

Analysis of (final Design) trench cover Technotrak rib tests2

Introduction

Do not accept or reject a design based solely on the data presented in this report. Evaluate designs by considering this information in conjunction with experimental test data and the practical experience of design engineers and analysts. A quality approach to engineering design usually mandates physical testing as the final means of validating structural integrity to a measured precision.

Geometry and Mesh

The Relevance setting listed below controlled the fineness of the mesh used in this analysis. For reference, a setting of -100 produces a coarse mesh, fast solutions and results that may include significant uncertainty. A setting of +100 generates a fine mesh, longer solution times and the least uncertainty in results. Zero is the default Relevance setting.

Bounding Box Dimensions	1200 mm 1080 mm 51.5 mm
Part Mass	19.29 kg
Part Volume	1.06e+007 mm ³
Mesh Relevance Setting	0
Nodes	33923
Elements	16638

Bounding box dimensions represent lengths in the global X, Y and Z directions.

Material Data

The following material behavior assumptions apply to this analysis:

- Linear - stress is directly proportional to strain.
- Constant - all properties temperature-independent.
- Homogeneous - properties do not change throughout the volume of the part.
- Isotropic - material properties are identical in all directions.

TABLE 2 SMC-GREEN-TECHNOTRAK	
Young's Modulus	7000 MPa
Poisson's Ratio	0.38
Mass Density	1.82e-006 kg/mm ³
Tensile Yield Strength	33.0 MPa
Tensile Ultimate Strength	67.0 MPa

Loads and Constraints

The following loads and constraints act on specific regions of the part. Regions were defined by selecting surfaces, cylinders, edges or vertices.

TABLE 3 Load and Constraint Definitions			
Name	Type	Magnitude	Vector
Force 1	Surface Force	8000 N	0.0 N 0.0 N -8000 N
Frictionless Constraint 1	Surface Frictionless Constraint	N/A	N/A

TABLE 4 Constraint Reactions				
Name	Force	Vector	Moment	Moment Vector
Frictionless Constraint 1	8000 N	0.0 N 0.0 N 8000 N	1.415 N·mm	-0.3344 N·mm -1.375 N·mm 0.0 N·mm

Note: vector data corresponds to global X, Y and Z components.

Results

The table below lists all structural results generated by the analysis. The following section provides figures showing each result contoured over the surface of the part.

Safety factor was calculated by using the maximum equivalent stress failure theory for ductile materials. The stress limit was specified by the tensile yield strength of the material.

Name	Minimum	Maximum
Equivalent Stress	1.233e-002 MPa	86.66 MPa
Maximum Principal Stress	-19.04 MPa	109.2 MPa
Minimum Principal Stress	-81.05 MPa	18.48 MPa
Deformation	5.878e-002 mm	24.69 mm
Safety Factor	0.3808	N/A

