AKADEMIA GÓRNICZO-HUTNICZA
IM. STANISŁAWA STASZICA W KRAKOWIE

ABAQUS

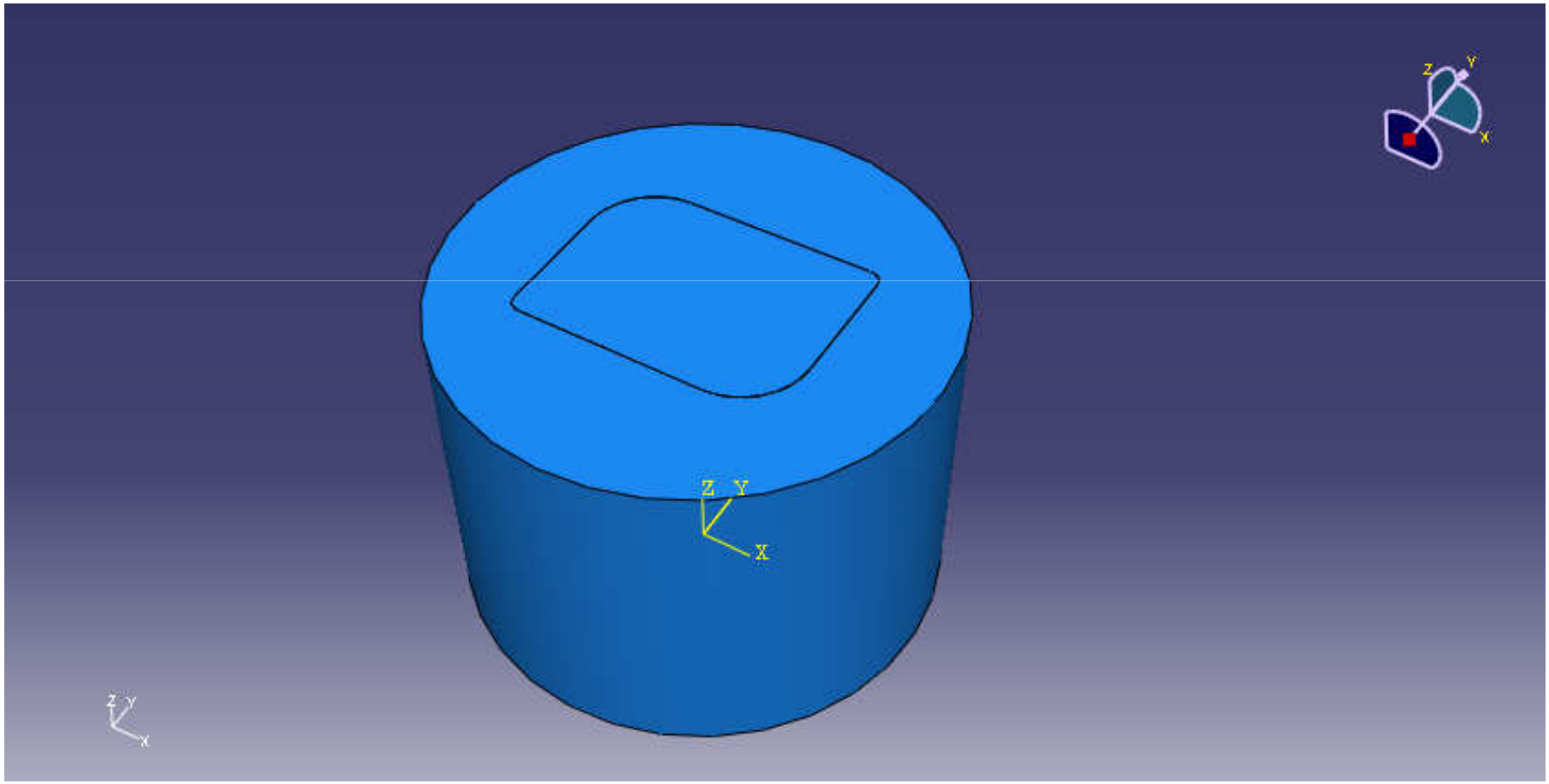
Thermal analysis

Two steps analysis (thermal and mechanical)

dr inż. Piotr Kustra

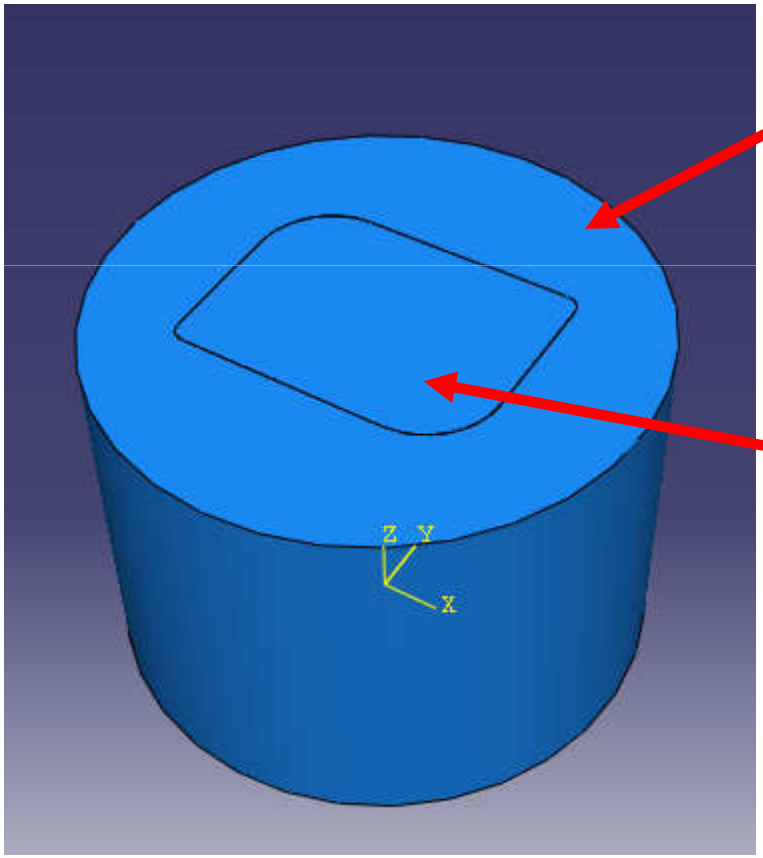
Wydział Inżynierii Metali i Informatyki Przemysłowej

Model definition



Materials definition

Materials data



Resin

E=13GPa

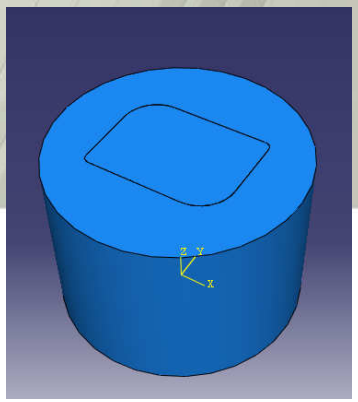
n=0.35

Aluminium

E=70GPa

n=0.38

Thermal stress



Materials data

Resin

Specific heat	1000 J/(Kg K)
Thermal conductivity	1 W·/(m·K)
Expansion	2.3 10-5 1/C
Density	1719 kg·m3

Aluminium

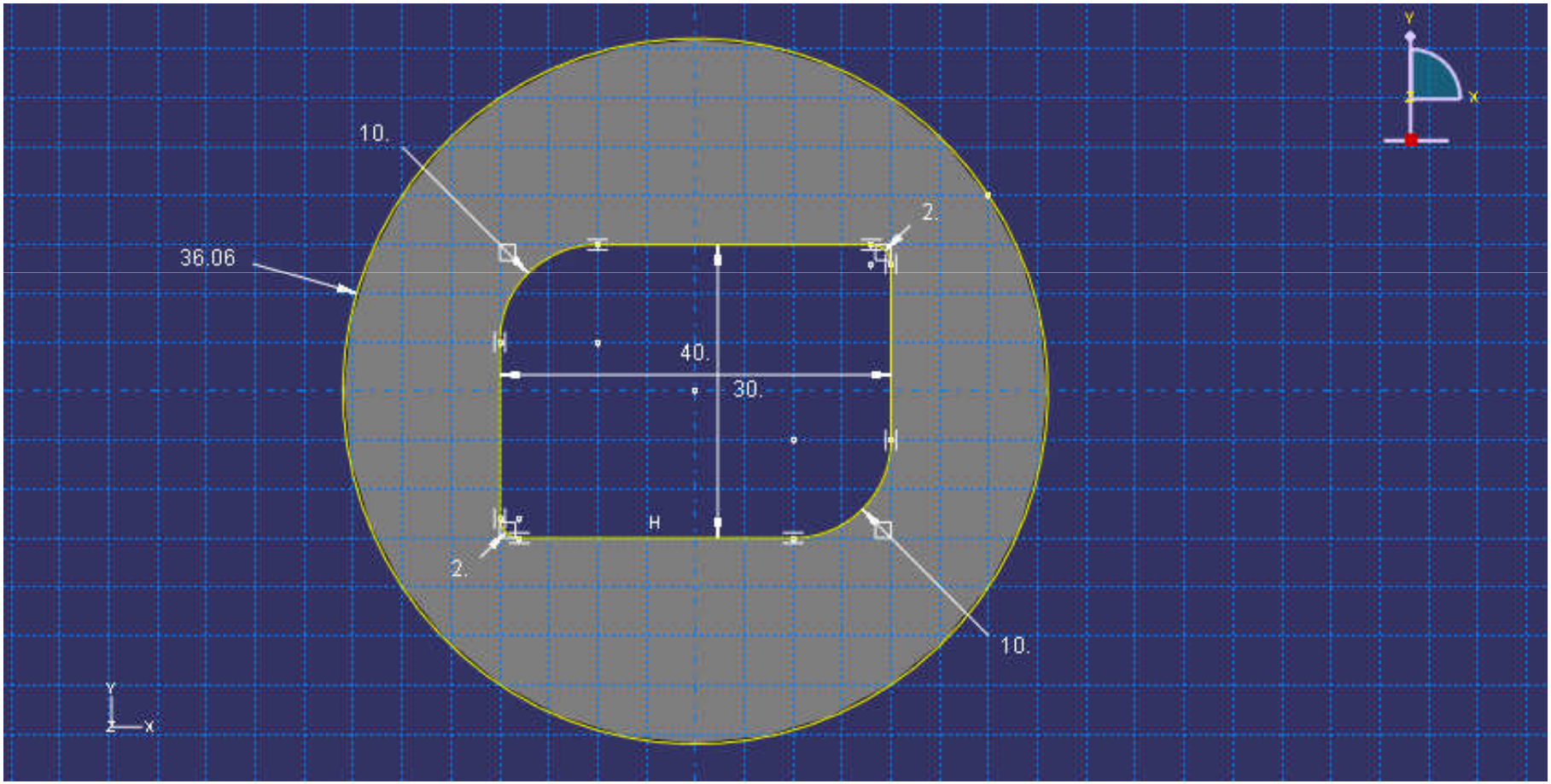
Specific heat	871 J/(Kg K)
Thermal conductivity	202 W·/(m·K)
Expansion	2.3 10-5 1/C
Density	2700 kg·m3

