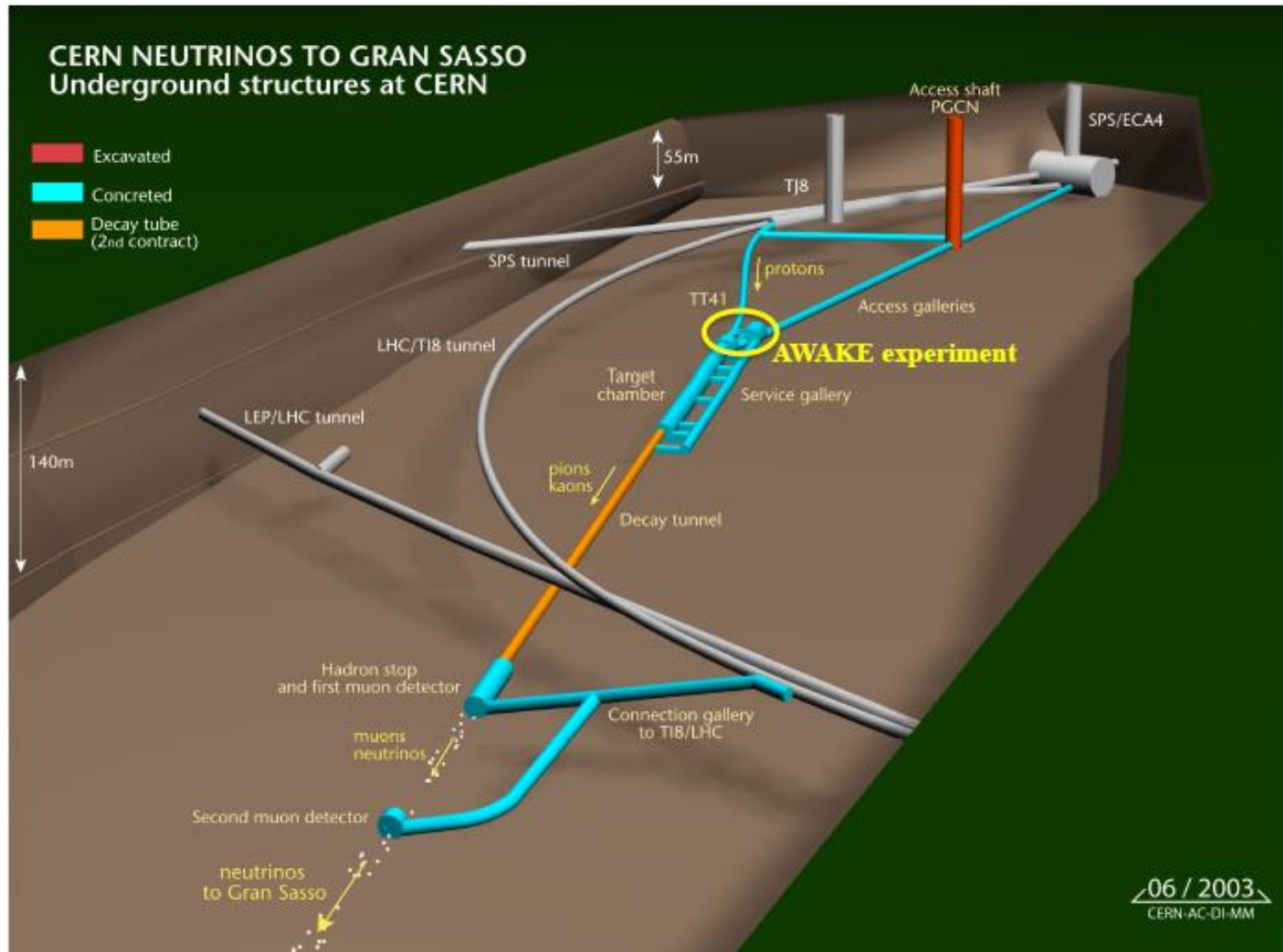


Awake CNGS Window and Shutter

Thermo-Mechanical Calculations

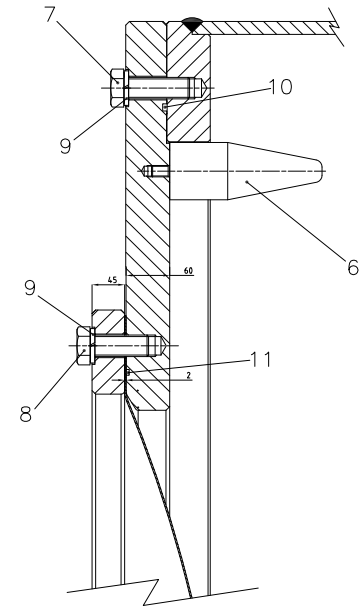
