Exoskeleton - Design extension

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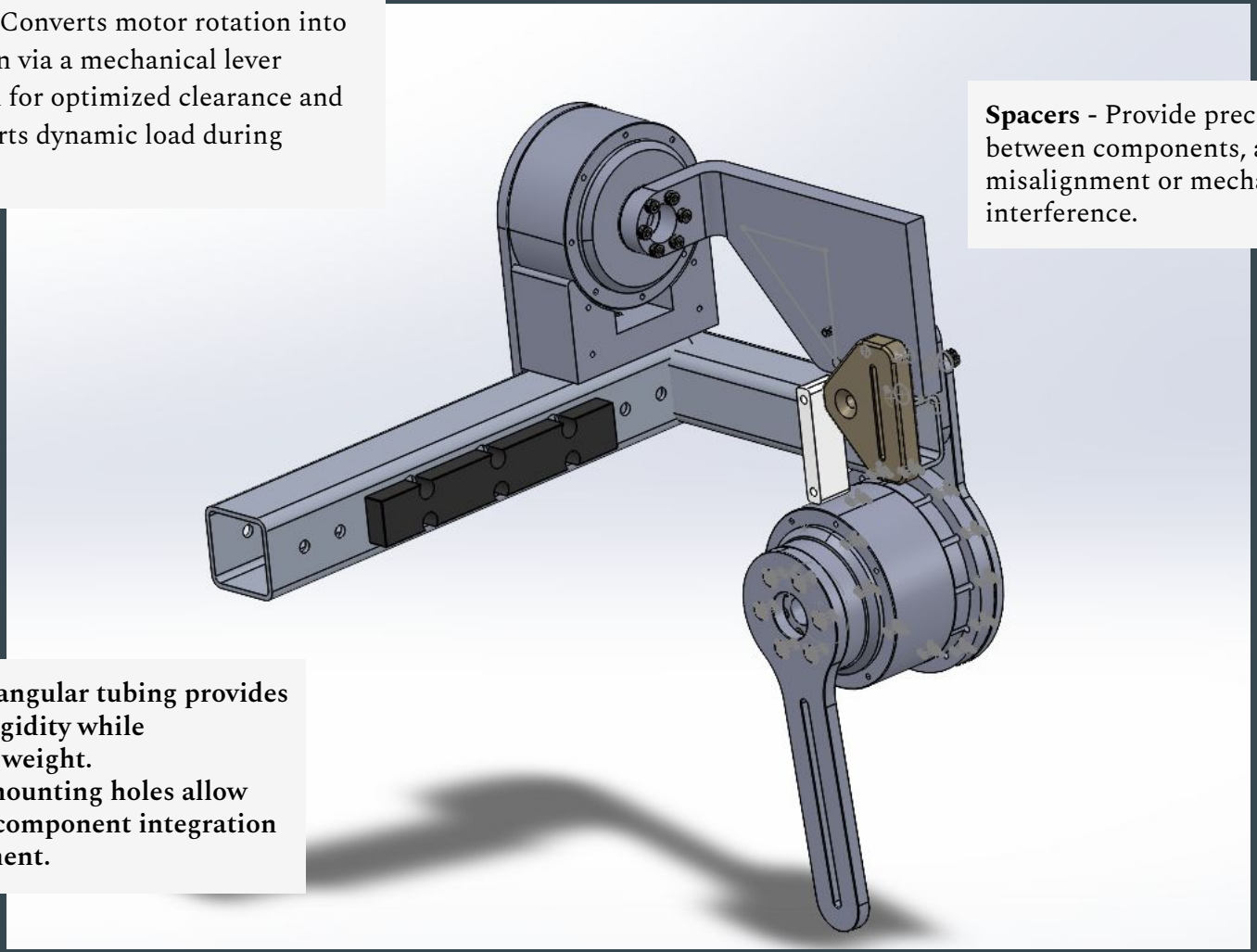
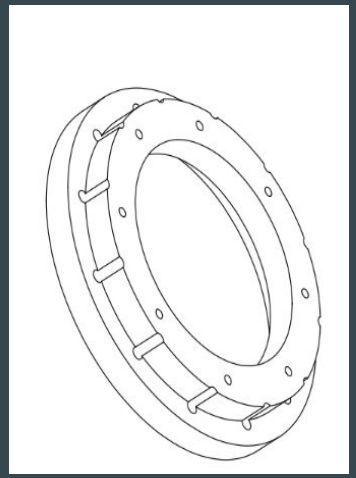
Rotating Link Converts motor rotation into limb articulation via a mechanical lever system. Profiled for optimized clearance and strength, supports dynamic load during walking.

