

# Final Presentation

8/14/2024

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Helena Sieh

# About Me

**Home:** Honolulu, Hawaii



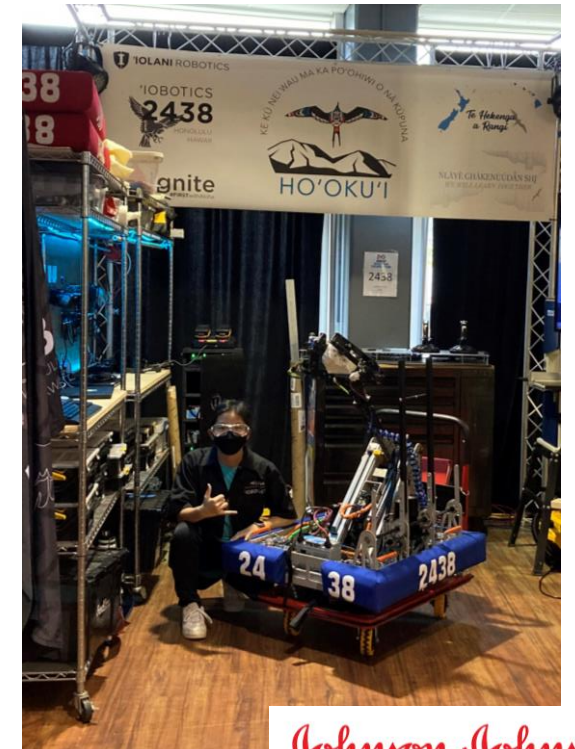
**School:** University of Michigan – Ann Arbor

**Major:** Robotics Engineering

**Fun Project:** Drone

**Past Internship:** Naval Information Warfare Center

**Hobby:** futsal, FRC, hiking



Johnson & Johnson

# Acknowledgements



I would like to thank Akhila for being my mentor this summer



Justin, Nathan, Kenneth & Will for their guidance in my projects throughout this summer

# Overview of Projects

- Friction Testing Fixtures
- G5 Fastener Loosening Test
- G4&5 Motor Attachments and Mounts





## Project #1

## Friction Test Fixtures

# Overview

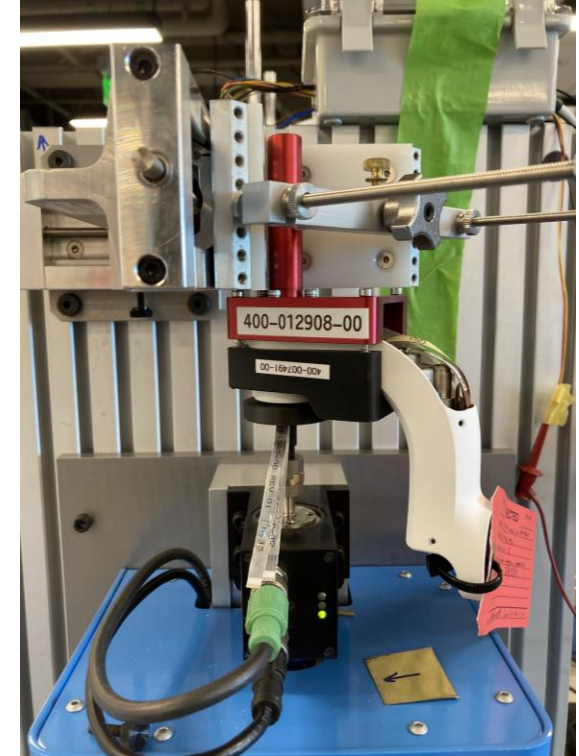
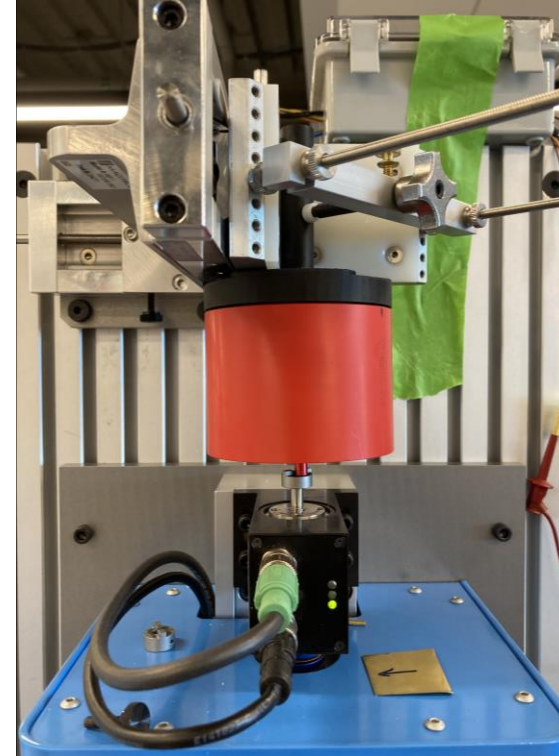
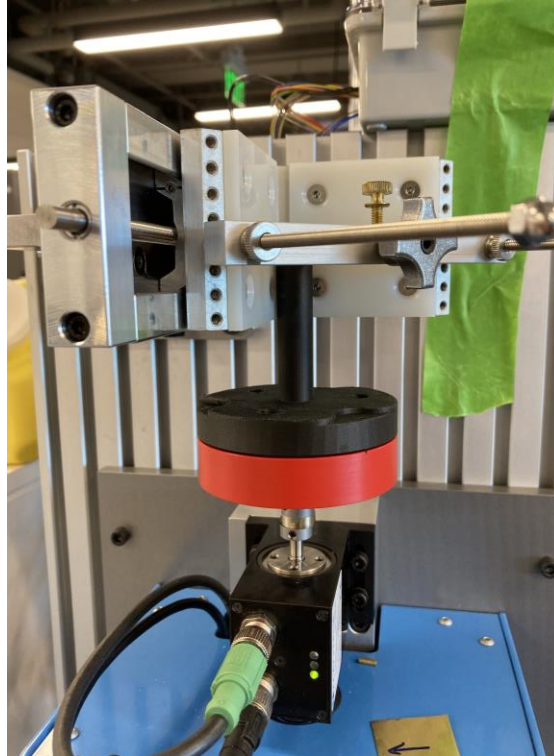
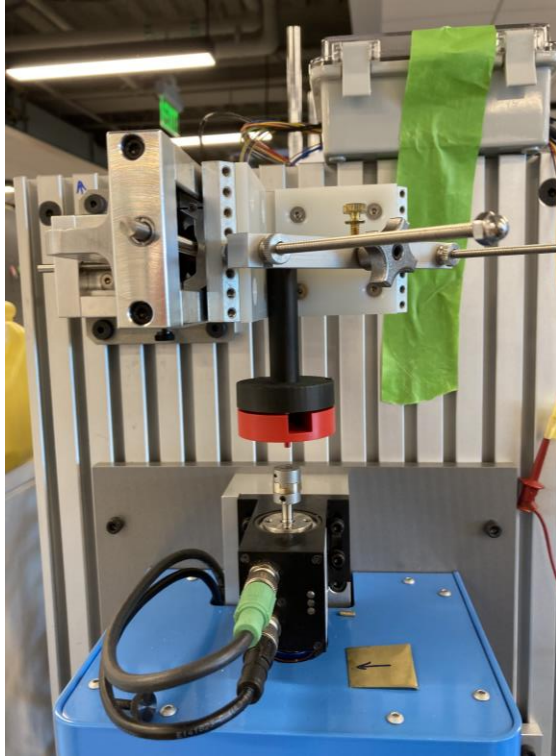
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- Multiple setups for different motors
- Task: minimize # of setups for magtrol machine