Data for ABAQUS (model in mm)

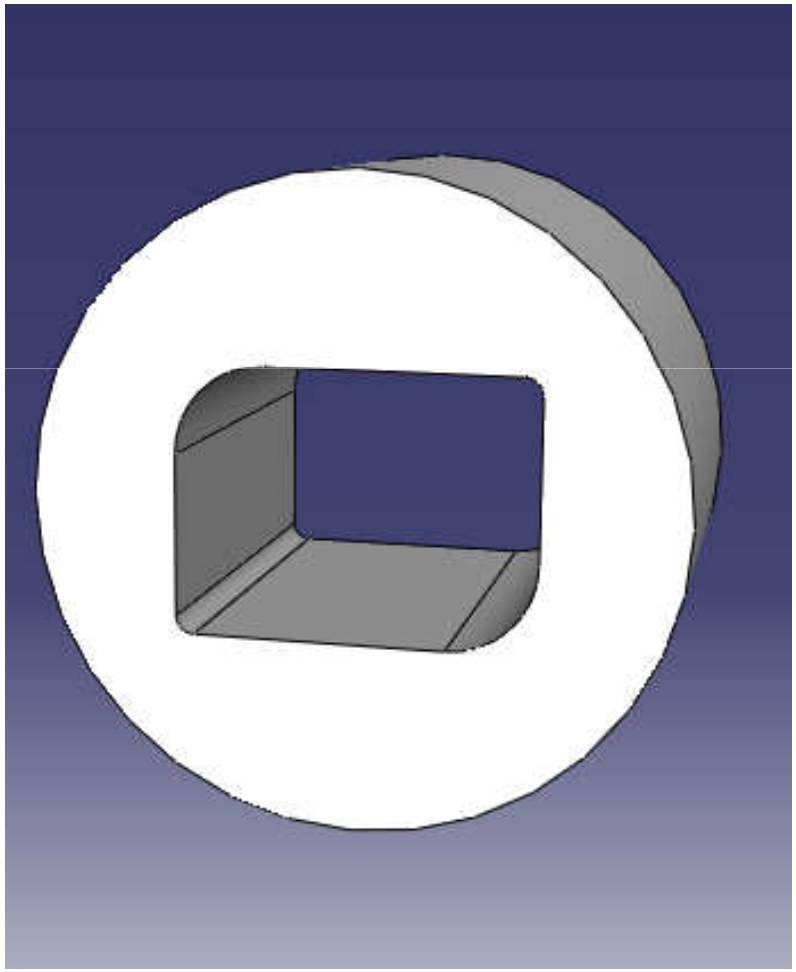
Specific heat	1000000000
Thermal conductivity	1
Expansion	4.2E-005
Density	1.719E-009

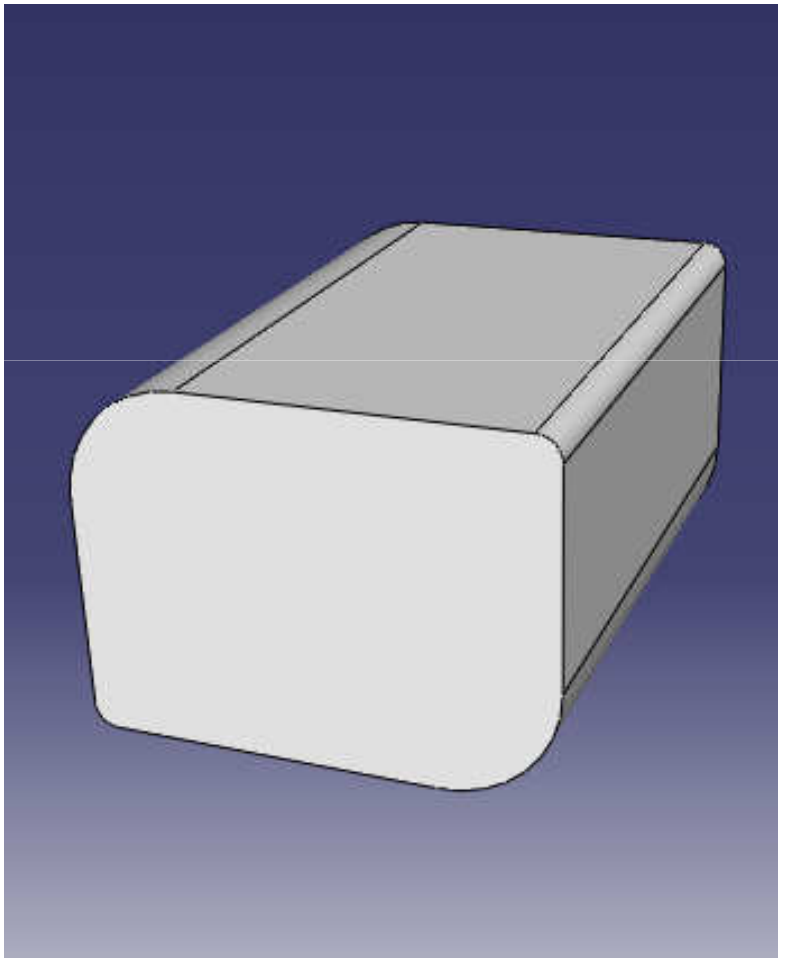
Specific heat	871000000
Thermal conductivity	202
Expansion	2.3E-005
Density	2.7E-009

