

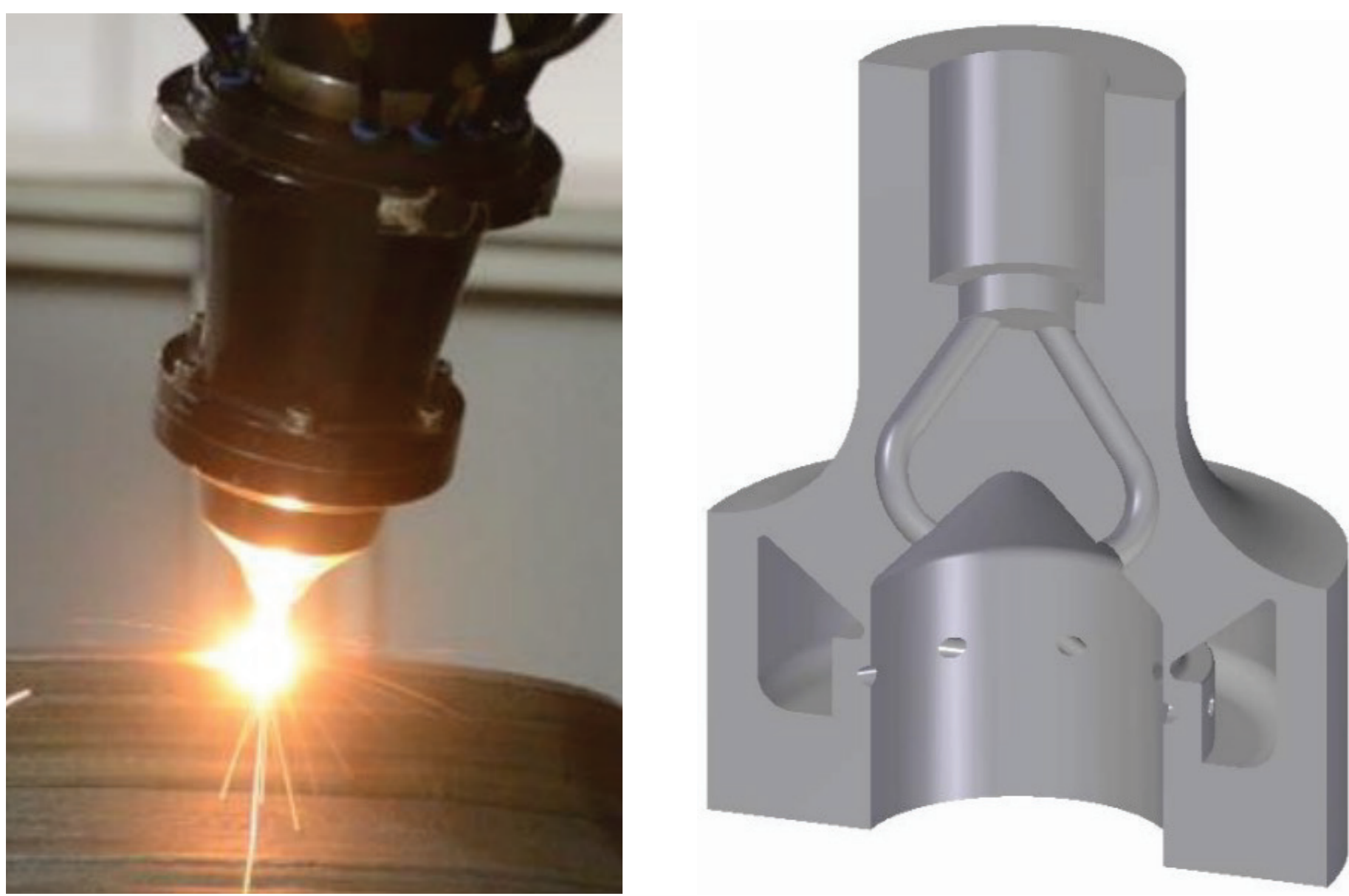


# PRIME: Powder Removal in Microgravity Environments Experiment

EM22 – Contamination Control Team: Justin McElderry and Julian Turner

## Introduction

- In Additive Manufacturing (AM) with metal powders, layers of material are deposited and fused to form aerospace 3D printed parts
- Remnant powder must be removed from interior cavities and channels to fully clean the part
- AM cleaning methods have been a topic of interest



