

Vandal Forge 3D Metal Printer

Problem

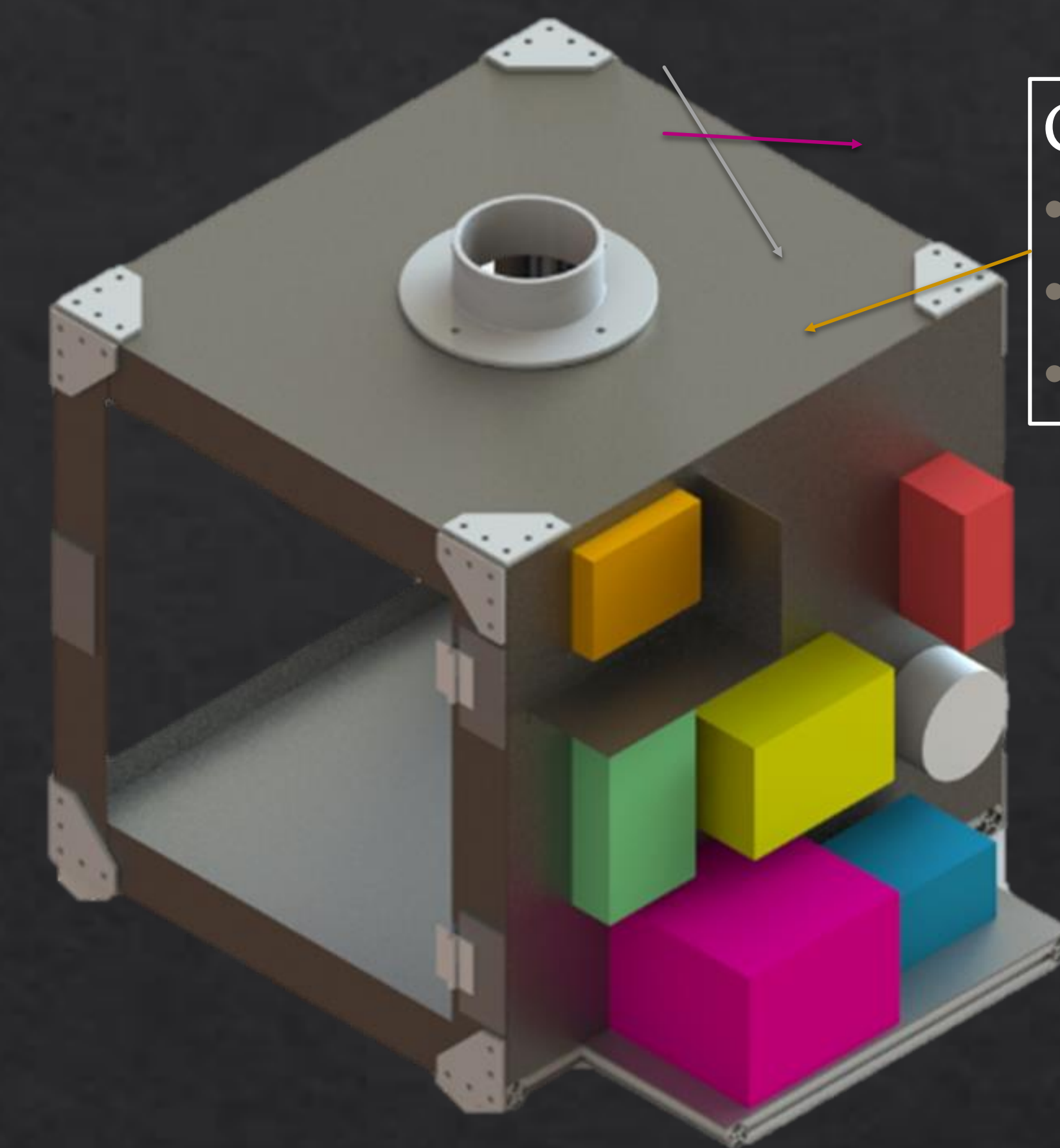
Current 3D printers are limited in material or cost. Low-cost plastic 3D printers exist, but produce relatively fragile parts. 3D metal printers exist, but cost \$50,000 or more. Our task is to develop a low-cost metal 3D printer for use in academic, home, and small-business environments.

Solution

Combine current plastic printing technology with wire-feed MIG welding technology. MIG welders use an electrical arc to melt a wire, which gets deposited on the welding surface. This is similar to how FDM plastic printers work.