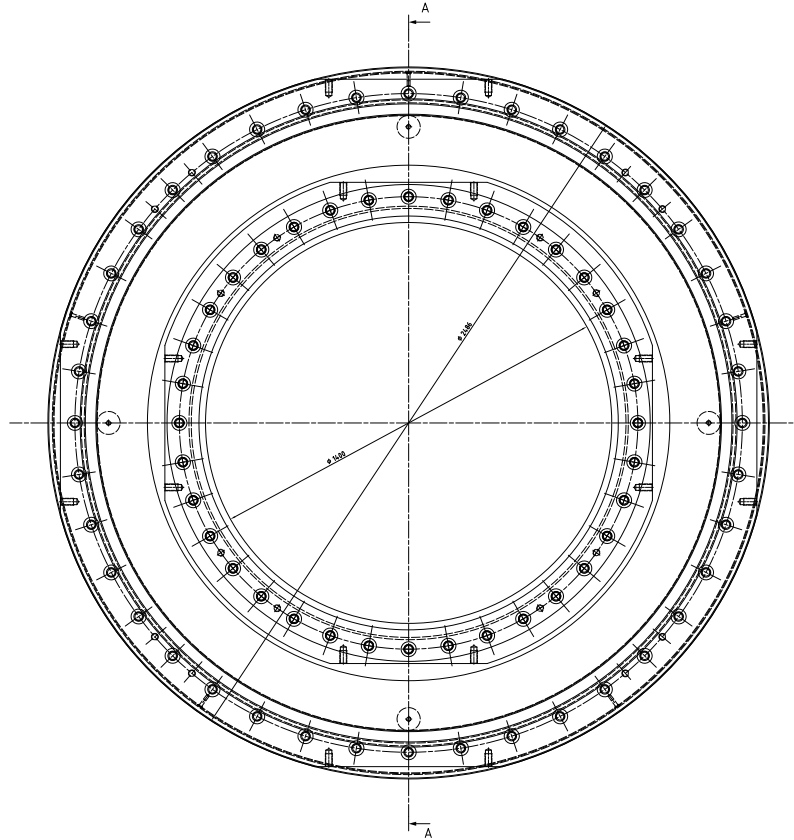
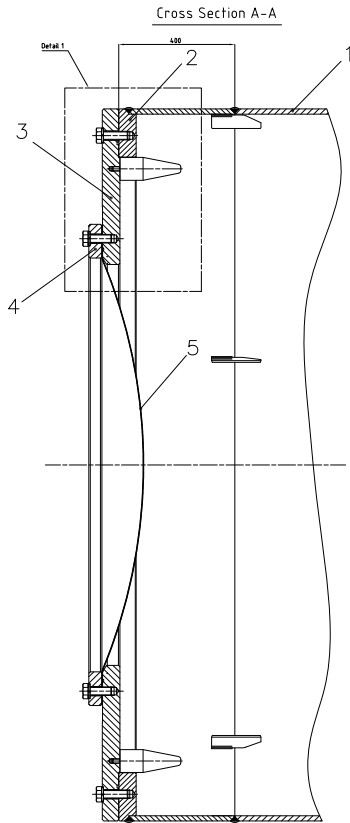
Szymon Sroka, Antonio Perillo-Marccone — EN/STI/TCD