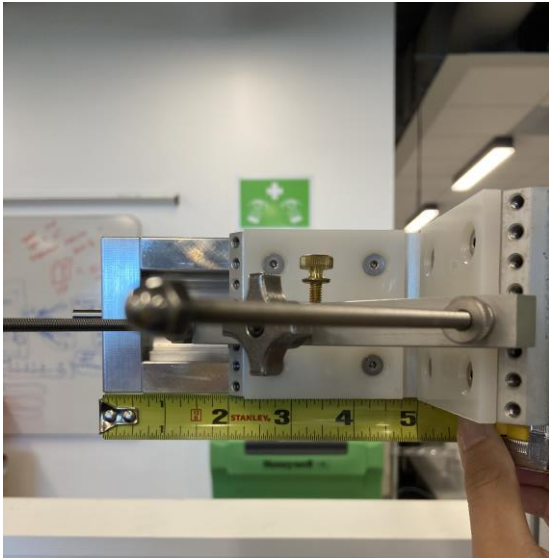
# Magtrol Setups

- Setup for L4, L5, G0-5
- Modified the diameter and height

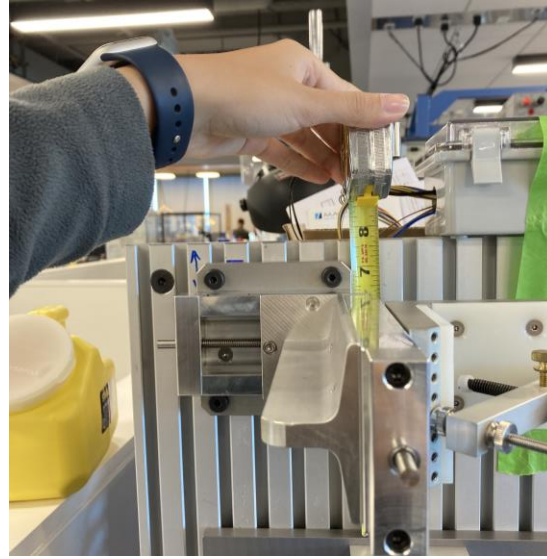




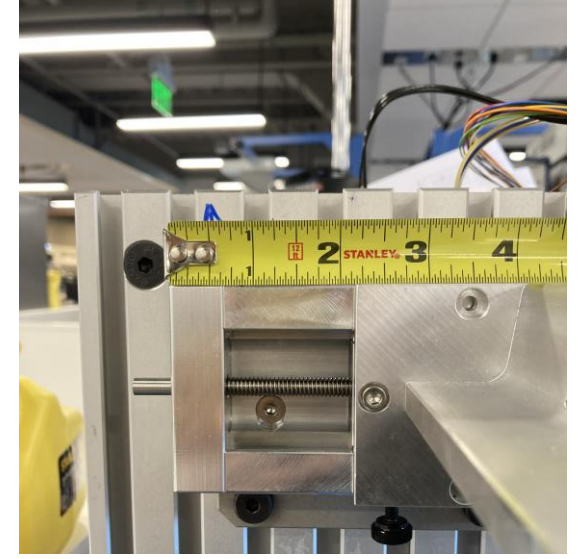
# Magtrol Set Positions



x: 2.375 in



y: 7.14 in

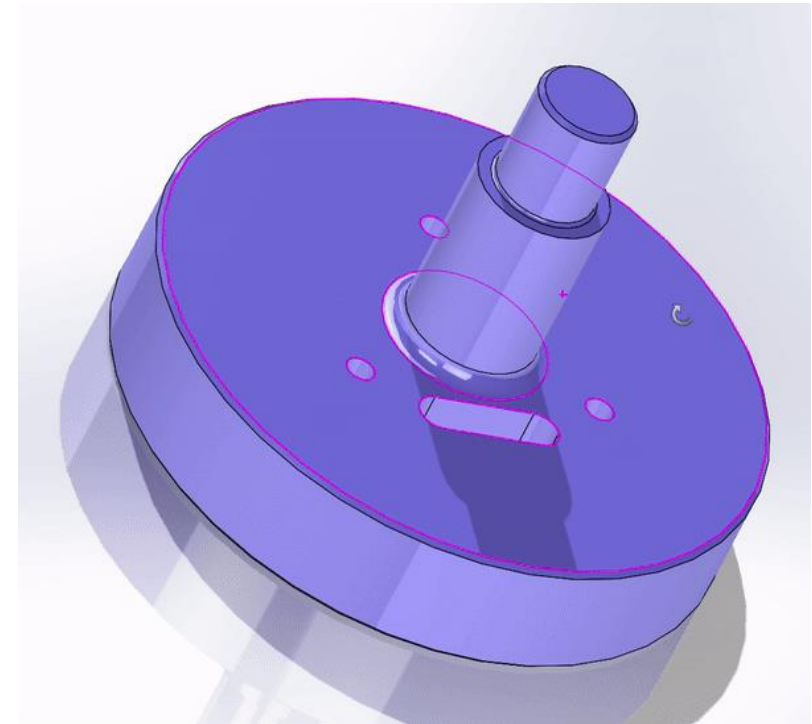
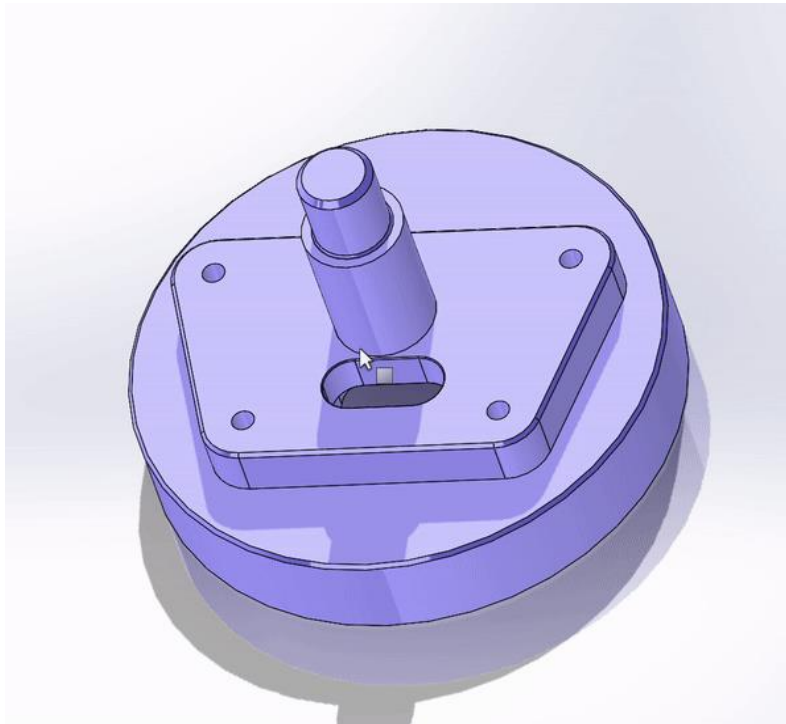