3D Plastic Printer Assembly



Controller
• Schematics
• Firmware
• Printing Process

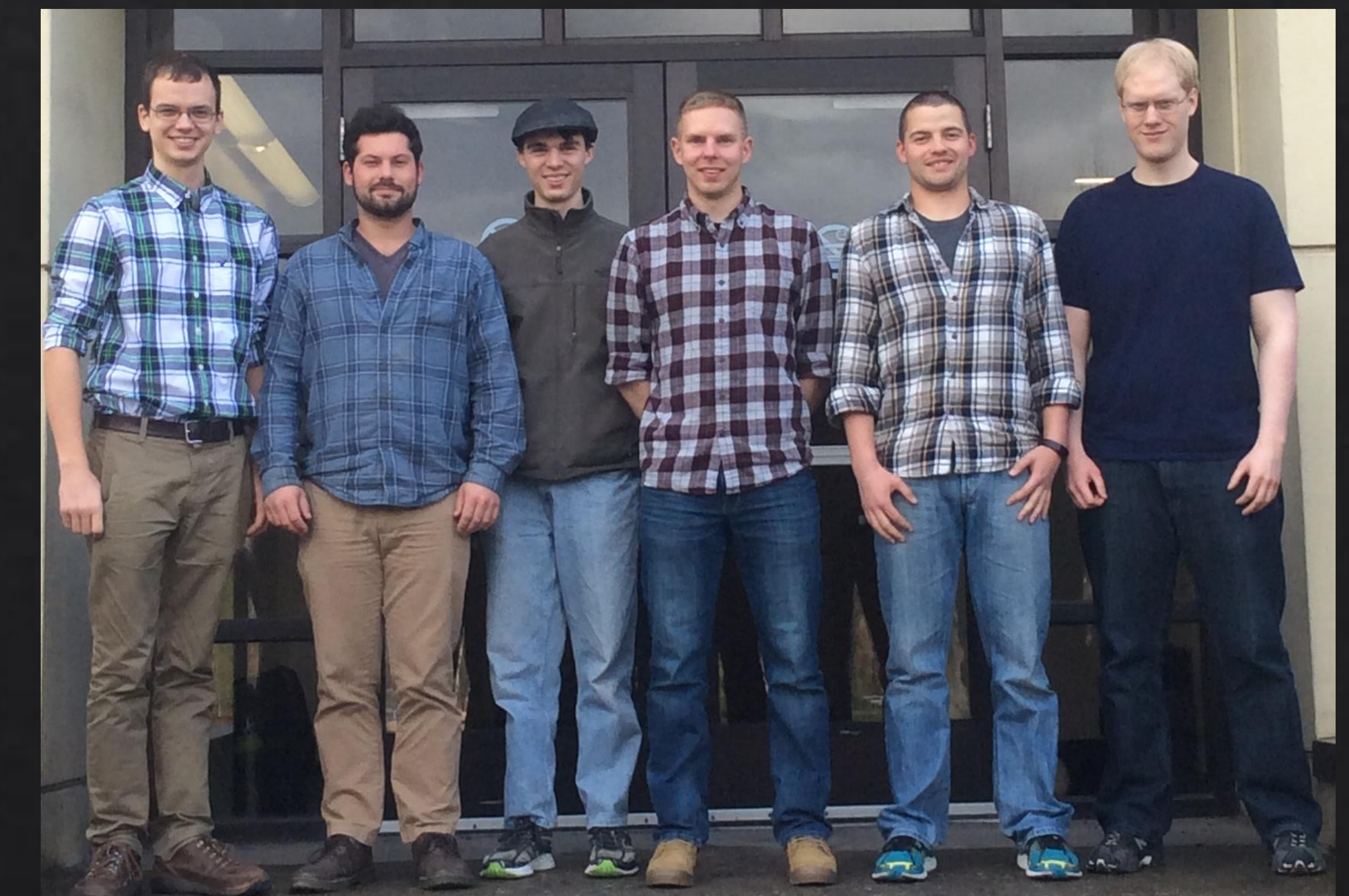
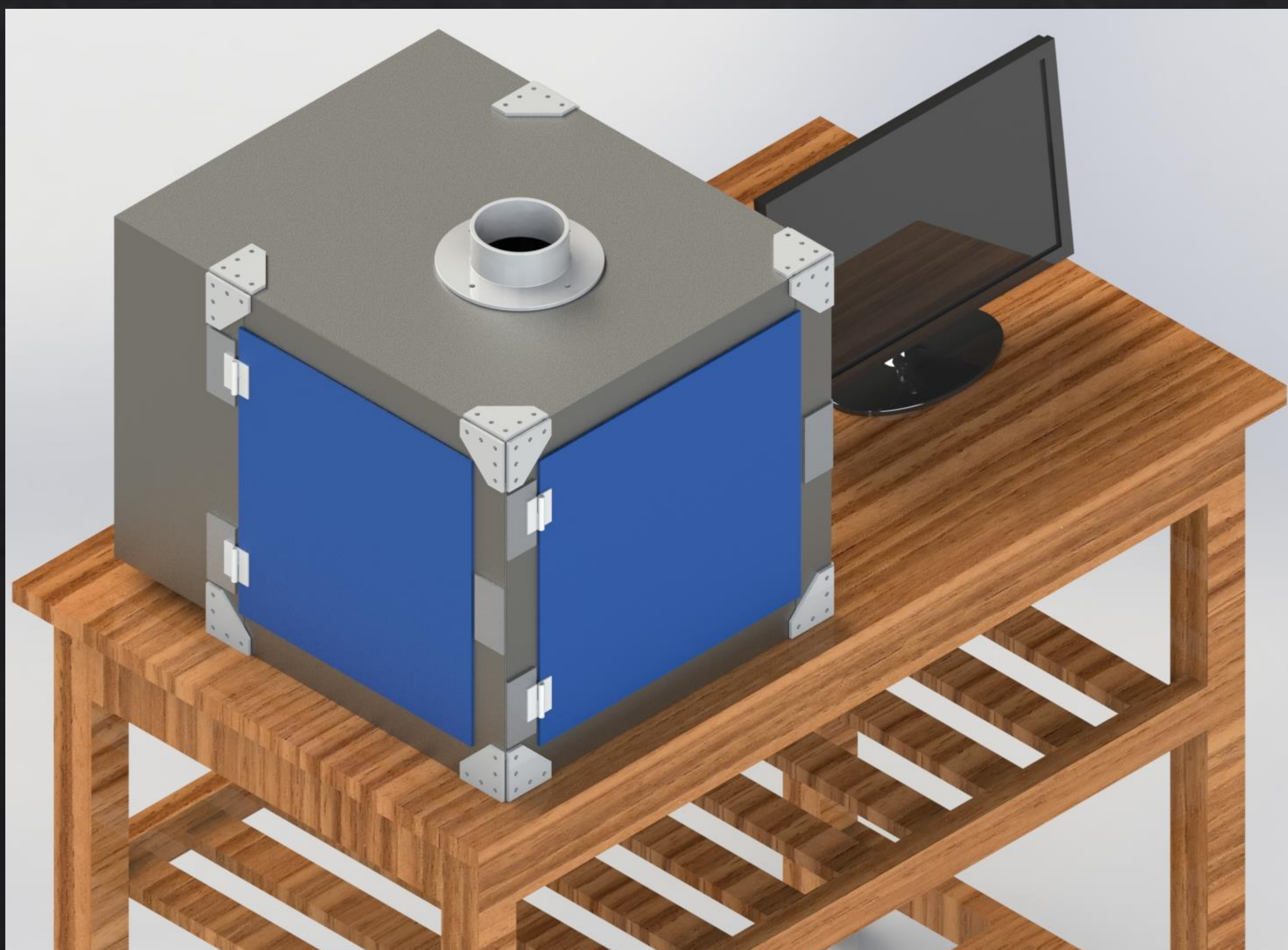
Welder
Gas Assembly
Wire Feed Assembly
Power Supply
Machined Parts

Integration

- Wire Cutter Assembly
- Print Bed Assembly

Design Features

- Wire cutter for consistent layer conditions and removal of welding wire balls
- Aluminum print bed-with easy print-surface removal
- Smoothie board controller for extreme expandability
- Based on the P3Steel design for easy assembly and stability
- Power systems based on a low-cost flux core welder
- Computer control for all variables in welding process, such as power, wire feed rate, and gas flow.
- Fume extractor to remove harmful welding fumes.
- Safety doors that are transparent, UV protected, and feature automatic shutoffs to prevent eye injuries.



From the left: Nathan Wagner, Kyle Krieg, Peter Haley, Maxwell Emerson, Matthew Buchanan, and Jay Van Gerpen