**Bulging analysis of the assembled tuner under the nominal heat load**

Assumed material properties:

**Al2O3 (99.5%) Al2O3 (99.9%) (ultra high purity)**

Density 3.9 G/cm3 3.92

Elastic Modulus 370 GPa 386

Poison ratio 0.22 0.22

Compressive strength 2600 MPa 2700

Flexural strength 379 MPa 400

Tensile strength 262 MPa 283

Specific heat 880 J/(kg\*K) 870

Thermal conductivity 30 W/m.K 35

Thermal expansion coefficient 8.2x10-6 1/0C 8.1x10-6

Dielectric constant 9.7 9.8

Dielectric loss coefficient 0.0001 <0.0001

Dielectric strength 8.7 kV/mm 8.7

**Ferrites AL-800**

Density 4.5 - 5 G/cm3

Elastic Modulus 120 – 150 GPa

Poison ratio

Compressive strength 410 – 2000 MPa

Flexural strength 120 – 150 GPa

Tensile strength

Specific heat 710 – 1100 J/kg-K

Thermal conductivity 3.5 – 6.3 W/m-K **5.4 W/m.K**

Thermal expansion coefficient (8 – 11)x10-6 1/K **1.04x10-5/0C**

Dielectric constant 10 - 300

**Stainless steel**

Density 8.0

Elastic Modulus 193 GPa

Poison ratio 0.27 – 0.3

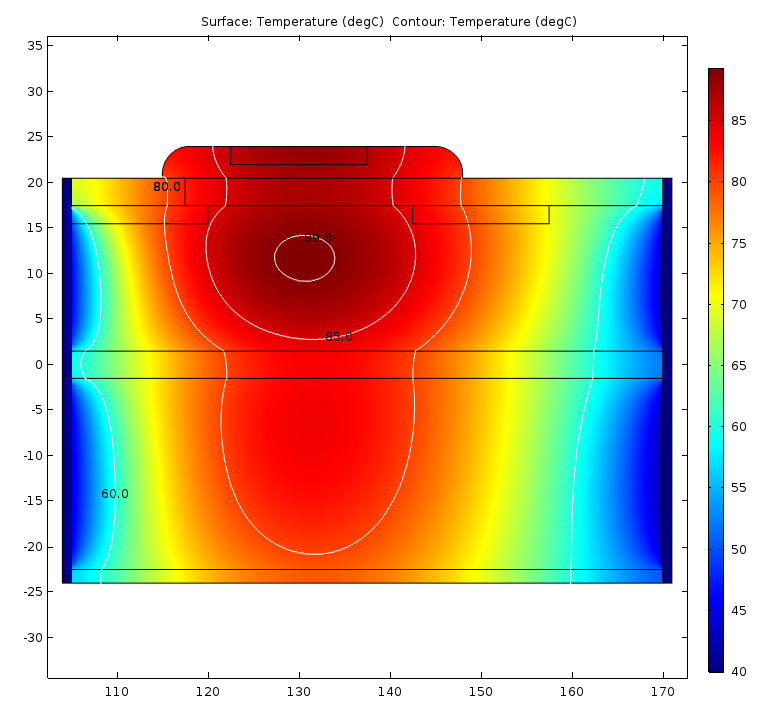
Tensile strength 500 MPa

Specific heat 500 J/kg-K

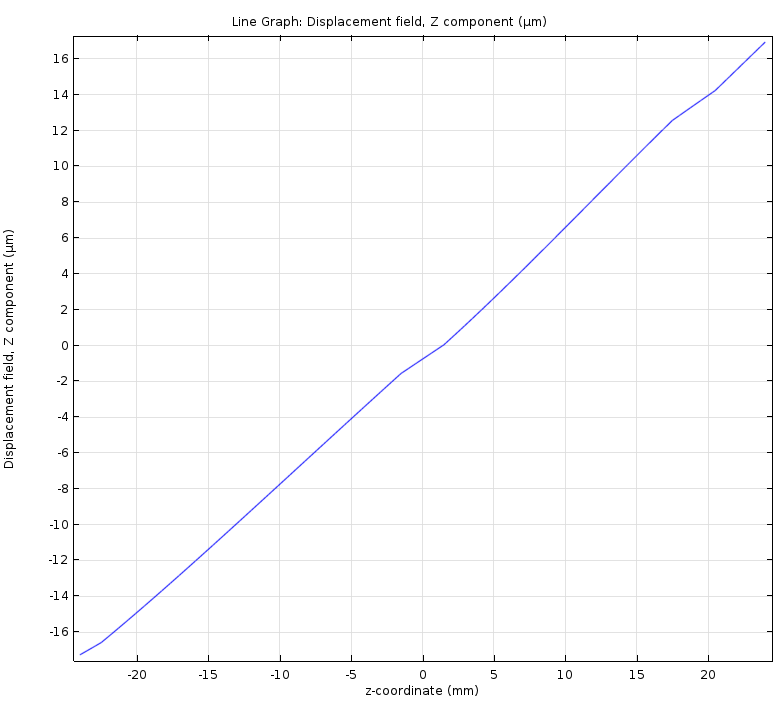
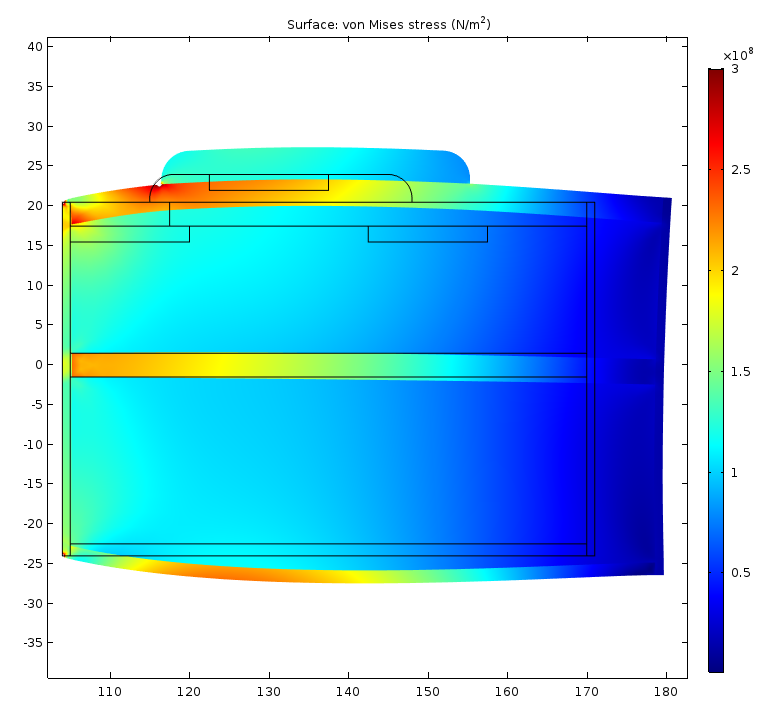
Thermal conductivity 16.3 W/m-K

