Ankit AEROSPACE

SCIAKY INC.

P PanOptimization

Grid-Fin

Fixturing

Ti-6Al-4V deposition
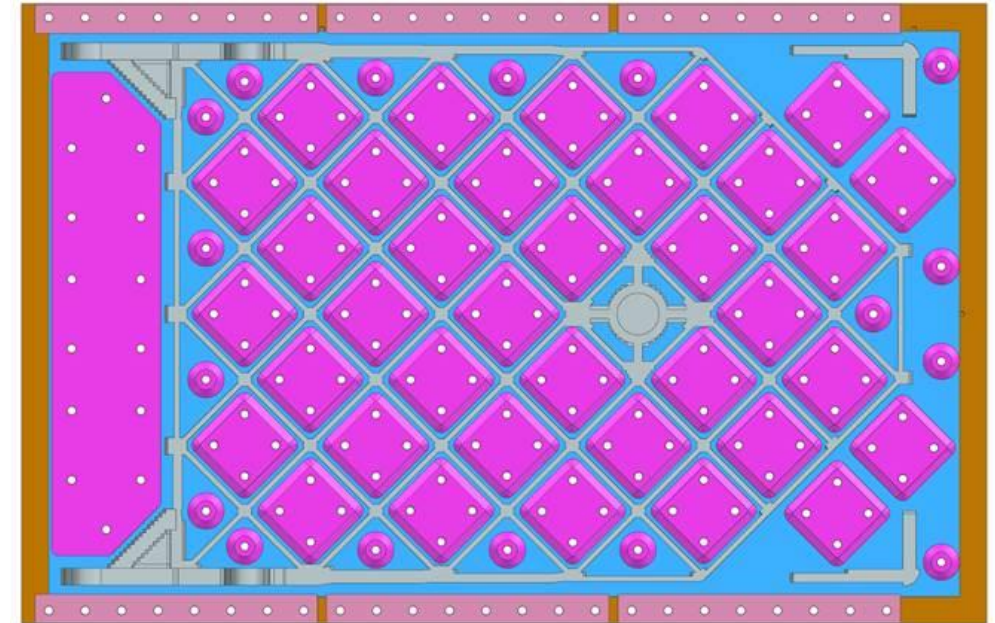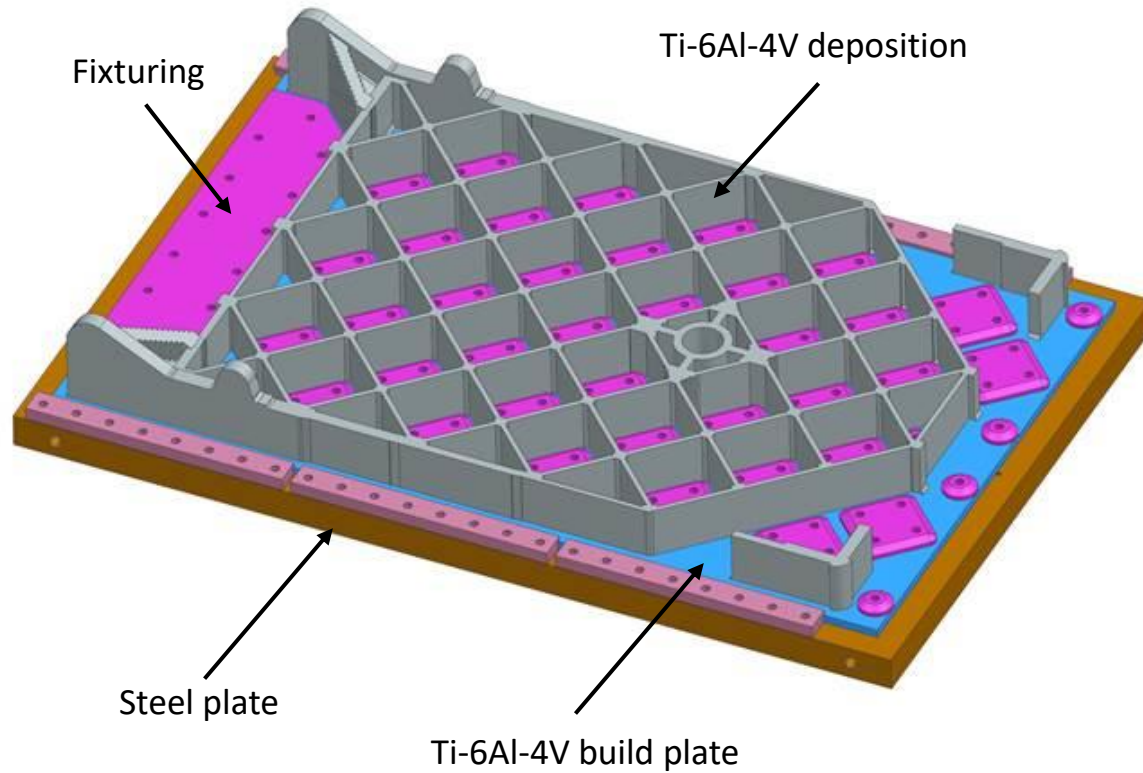
Steel plate

