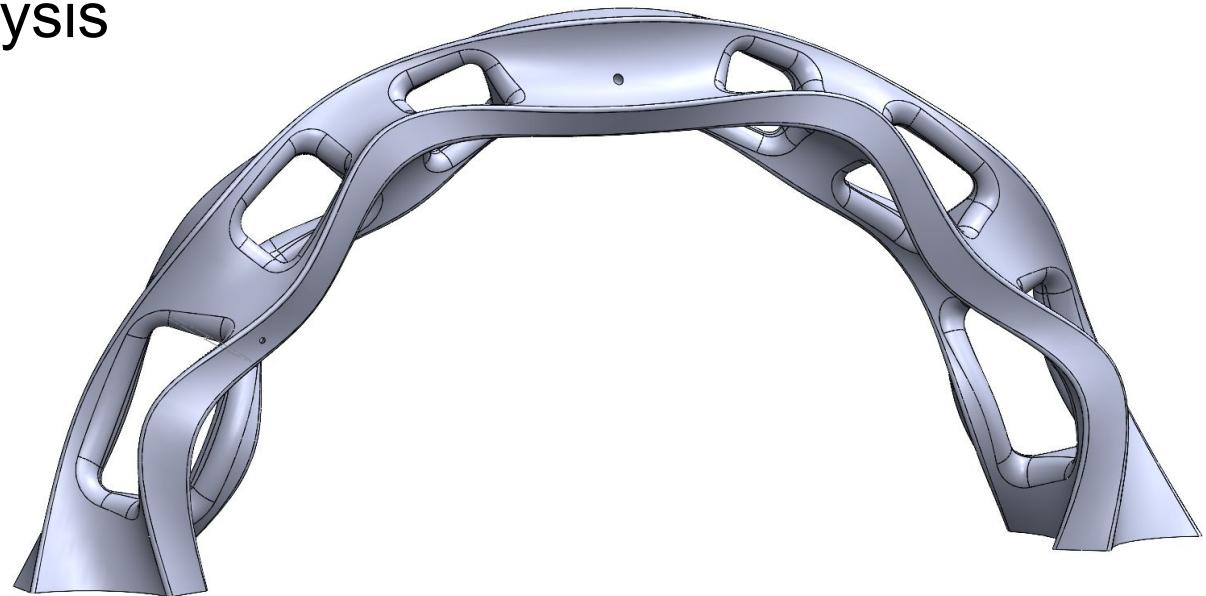


# FDM Bridge

Team 9: Trishala Menkar, Maila Kodas, and Carly Buchanan

November 2nd, 2021

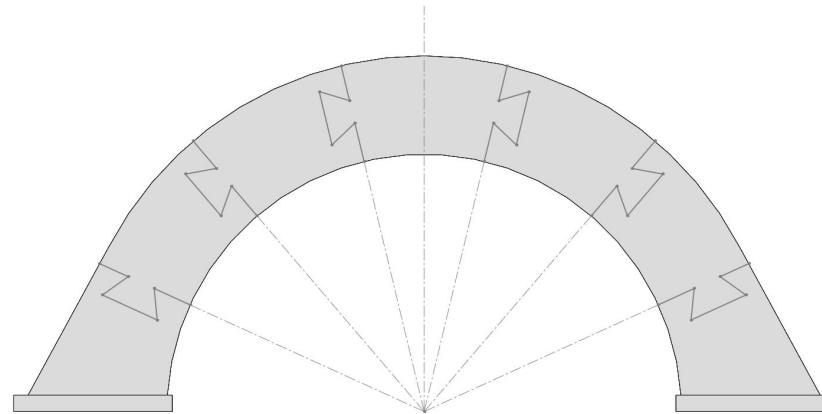
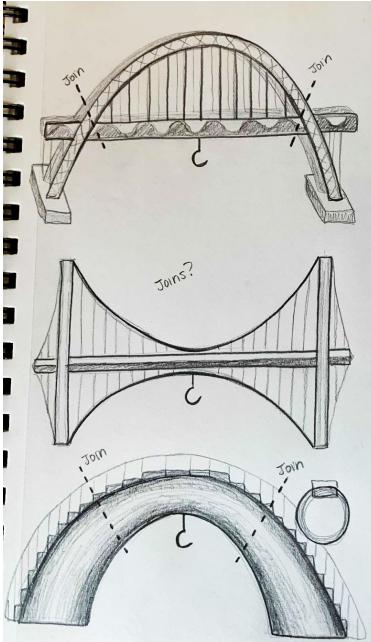
- Initial Concept Design
- nTopology Analysis
- Test Prints
- Final Design
- Solidworks Analysis