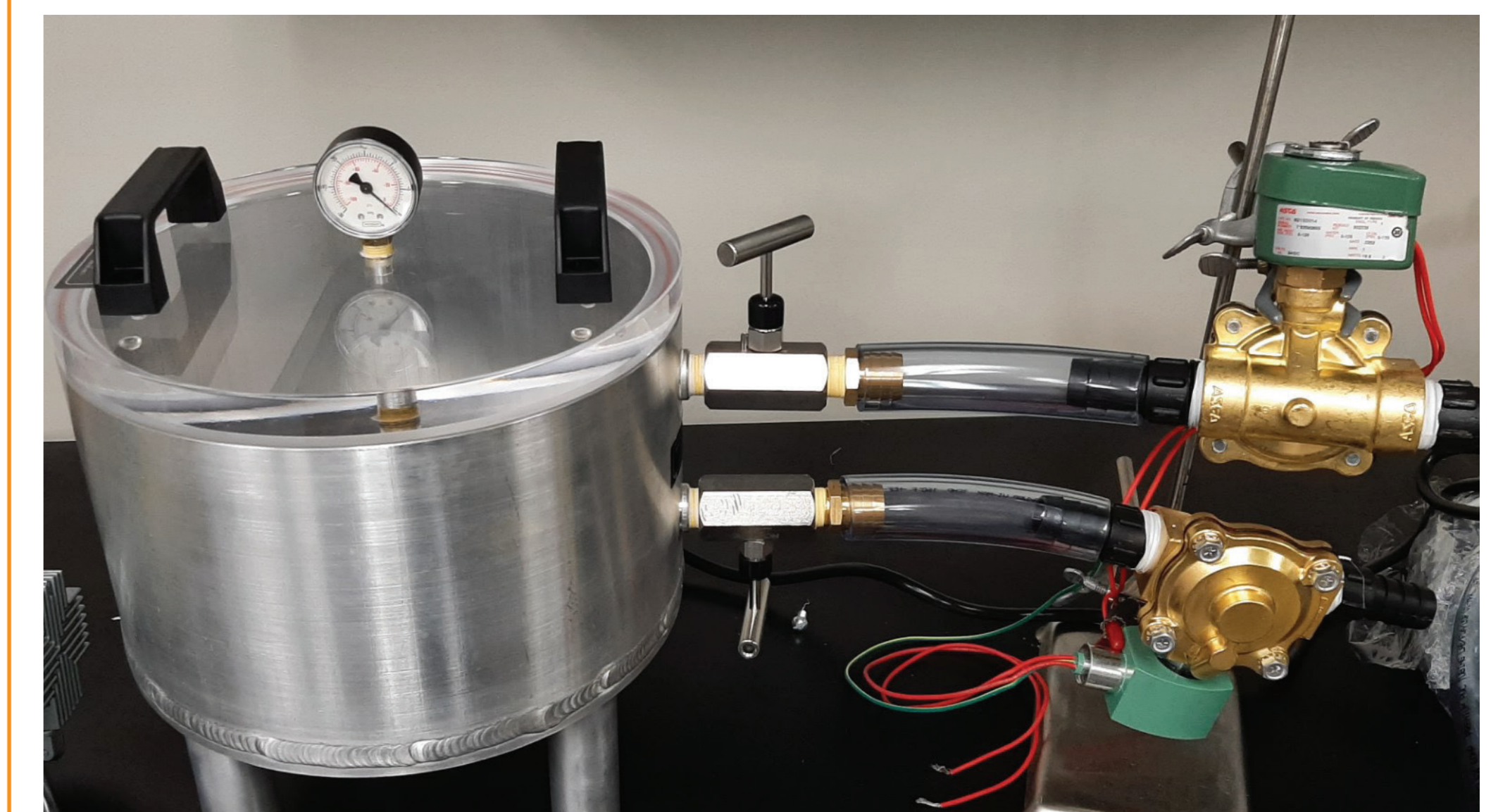
## Purpose

- Research in cleaning these AM parts for reducing contamination is limited in space habitats
- If tested in microgravity, the capability to clean AM parts can further In-Space Manufacturing (ISM)



