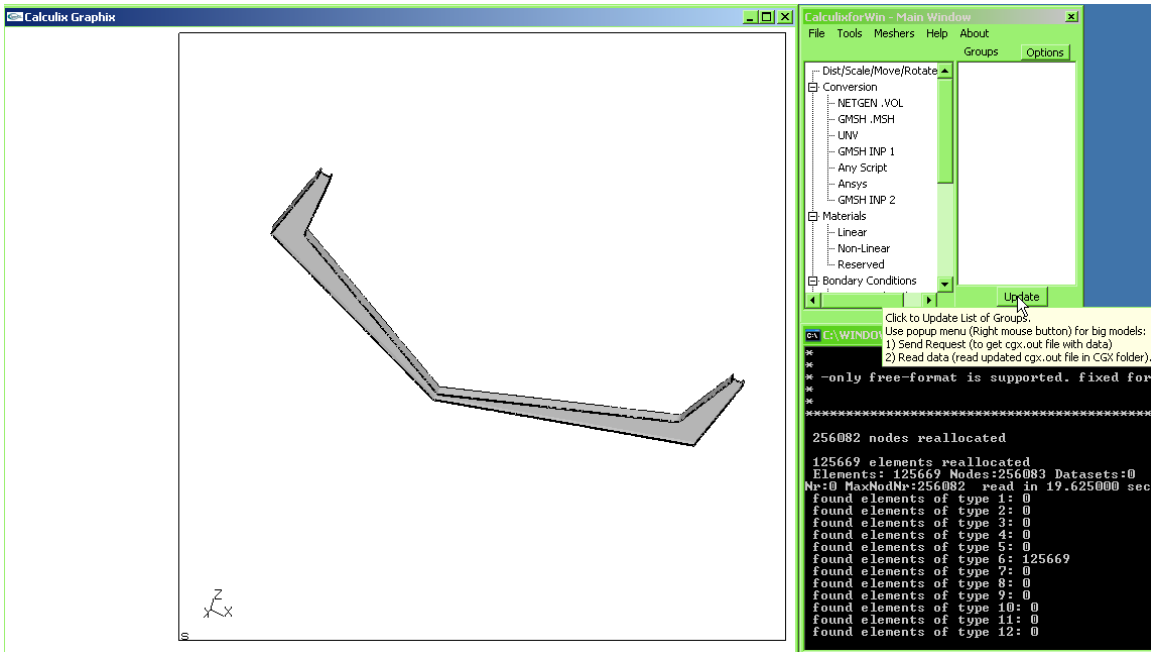
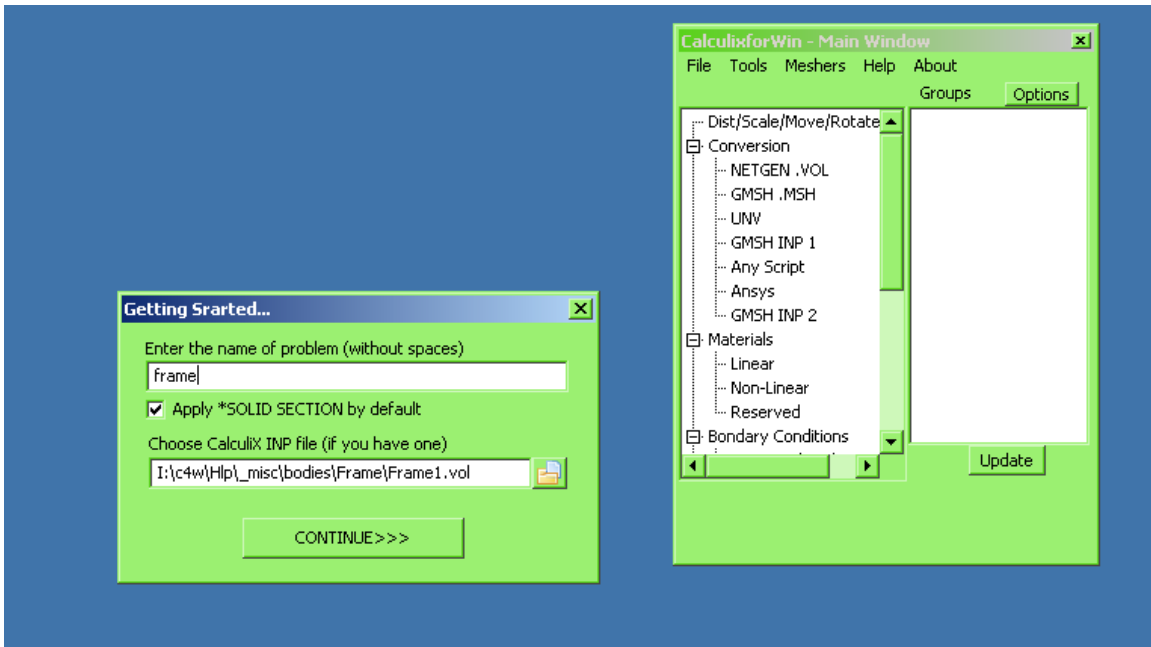


