



# Polymer Infiltration Device for Cellular Structures

## Team 01

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### Project Scope

The purpose of this project is to design and build a prototype device that will fill additively manufactured lattice structures of various sizes, shapes, and lattice configurations with Sylgard 184 silicone.

### Project Purpose

- Help experiment with the mechanical response of filled lattices and warheads
- Fill lattice structures with high explosive polymers
- Help verify validity of Rule of Mixtures

### Cellular Structures

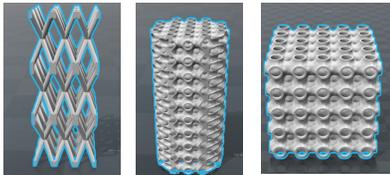


Figure 1. Three lattice designs

### Functional Breakdown



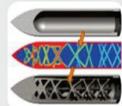
Isolate Lattice



Purge Air from lattice/fluid

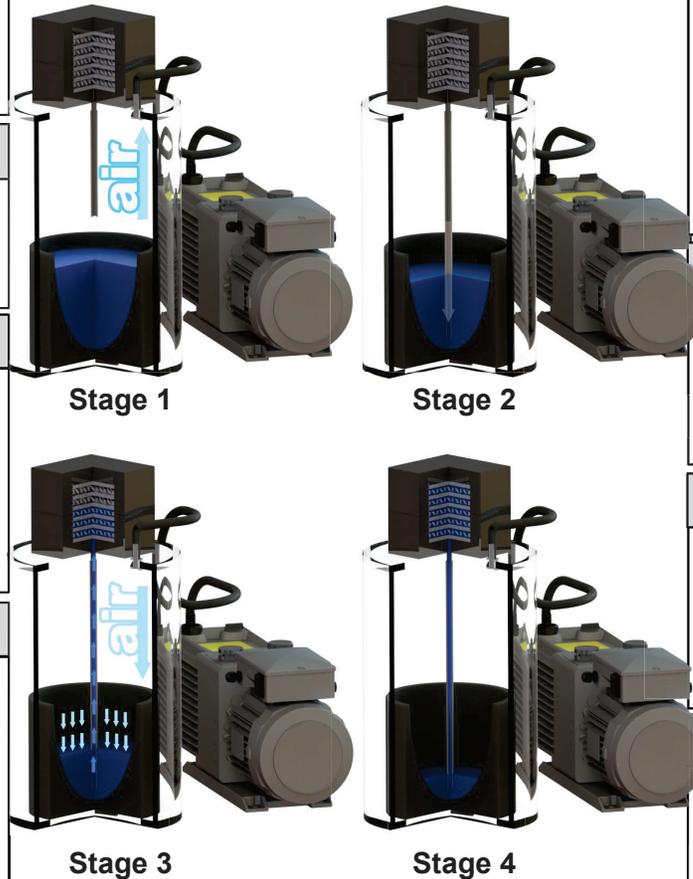


Transfer Fluid



Fill Lattice

### Design



### Design Explanation

1. The degas chamber, the lattice, and the silicone are all evacuated of air.
2. The transport tube is lowered into the degassed silicone.
3. The air is reintroduced into the degas chamber.
4. After the lattice is filled, the silicone cures and the lattice is removed.

### Important Targets

Metric	Target
Porosity	<1% Void Volume Percentage
Surface Tolerance	<0.01 inches off lattice surface

### Project Plan

- Design a reusable jig flush to lattice surface
- Finalize design parts and technologies
- Order and assemble prototype
- Test if target of <1% porosity is achieved by calculating void volume percentage and serial sectioning

### Acknowledgements

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