Figures

FIGURE 1
Equivalent Stress

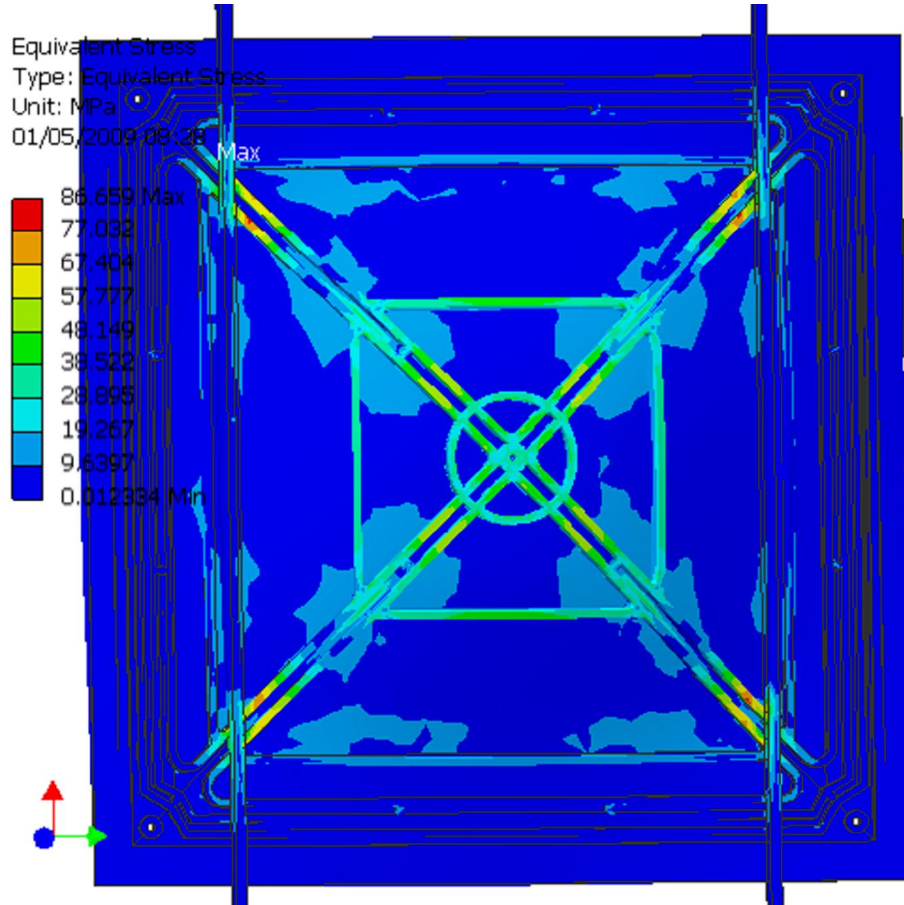


FIGURE 2
Maximum Principal Stress

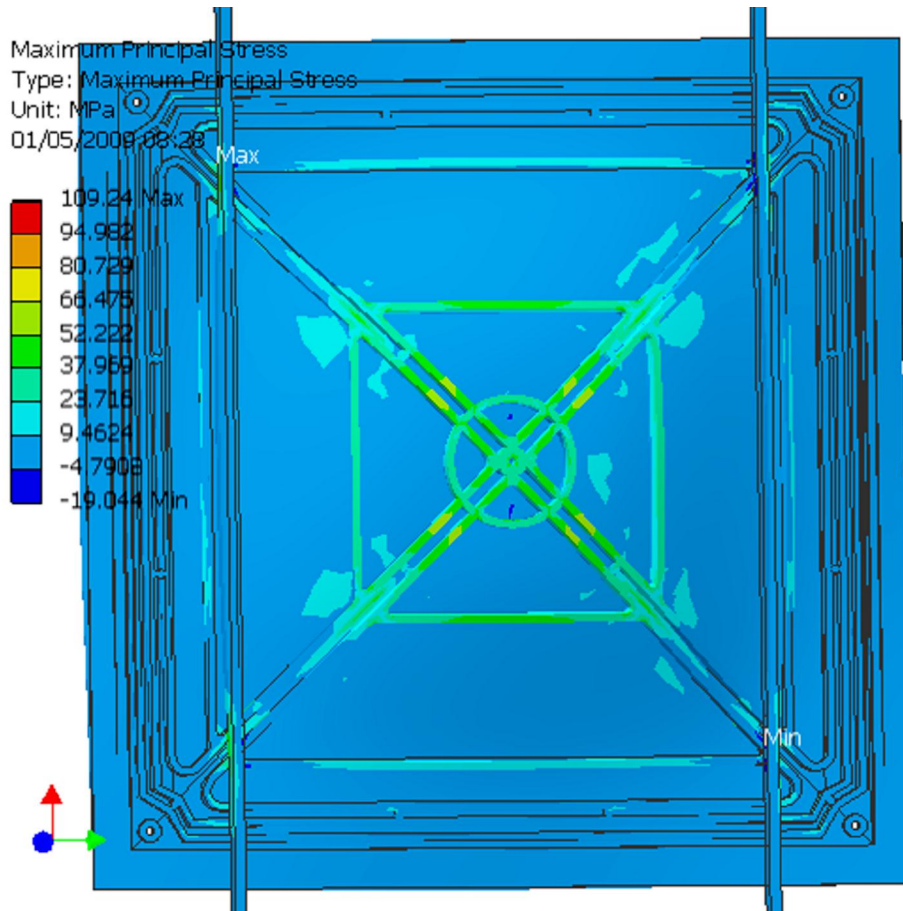