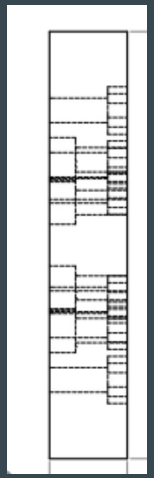


Spacers - Provide precise offsets between components, avoiding a misalignment or mechanical interference.

Hollow rectangular tubing provides structural rigidity while minimizing weight.
Machined mounting holes allow for flexible component integration and adjustment.

Connectors designed to accommodate for 2 different motor sizes, according to the project testing requirements and transition b/w structural and tubing elements. Provide modularity for quick assembly, testing, and field replacements.





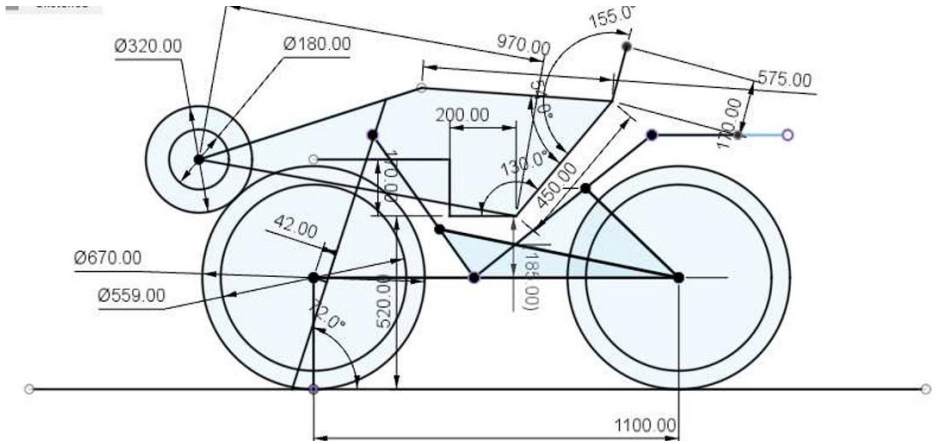
Screw holes are designed to accommodate both the shank and head of standard fasteners, enabling flush and secure joining between mating components.
Integrated hex nut pockets provide a reliable fastening method, especially in 3D printed parts, where direct threading is impractical or weak.