# Choose from common bridge geometries

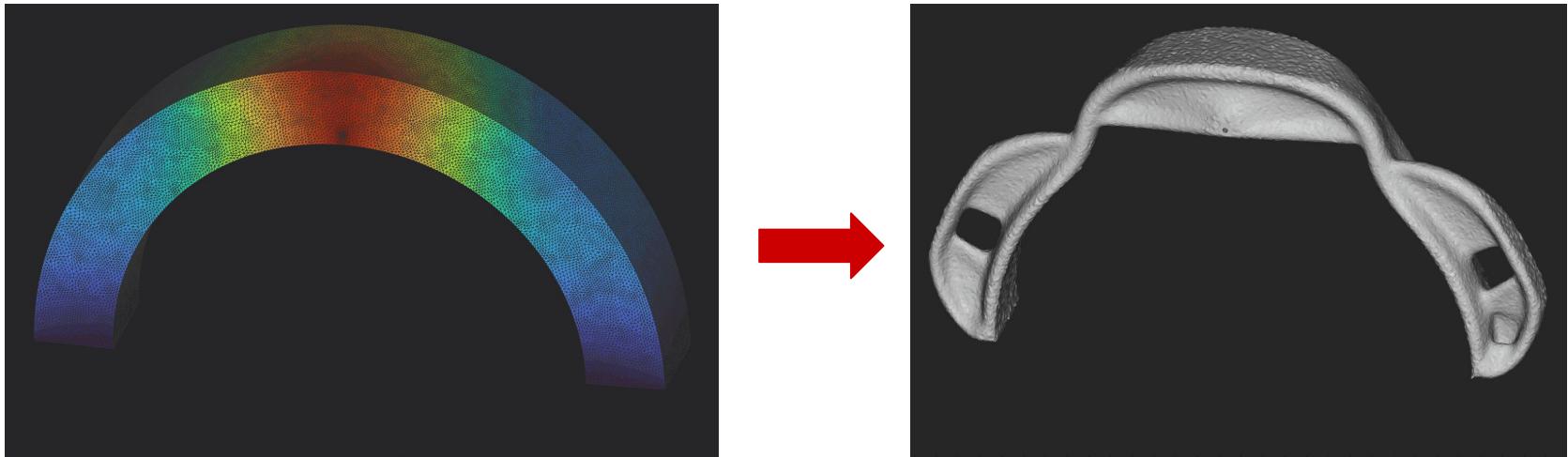
## 3D Printing design considerations and limitations

- Max piece length of 150 - 230 mm
- Must maximize strength with layer orientation

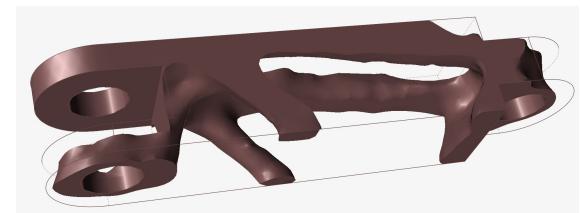
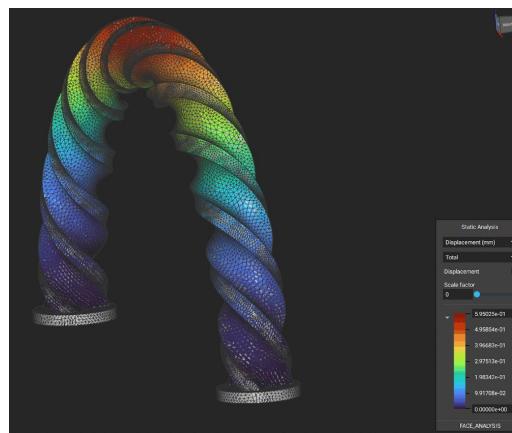
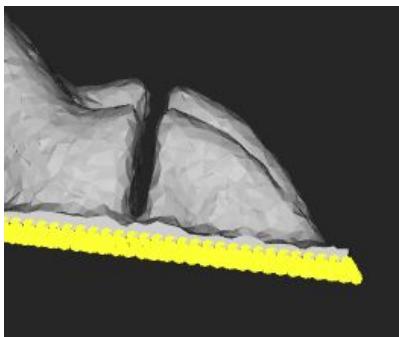


Settled on classical arch  
with dovetail joints

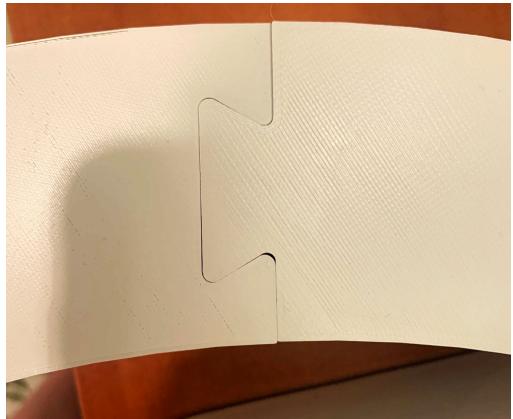
# nTopology Optimization provided a guide for lightweighting

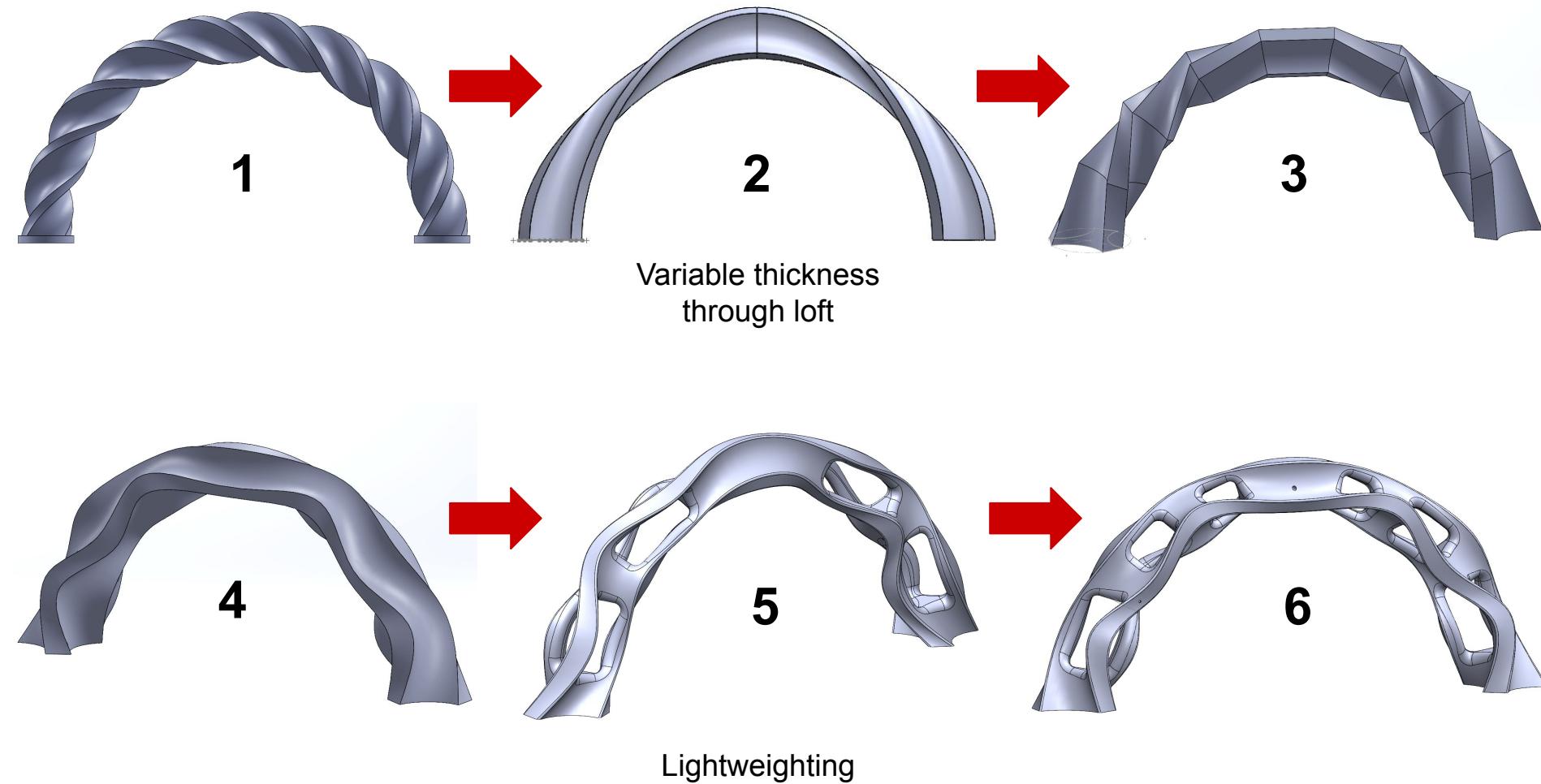


... though nTopology presented a steep learning curve

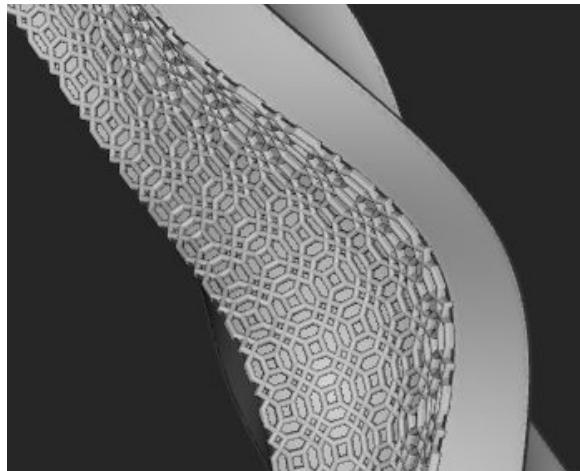
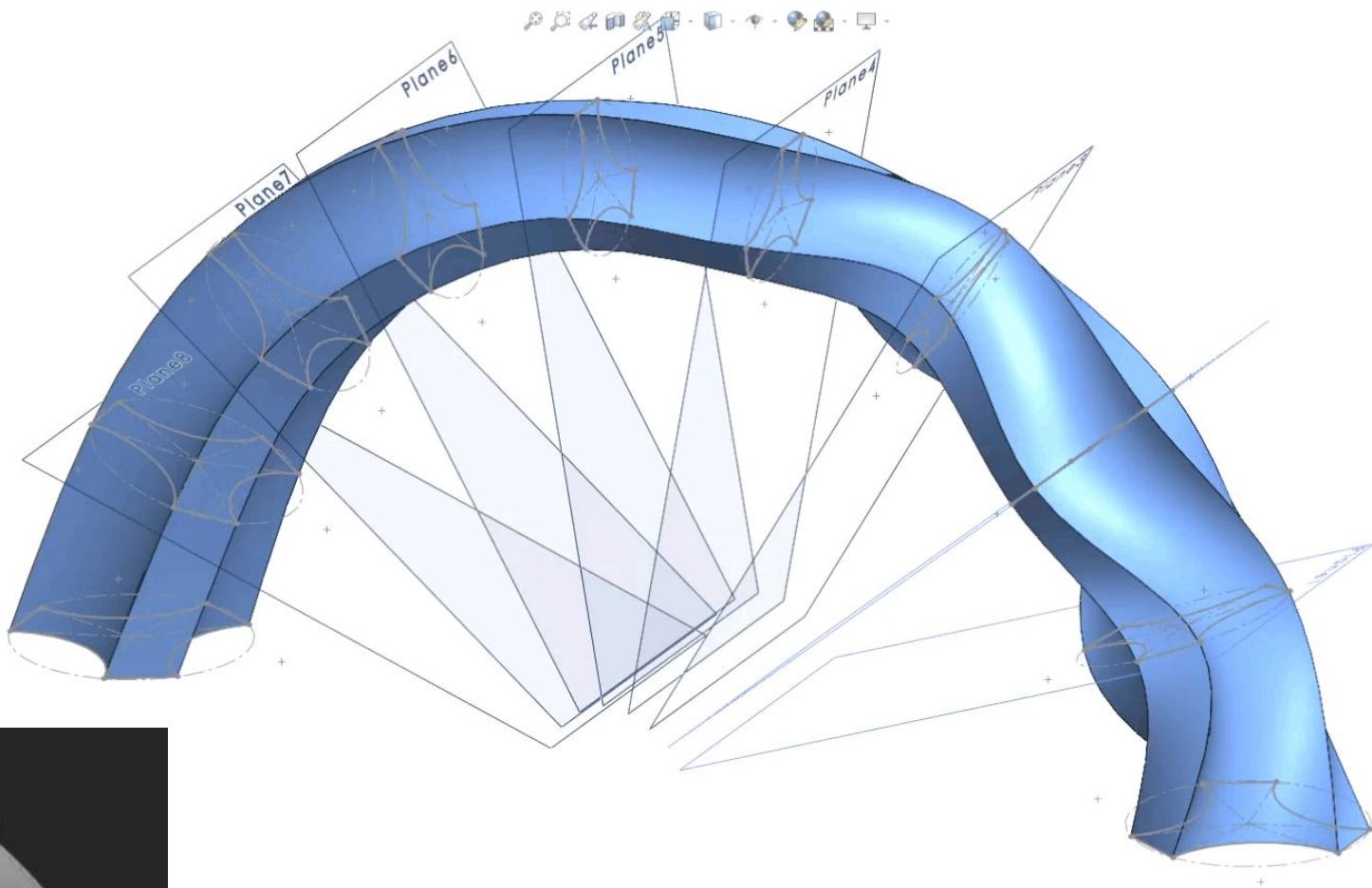


- Gave tolerancing for joints
- Hole compensation to fit 5mm pin
- Understand precision of printers
- Test strength of dovetail joint





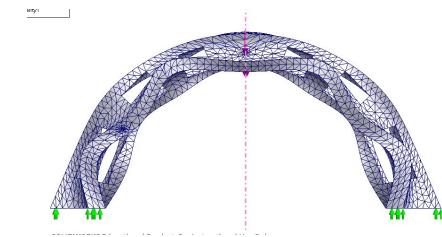
# Final Design



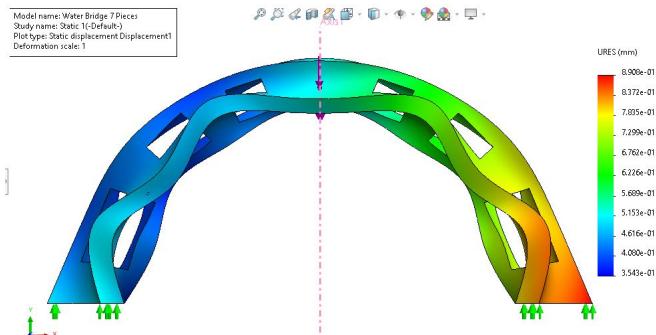
Boston University ME557

**BOSTON  
UNIVERSITY**

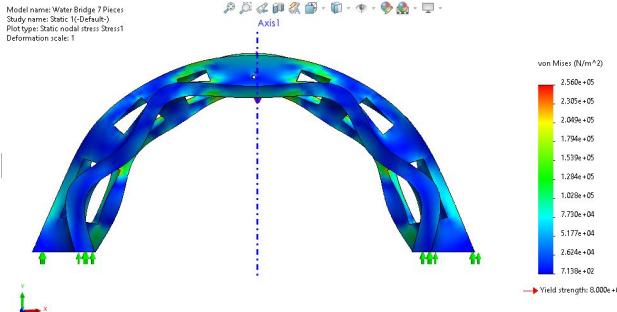
Solidworks Analysis helped gain confidence for infill percentages and load sustenance capabilities



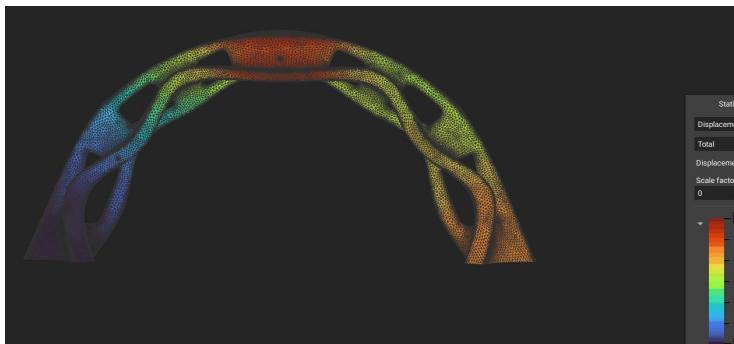
Model Simplification to run Solidworks: Fillets removed = Simplification factor 0.1



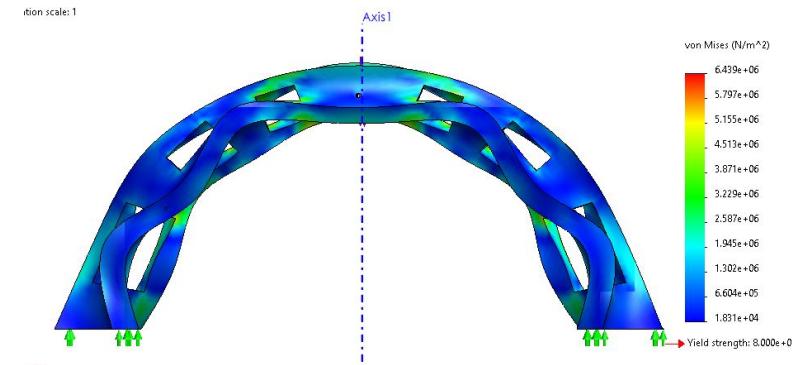
Load applied 10 kgs, Deformation 0.889mm



Yield Strength  $8.0 \times 10^6$  N/m² Von mises  $2.56 \times 10^5$  N/m²



Load applied 10kgs, Deformation 0.808mm



Load applied 50 kgs Von Mises  $6.436 \times 10^6$  N/m²