FIGURE 3
Minimum Principal Stress

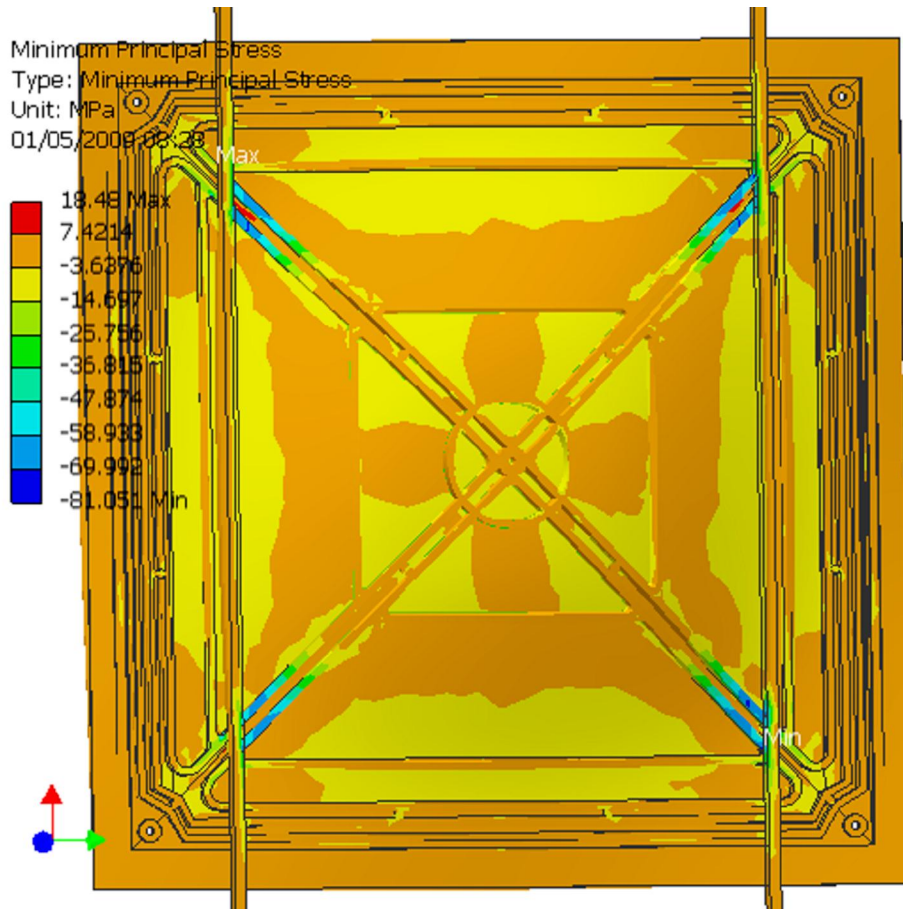


FIGURE 4
Deformation

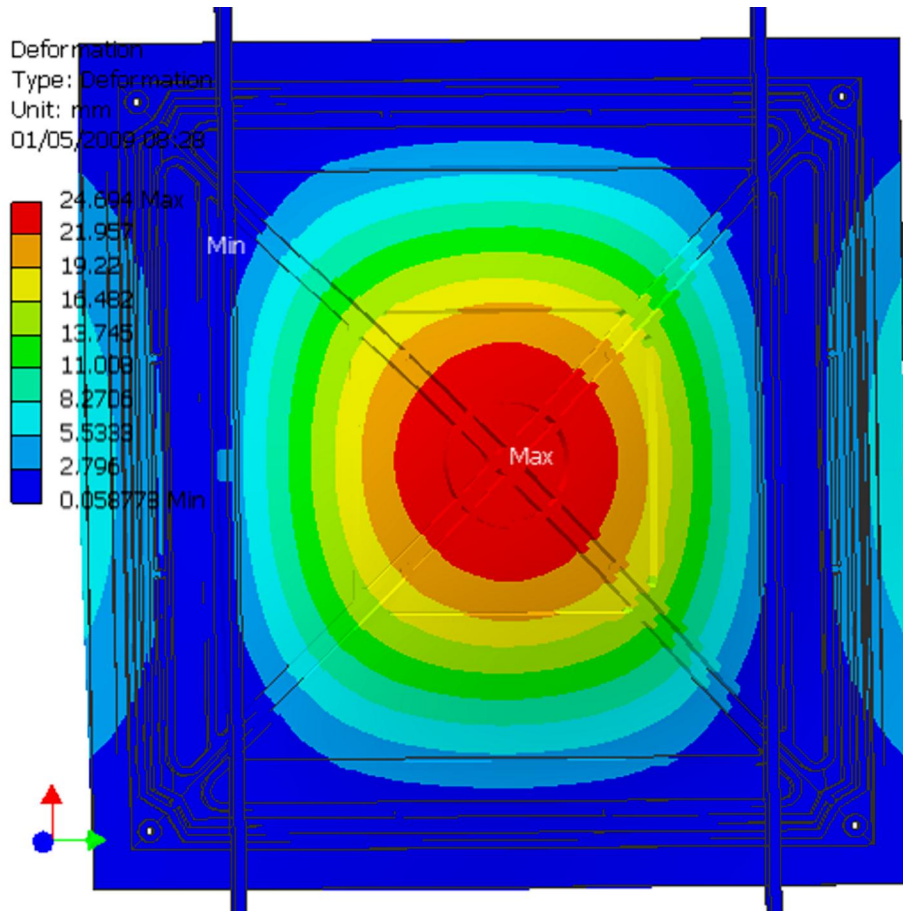


FIGURE 5
Safety Factor