Model

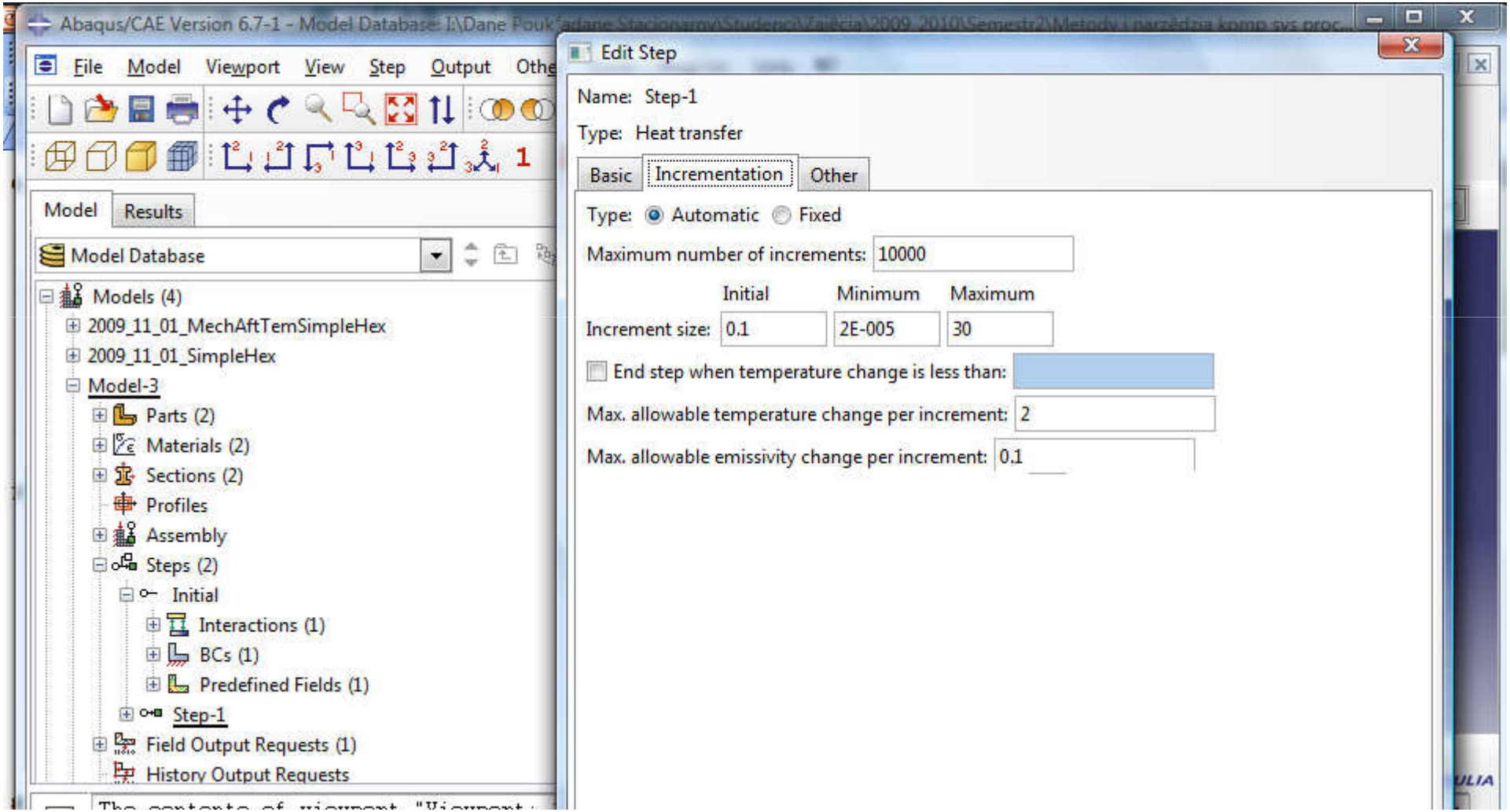


Parts

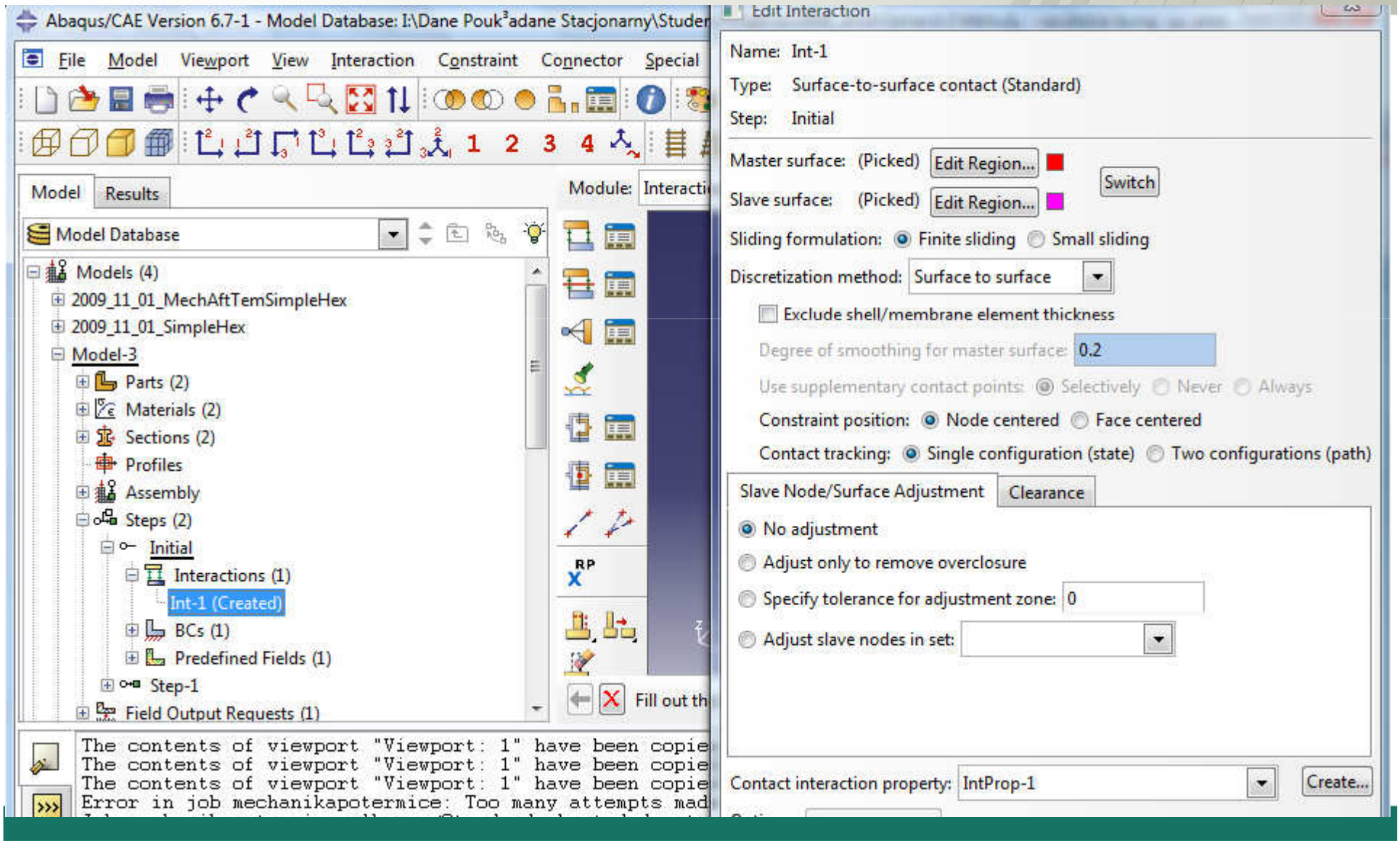




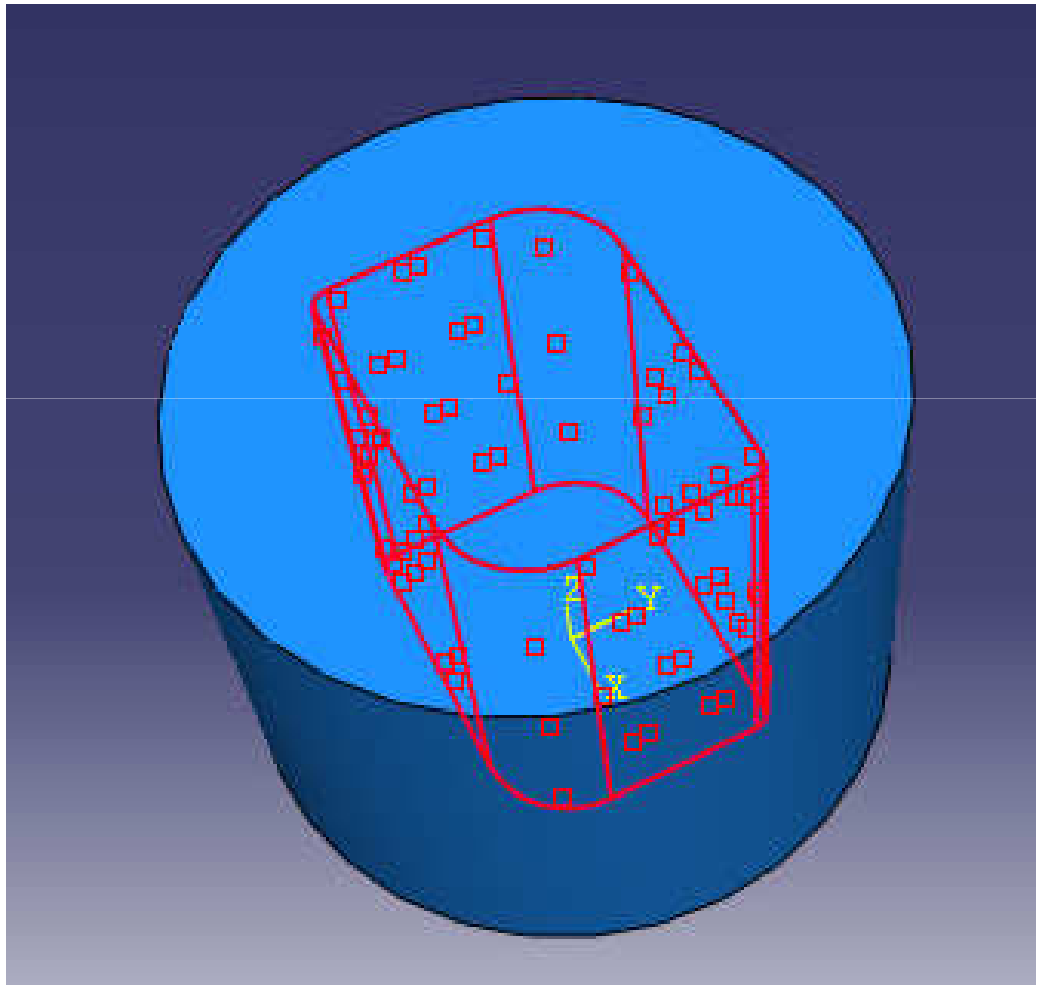
Analysis type

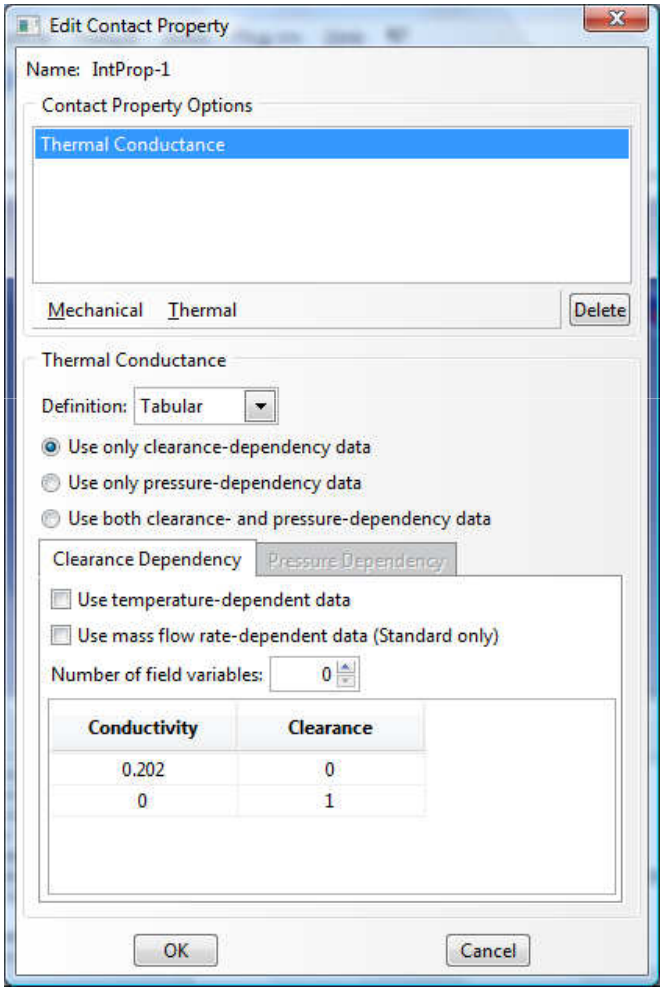


Contact definition

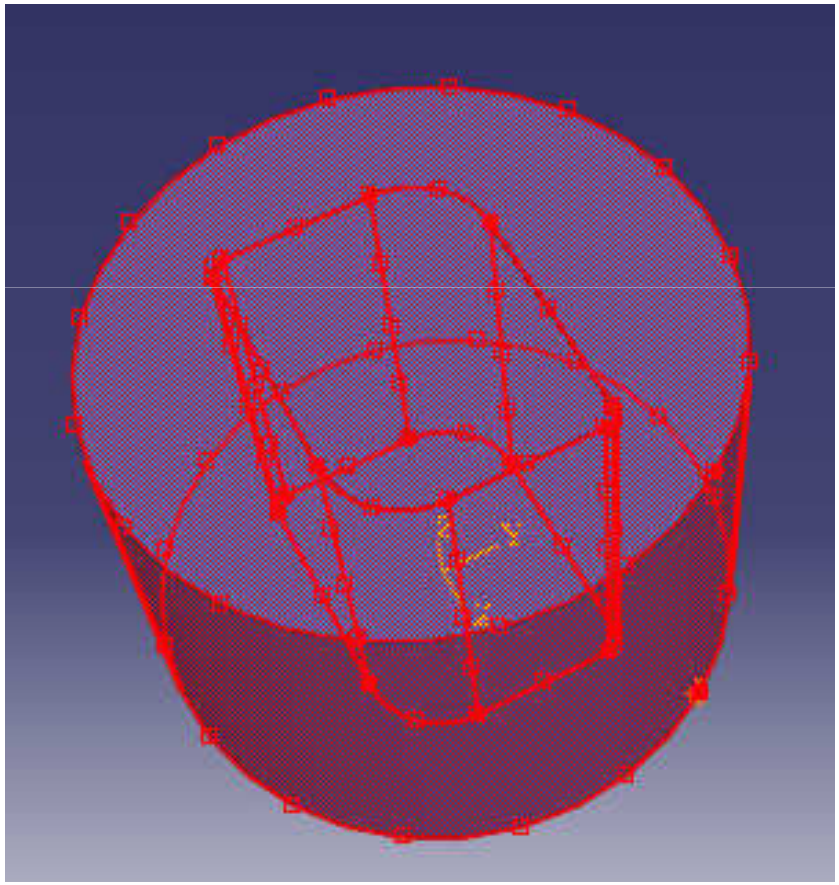