Fig. 11 Run CalculiXForWin and update groups

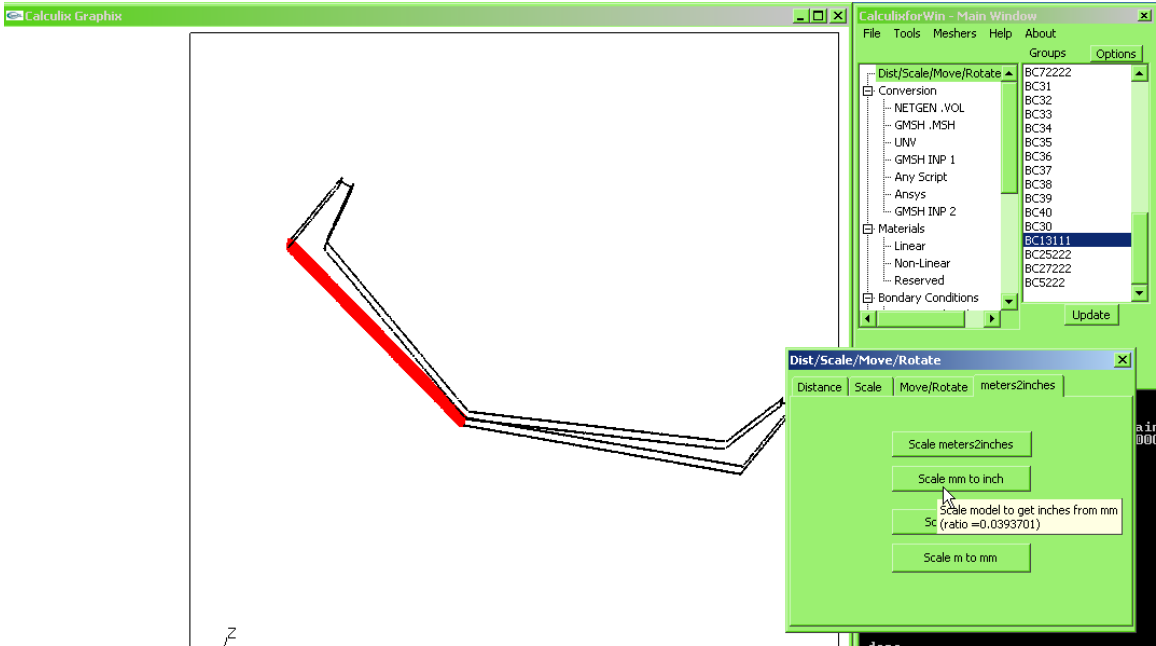
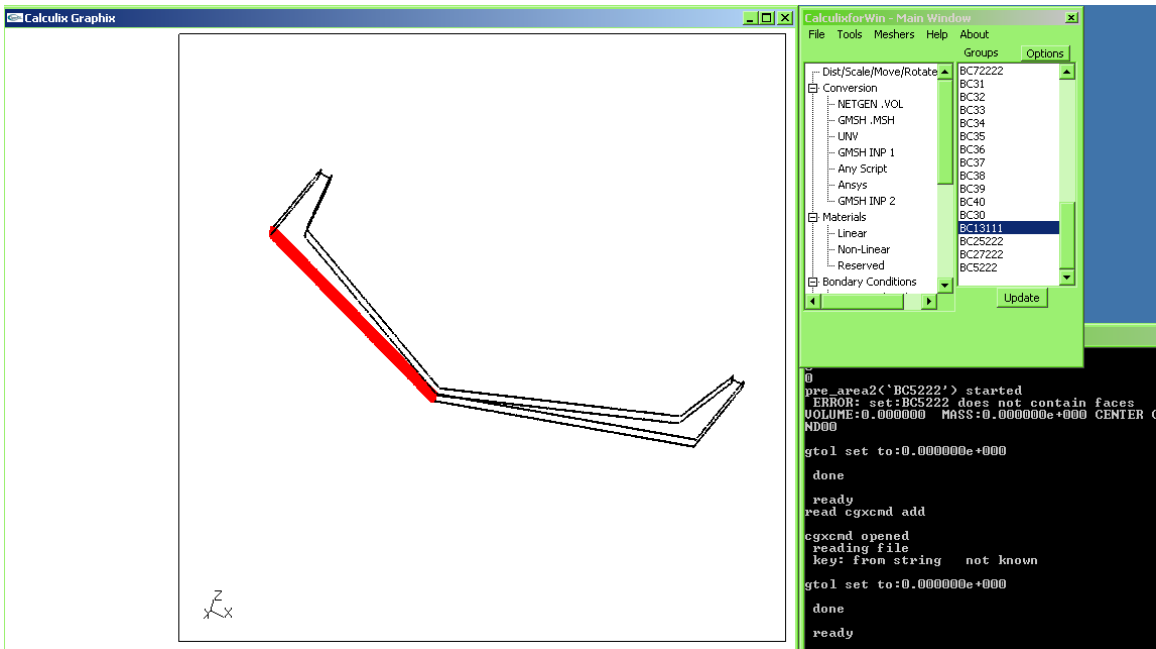


Fig. 12 Scale the model (needed with using STEP geometry with inches)
Don't forget to update groups in CalculiXForWin after scaling

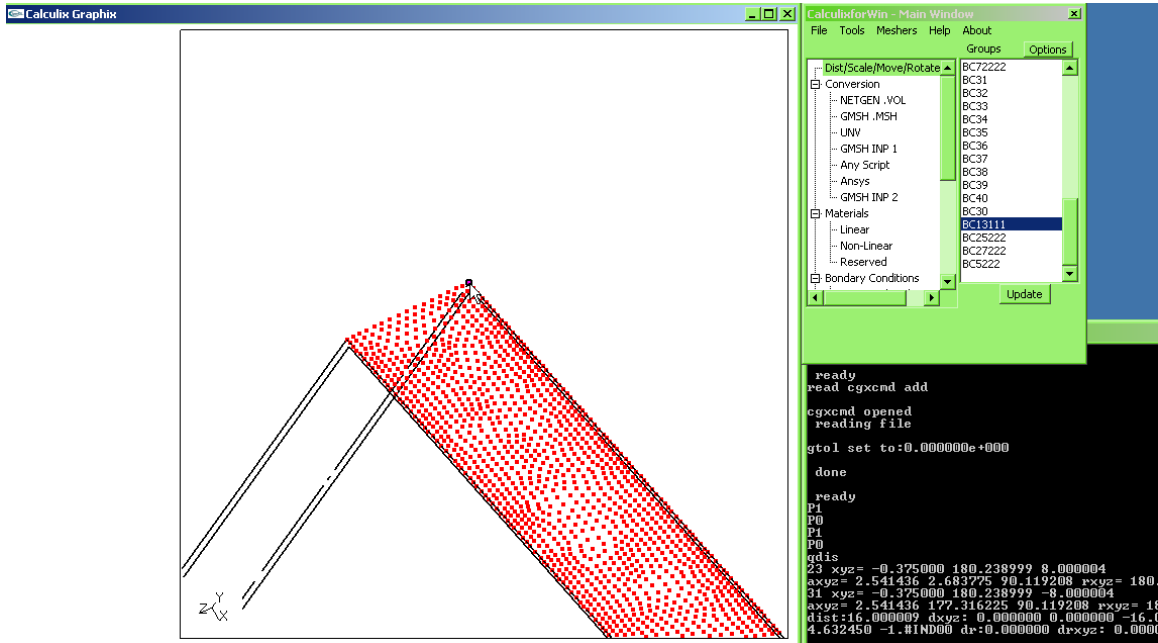


Fig. 13 Check the distance between two nodes ("qdis" card) to be sure that the model was scaled properly and not it is compatible with units you use.