Ti-6Al-4V build plate

Image courtesy of Ankit Aerospace
and Sciaky Inc.
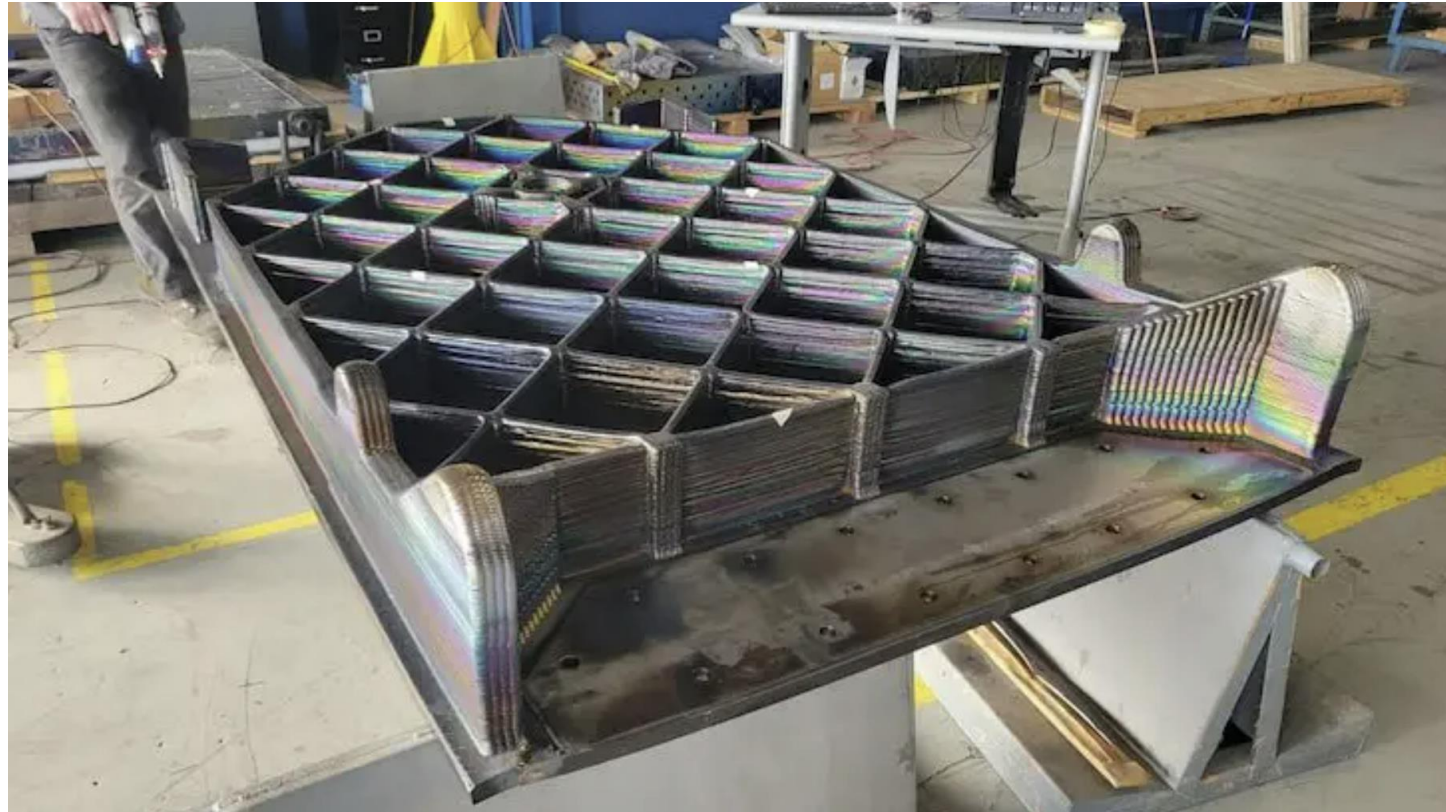
Build plate dimensions = 2.65m x 1.7m

Grid-Fin

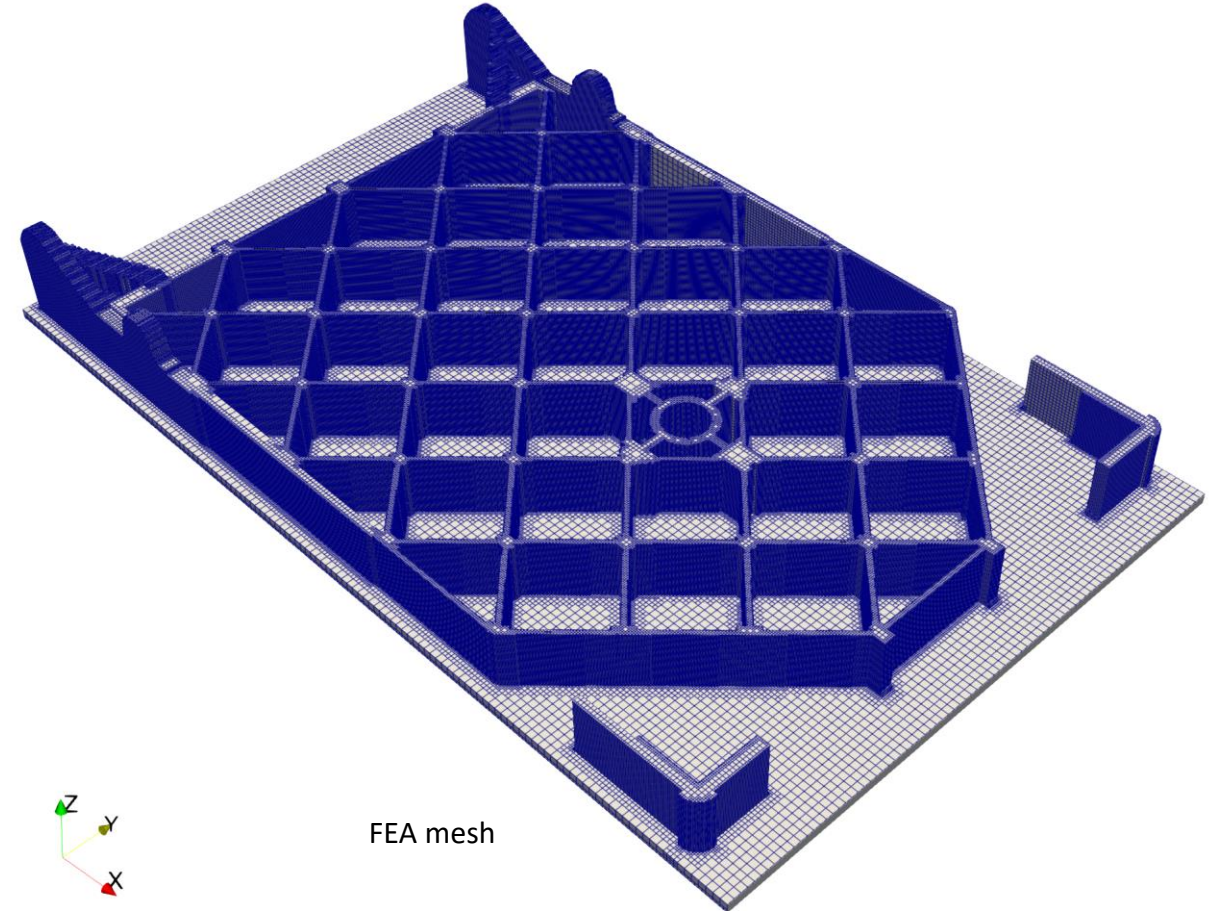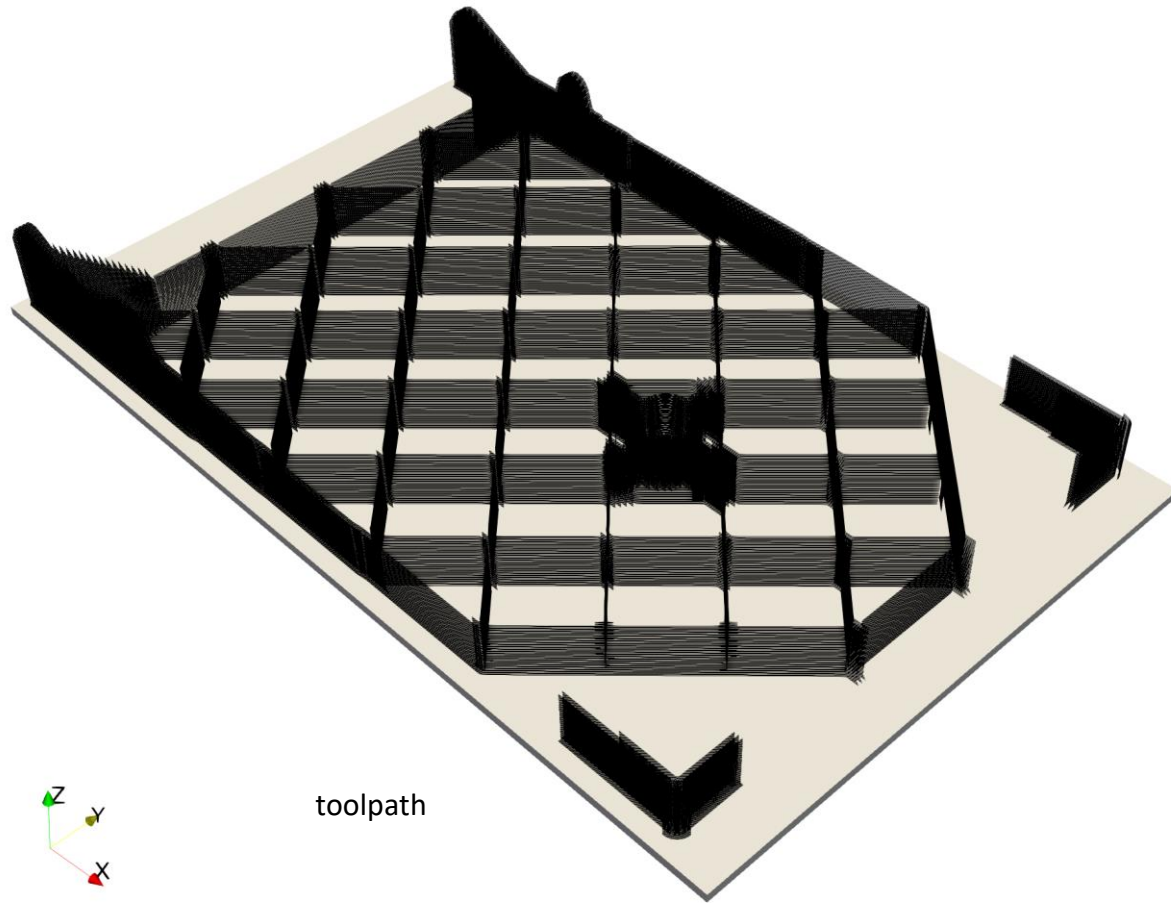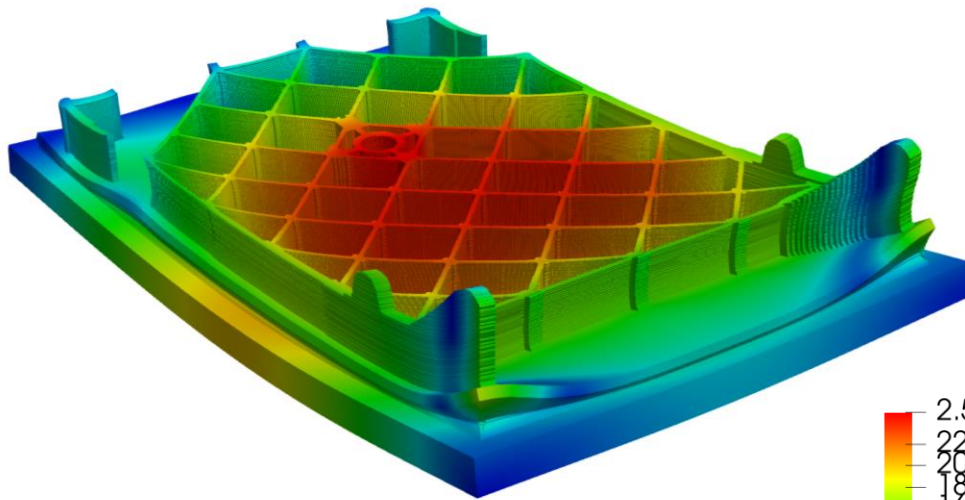Image courtesy of Ankit Aerospace
and Sciaky Inc.