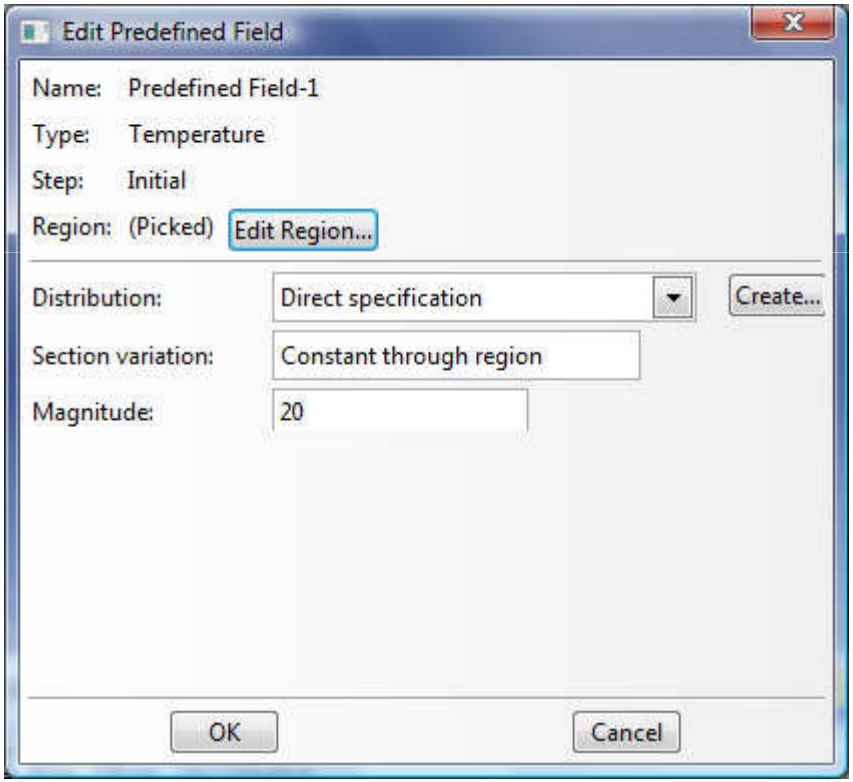
Thermal Conductance



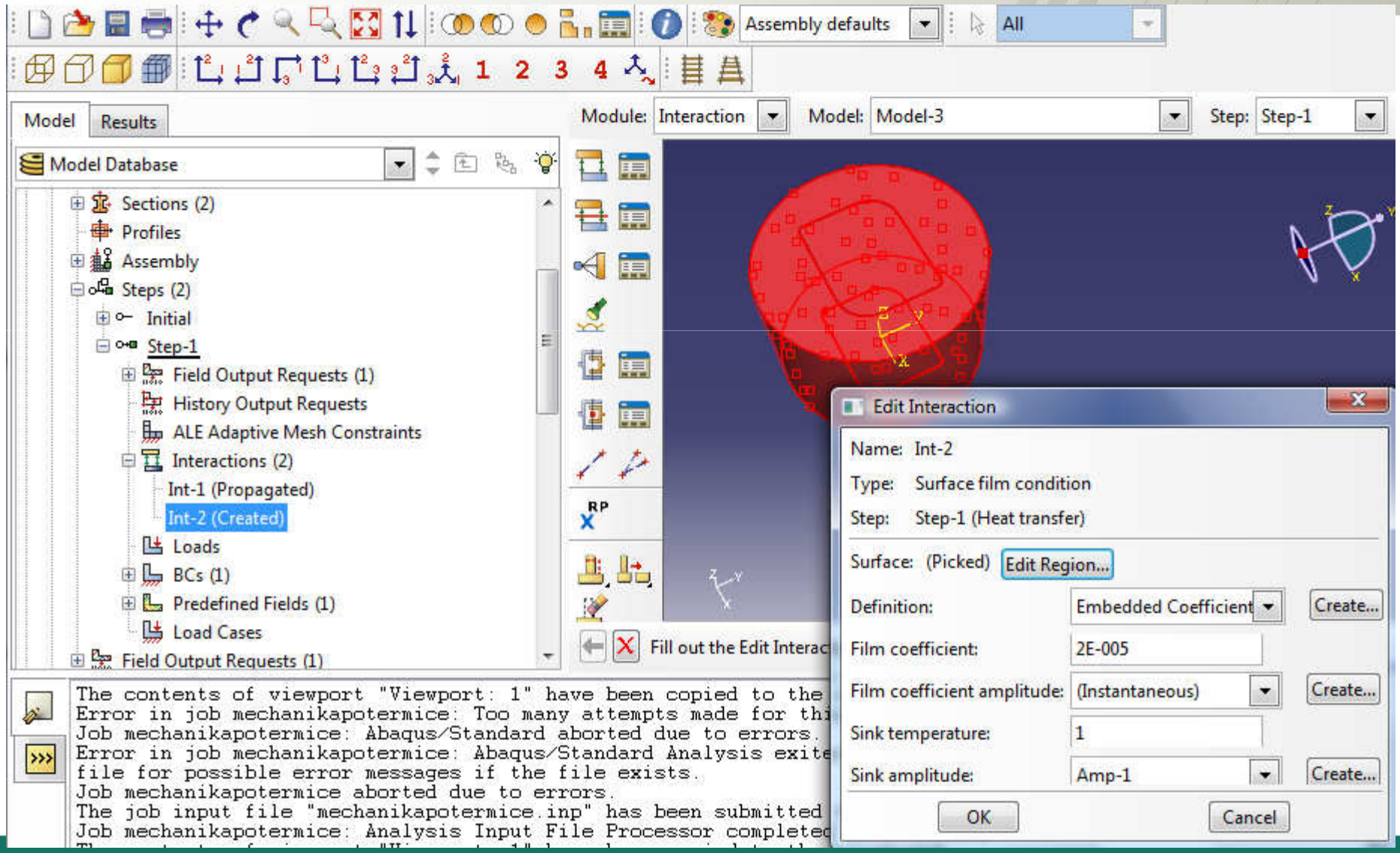


Initial temperature



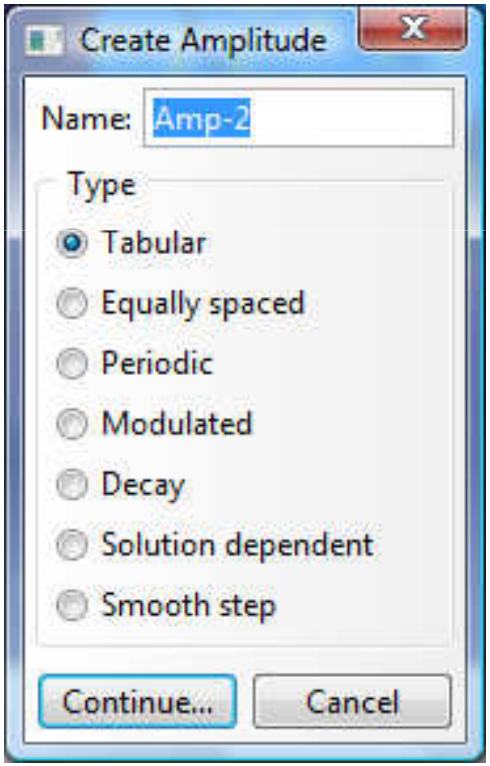


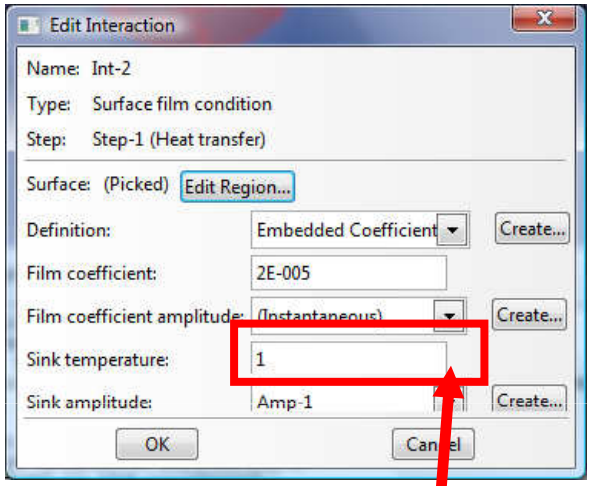
Surface film condition

