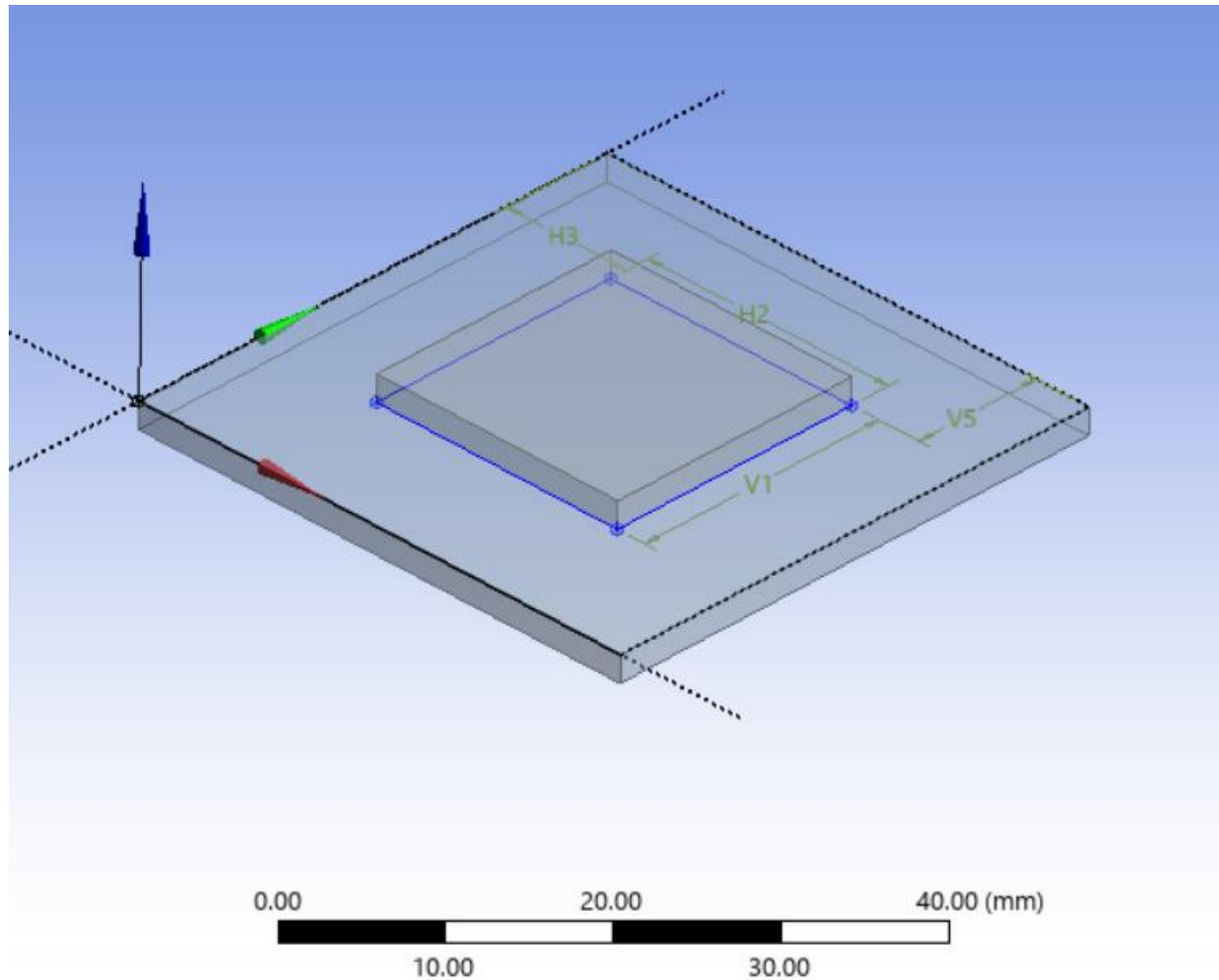Project 11: ANSYS: Thermal+structural analysis of a semiconductor package

Problem Statement: apply thermal condition in a semiconductor package and calculate the structural deformation.