An FEA mesh is generated directly from the toolpath

toolpath

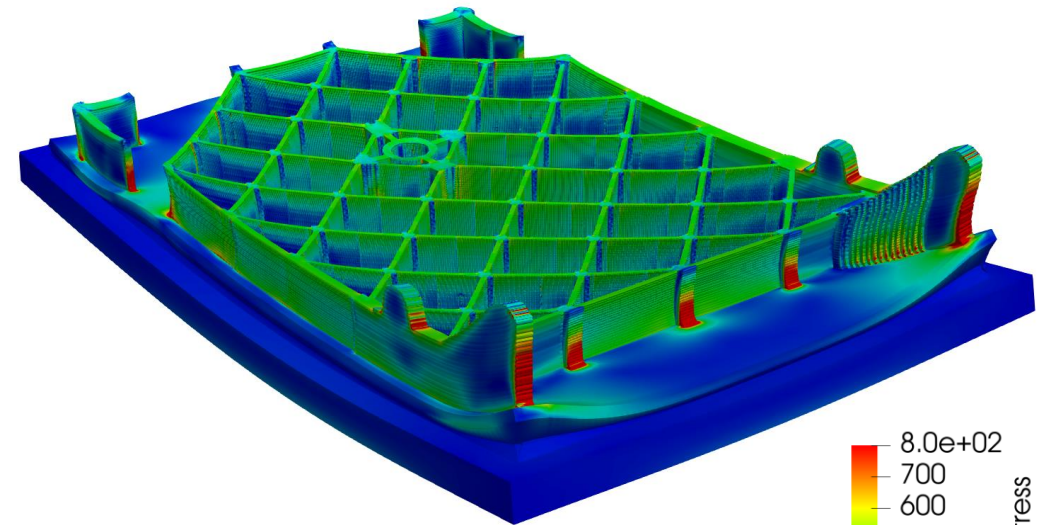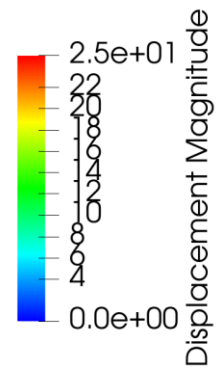FEA mesh

Grid-Fin simulation results

Simulation stats:

- 4.1M nodes
- Runtime = 2.4 hours (48 core CPU)
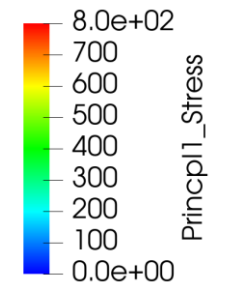- Peak memory = 71 GB
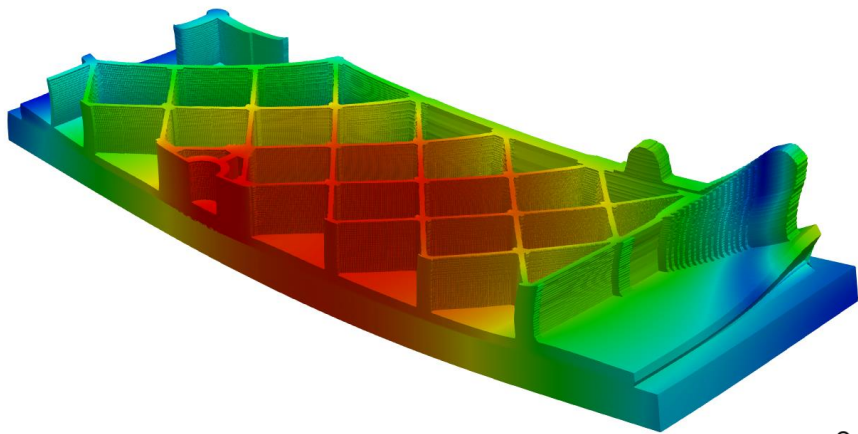