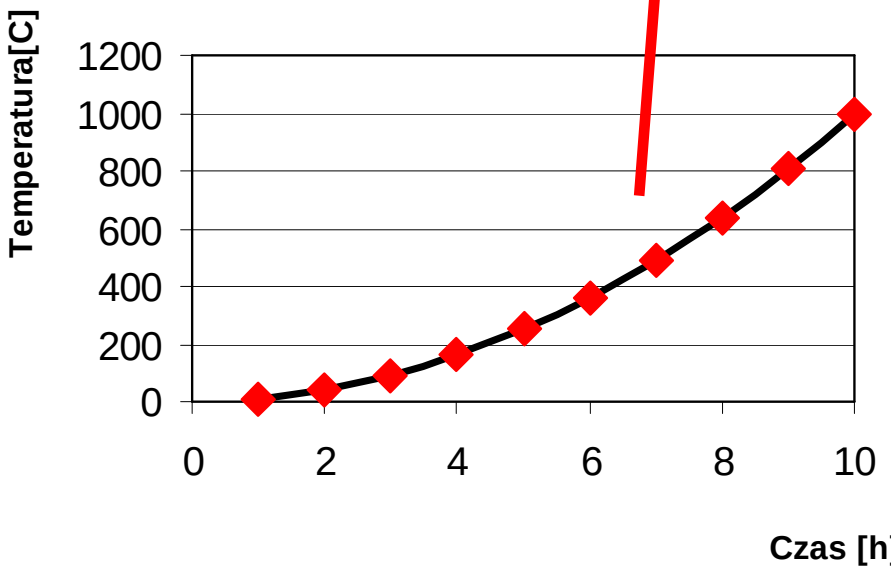


Outside tempereature - heating

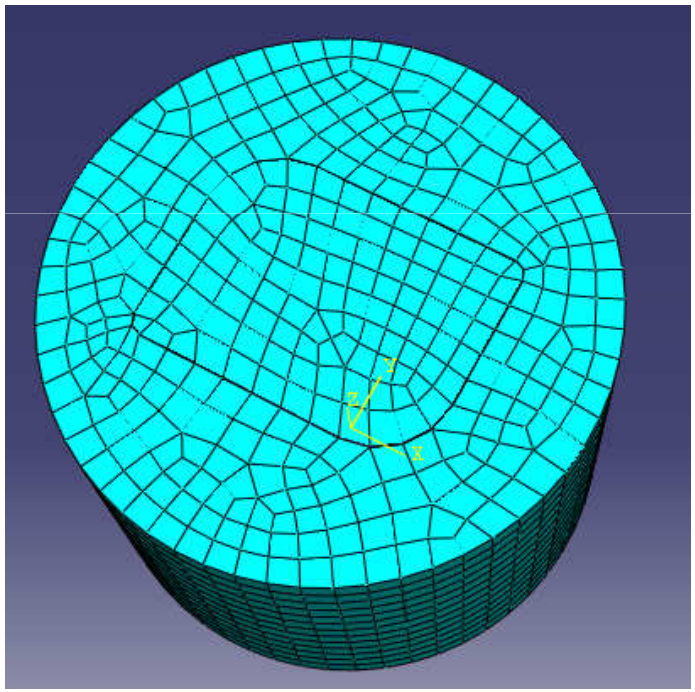
Amplitude

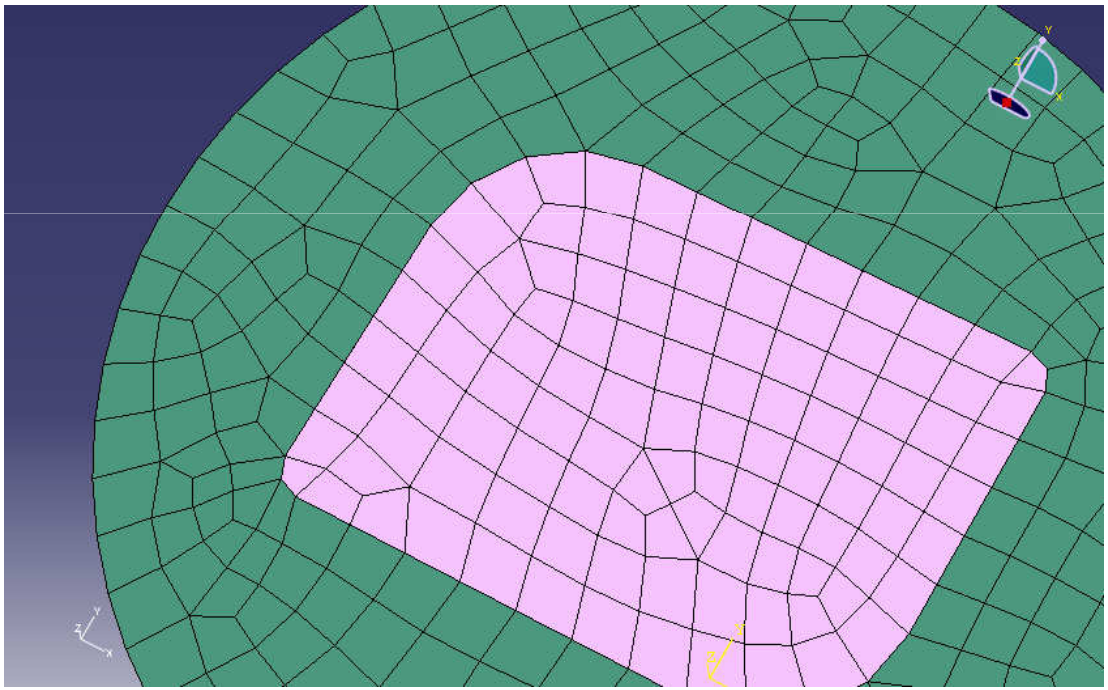




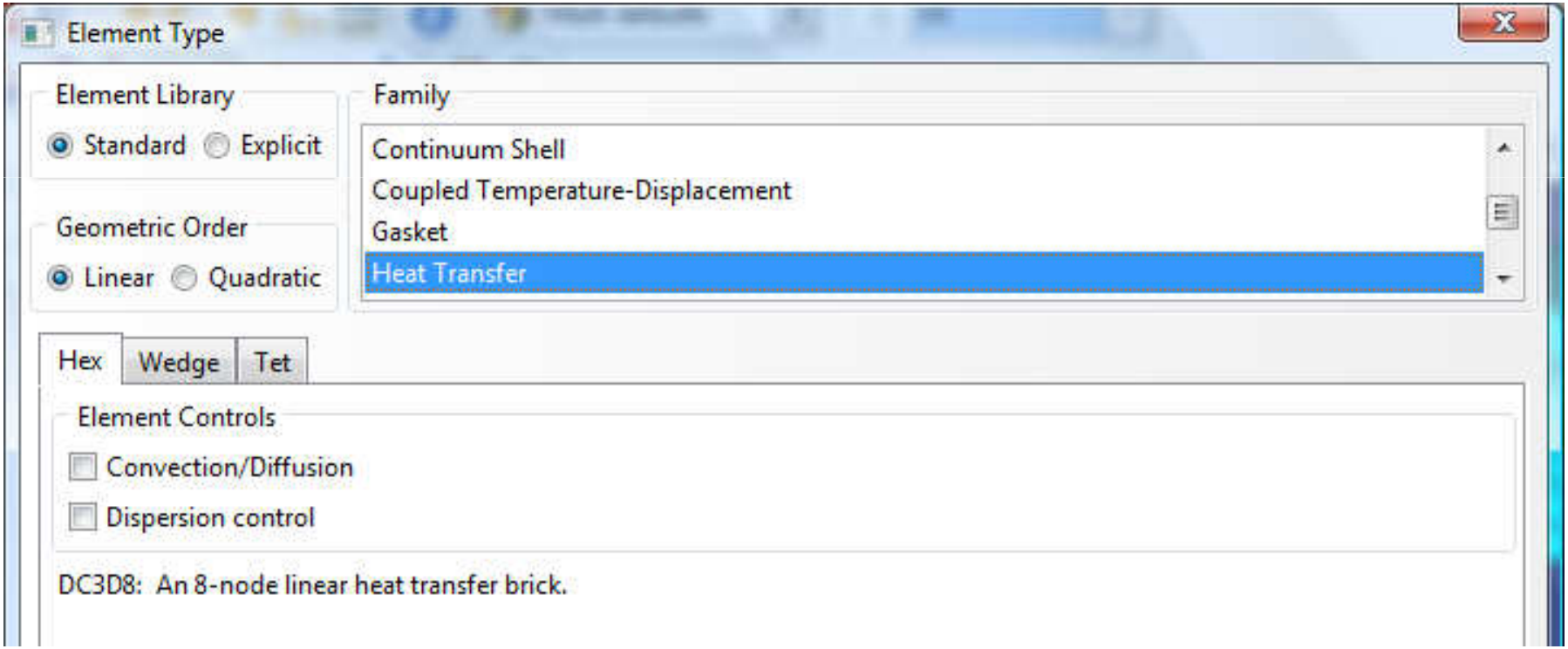


FEM grids

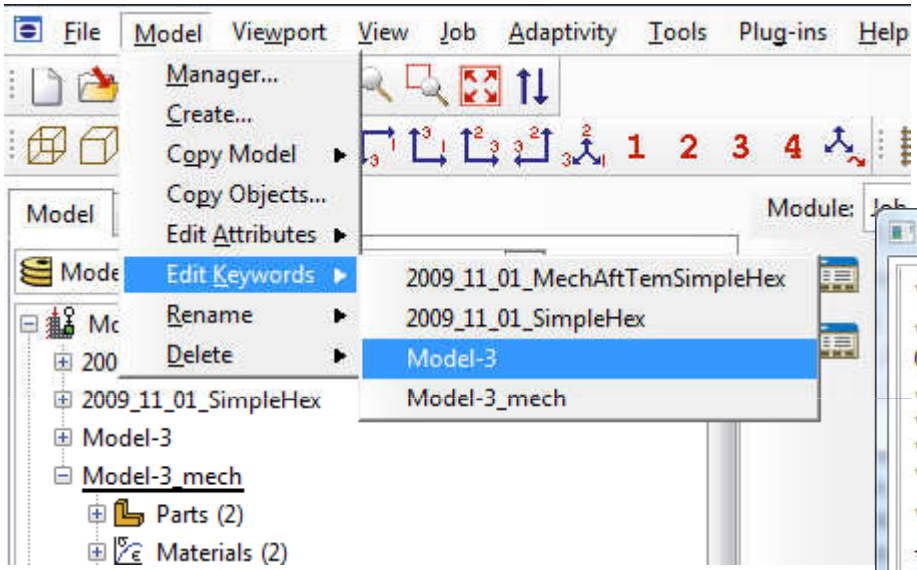