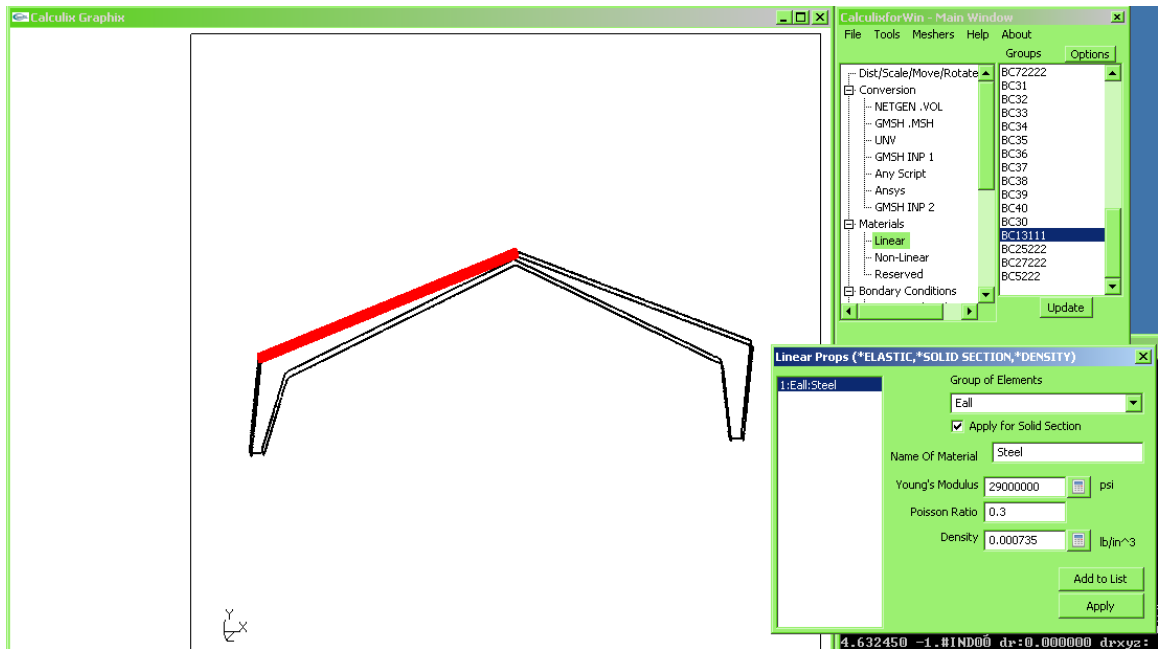


Fig. 14 Check material data applied

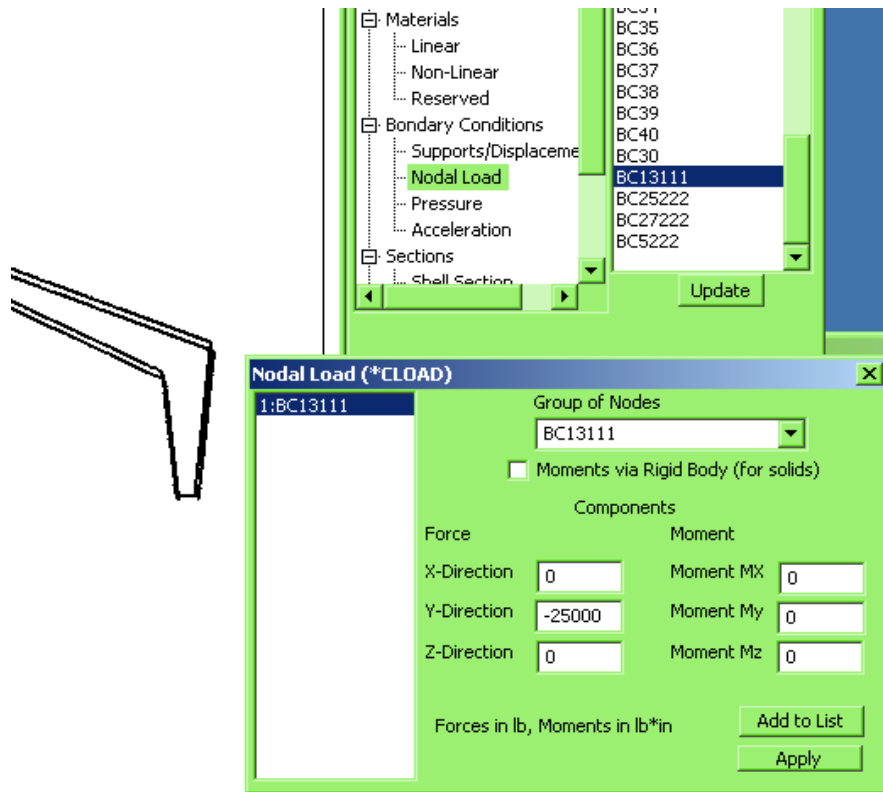


Fig. 15 Apply the load = 25,000 #

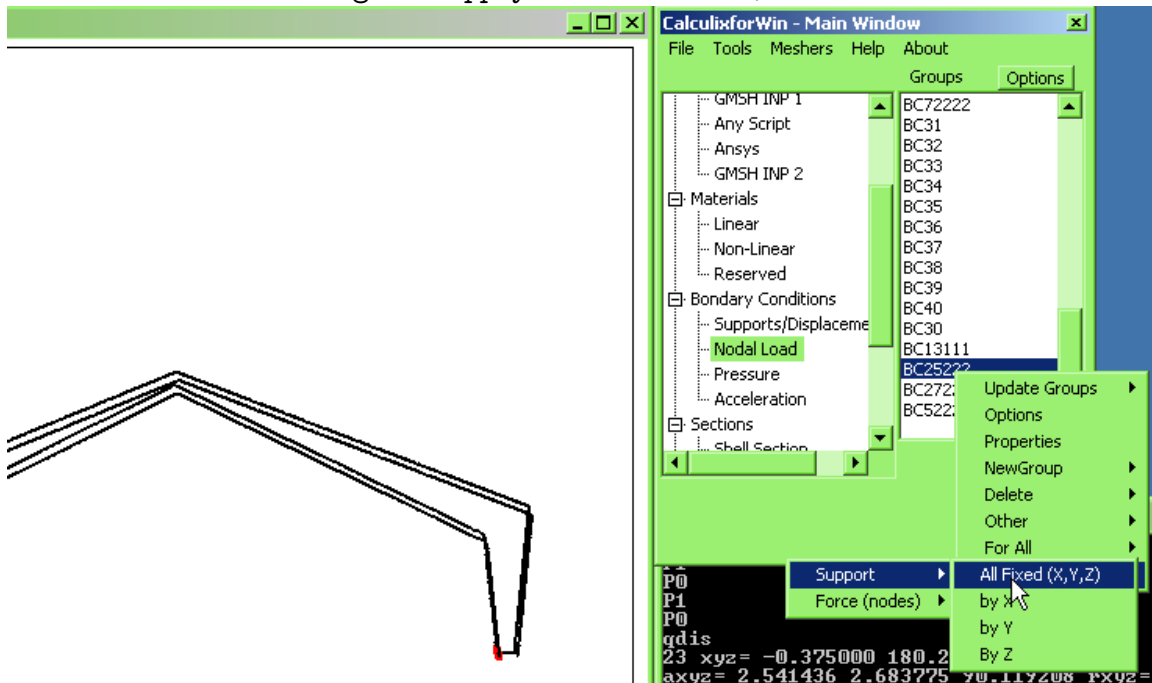


Fig. 16 Apply "All fixed" support

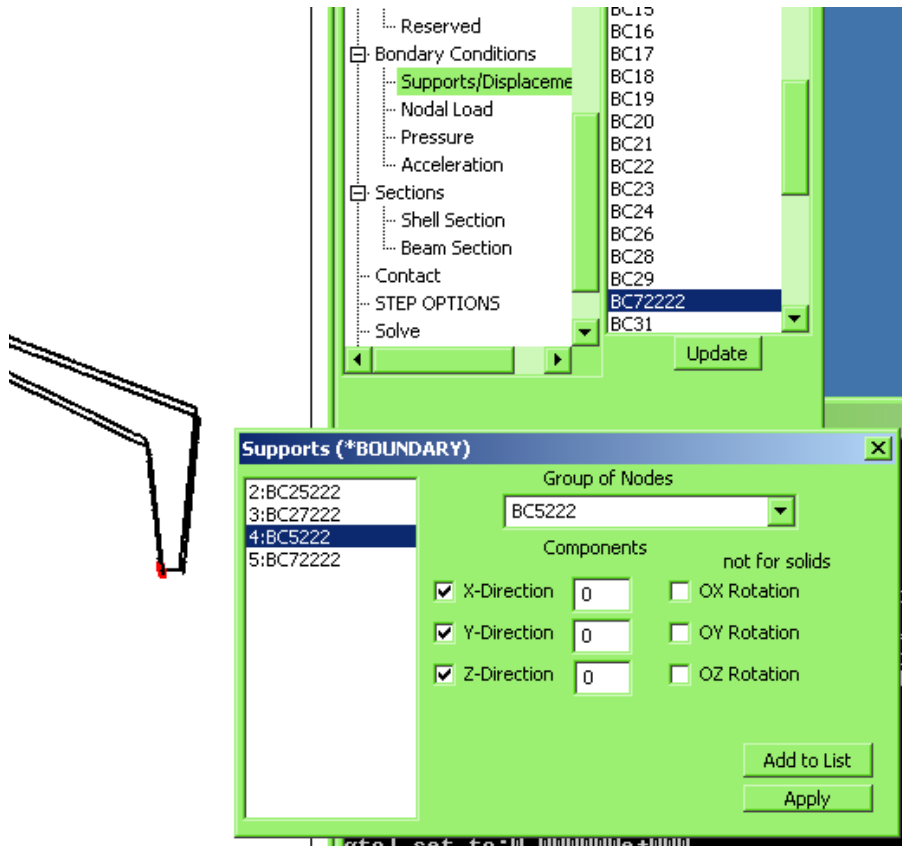
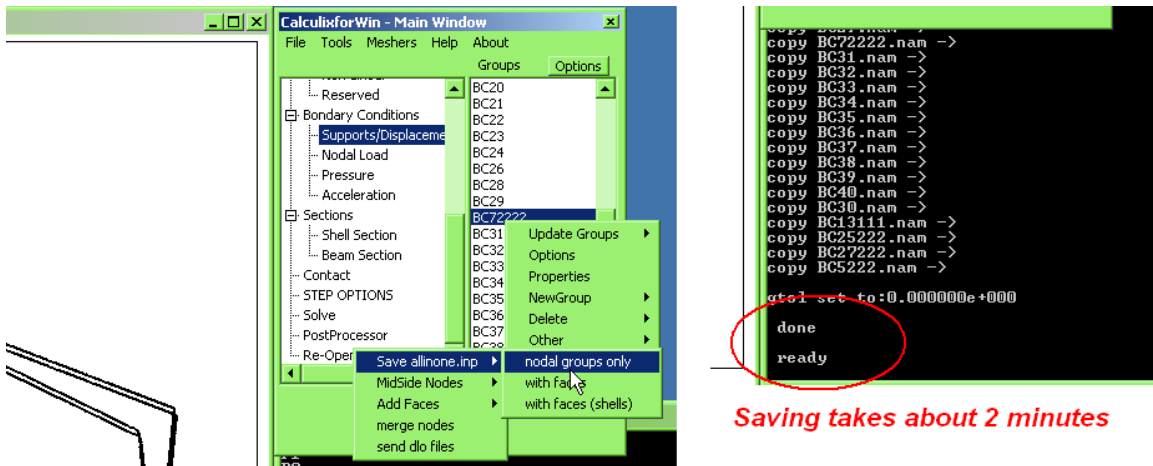


Fig. 17 "All fixed" support applied



Saving takes about 2 minutes

Fig. 18 Save "allinone.inp" file with groups. It may take some time.

