

## Abstract

This project was a collaboration between BAE Systems Inc., a Fort Wayne based company that assembles specialty circuit boards, and Trine University Mechanical Engineering students. The goal of this project is to design and build an automated machine that will lay a bead of silicone sealant along the edge of components on a circuit card assembly.

## Customer Needs and Requirements

- Overall size must be roughly 30" x 30"
- Must fit a maximum CCA size of 18" x 20"
- Must follow BAE safety protocols
- Machine must use 30CC RTV Cartridges
- Must cost less than \$15,000

## Concept Selection

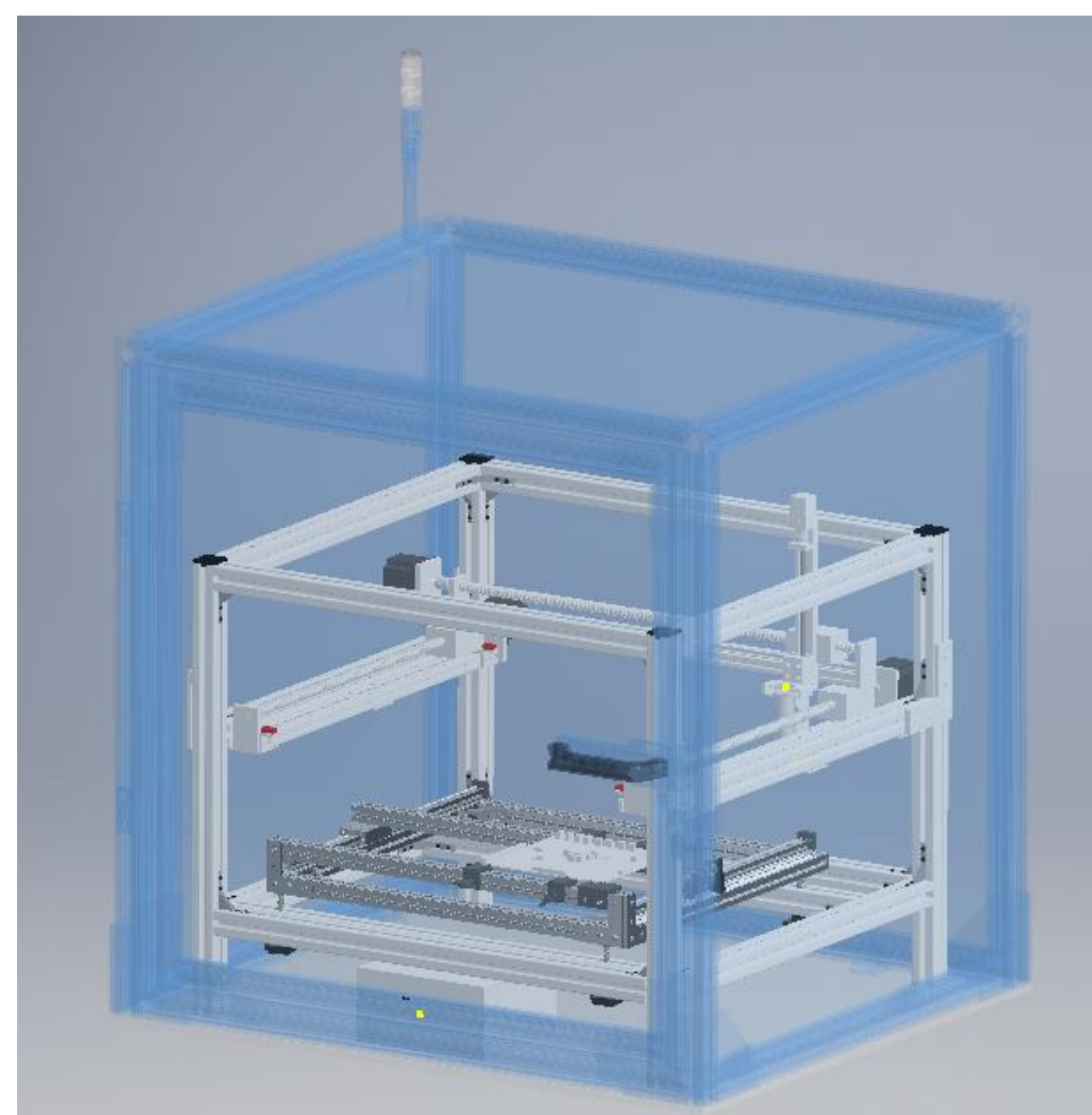


- Screw Drives
- Nordson Dispenser
- Hakko Board Cradle



## Design Solution

The final design solution is a fully customized 3 axis machine the meets all the requirements given.