Thermal expansion coefficient 15.9 x10-6 1/K

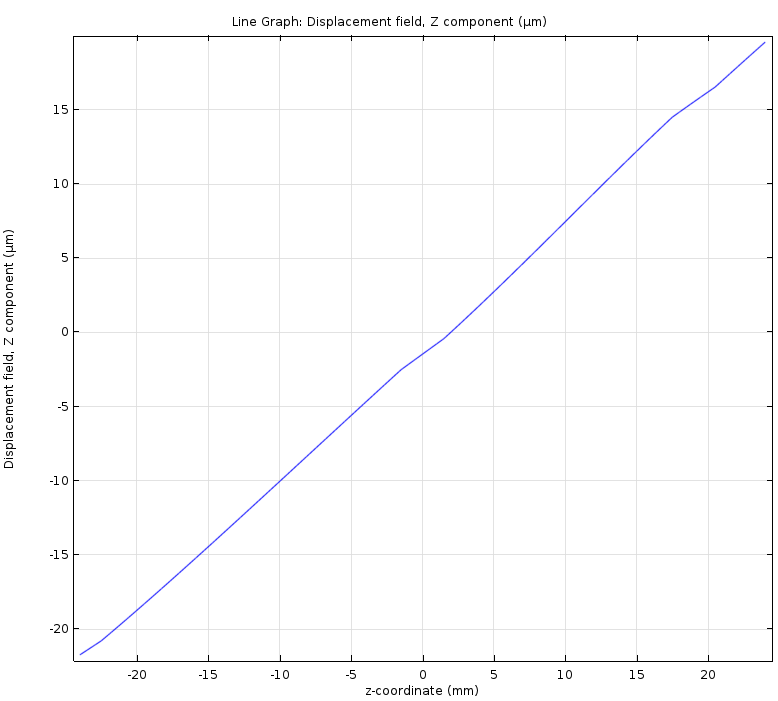
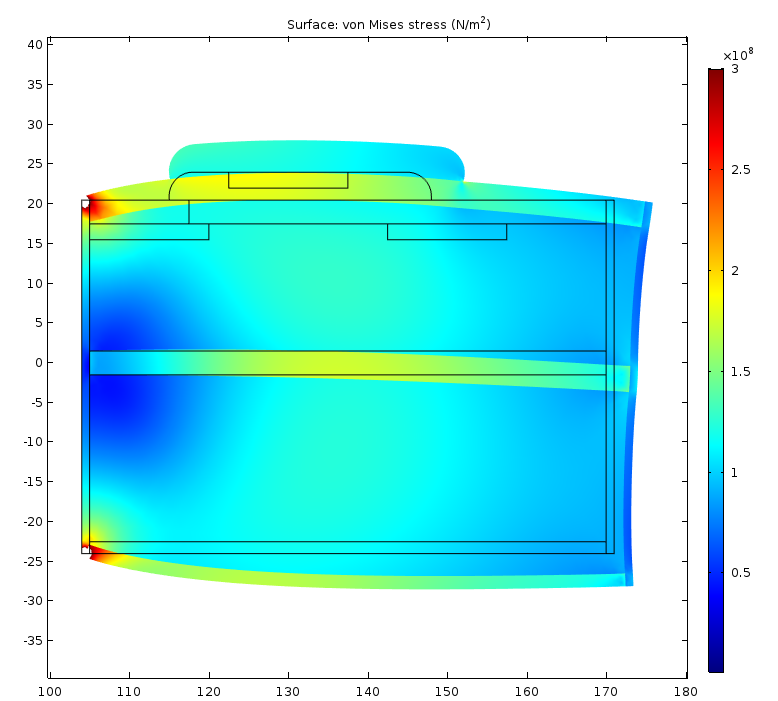
Temperature field consistent with what was found earlier



Von-Mises stress and deformation (R = 135 mm) with the outer pressure 100 kPa (1 Atm)



Von-Mises stress and deformation (R = 135 mm) with the outer pressure 1E8 Pa (1000 Atm)



**Different boundary conditions must be imposed on the structure to avoid the effect of the stainless steel shells. Let’s allow free movement of the steel shells (having in mind that there is no bonding between the blocks and the shells). This is equivalent to saying that the Young’s modulus of the shell material is very low.193**