Units: mm

Warp 5x

Units: MPa

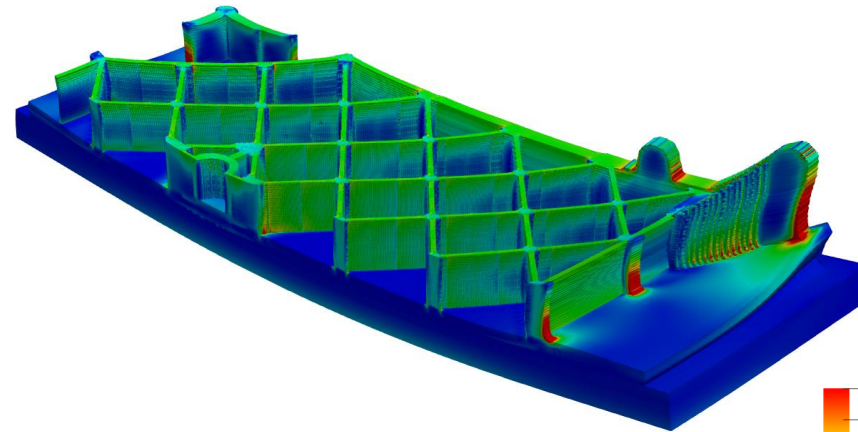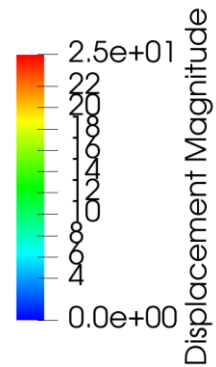# Grid-Fin simulation results half symmetry model

Simulation stats:

- 2M nodes
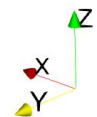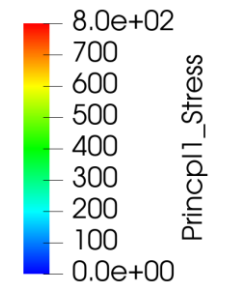- Runtime = 34 mins (8 core laptop)
- Peak memory = 22GB