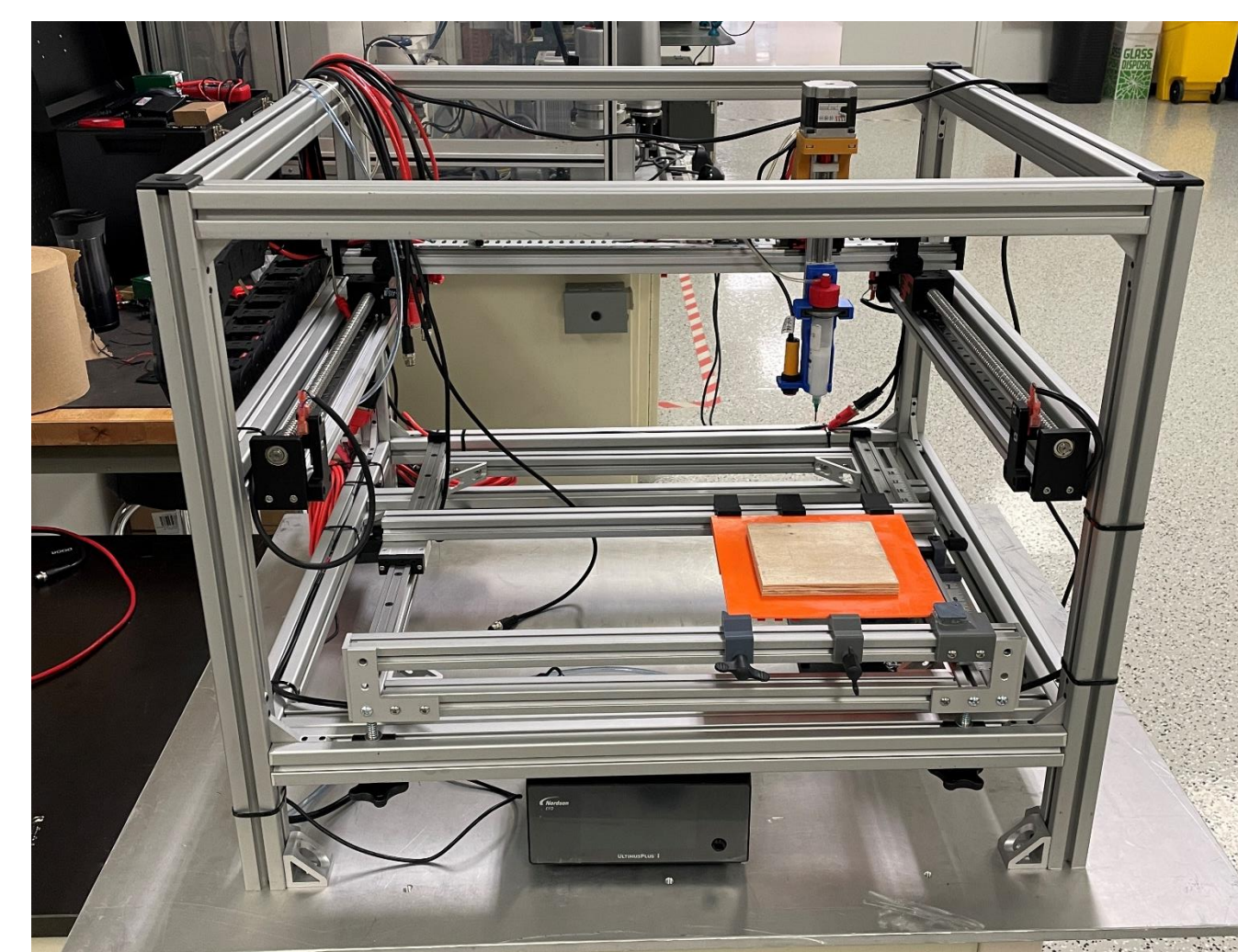
## Manufacturing

### Cutting Frame



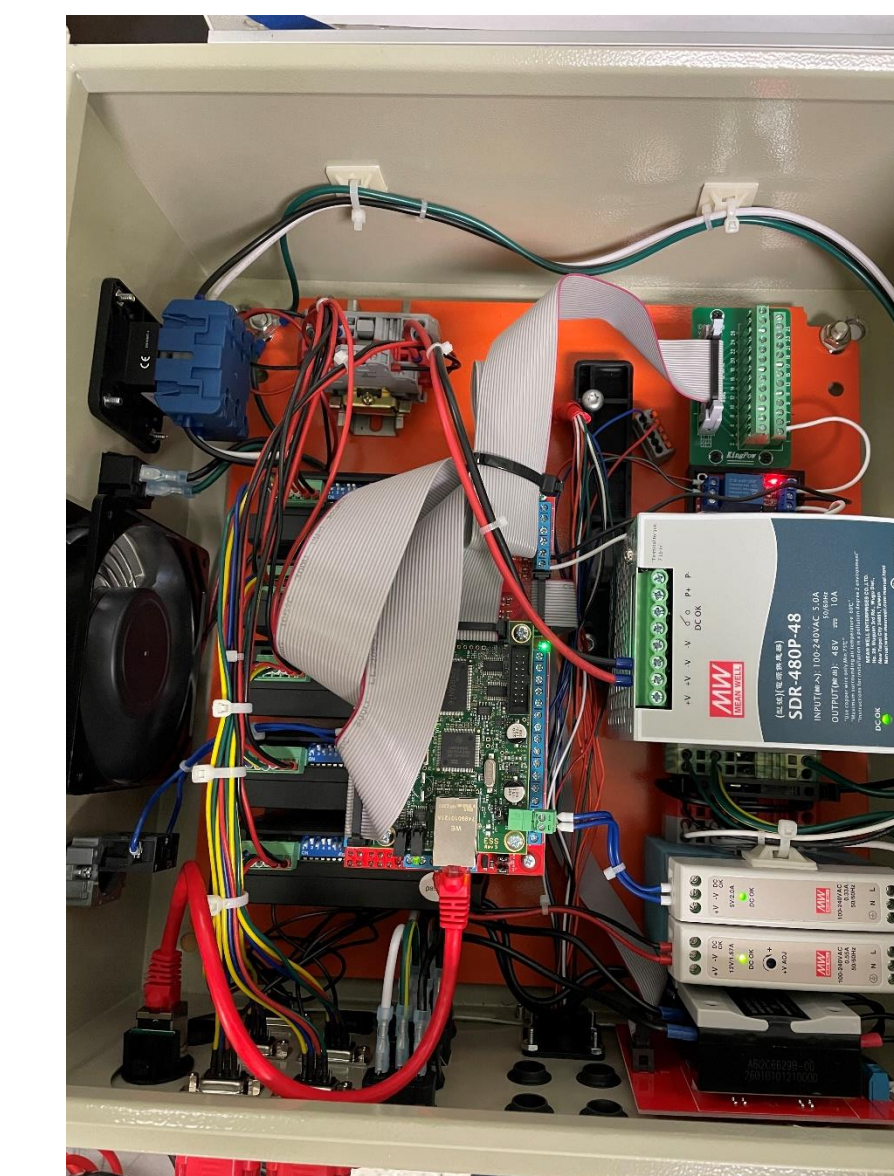
- Aluminum Extrusion Frame

### Assembly



- 90° Aluminum Gussets
- Attach to Aluminum Plate

### Dispenser Integration



- Integration of Dispenser with Operating System