z: 4.99 in



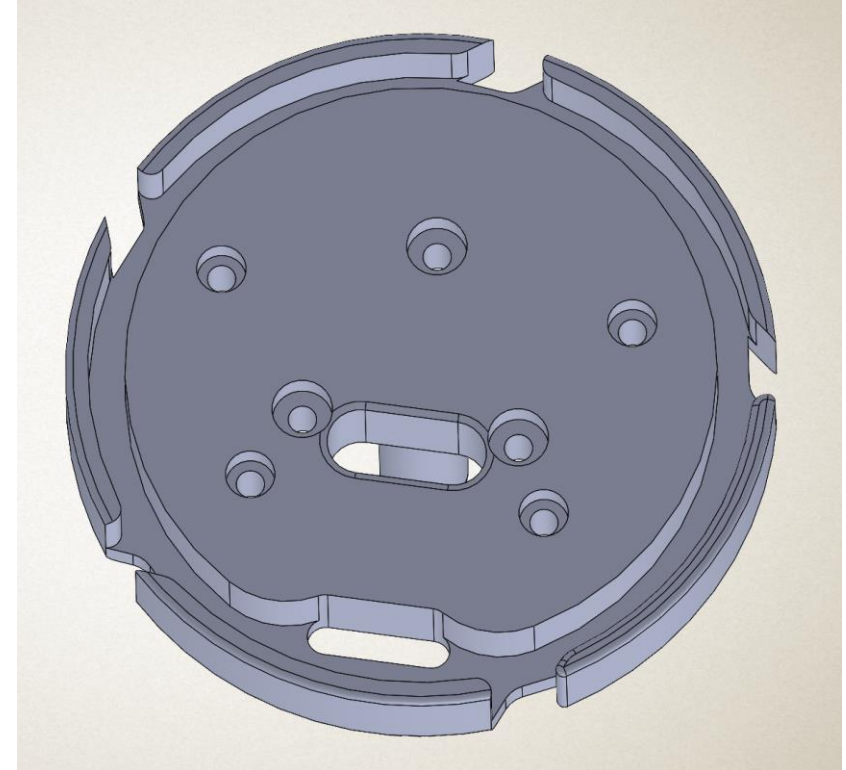
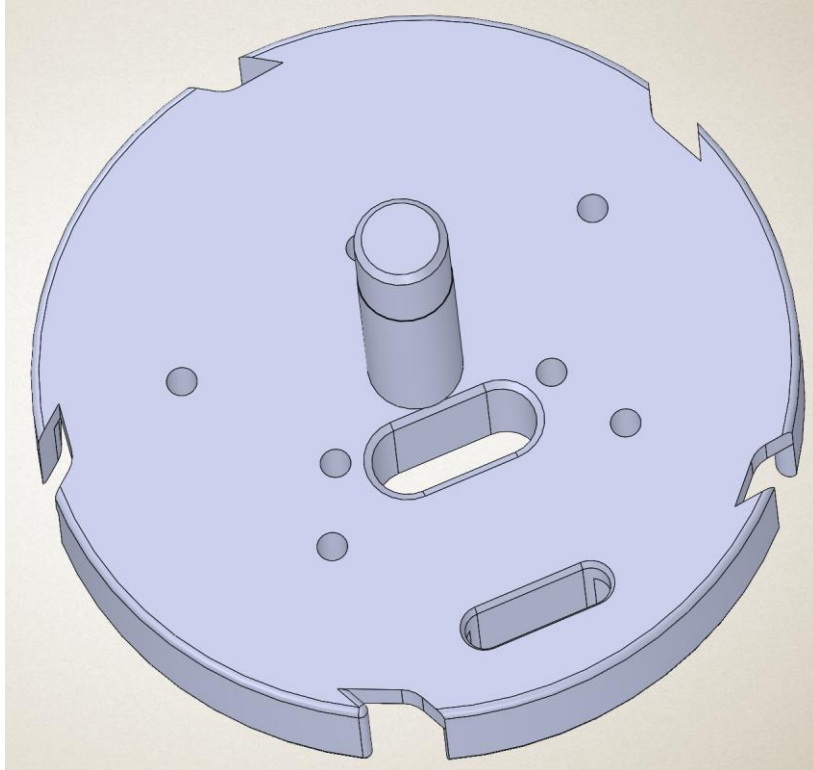
# Adjustable Output Shaft Fixture

- Noticed that there were many setup pieces to connect output shafts that connect to the magtrol
  - G4 and G5

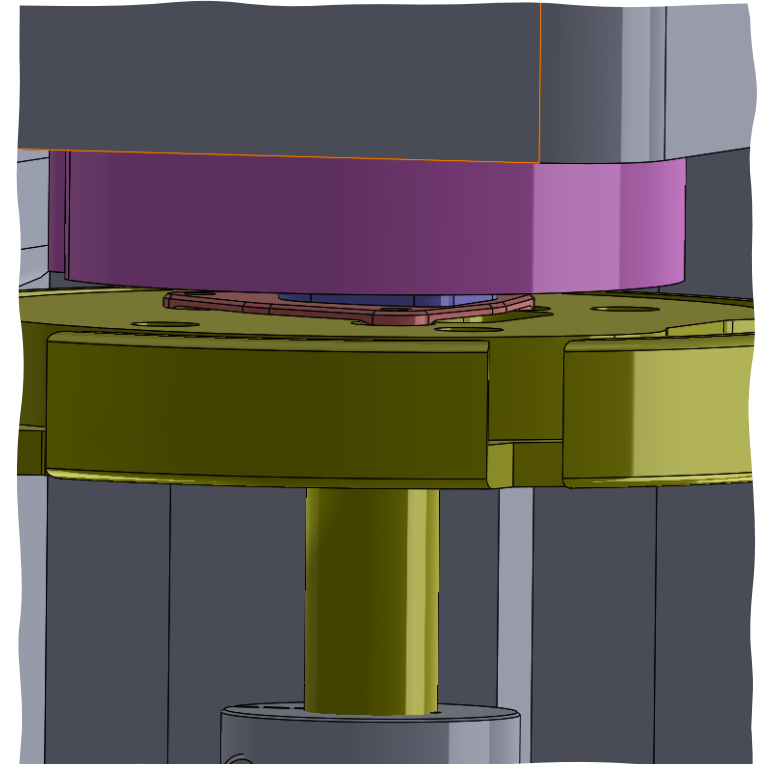
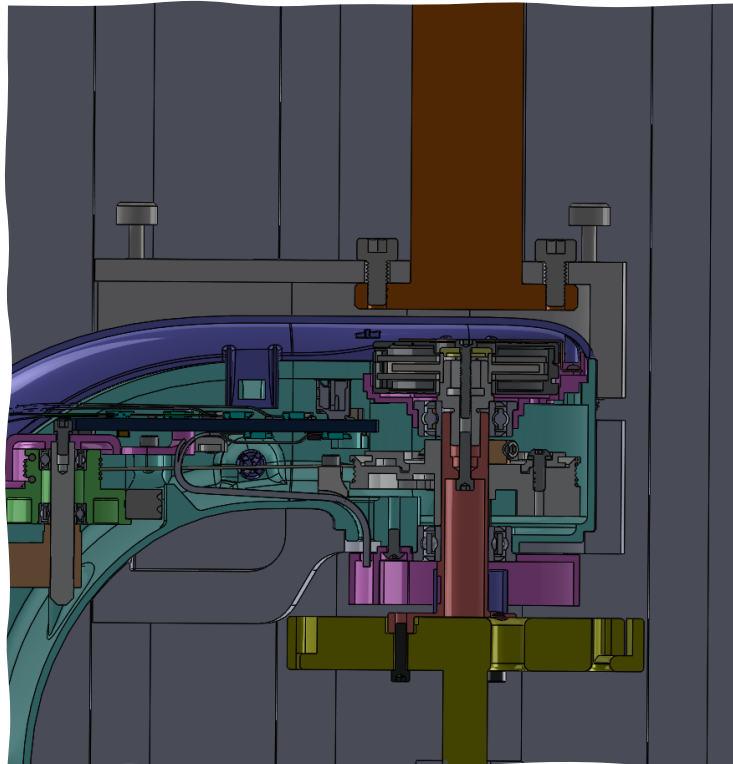
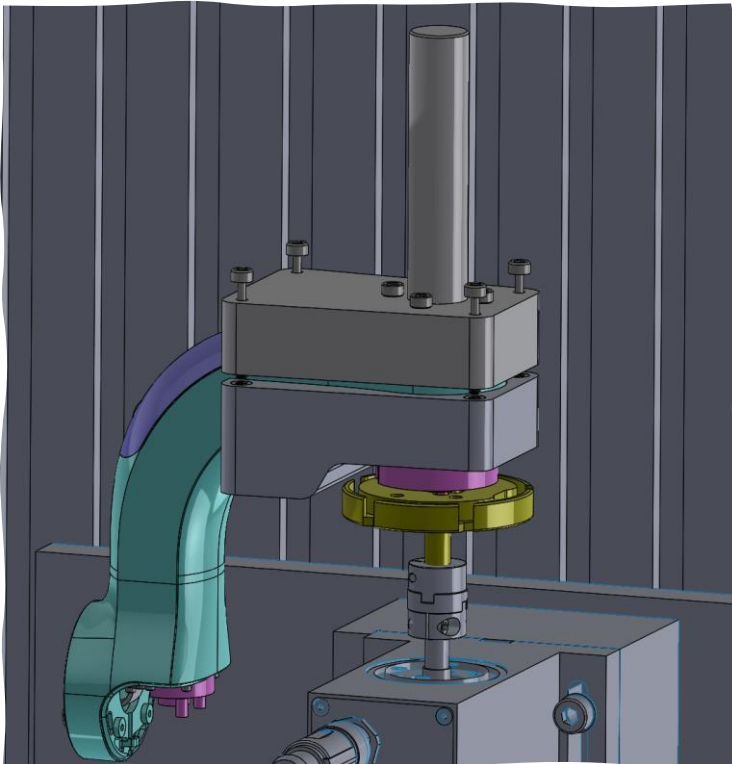