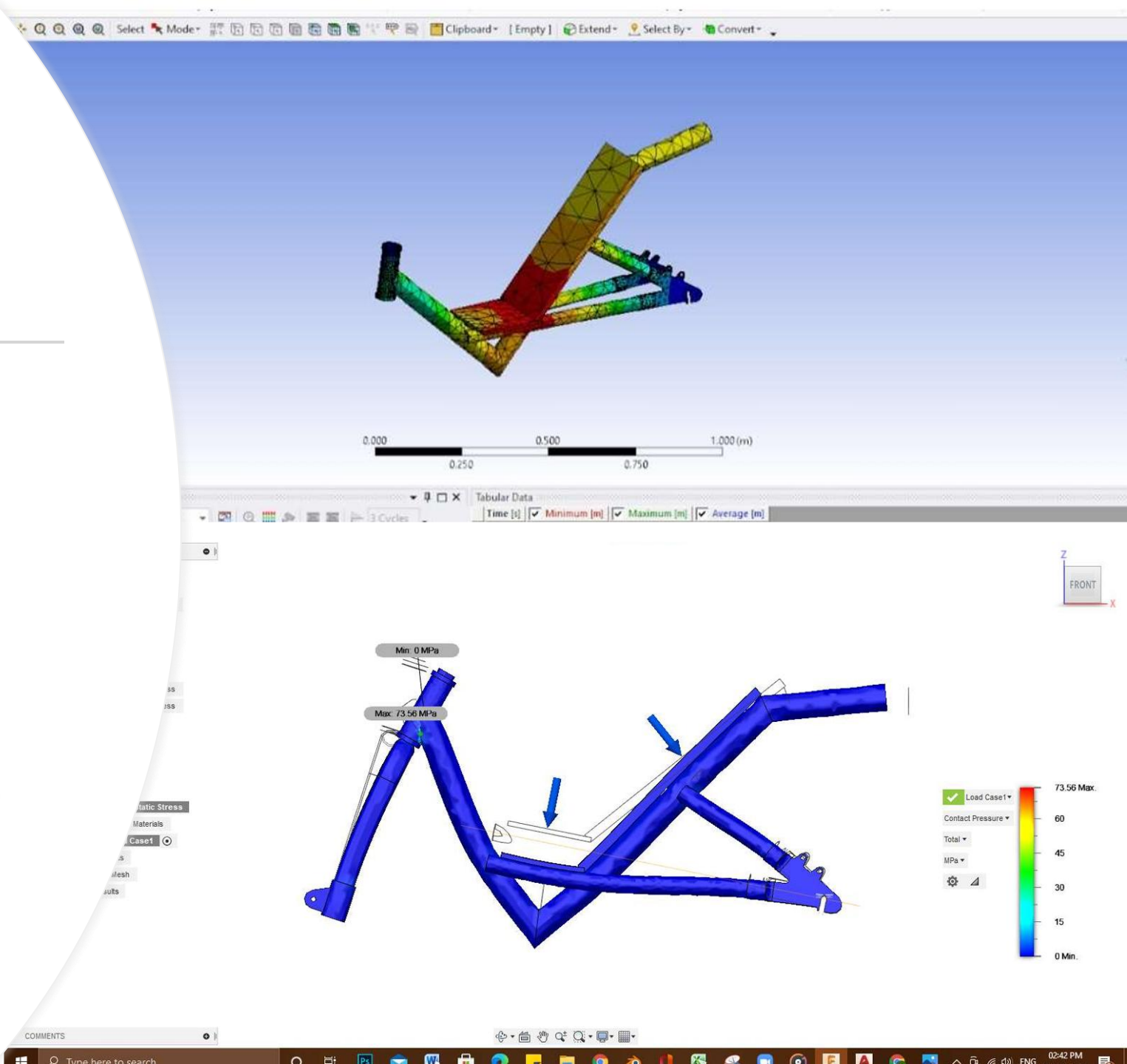
Bamboo Bicycle Frame

Bamboochi Bicycles

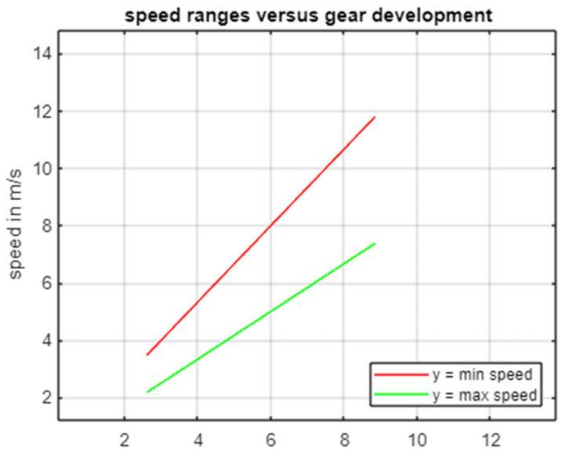
SolidWorks Model

Geometric Design and Analysis

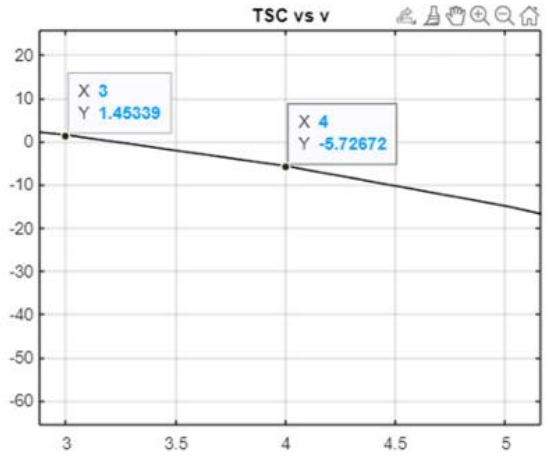




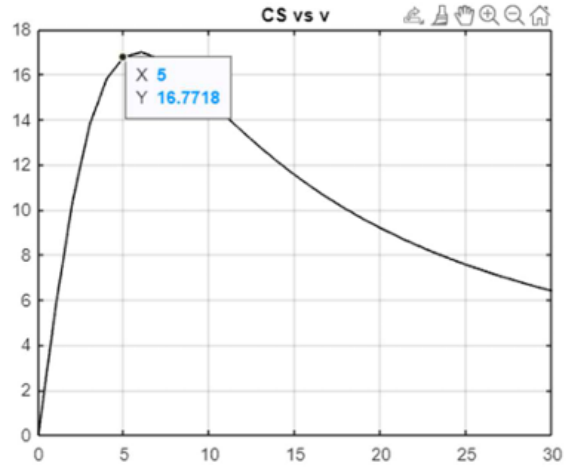
Patterson's Method



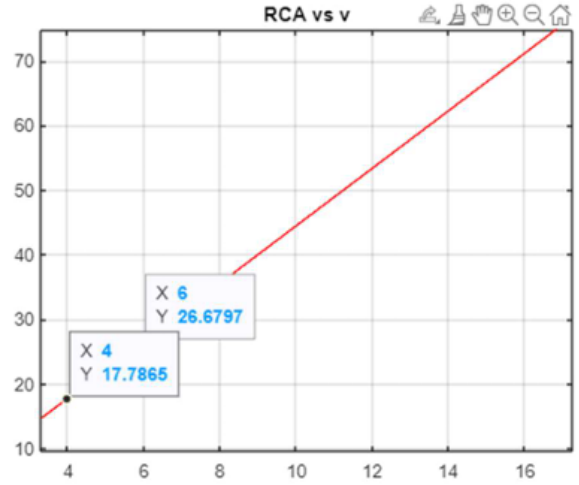
Speed v/s Gear development



Tortional Spring Constant v/s Velocity



Control Sensitivity v/s Velocity



Roll Control Authority v/s Velocity

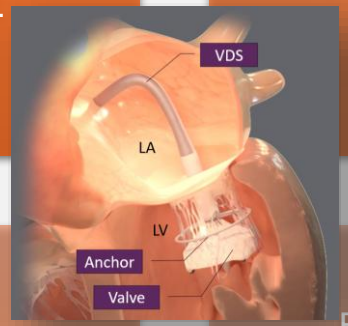
Internship Projects