Units: mm

Warp 5x

Units: MPa

Grid-Fin simulation results video
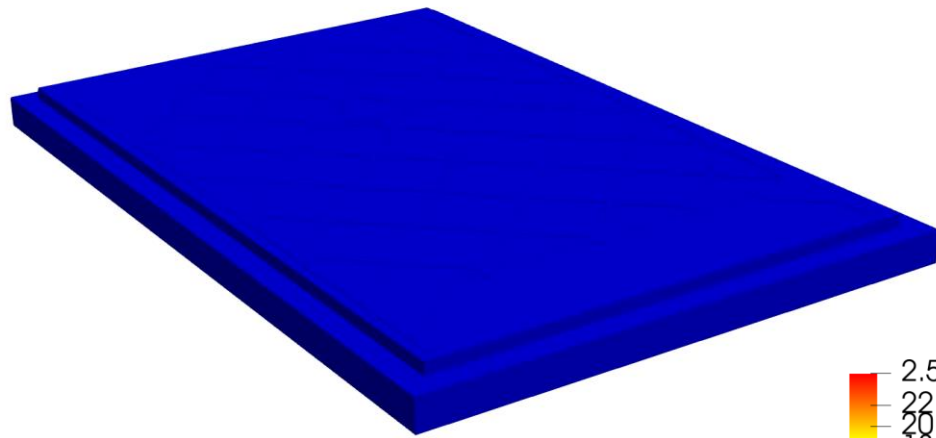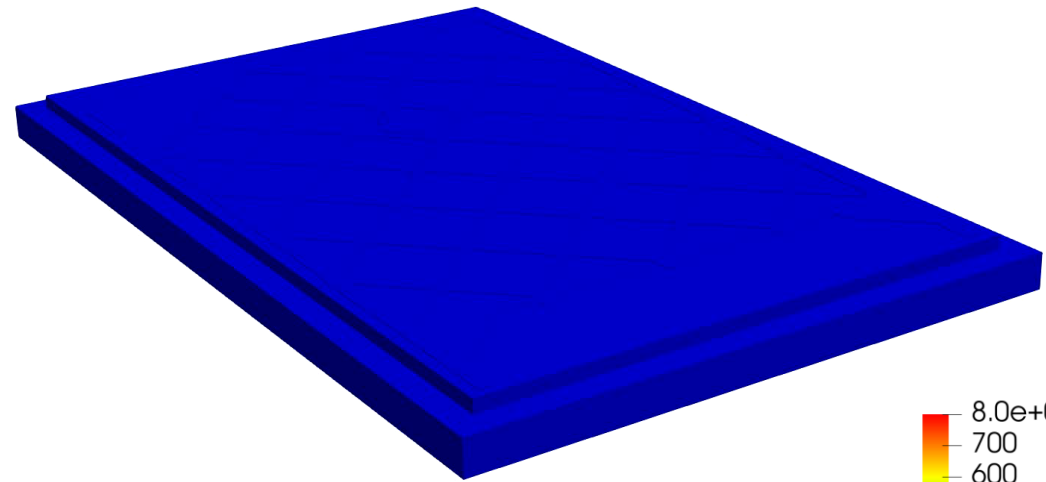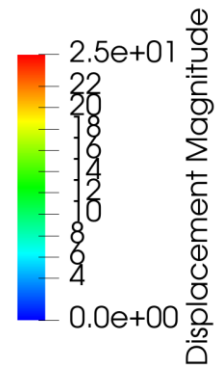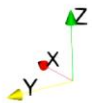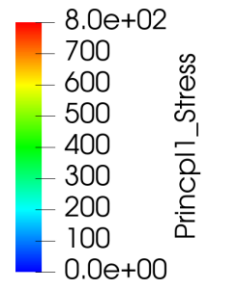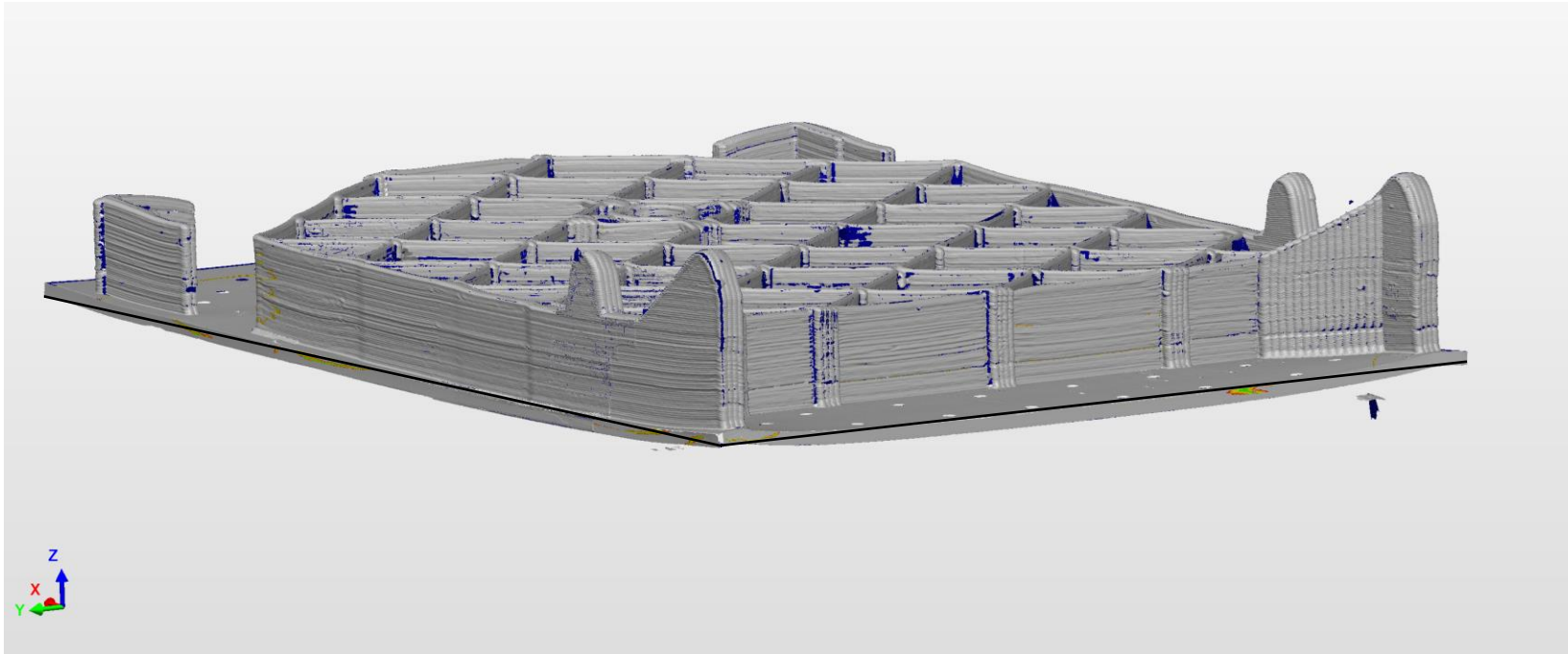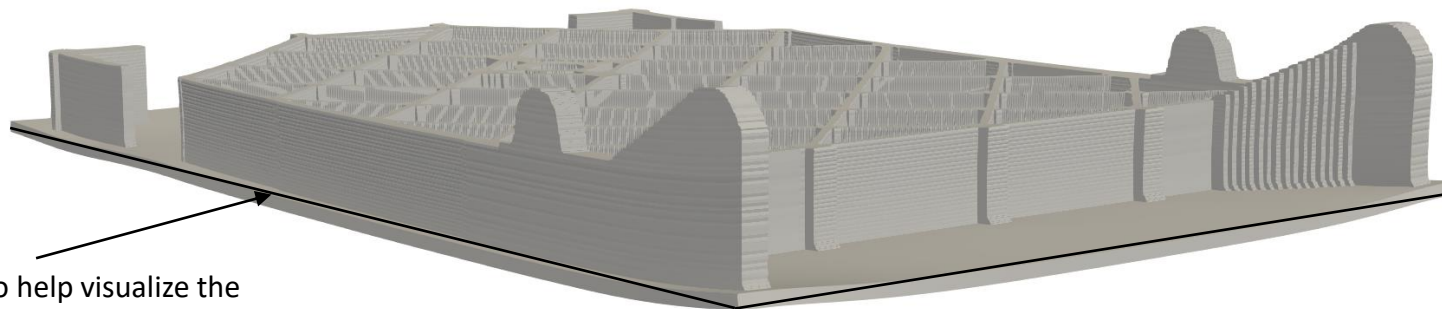
Grid-Fin – distortion trends are visibly captured

Experiment

Image courtesy of Ankit Aerospace
and Sciaky Inc.

Simulation

Straight line to help visualize the
build plate distortion

Grid-Fin – Simulated distortion magnitudes are in very close agreement with experiment
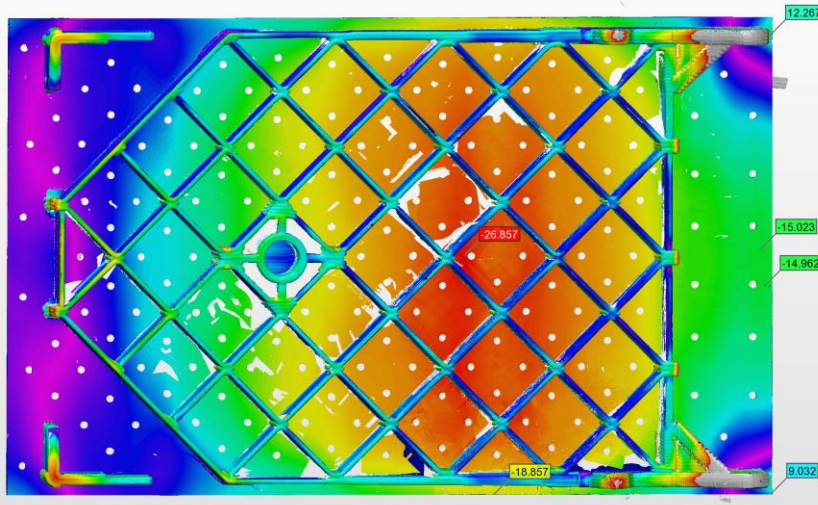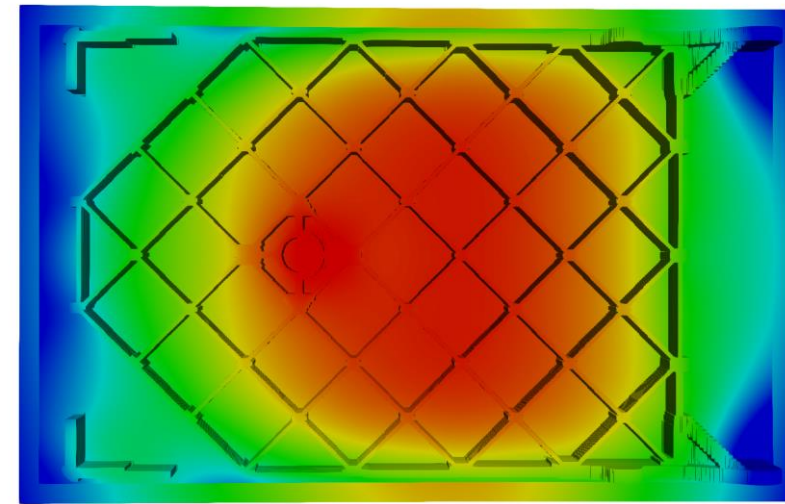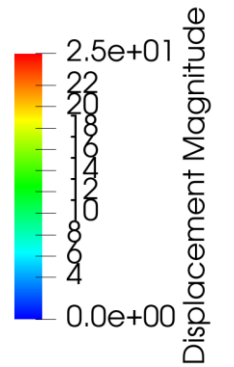

Image courtesy of Ankit Aerospace and Sciaky Inc.