# CAD

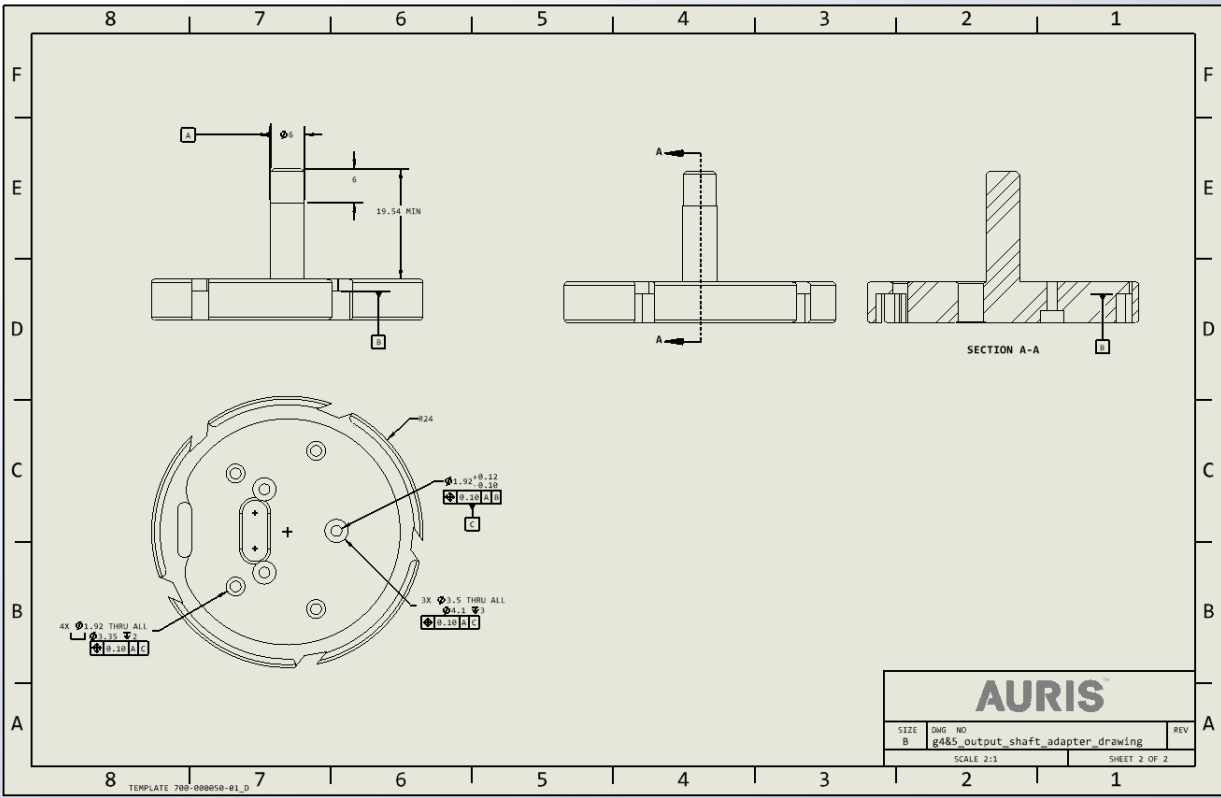
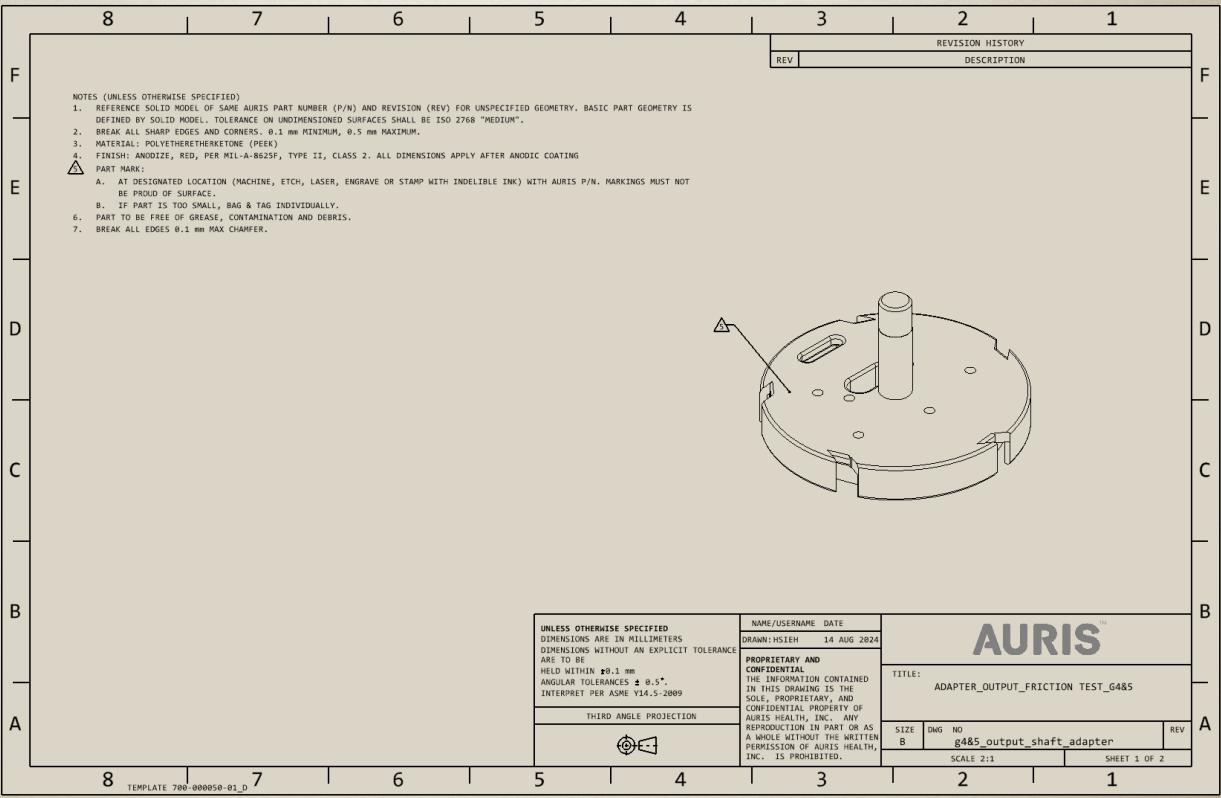
- Slots for the FFC's
- Cut out outline is to route the wires away from the motor
- Concerns:
  - design to bend/turn the FFC's
  - easily manufacturable



