EN Engineering Department

Awake CNGS Window and Shutter

Thermo-Mechanical Calculations

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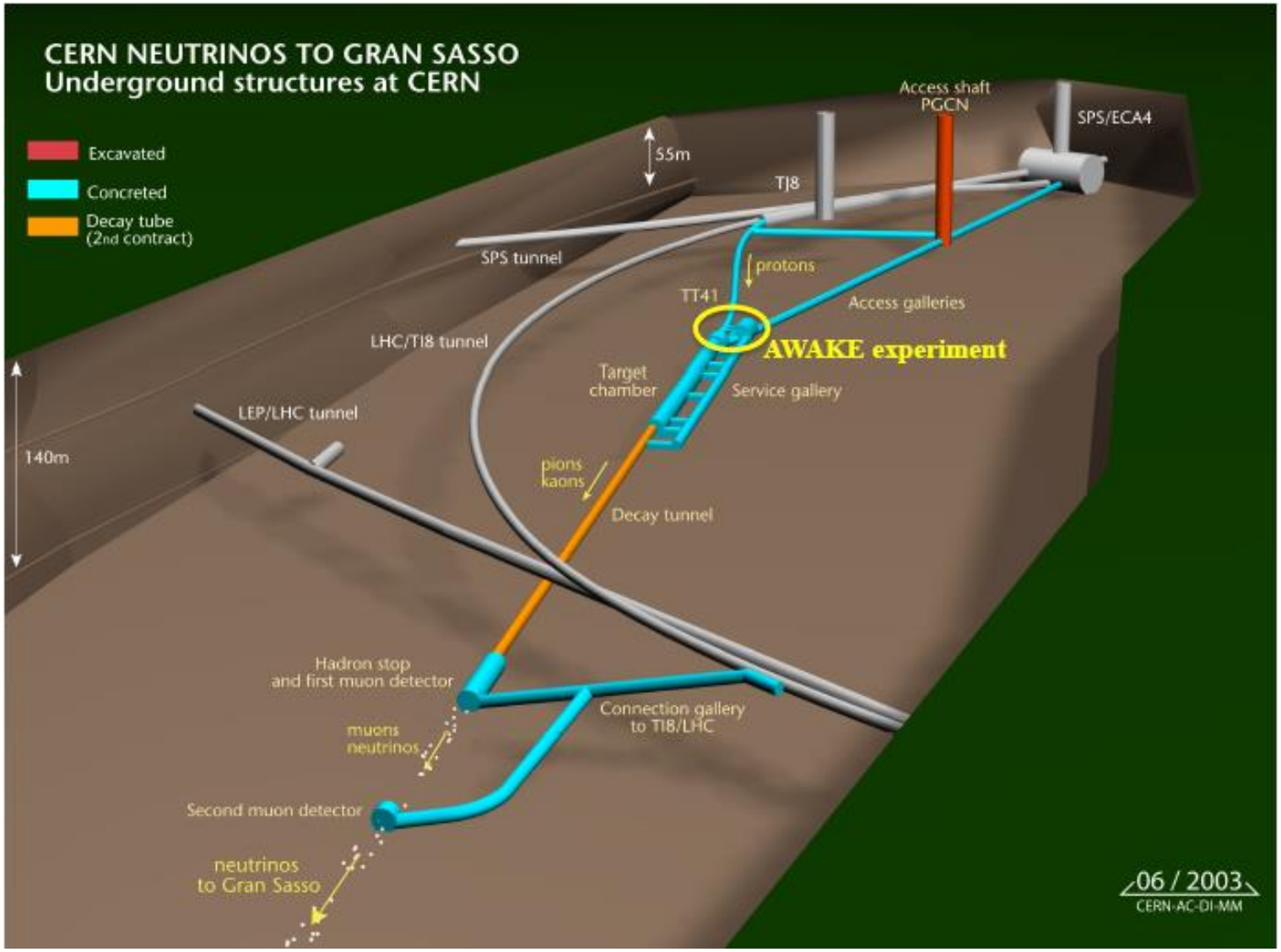