Experiment

Simulation

Units: mm

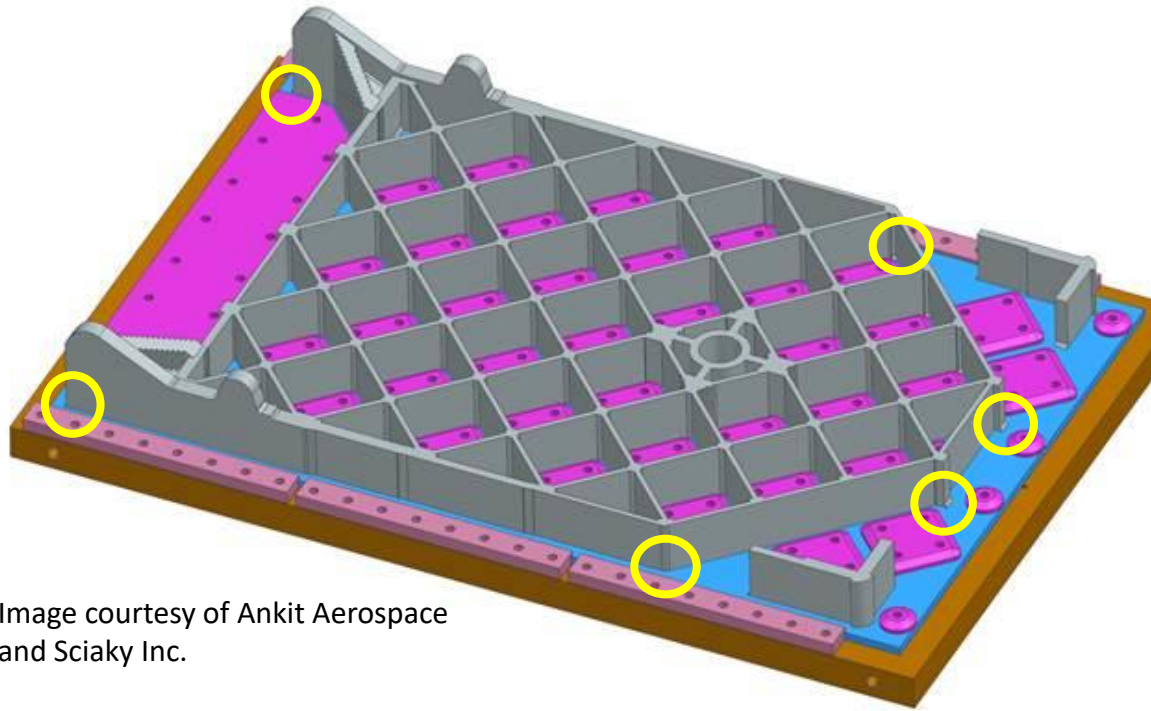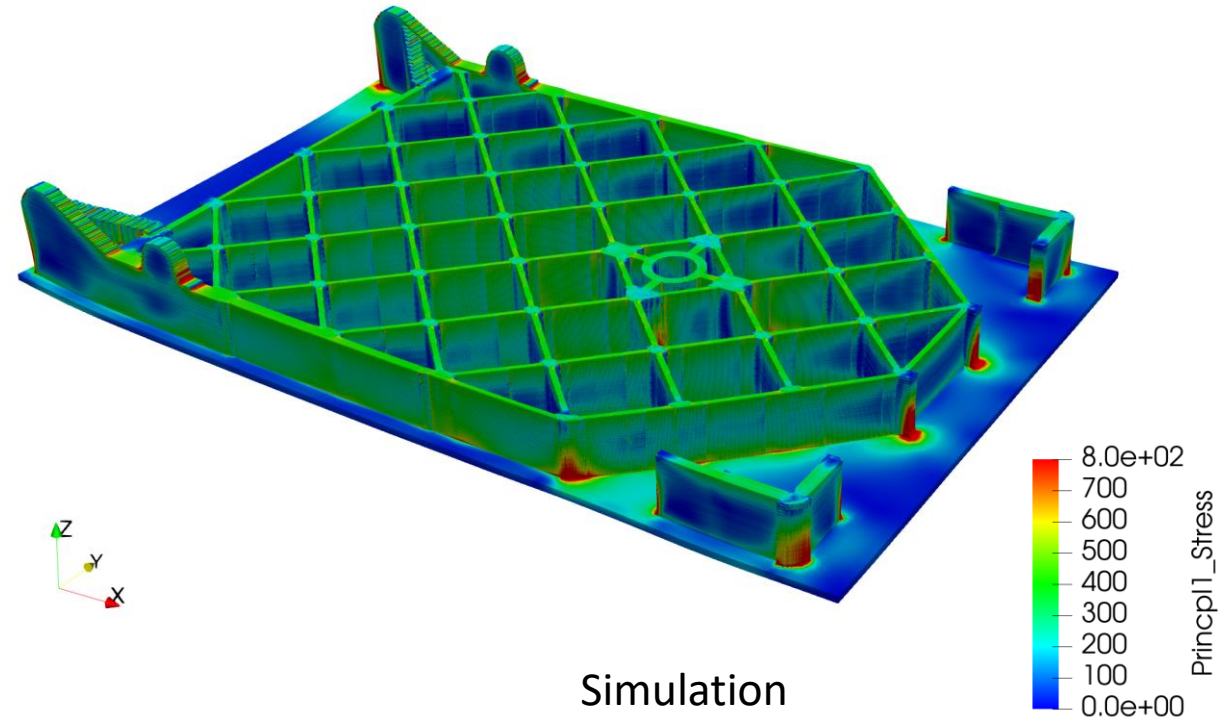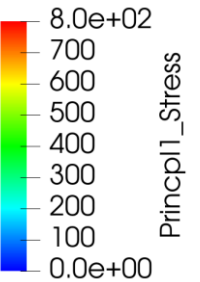# Grid-Fin – Crack locations correlate to high stress/strain regions in the model

Image courtesy of Ankit Aerospace and Sciaky Inc.