# L4 Magtrol Setup Assembly



# Drawing



400-017369-00\_Rev01\_ADAPTER\_OUTPUT\_FRICTION TEST\_G4&5



# Test Part

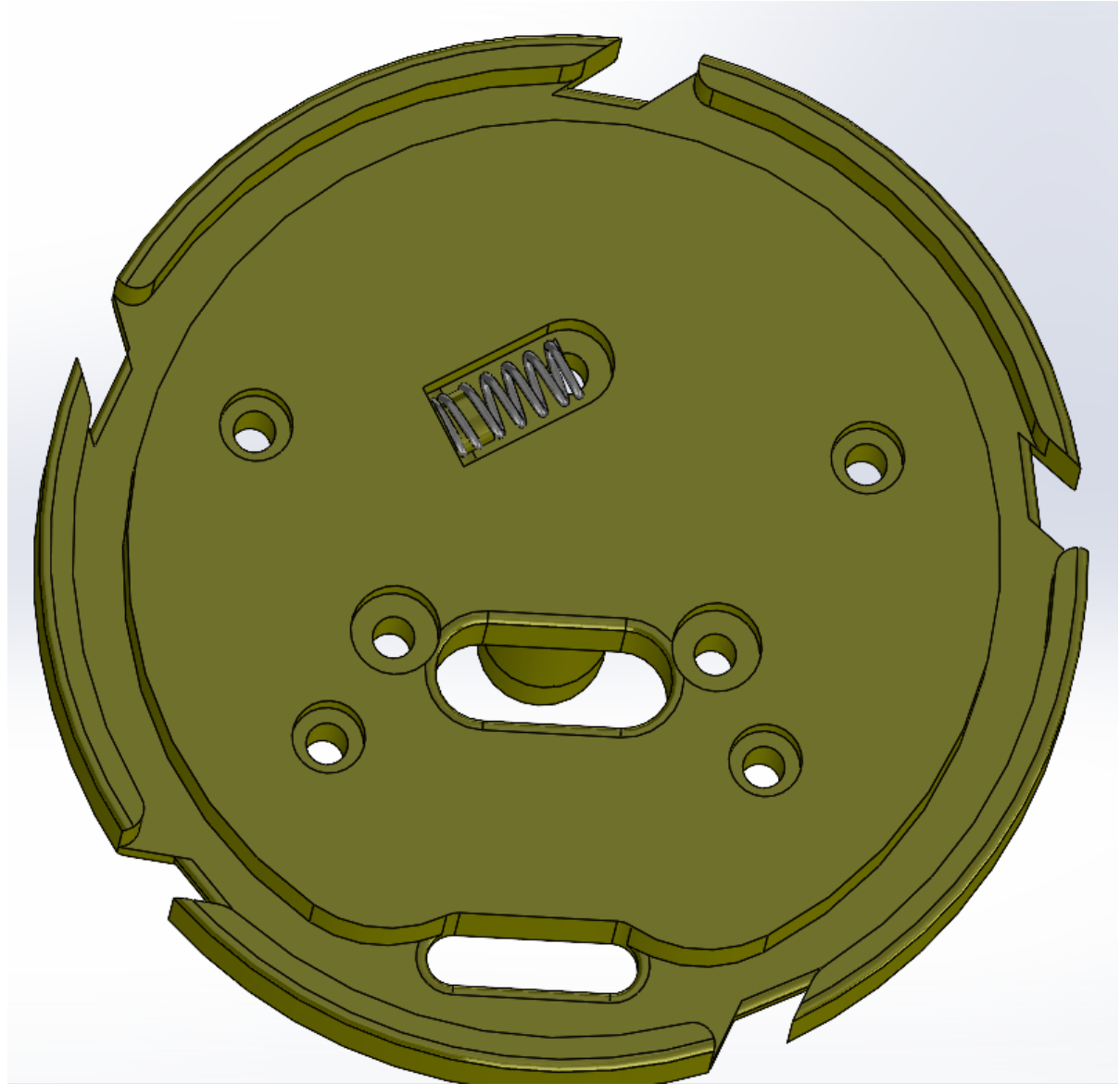
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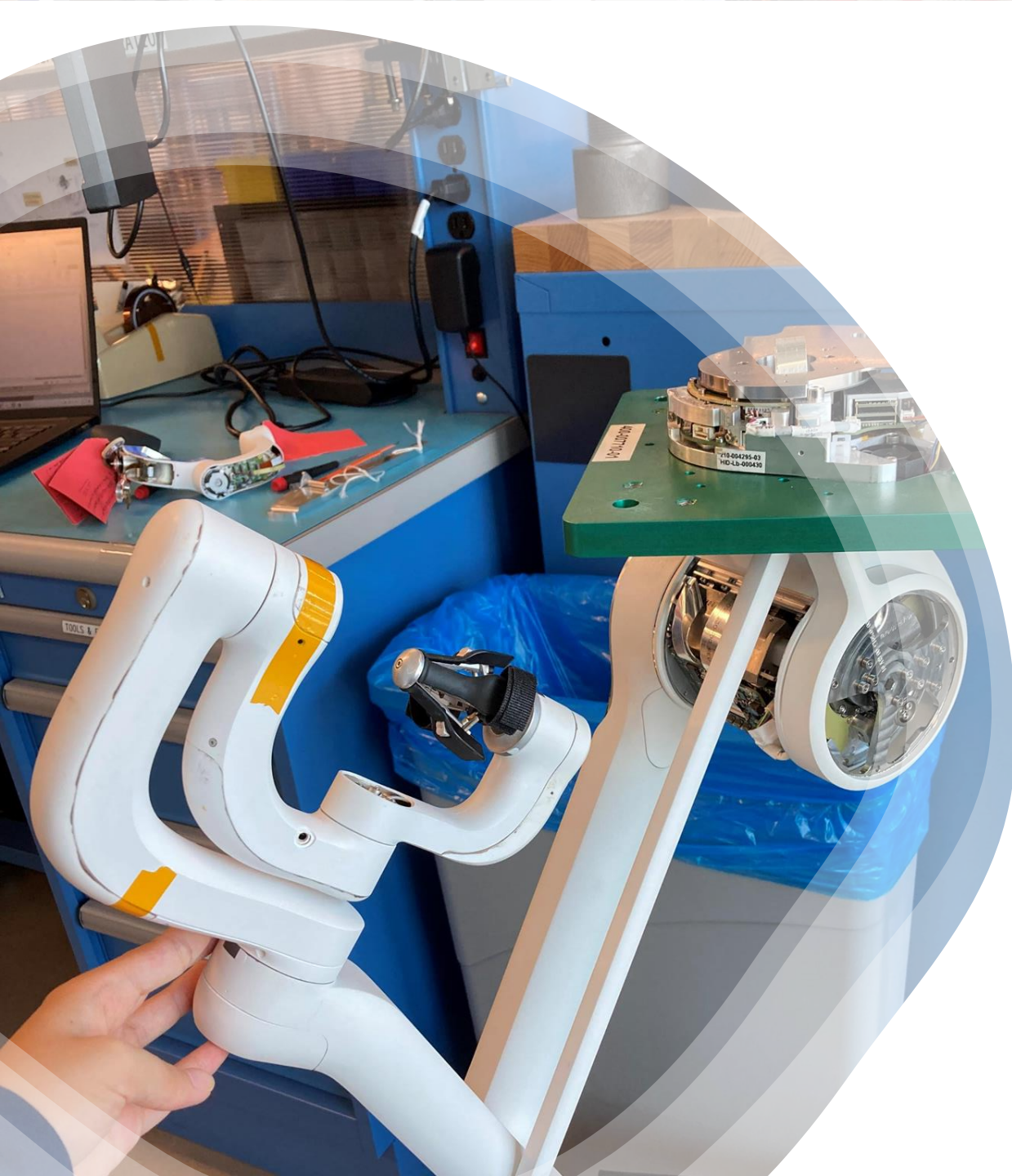