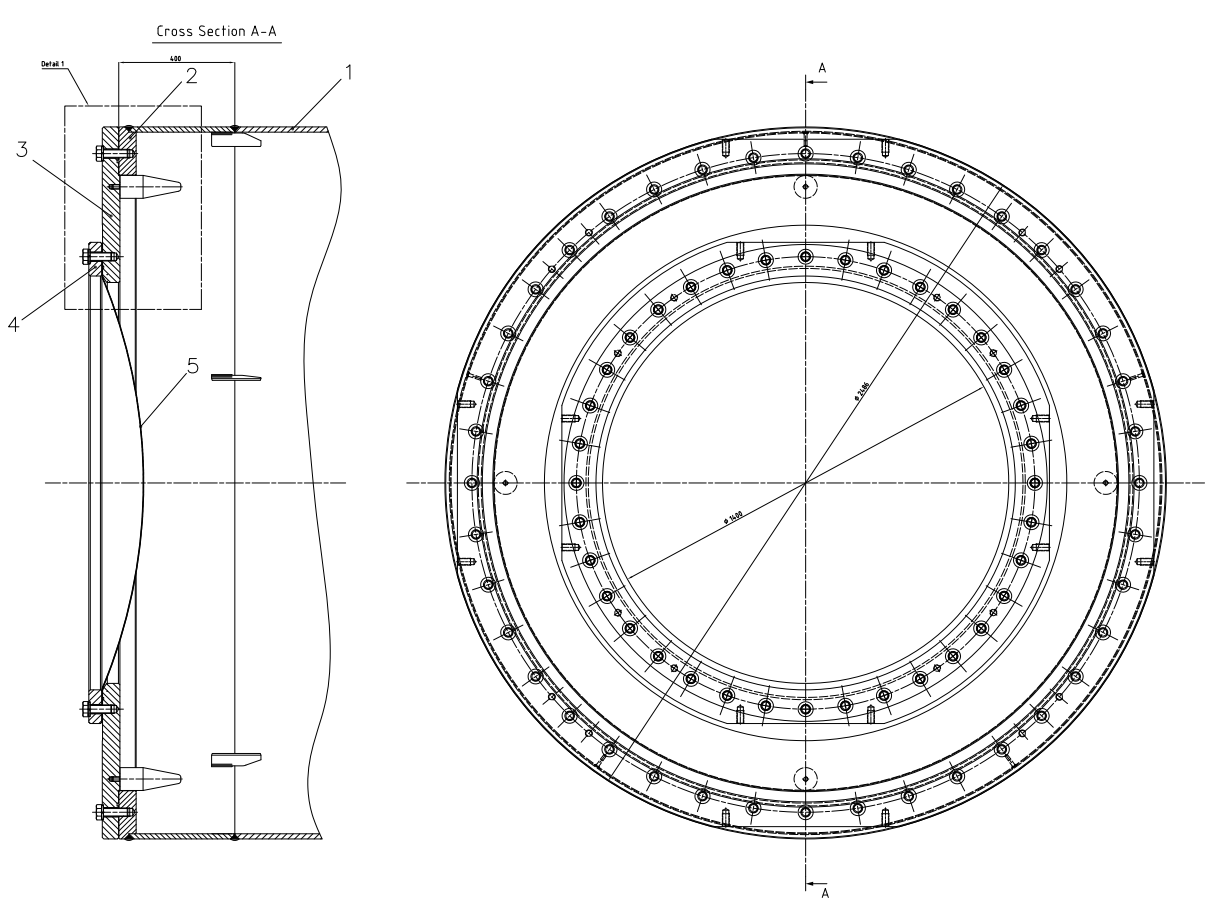
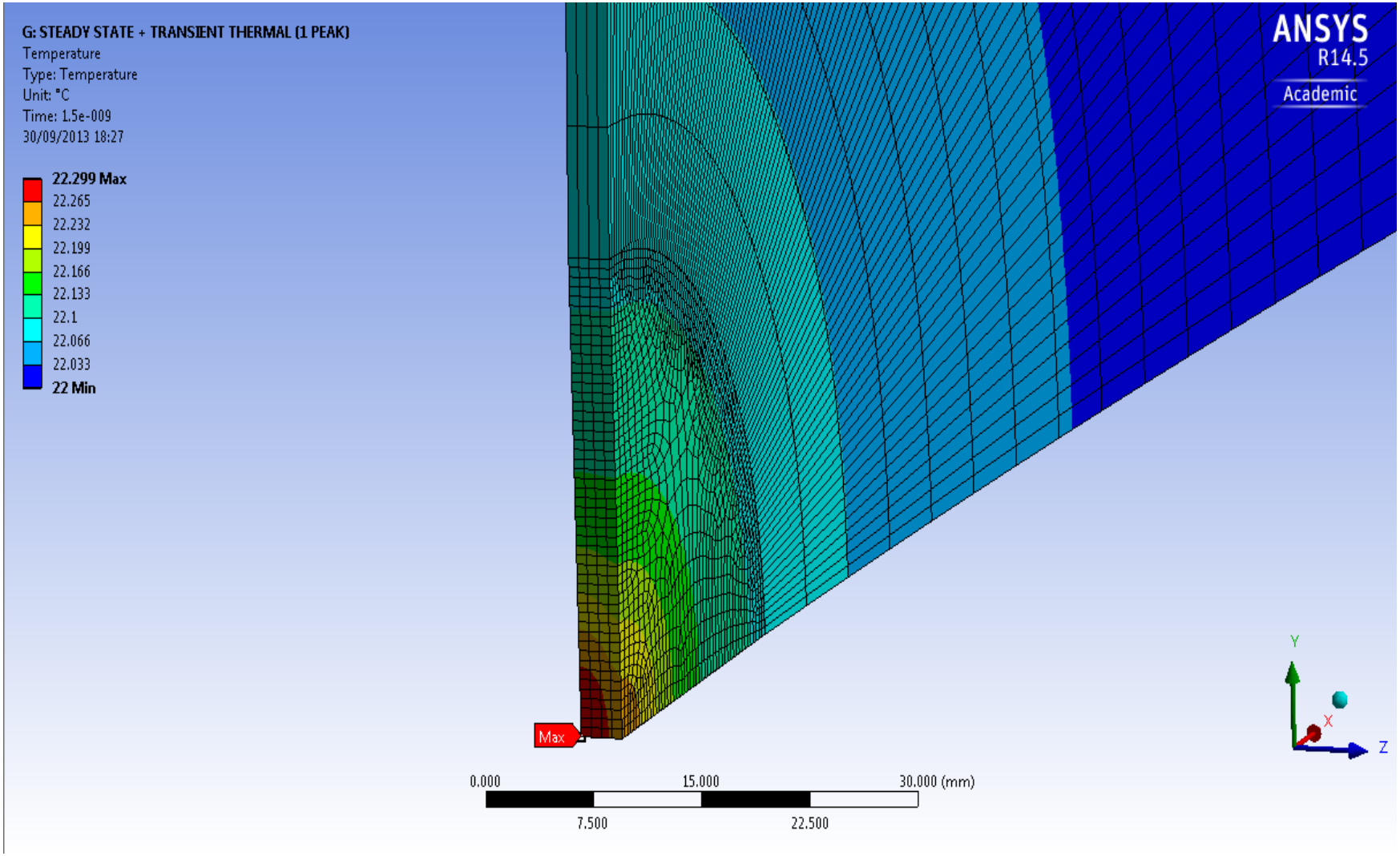
Introduction