## Methods

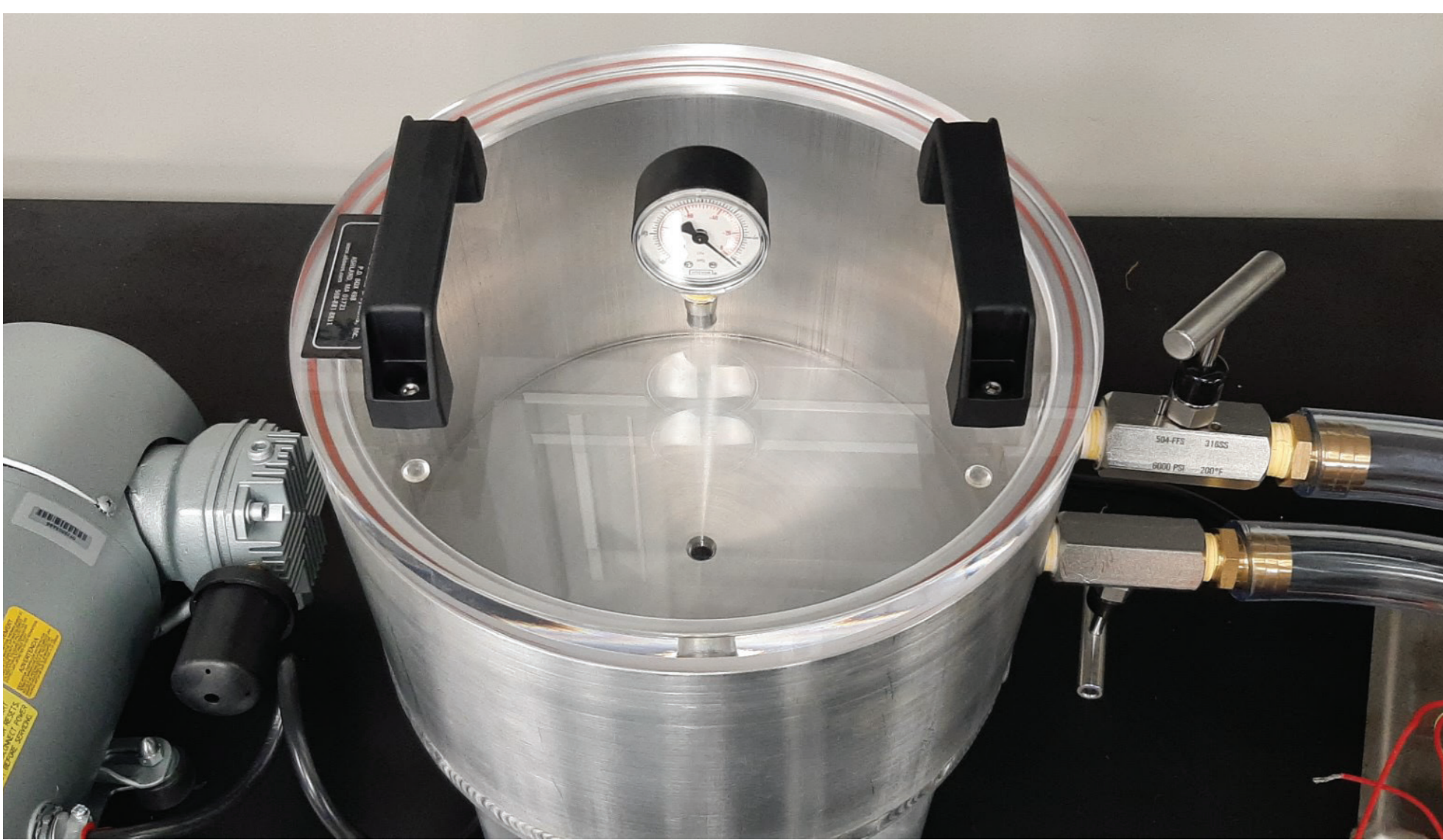
- Vacuum Cycling Nucleation (VCN) was the picked solution for a prototype capsule
- A scaled down cleaning experiment in a prototype capsule in being developed Summer 2023
- Housing will enclose vacuum chamber and valves to mimic ISS payload to handle in Microgravity Science Glovebox



## Methodology

### Vacuum Chamber

- 11- x 6-inch chamber



### Valves

- Solenoid valves controlled by Arduino



### Vacuum Pump

- Oil-free electric pump with 5 CFM



## Current Status

- Hardware is here and being assembled Summer 2023
- Controller and code are being developed to pulse vacuum in chamber

## Forward Work

- Finishing up first prototype capsule this summer
- Applying for a center innovation fund
- Aiming to have Tec-Masters, Inc. do a technology transfer to build flight version

## Acknowledgements

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