## Spring (In Progress)

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- Use compression spring as a clamp
- Spring force is 17.5 lb/in (1.98 N/m)





## Project #2

## G5 Fastener Loosening Test

# Overview

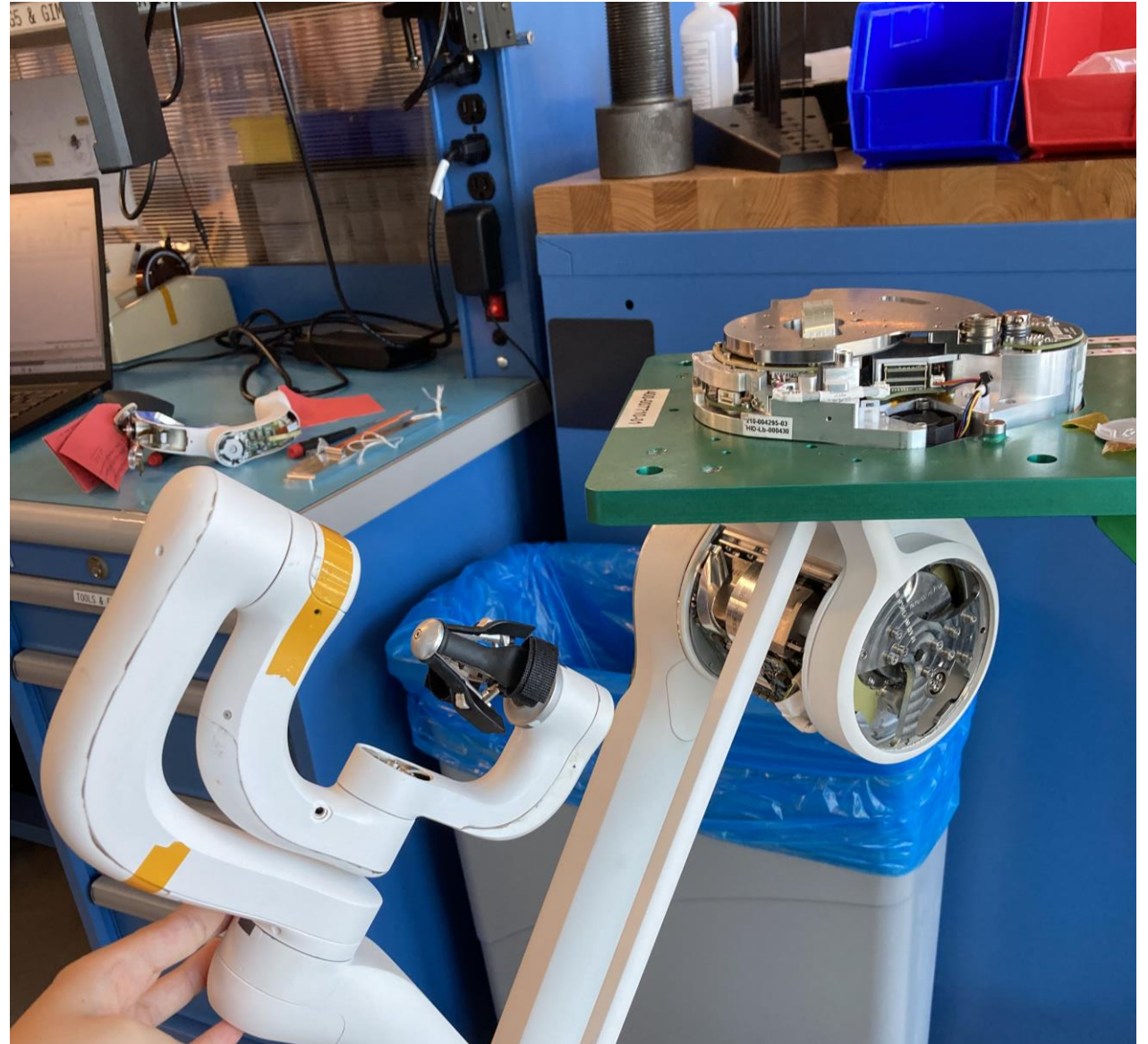
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- Problem: fasteners in the G5 joint loosening causing problems
- Goal: To roughly determine after how many falls it takes for the fasteners start to go loose and expand



# Testing Procedure

- Used HID 461
- Dropped the HID at top limit
- Test the strength of the fasteners after every 10 drops



# Results

- Failed after 50 drops
- top right bolt: immediately loose, loctite present
- top left bolt: immediately loose, loctite present
- bottom bolt: slightly tight, loctite present





# Solution

NEW: alloy socket head screws  
w/ loctite 243

Procedure:

- cleaned with dust remover
- replace with alloy socket head screws and loctite 243
- torqued (0.2 Nm)