Run the solution after saving .INP file. This is big model with accurate meshing. It could not be solved with 32-bit CCX version and 1.86 GB RAM. The model requires 64-bit CCX (bconverged.com) and 8 GB RAM.

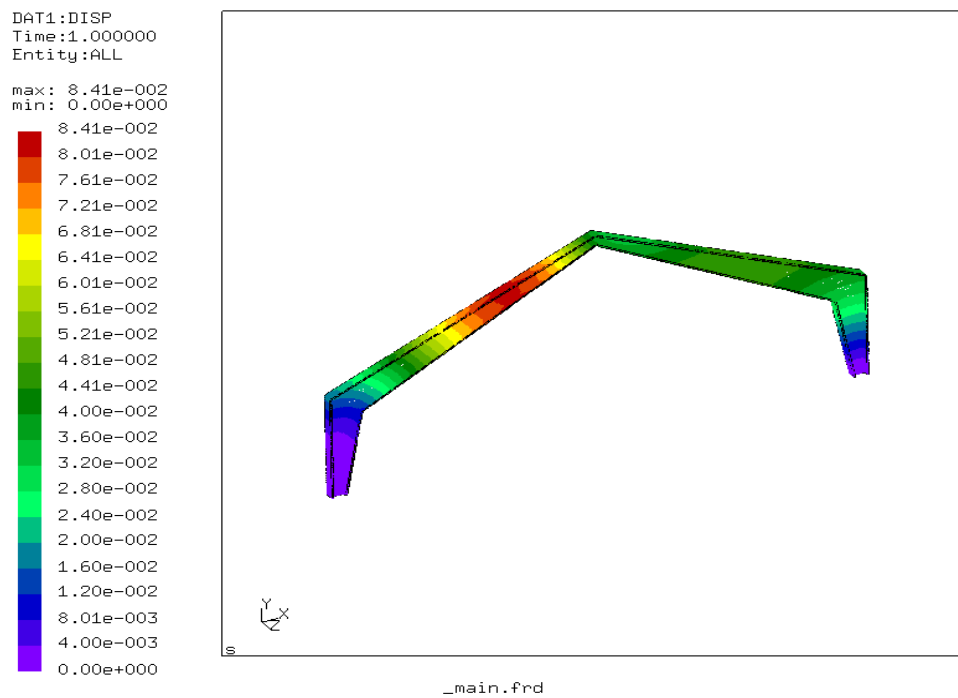


Fig. 19 CalculiX in Post-processing mode.
Max. displacement 0.084''

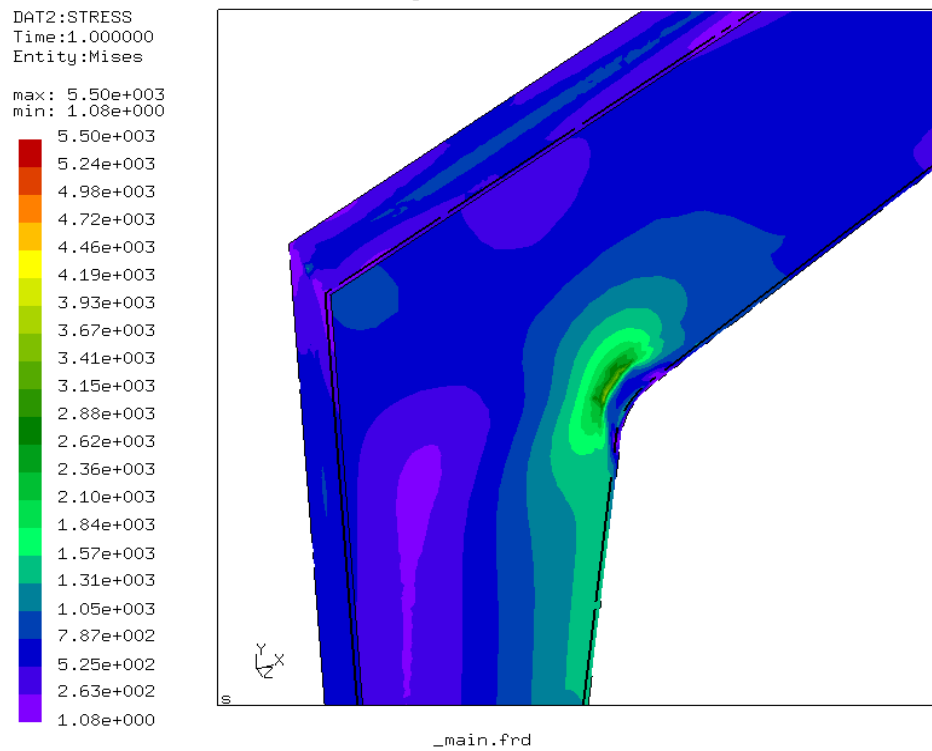
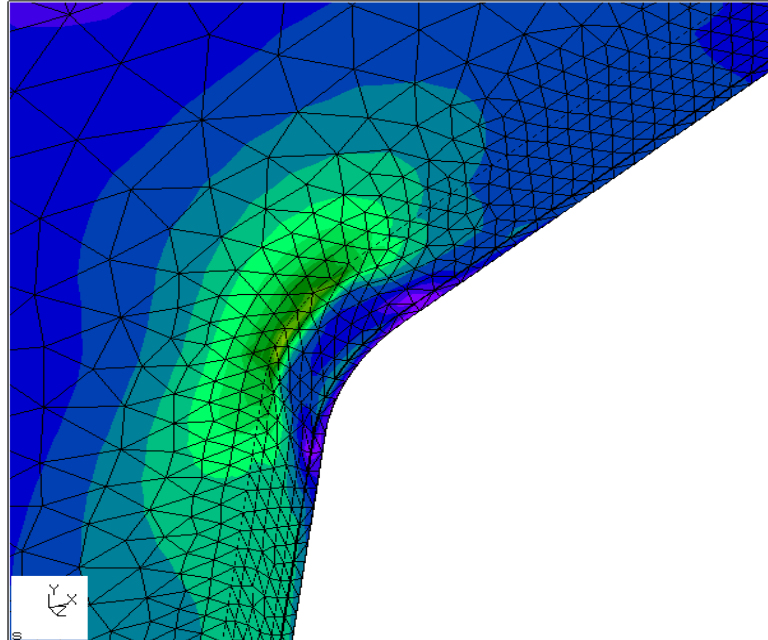