Vacuum Window

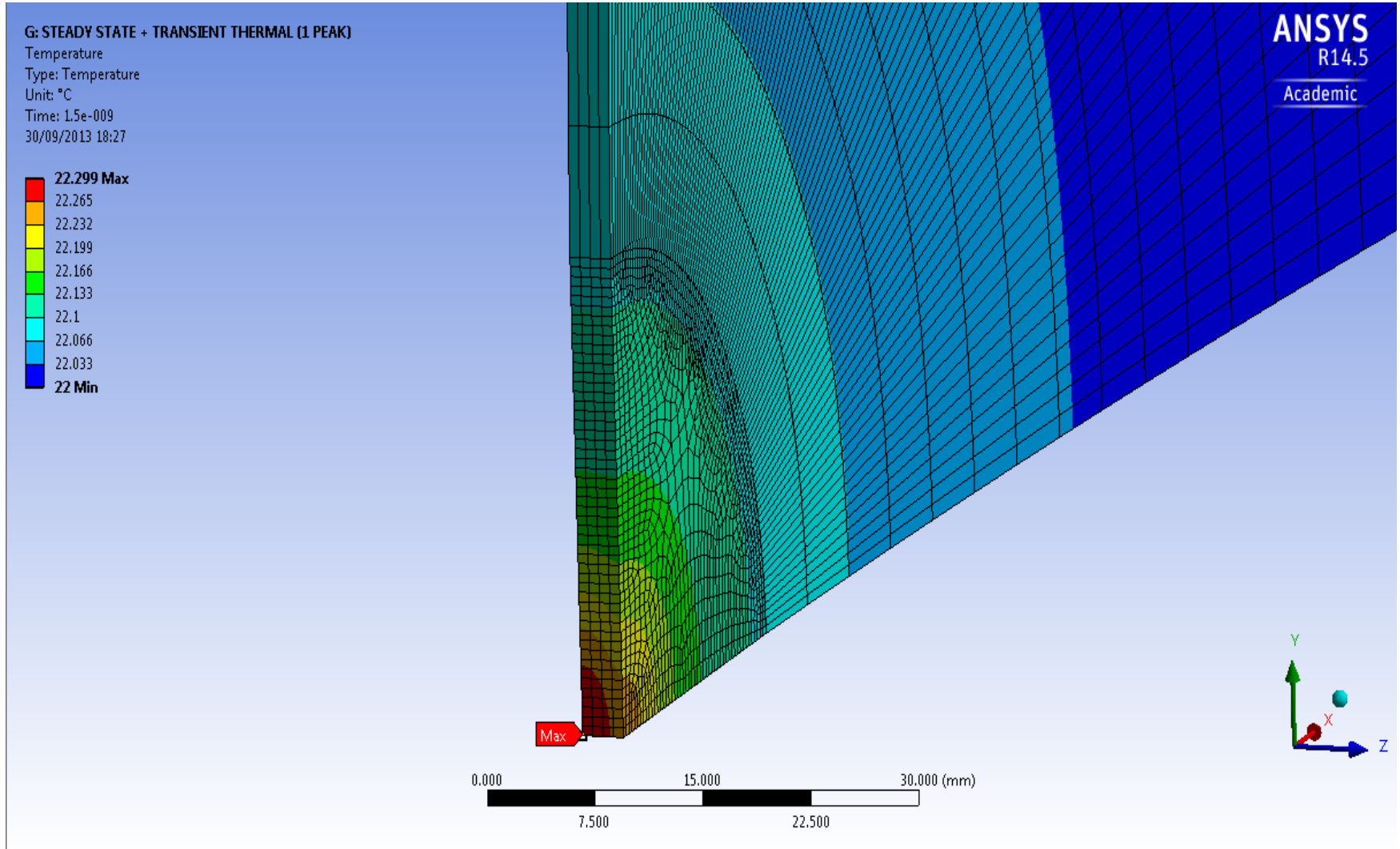
Detail 1

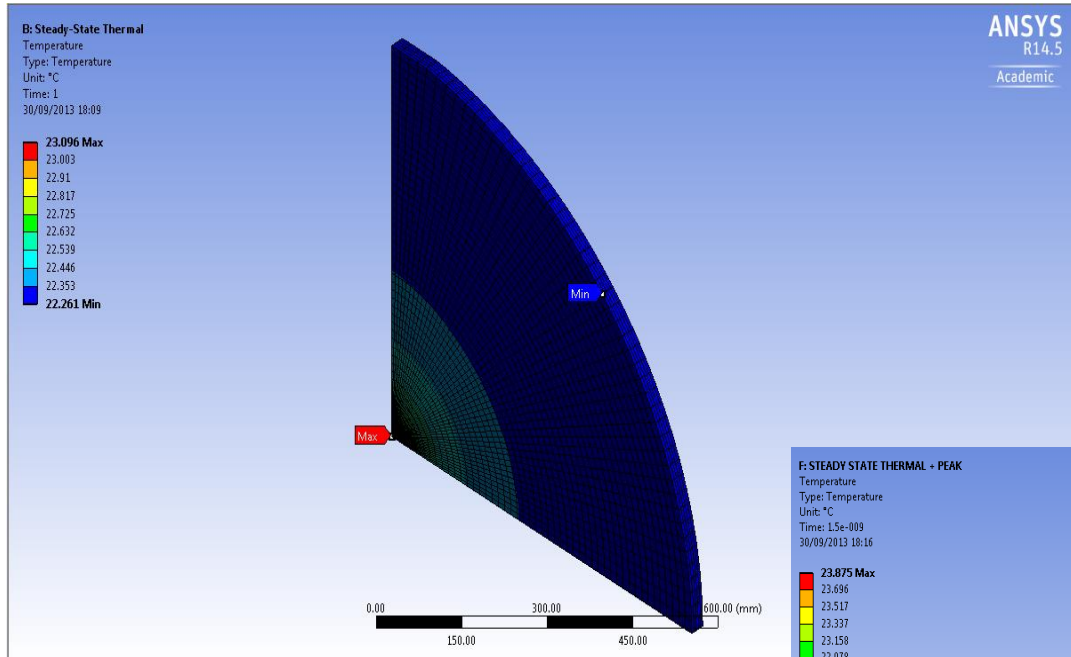
SCALE : 1:2



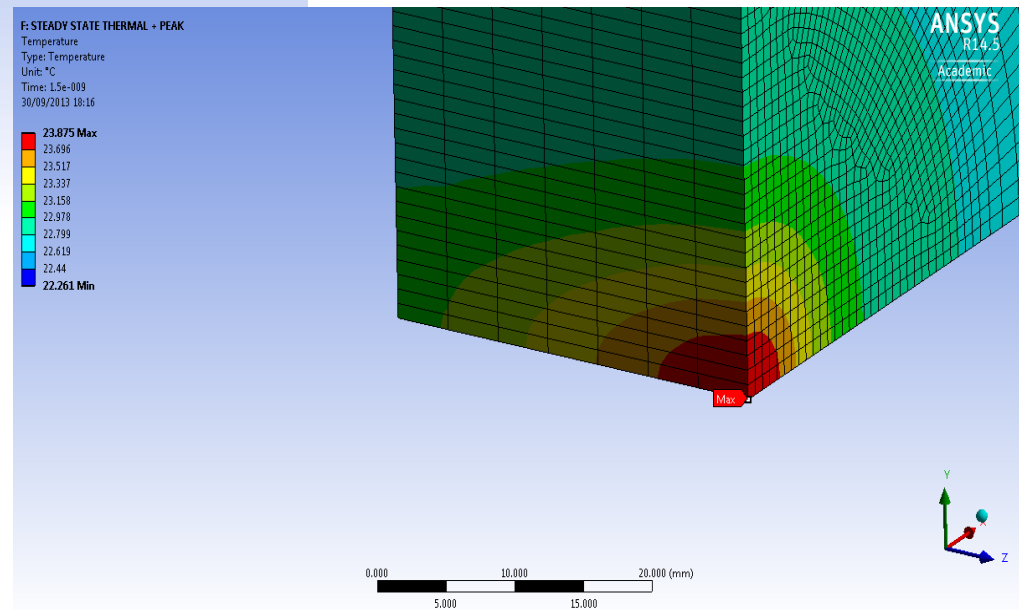
QTY	DESCRIPTION	UNIT	MAT.	REVISION	OBSERVATIONS	REV. DATA
1	Inelastic steel HELOCOPLAS	11	ØCore 5,1 mm			
ØR 200			Ø 17000 / Ø 1510,2			
1	Inelastic steel HELOCOPLAS	10	ØCore 2,1 mm			
ØR 200			Ø 2239,8 / Ø 2254			
20	Spring washer M30	9				
			Perforat. ØR 150			
40	Screw H. M30x60	8				
Quality 8.8			Perforat. ØR 54			
40	Screw H. M30x60	7				
Quality 8.8			Perforat. ØR 54			
4	Sealing cone	6	Steel			
			Mat. SP52GHA_0104			
1	Entrance window	5	Titanium			
			Mat. SP52GHA_0121			
1	Flange for titanium window	4	Steel			
			Mat. SP52GHA_0122			
1	Moist range	3	Steel			
			Mat. SP52GHA_0123			
1	Intermediate flange	2	Steel			
			Mat. SP52GHA_0111			
1	Vacuum Tube	1	Steel			
			ØR 100mm vacuum tube			