Geometry:

Material Properties:

Cu Die:

Density	8933	kg m^-3
Isotropic Instantaneous Coefficient of Thermal Expansion	2.08E-06	C^-1
Isotropic Elasticity		
Derive from	Young's Modulus an...	
Young's Modulus	1E+05	MPa
Poisson's Ratio	0.3	
Bulk Modulus	8.3333E+10	Pa
Shear Modulus	3.8462E+10	Pa
Isotropic Thermal Conductivity	400	W m^-1 C^-1
Specific Heat Constant Pressure, C_p	385	J kg^-1 C^-1

Si substrate:

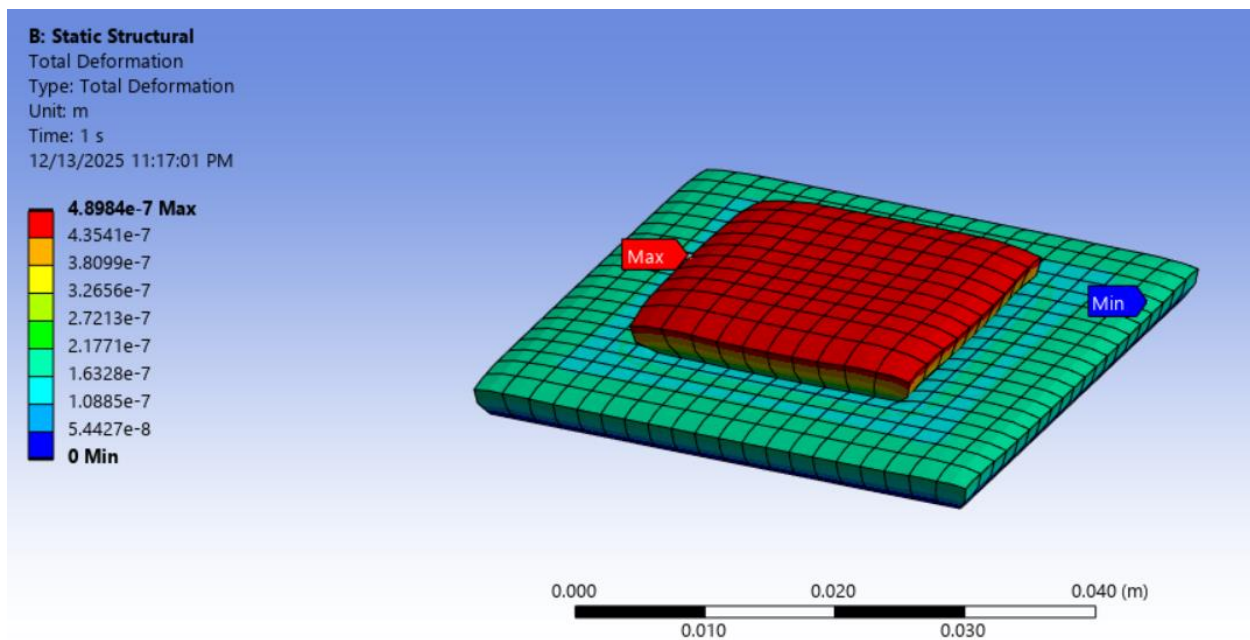| Density	2330	kg m^-3
Isotropic Instantaneous Coefficient of Thermal Expansion	2.6E-06	C^-1
Isotropic Elasticity		
Derive from	Young's Modulus an...	
Young's Modulus	2E+05	MPa
Poisson's Ratio	0.27	
Bulk Modulus	1.4493E+11	Pa
Shear Modulus	7.874E+10	Pa
Isotropic Thermal Conductivity	148	W m^-1 C^-1
Specific Heat Constant Pressure, C_p	712	J kg^-1 C^-1

Loading and boundary conditions:

1) Die has temperature of 60.
2) Substrate has temperature of 40.
3) Bottom surface of substrate is fixed.

Mesh: (coarse due to limitation of 1000 nodes in ANSYS educational version).

Results:

Deformation:

Mises Stress: