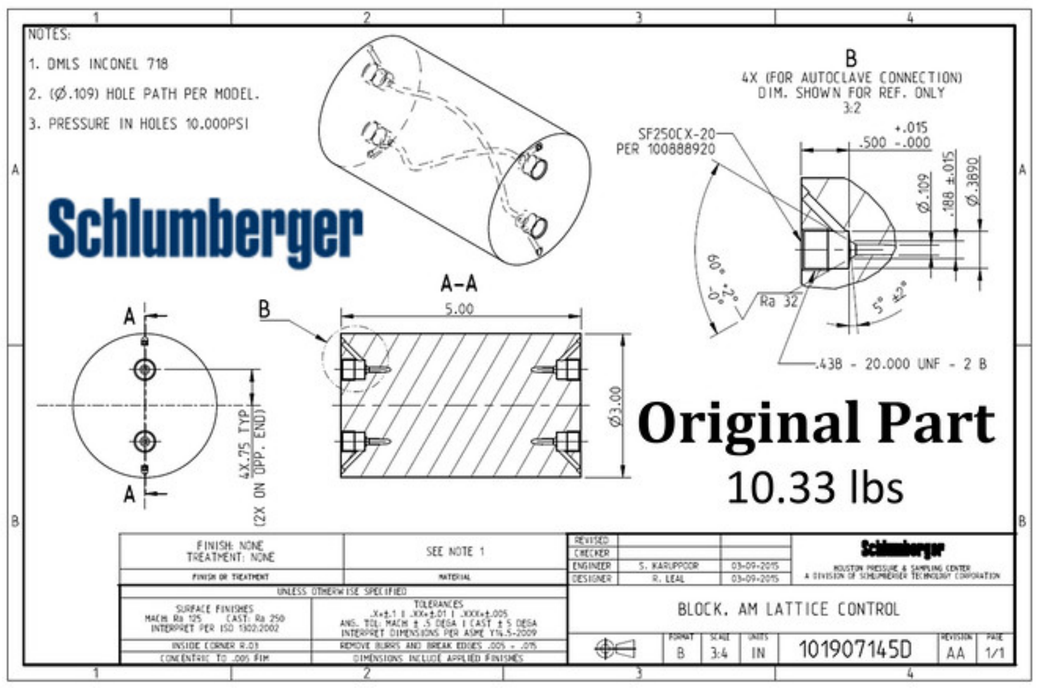
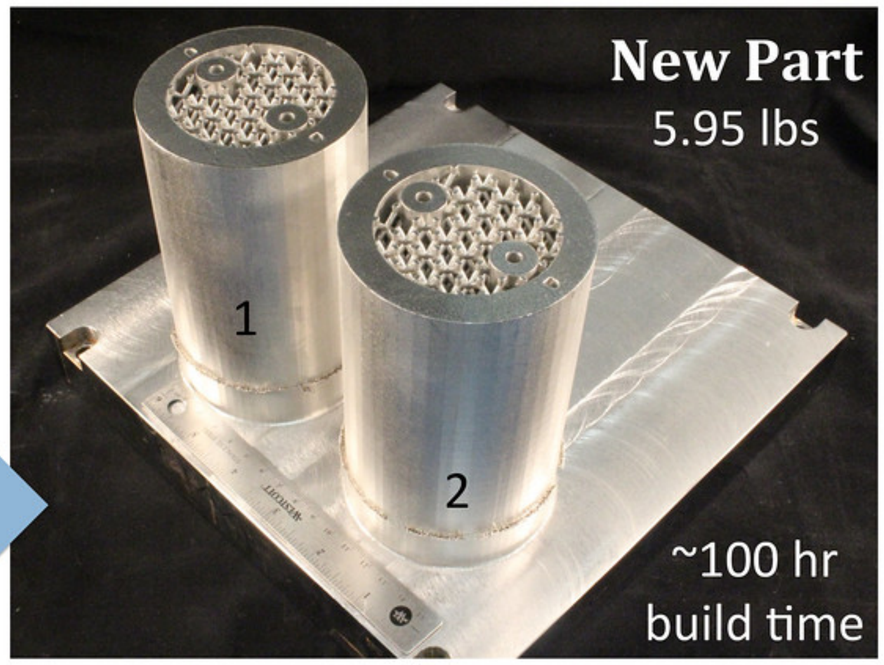
Designing for Additive Manufacturing: Lightweighting a 3D Printed Metal Part

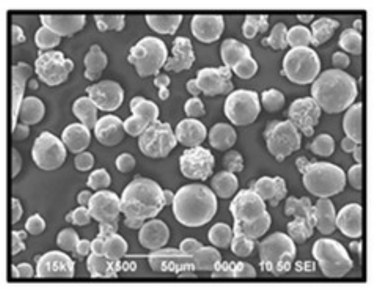


Direct Metal Laser Sintering (DMLS)

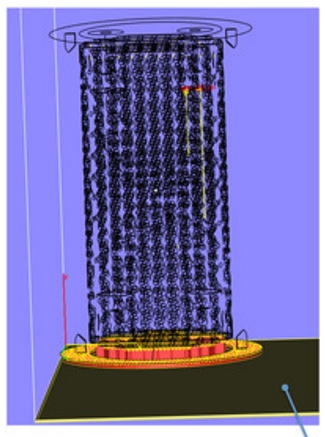
CIMP-3D

EOS M280 IN718 Powder





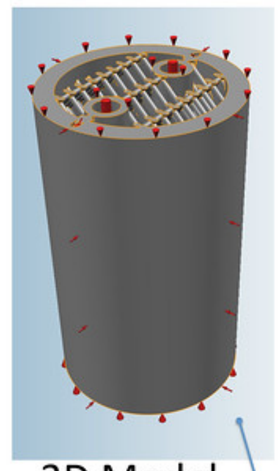
IN718 Powder



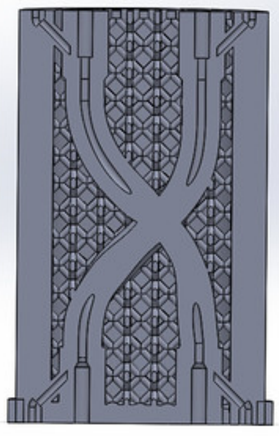
Final Build Layout

Dimensional Analysis (in mm)		
Measurement	**Build 1**	**Build 2**
Build Height	135.612	135.645
Diameter	81.082	81.041
Cylindricity	0.134	0.173
Perpendicularity	0.052	0.069
Flatness (Top)	0.075	0.059
Parallelism (Top)	0.07	0.078
Inner Circle (Right)	4.789	4.800
Inner Circle (Left)	4.808	4.813

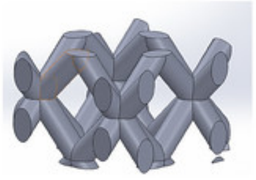
Precision & Quality Measurements Lab



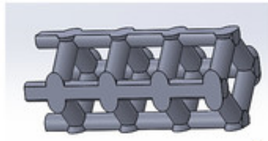
3D Model

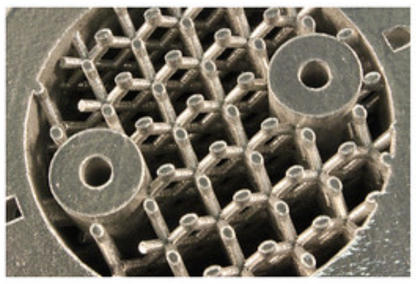


Lattice Refinement



Unit Cells





Final Lattice

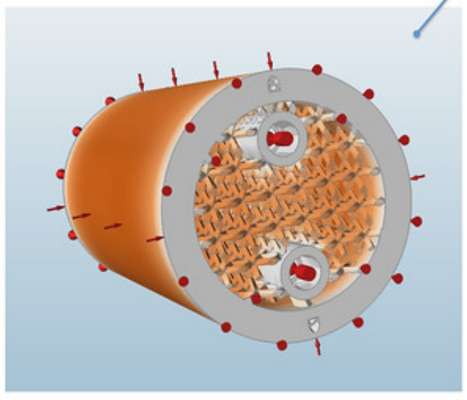
PDF Adobe → SolidWorks → Altair → SolidWorks