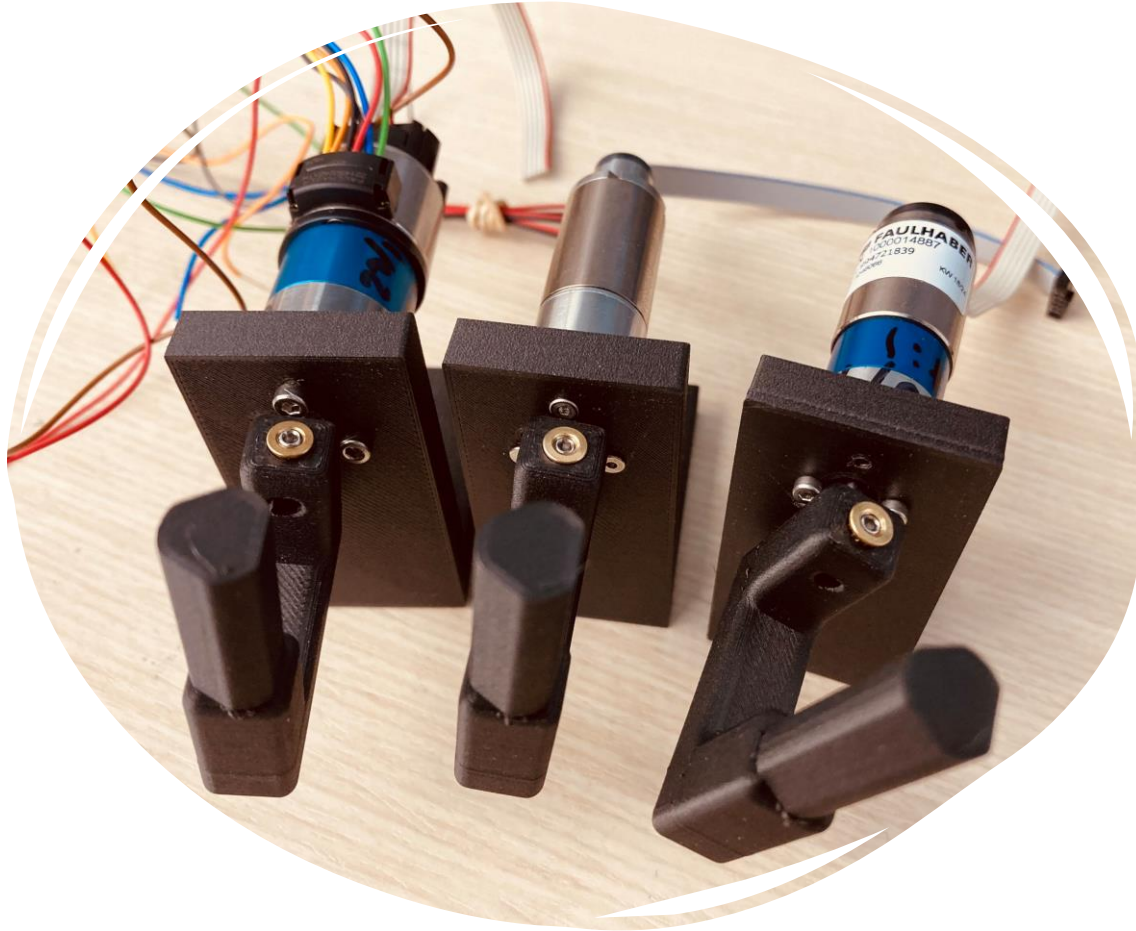


# Results

- Redo testing procedure
- After 200 drops, the alloy fasteners were undamaged







## Project #3

# G4&5 Motor Testing

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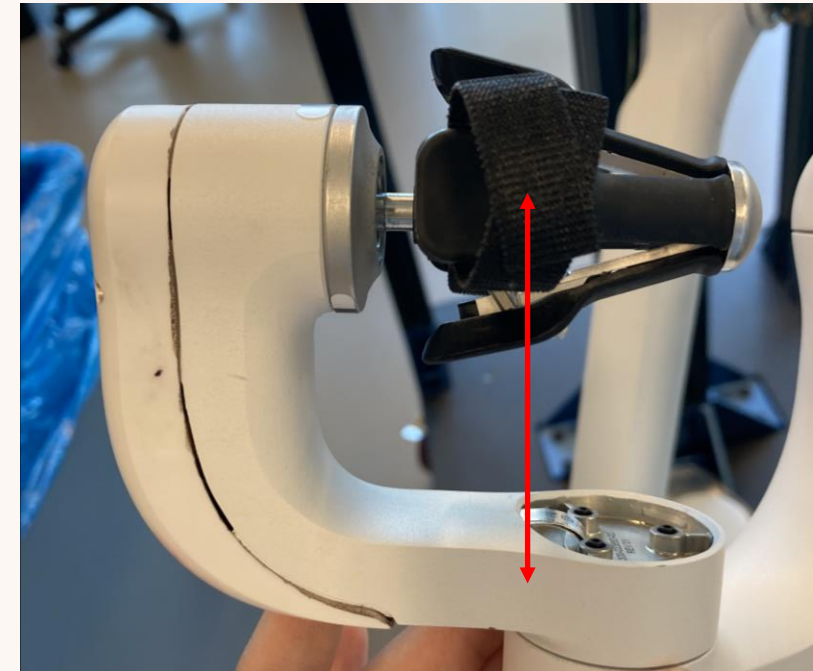
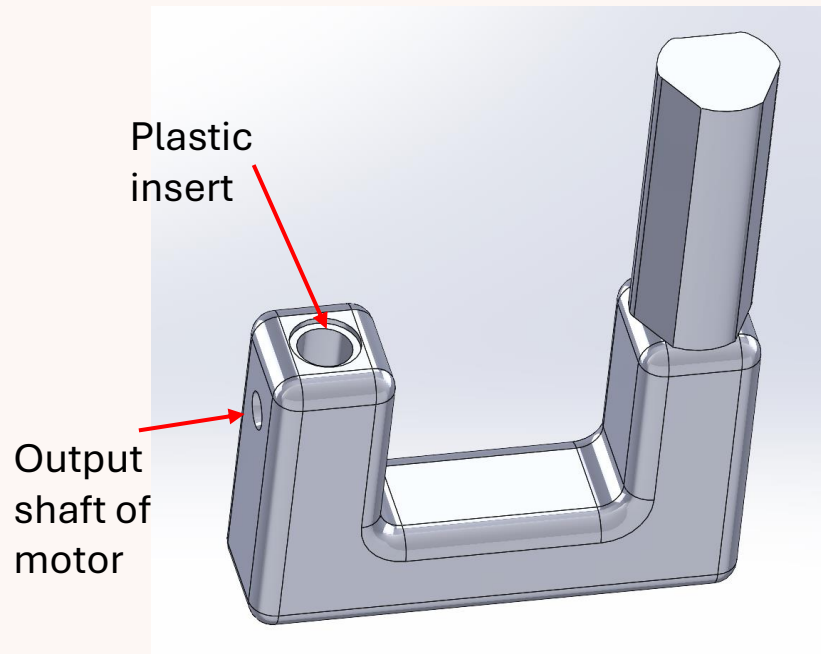
# Overview

- Design arm attachments and motor houses for the potential G4&G5 motor candidates
  - Parts help test and feel the friction of the motors
- Faulhaber 20/1
  - Maxon GPX 16A
  - Faulhaber 16/7



# Arm Attachment

- Output shaft of motor
- Plastic insert
- Set screw to clamp output shaft in place

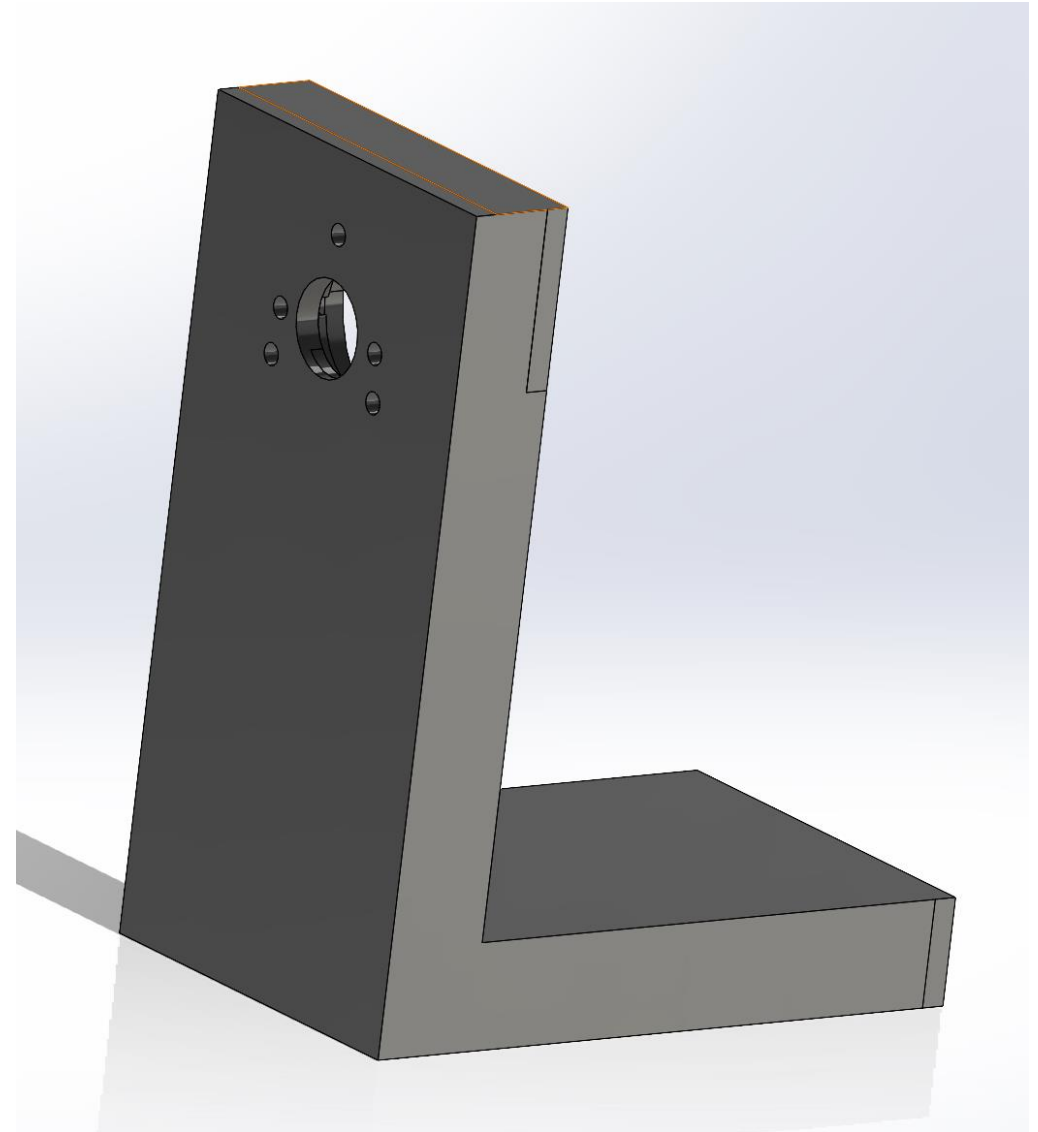


Length of the handle =  $\frac{1}{3}$  of the distance to eliminate the need for a gear ratio