Tioga Cardiovascular

Catheter steering Inspection Fixture (Pass/Fail Functional test)

Requirement

Catheter bends at 120 degrees for valve deployment



Obstacles

Printing time

Radius of curvature measurement

Catheter alignment

Fixture Stability

Solution

SLA Printed fixture

Sturdy

Easy to use

Repeatable design and Process

Create Approval Requests, Equipment Specification and Equipment Qualification for documentation

Impact

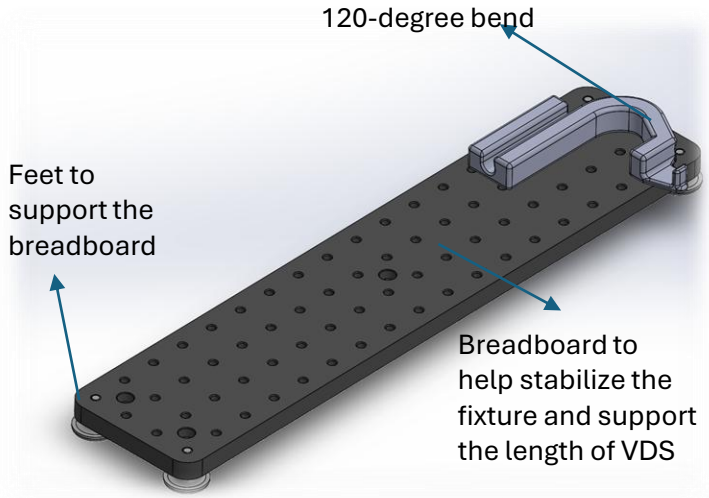
Efficient Inspection Method Implementation