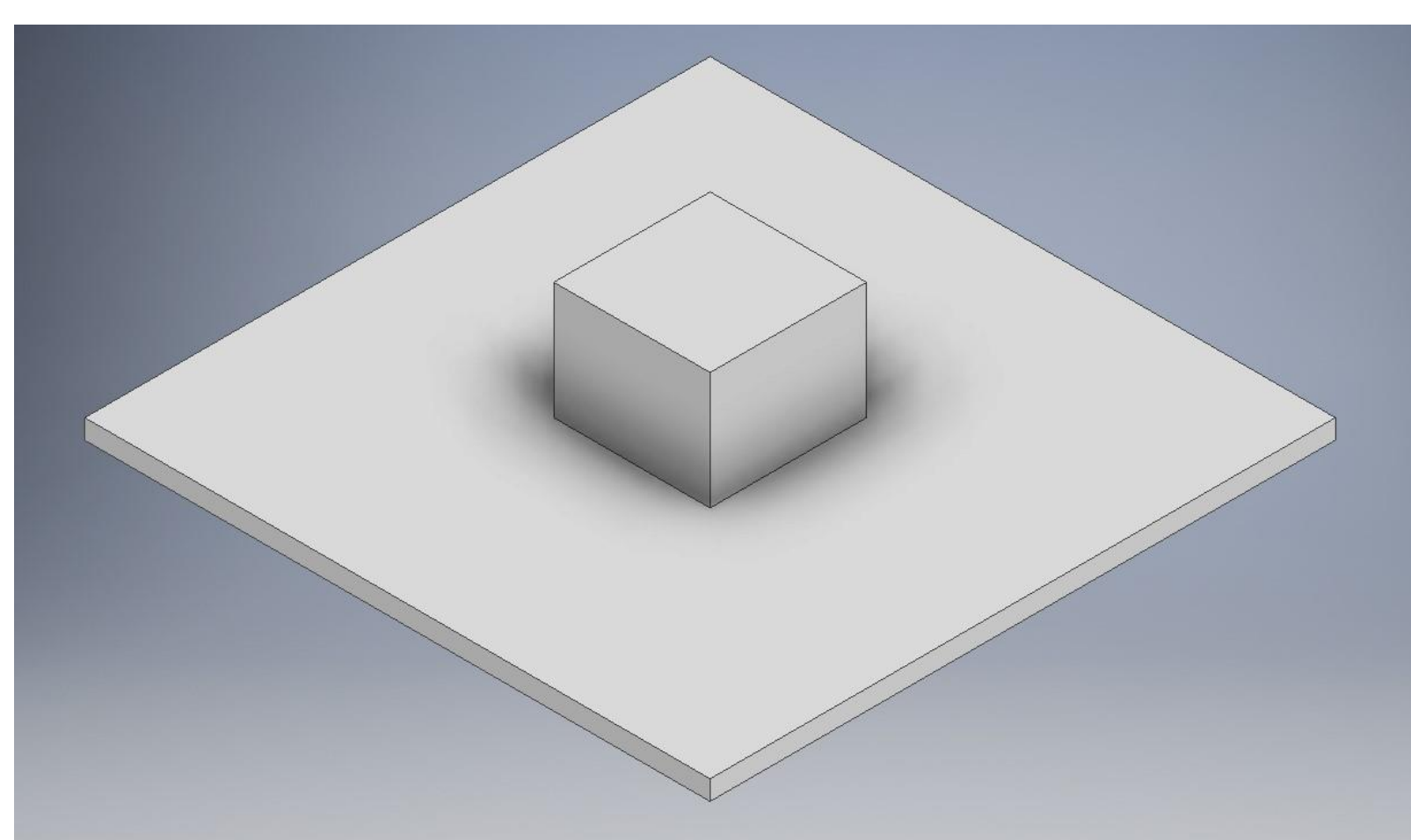
### Final Product



## Testing and Validation

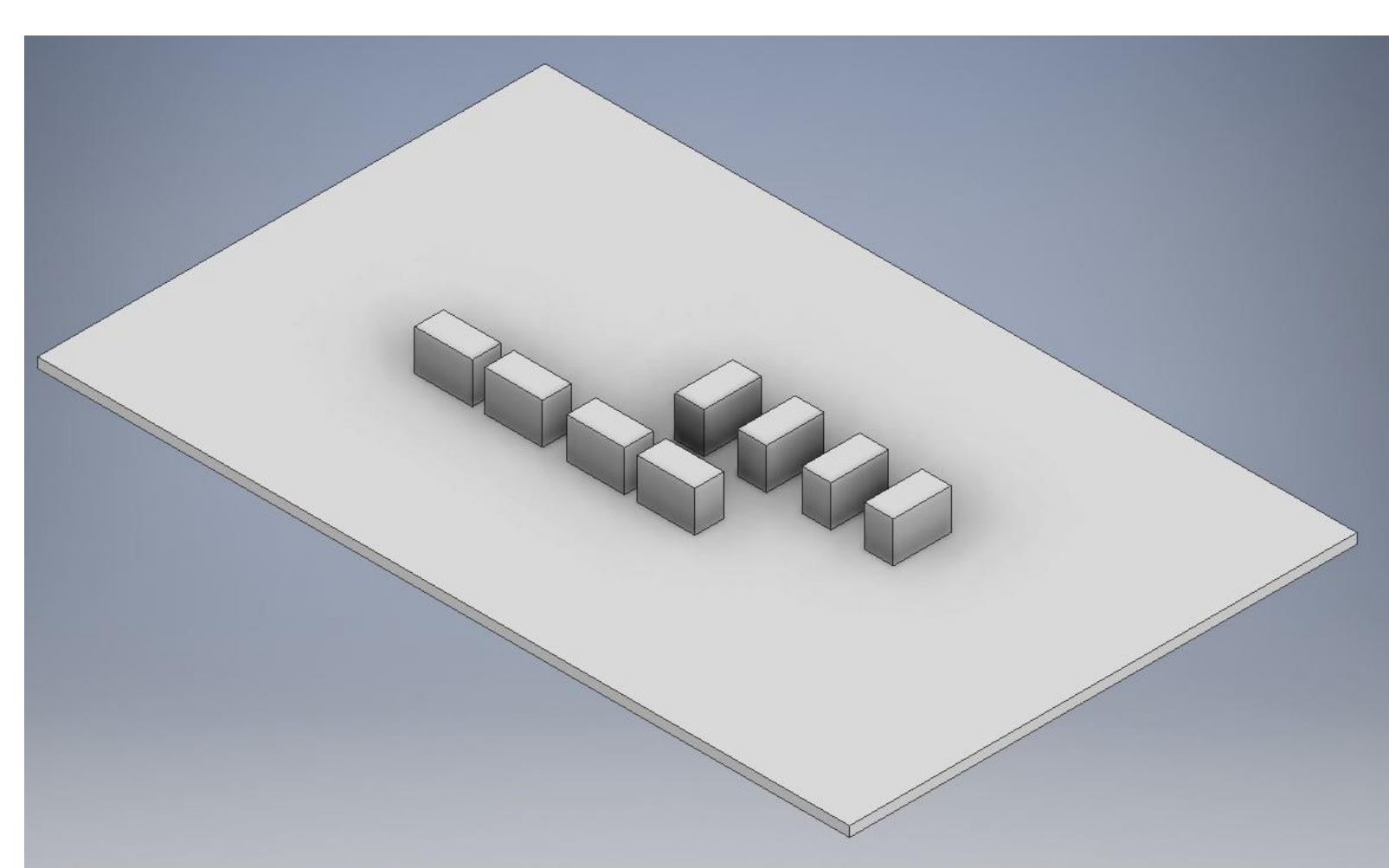
### Test 1: Initial Coding

- Used to determine how the coding language will work



### Test 2: Simple Test Board

- Simple components to track needle position



### Test 3: Final Board

- Components from BAE CCA
- RTV applied to all components



## Acknowledgments

We would like to acknowledge BAE Systems, Innovation One, and our lab manager, Joe Thompson



### References :

Board Holder: [Metcal BH-2000 - Board Holder \(hisco.com\)](https://www.hisco.com/products/metcal-bh-2000-board-holder)

Screw Drive Assembly: [Cartesian Robot XYZ Stage Positioning Rail Guide Linear Gantry System - Fuyu Technology Co., Ltd. \(fuyumotion.com\)](https://www.fuyumotion.com/)

Dispenser: [Precision Fluid Dispensers | Nordson EFD](https://www.nordson.com/)