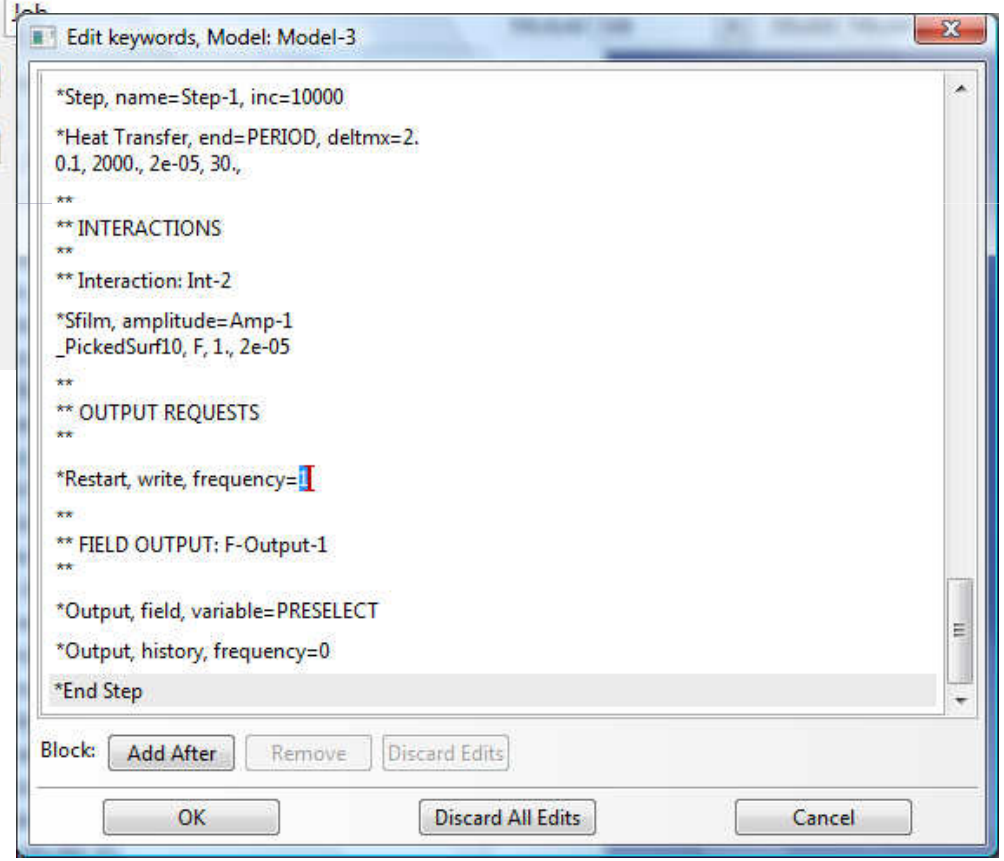


FEM element type



Two steps analysis – thermal and mechanical

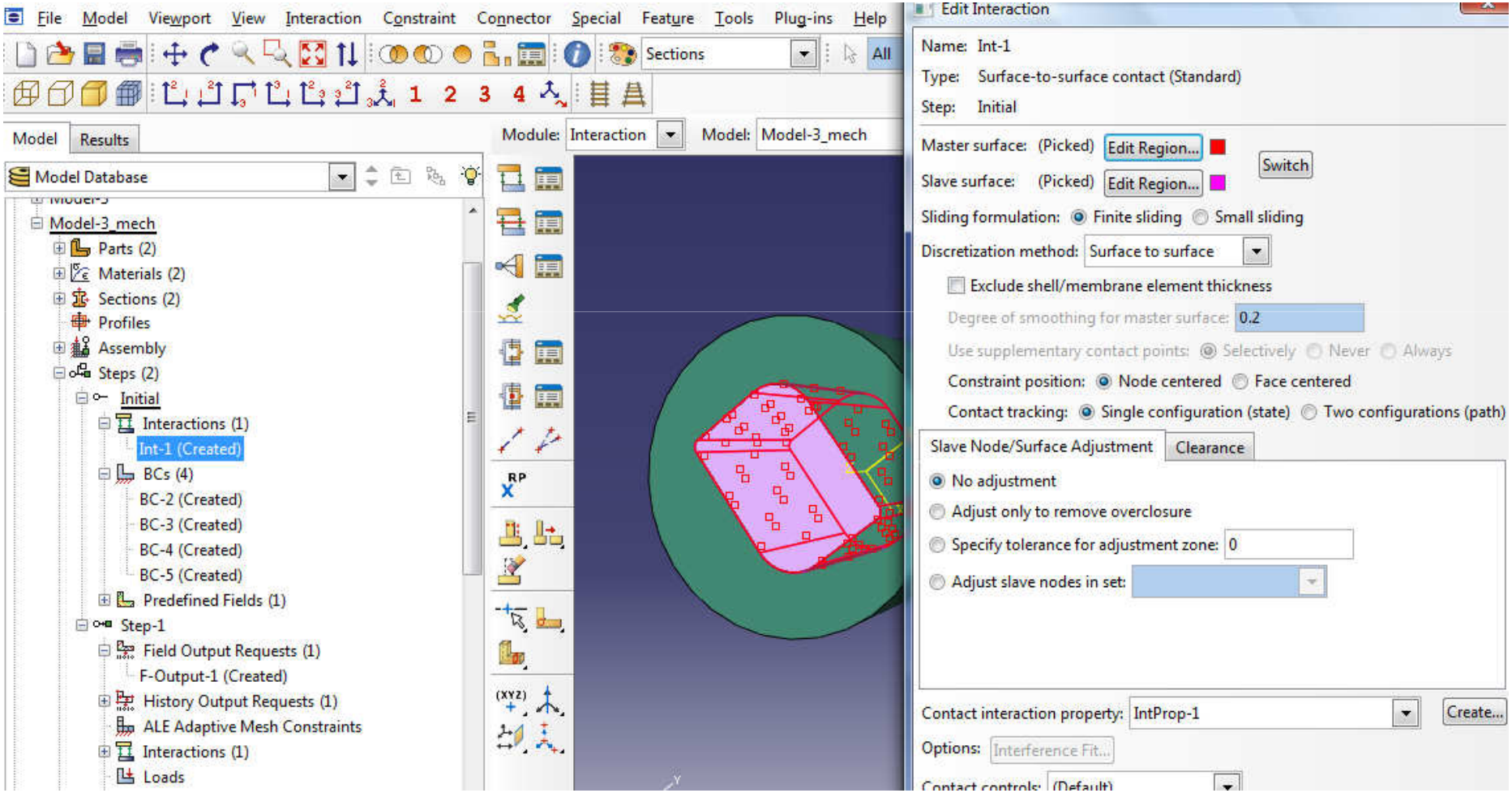




For two-staged analysis - thermal and mechanical
In thermal analysis user needs to edit Keywords :

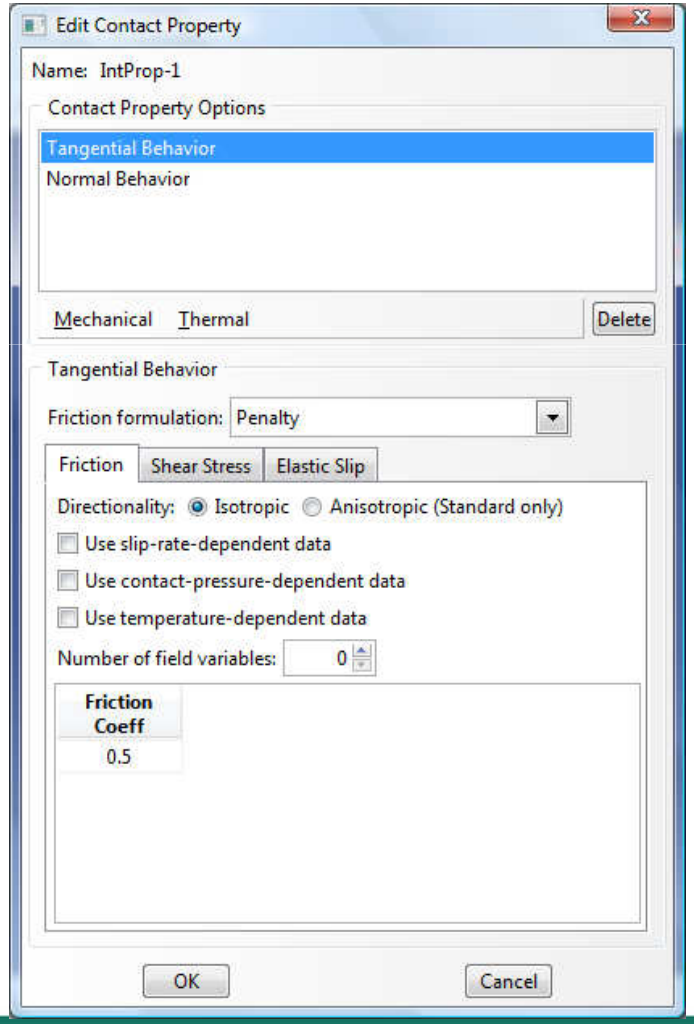
Restart, write, frequency = 1

Mechanical analysis

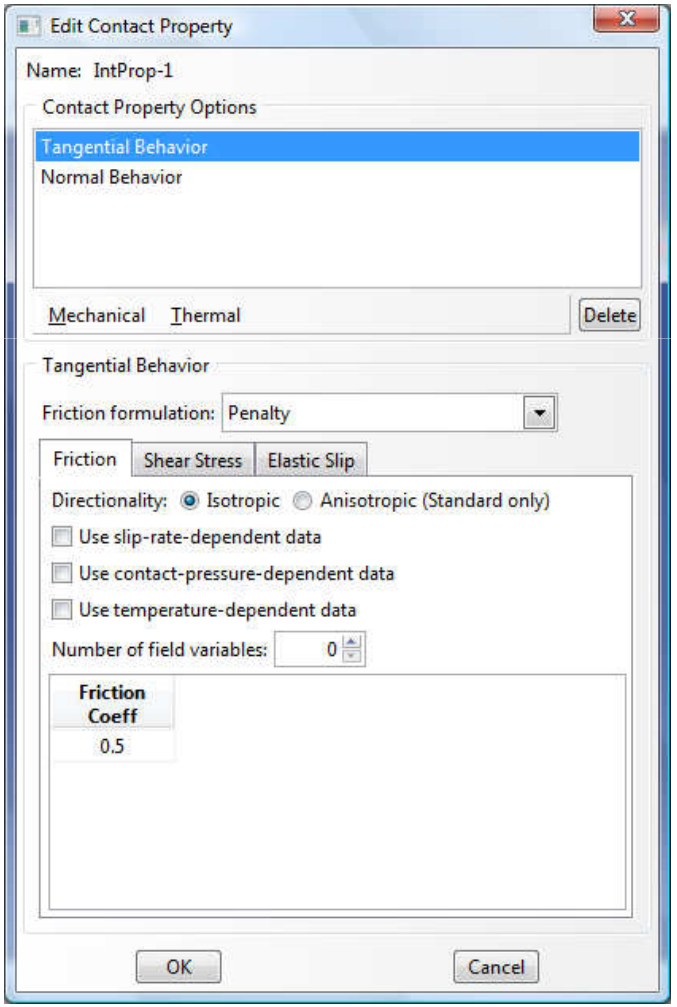


Mechanical analysis

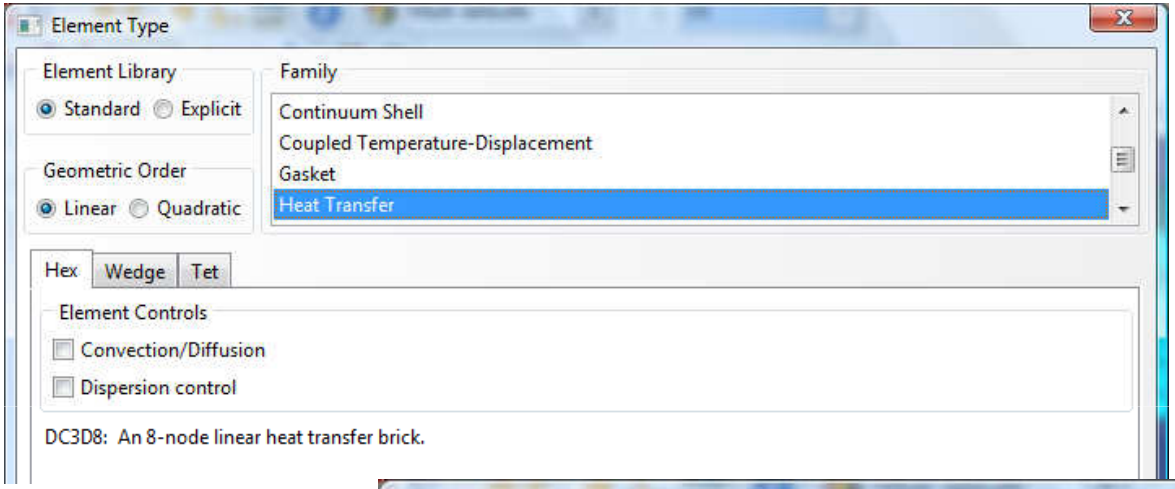
Analiza mechaniczna

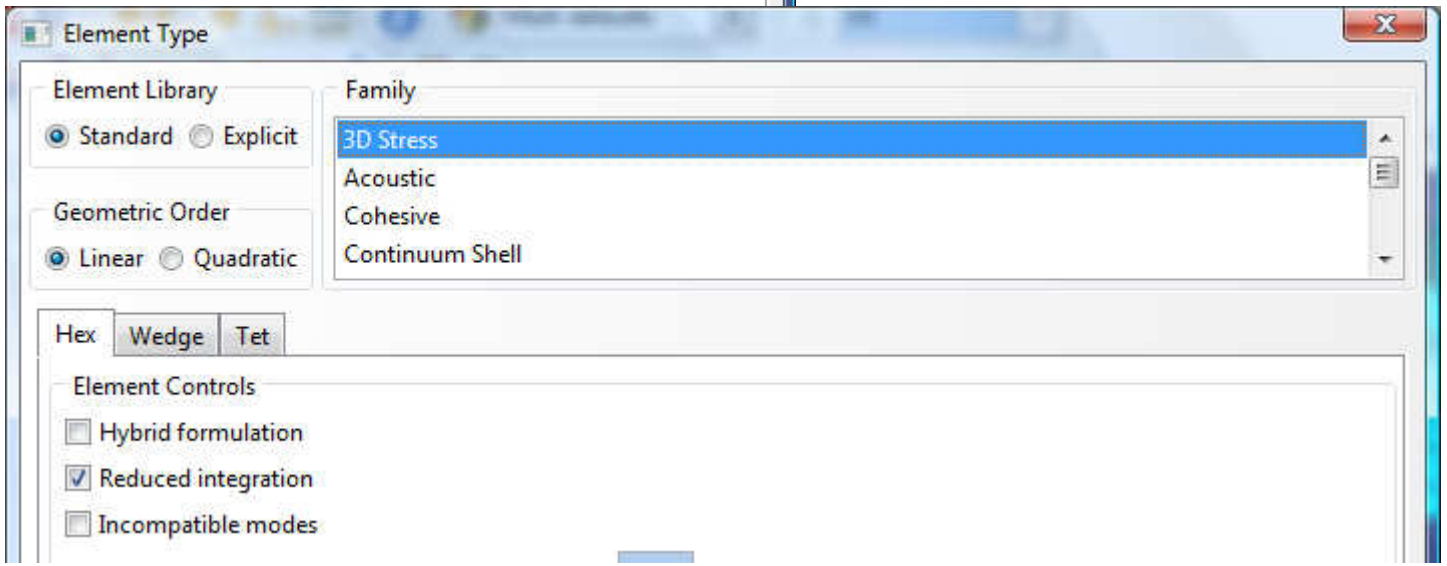


Analiza termiczna

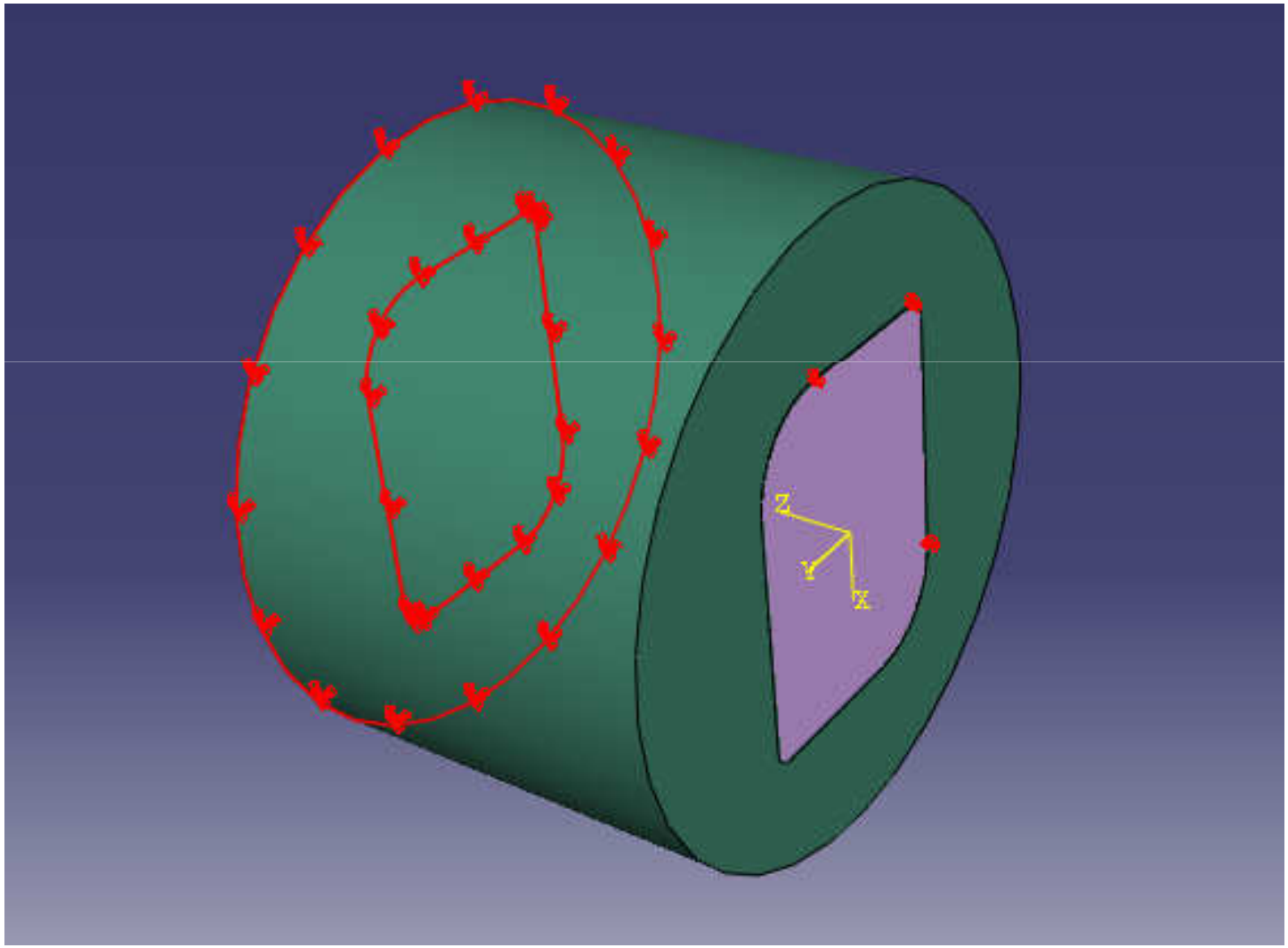


Element type in thermal and mechanical analysis

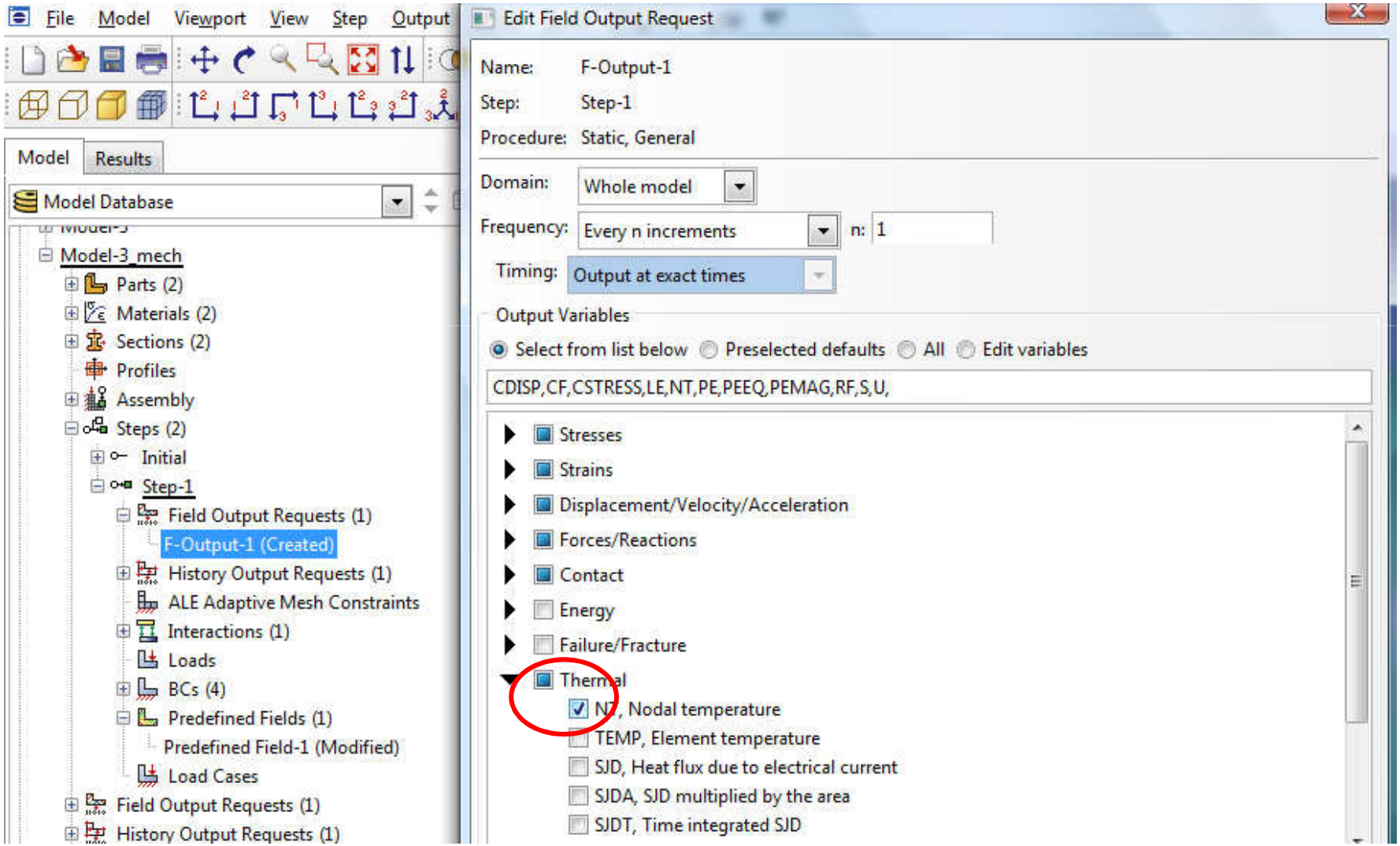




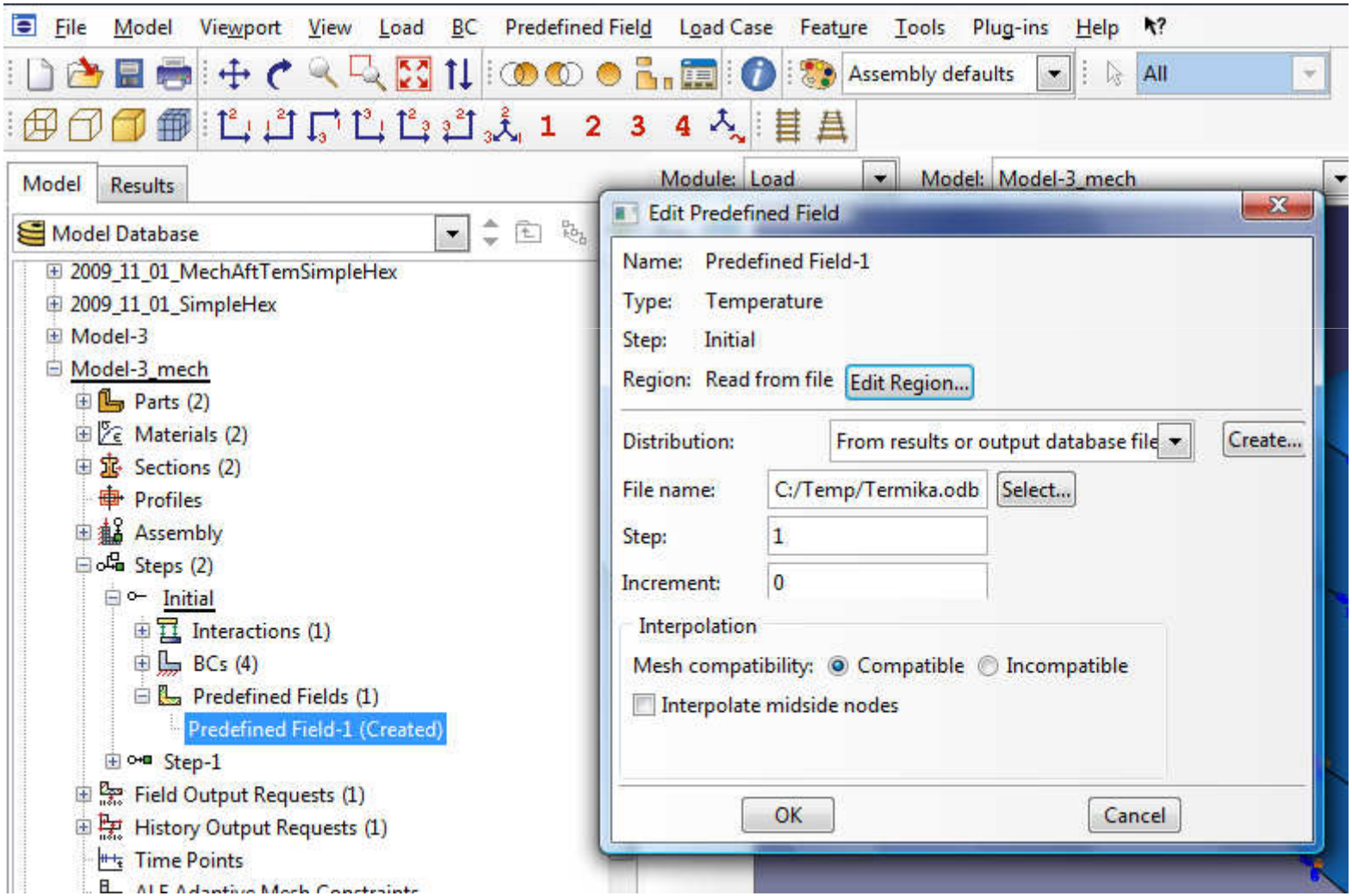
Boundary conditions



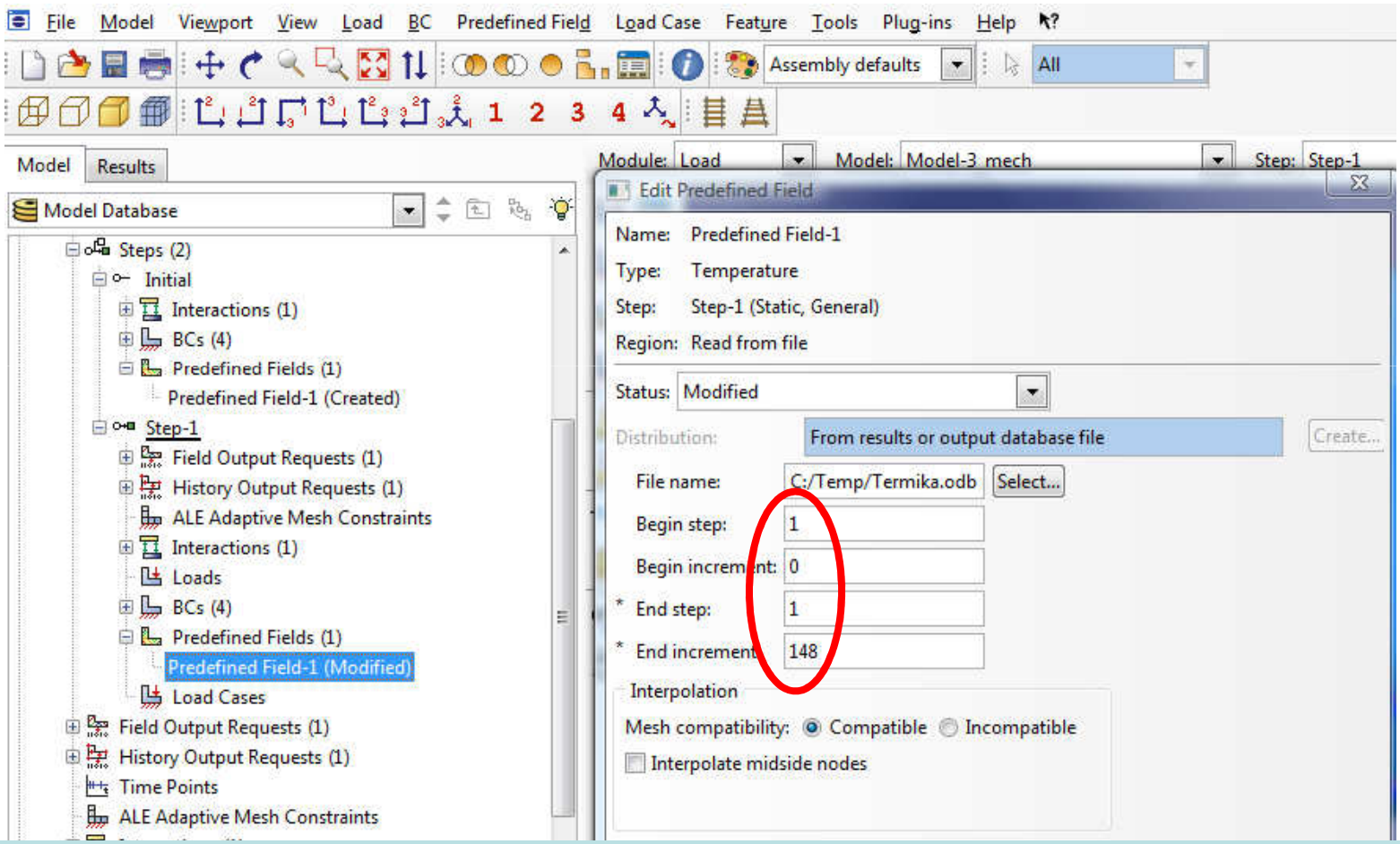
Output request – nodal temperature



Reading temperature field to mechanical analysis



Definition of increment



Definition of steps and increment which are read from thermal analysis to mechanical analysis (in thermal analysis was 148 increments (monitor))