# Motor Mount

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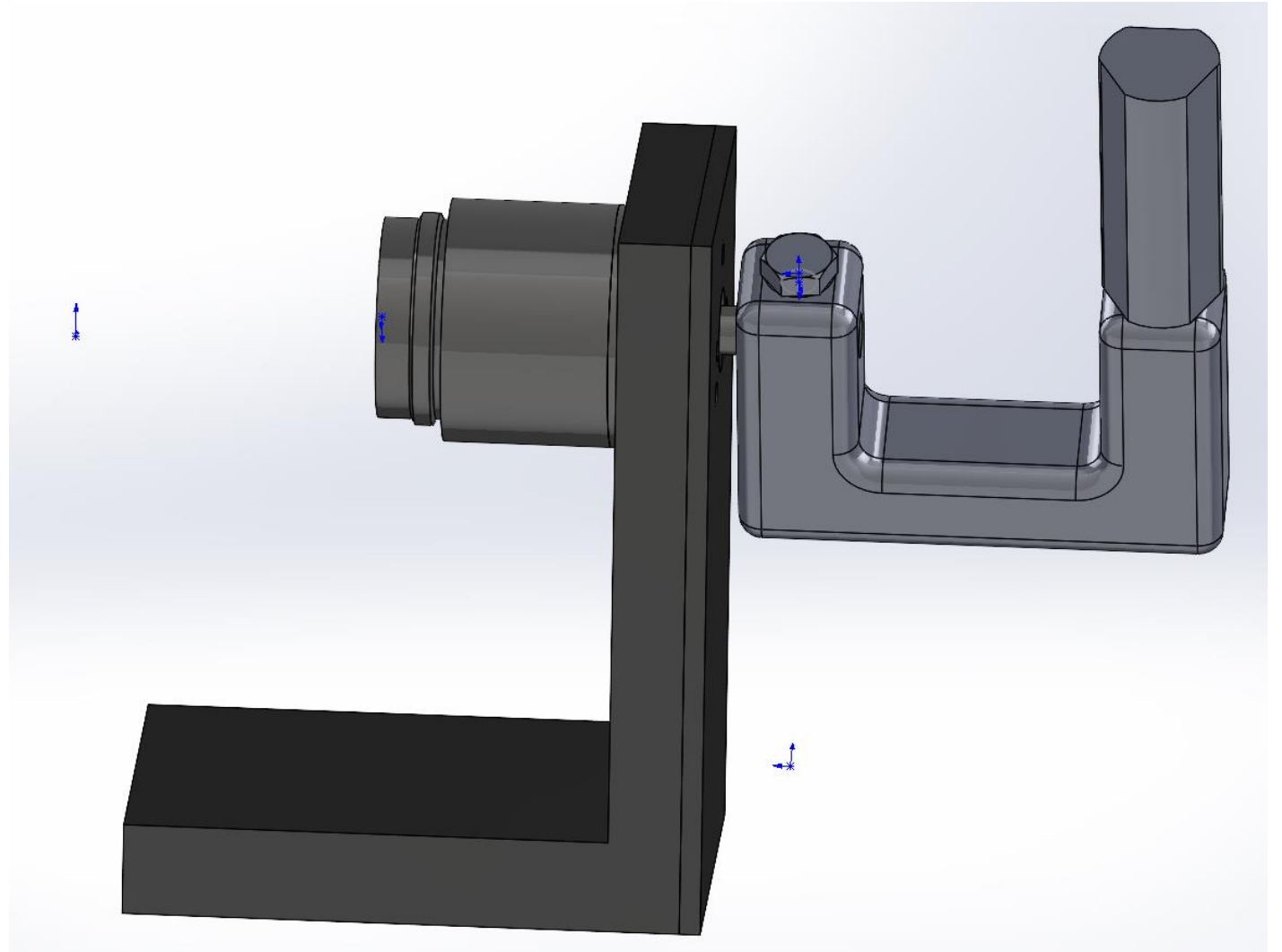
- Faulhaber 20/1
- Maxon GPX 16A
- Faulhaber 16/7





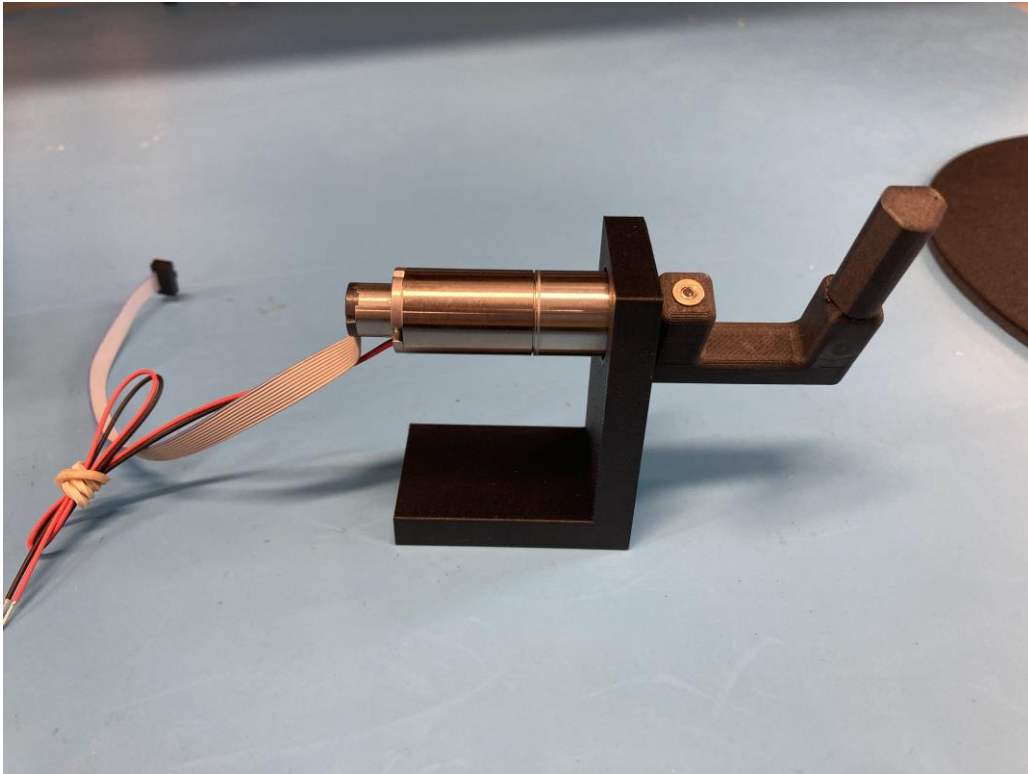
# CAD Assembly

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# Result

- Replaced screw with a 6mm set screw



# Takeaways

SolidWorks

Designing process

Feasibility of manufacturing

Tolerance Stacking and GD&T

Real World Engineering Experience

Thank You HID team!



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