Fig. 20 Localized Von-Mises stress (highly sensitive to mesh quality)

DAT2:STRESS
 Time:1.000000
 Entity:Mises

max: 5.50e+003
 min: 1.08e+000

5.50e+003
5.24e+003
4.98e+003
4.72e+003
4.46e+003
4.19e+003
3.93e+003
3.67e+003
3.41e+003
3.15e+003
2.88e+003
2.62e+003
2.36e+003
2.10e+003
1.84e+003
1.57e+003
1.31e+003
1.05e+003
7.87e+002
5.25e+002
2.63e+002
1.08e+000



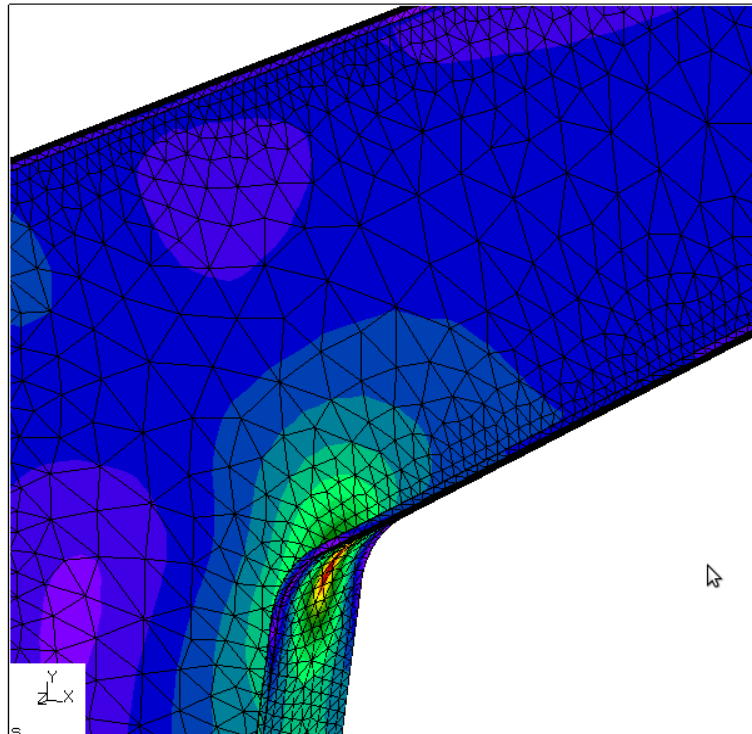
_main.frd

Calculix Graphix

DAT2:STRESS
 Time:1.000000
 Entity:Mises

max: 5.50e+003
 min: 1.08e+000

5.50e+003
5.24e+003
4.98e+003
4.72e+003
4.46e+003
4.19e+003
3.93e+003
3.67e+003
3.41e+003
3.15e+003
2.88e+003
2.62e+003
2.36e+003
2.10e+003
1.84e+003
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1.31e+003
1.05e+003
7.87e+002
5.25e+002
2.63e+002
1.08e+000