Experiment
(crack locations circled in yellow)

Simulation

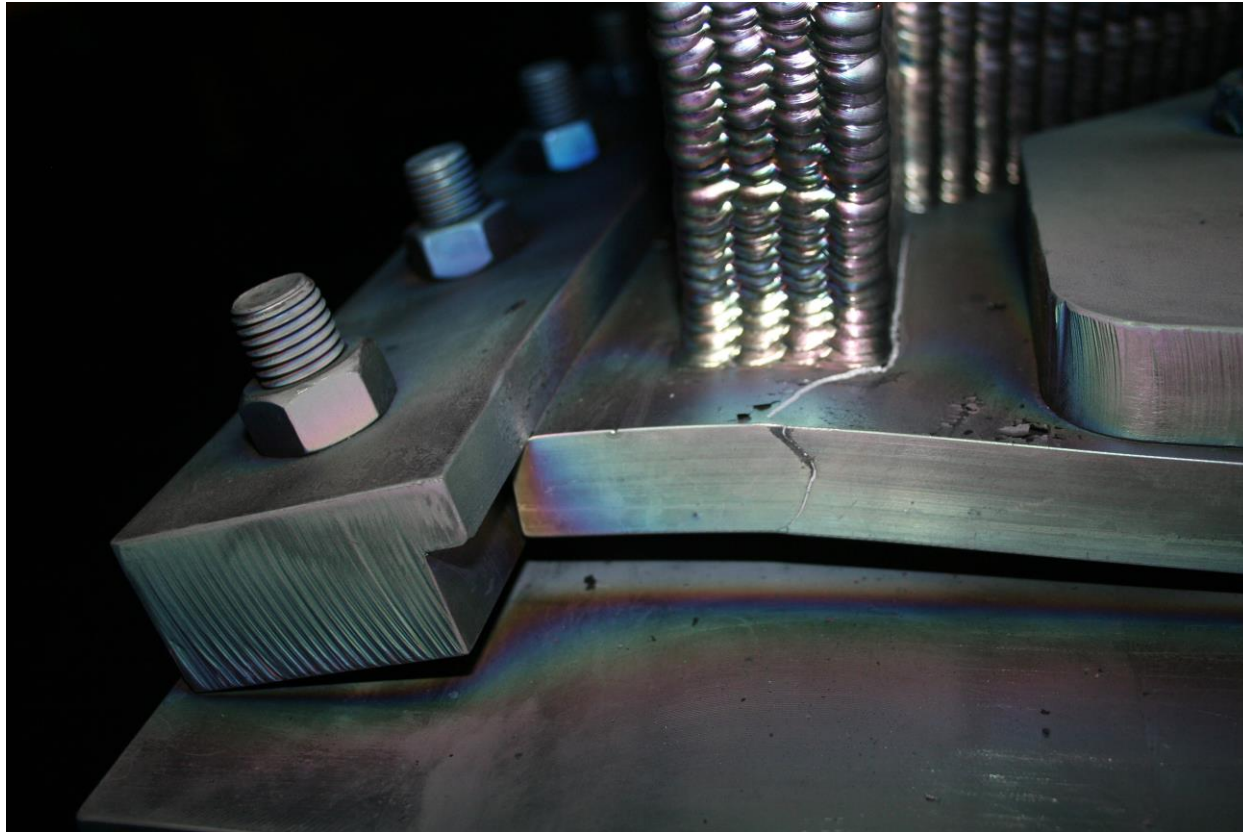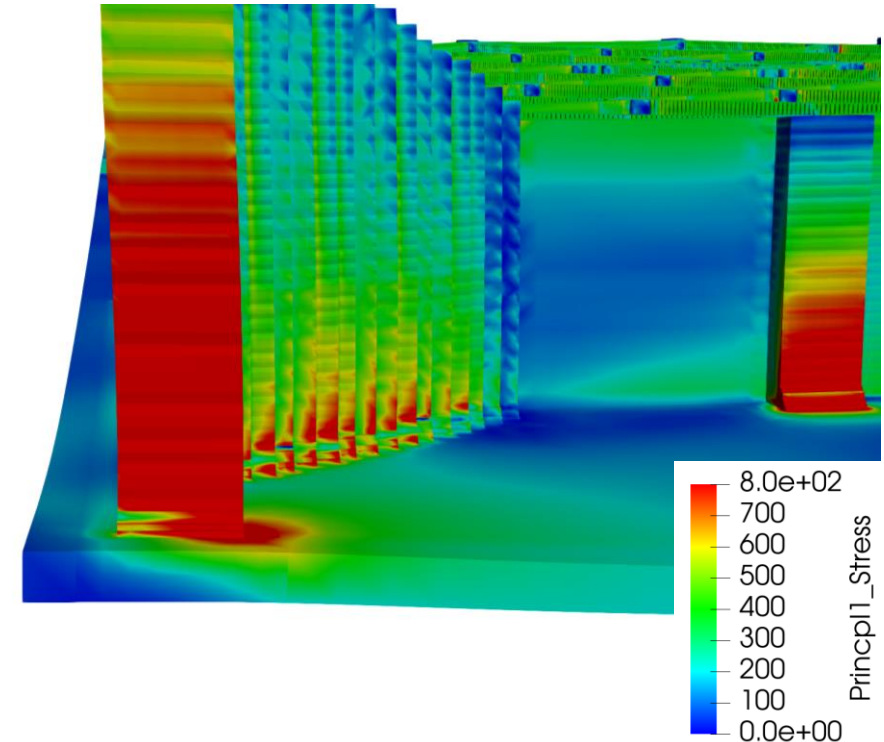# Grid-Fin – Crack locations correlate to high stress/strain regions in the model

Image courtesy of Ankit Aerospace and Sciaky Inc.

8.0e+02
700
600
500
400
300
200
100
0.0e+00

Princpl1_Stress

Units: MPa

Grid-Fin – Crack locations correlate to high stress/strain regions in the model

Image courtesy of Ankit Aerospace and Sciaky Inc.