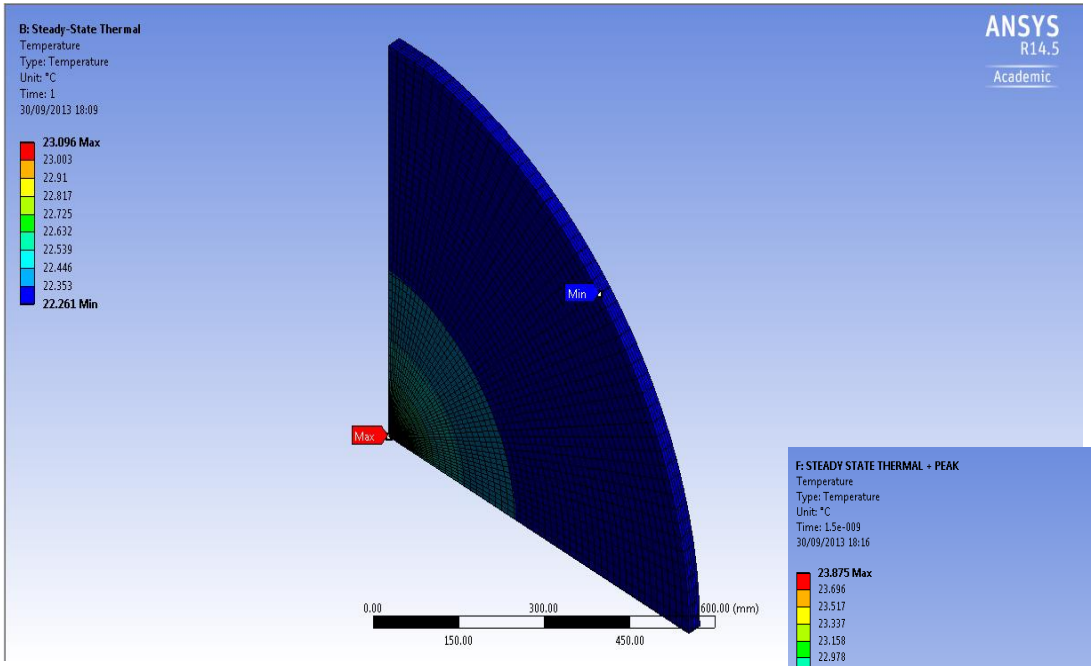
Vacuum Window



Vacuum Window
FEA Thermal Calculation

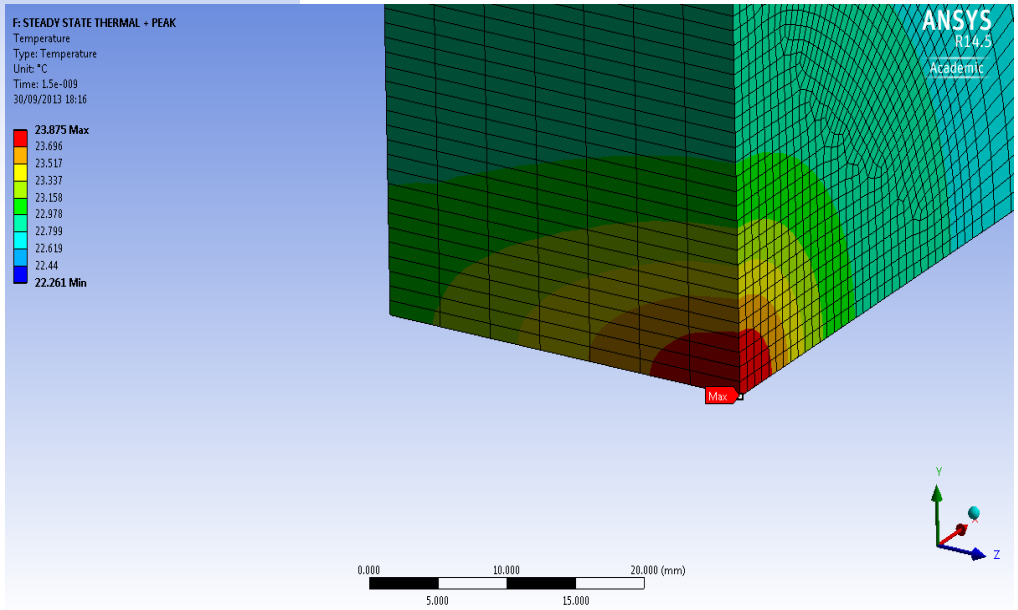


Shutter
FEA Thermal Calculation



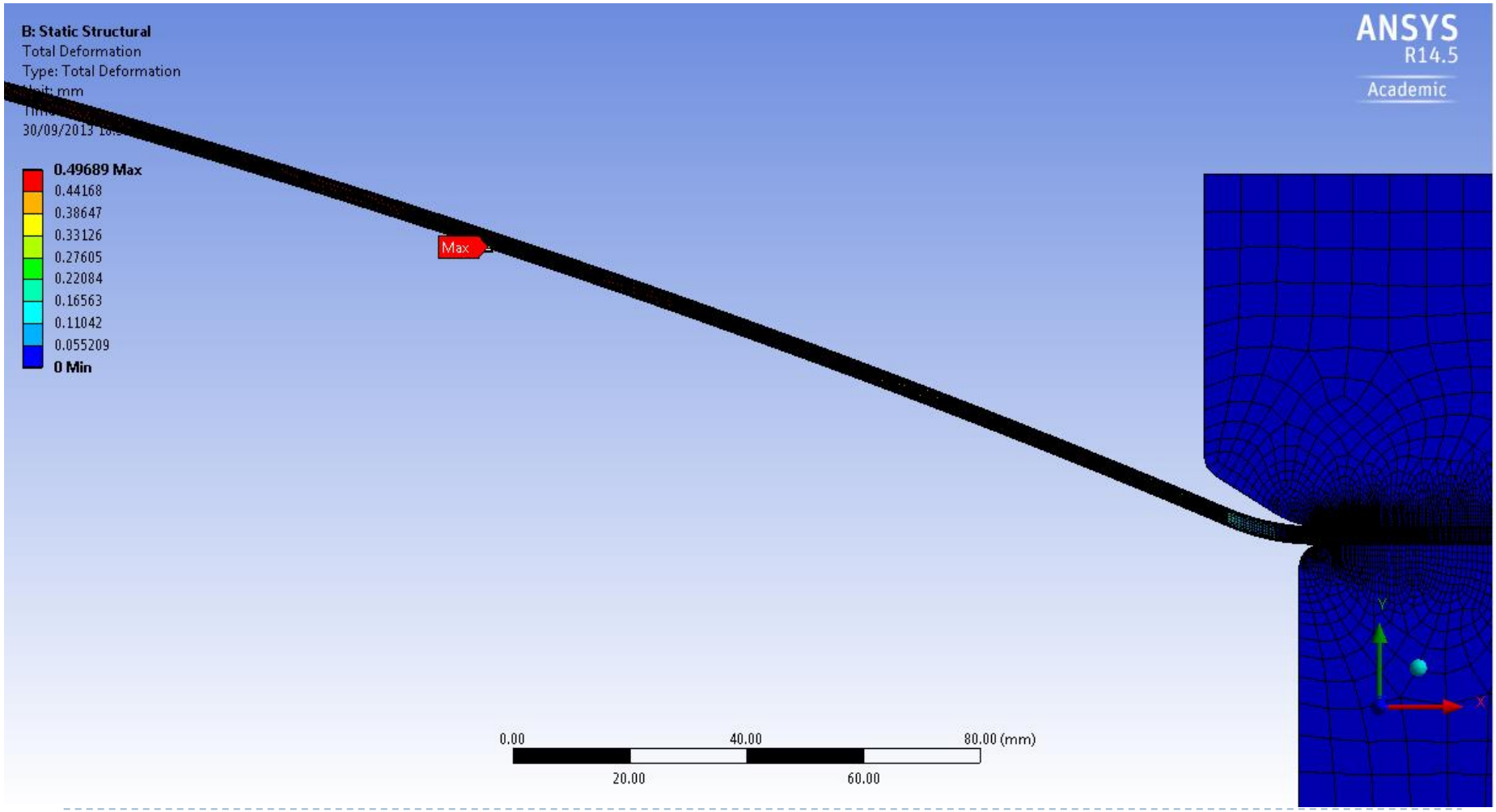
Steady State
Max Temp.= 23.096 °C