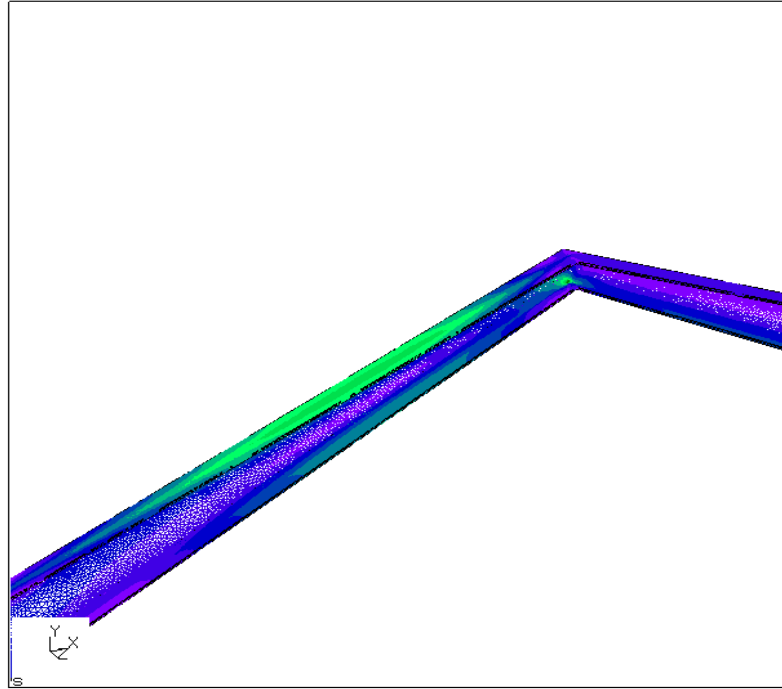
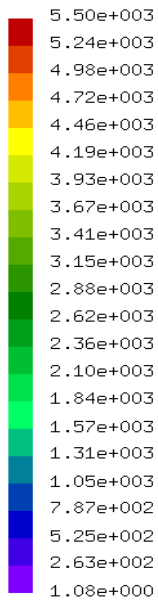


D:\c4w\Hlp_misc\bodies\Fram\inp_main.frd

Fig. 21 Max. Von-Mises stress 5,500 psi is localized

DAT2:STRESS
Time:1.000000
Entity:Mises

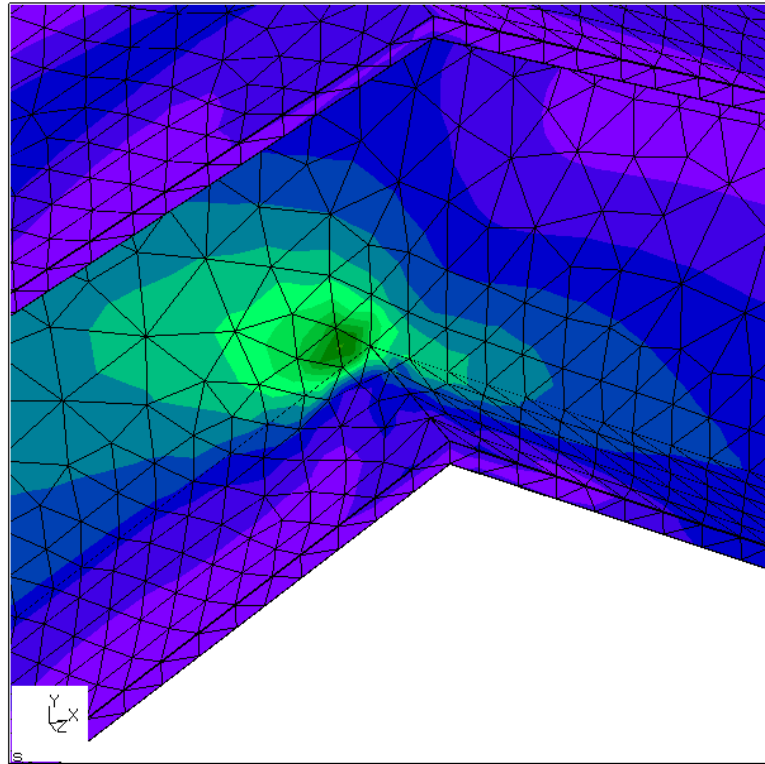
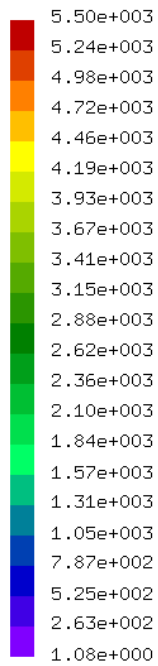
max: 5.50e+003
min: 1.08e+000



_main.frd

DAT2:STRESS
Time:1.000000
Entity:Mises

max: 5.50e+003
min: 1.08e+000



_main.frd

Fig. 22 Von-Mises Stress. Areas with local stress concentration