Units: MPa

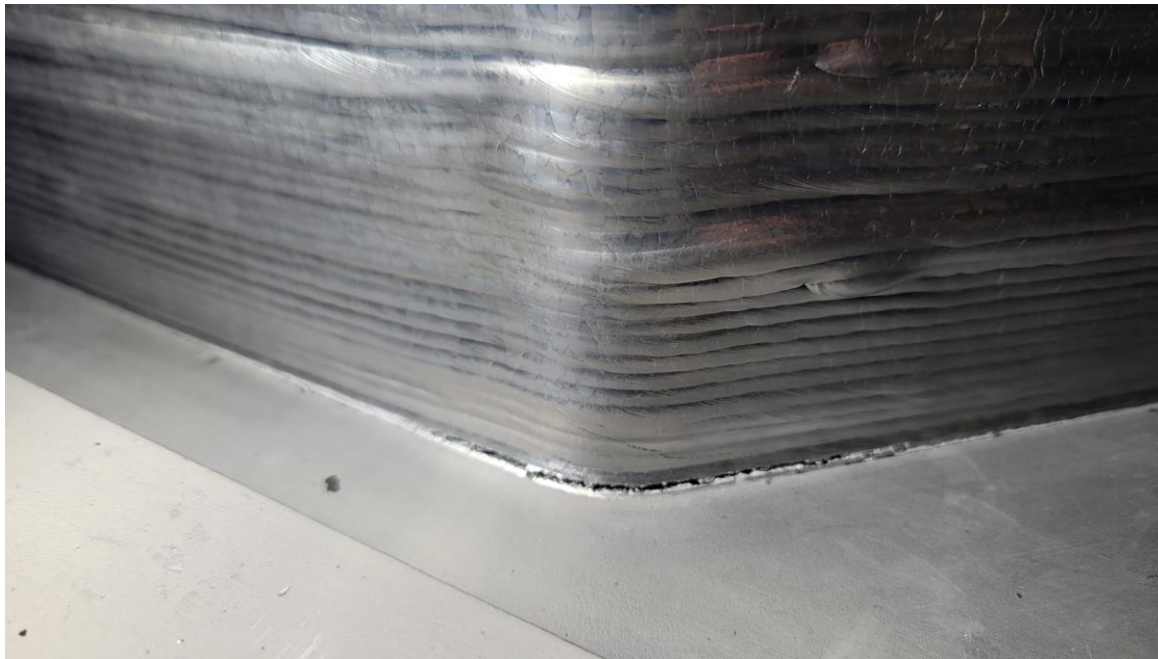# Grid-Fin – Crack locations correlate to high stress/strain regions in the model
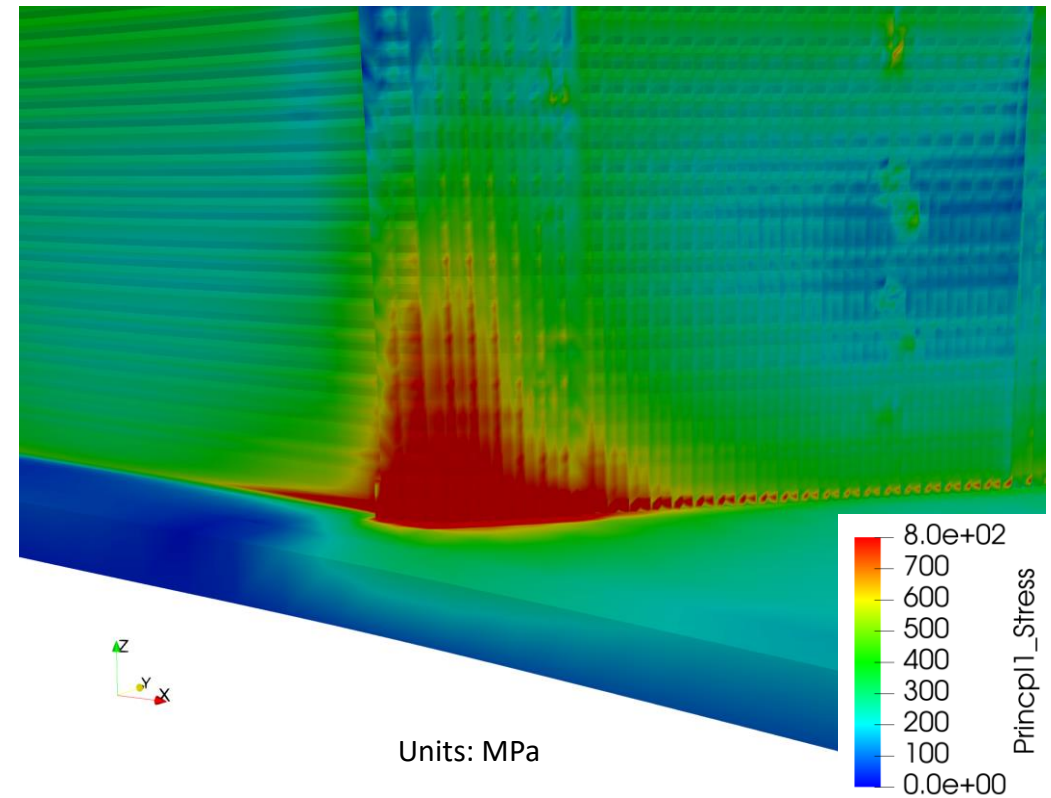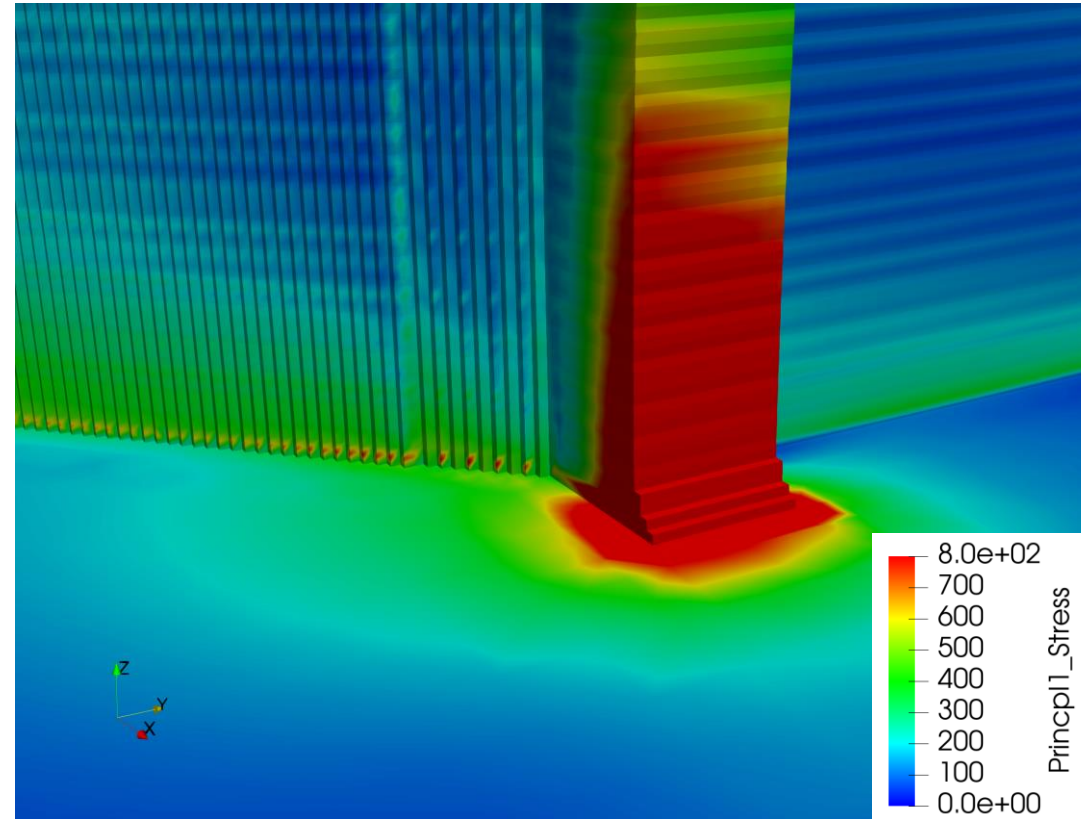

Image courtesy of Ankit Aerospace and Sciaky Inc.

Units: MPa