REV.	DATE	NON./NAME	ZONE	MODIFICATION
22				
21				
20				



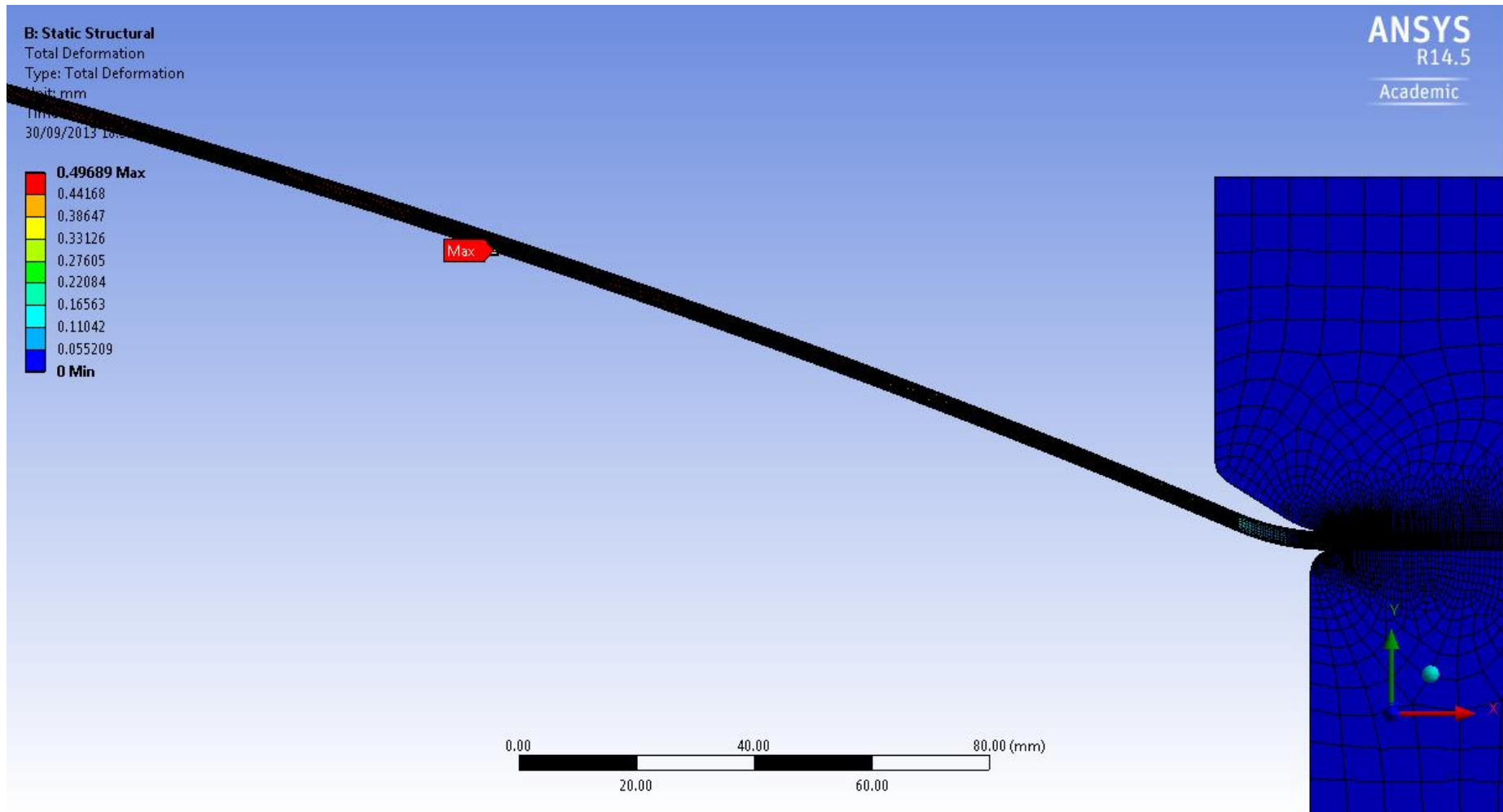


Steady State
Max Temp.= 23.096 °C

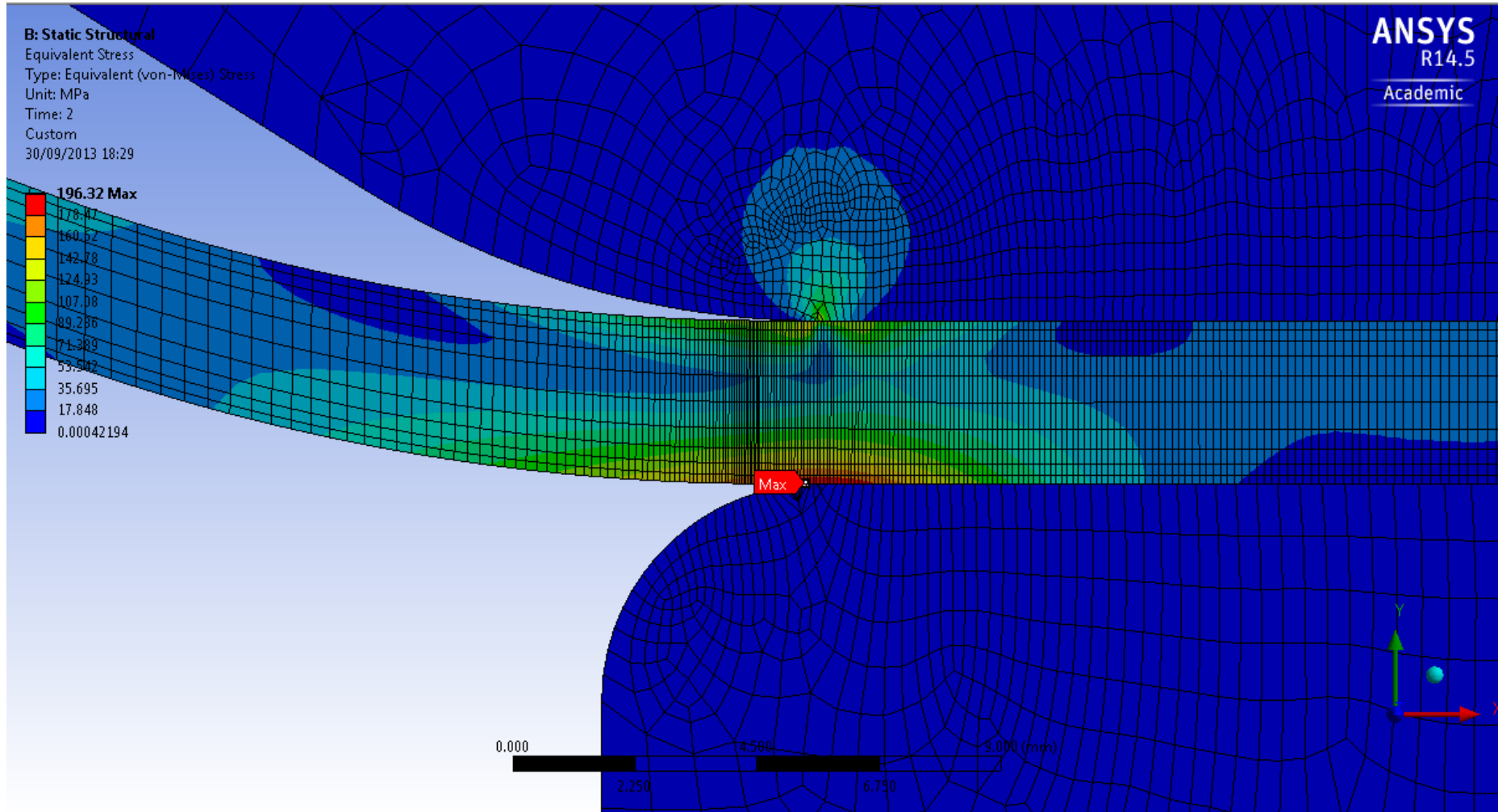


Steady State + 1 Pulse
Max Temp.= 23.875 °C

Max. Deformation = 0.5 mm



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



- 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