Parameters
- Cell Size
- Strut thickness

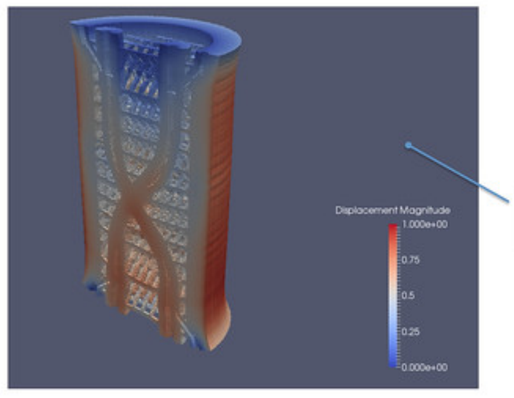
SolidWorks → Insight / Stratasys → Magics by Materialise → eos e-Manufacturing Solutions

Design Workflow

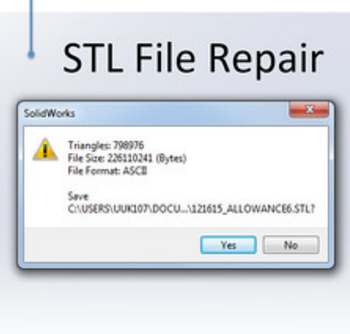
Altair → Pan Computing → INSPIRE solidThinking → Altair

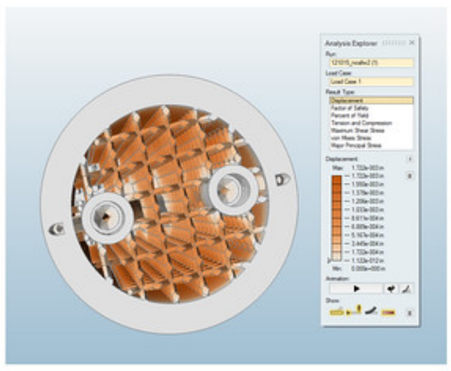


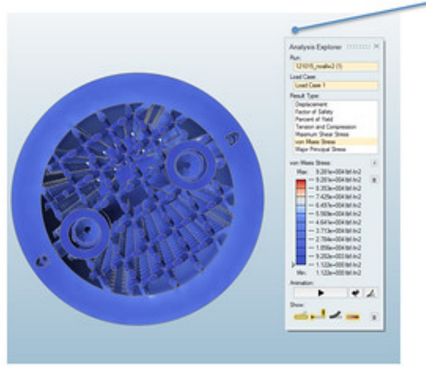
Boundary Conditions



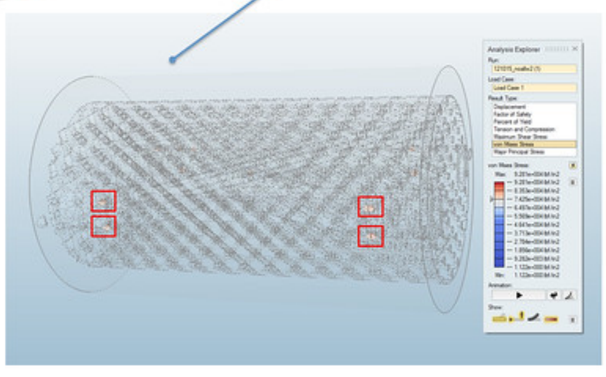
Deflection Analysis



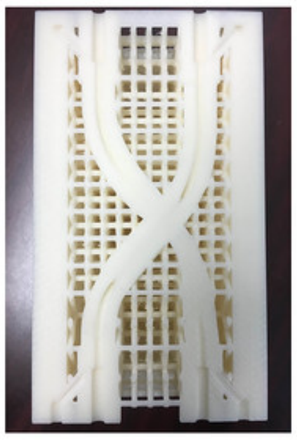




Finite Element Modeling (FEM) Analysis



Factor of Safety Analysis



Plastic Prototype (~96 hr build time)

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HAROLD AND INGE MARCUS DEPARTMENT OF INDUSTRIAL AND MANUFACTURING ENGINEERING

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