Steady State + 1 Pulse
Max Temp.= 23.875 °C



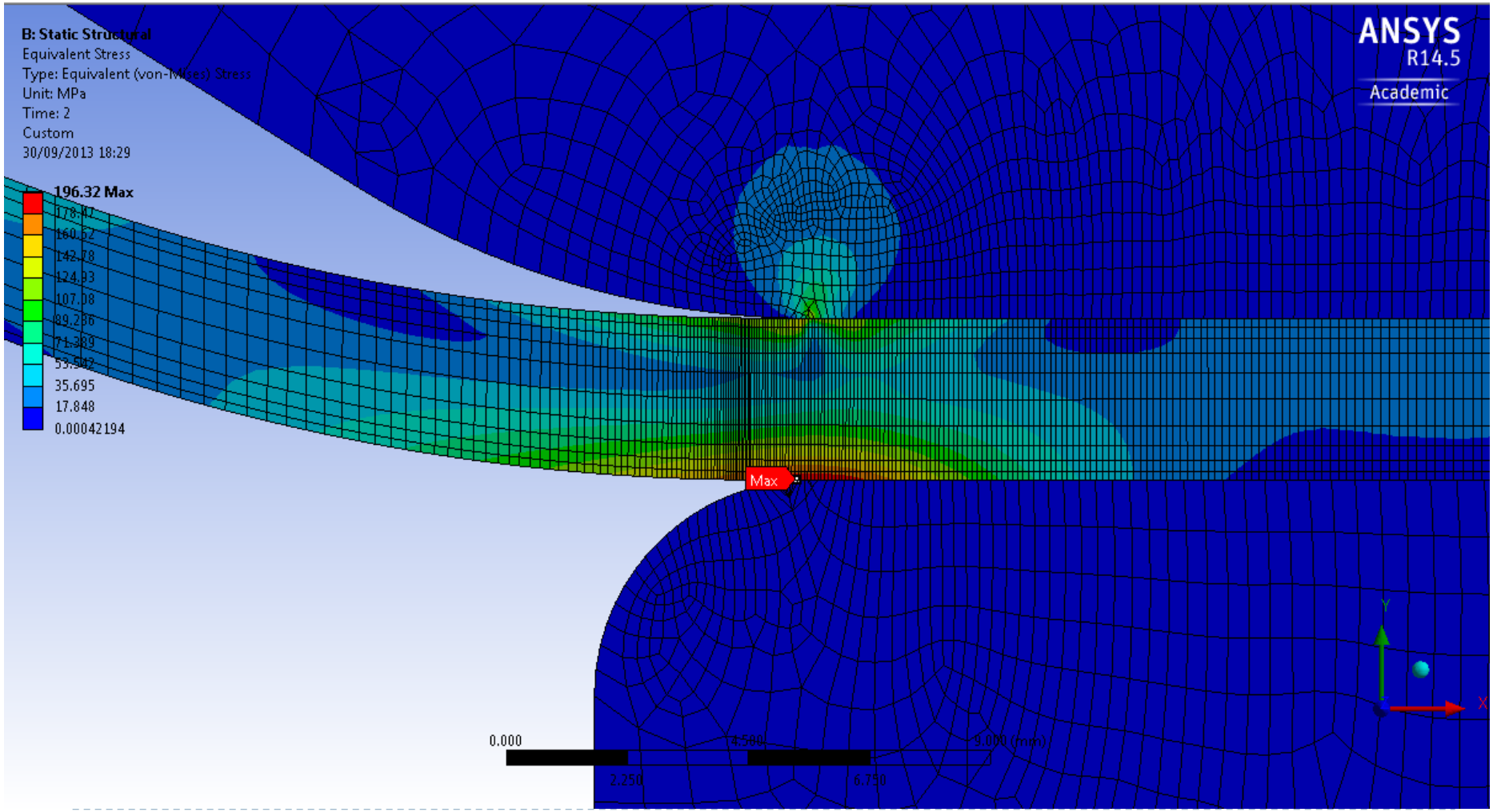
Vacuum Window
FEA Structural Calculation

Max. Deformation = 0.5 mm



Vacuum Window
FEA Structural Calculation

Max. Stress = 196 Mpa (Rp=275MPa, Rm=345MPa)



Conclusions

- Stresses in vacuum window due to atmospheric pressure
- Max stresses in window below yield strength of Titanium T40
- Very low temperatures increase in window and shutter due to beam
- Negligible thermal stresses in window and shutter due to beam