Functional understanding of catheter Assembly

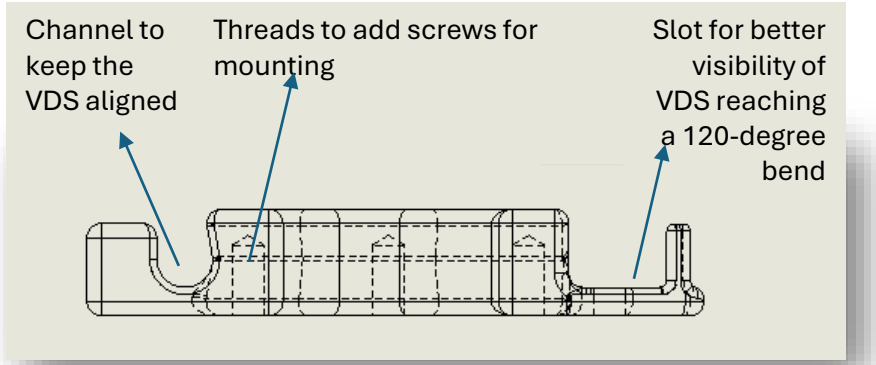
Learnt about different printing materials

First Fixture Printed ☺

Successful manufacturing, and on time implementation for use in Clean Room Environment.



Picture of the fixture



Catheter Handle Locking Mechanism

Problem

Yoke didn't clamp to lock Carriage handle assembly to prevent catheter handle assembly rotation

Obstacles

Cam dimensions incorrect

Time Constraint

Unknown inspection dimension

Supplier part

Solution

Re-work the current lot

Add inspection dimension

Change print orientation to avoid warpage at assembly location

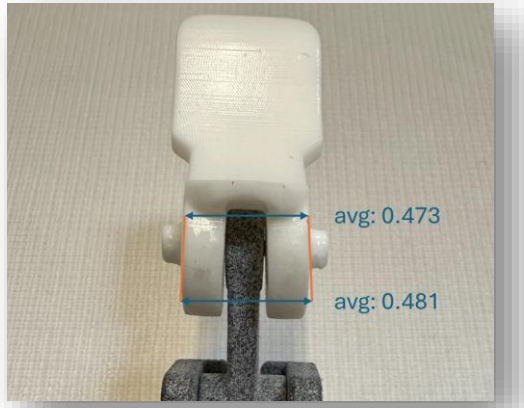
Create MPI for rework

Impact

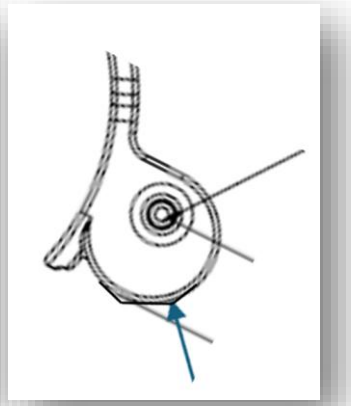
Saved future re-work requirements

Understood factors affecting 3D printing

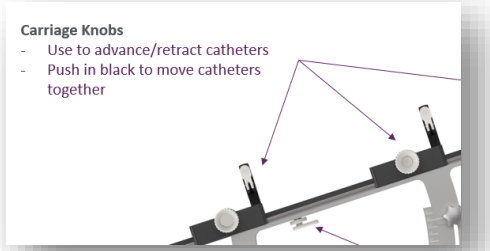
Redefined cam profile inspection requirement



Flanged cam



Incorrect cam profile printed



Restricted cam movement

Vertical Catheter Braiding Machine Fixture

Problem

Incorrect Braid Pattern due to Oscillation of long mandrels

Obstacles

Printing time

Dimensions and Cups

Silicone gripping mechanism

Diameter change

Space constraints

Solution

Dynamic Fixture to grip mandrels

Fixture to correct Wire Alignment

AR, EQ, ES for documentation purposes

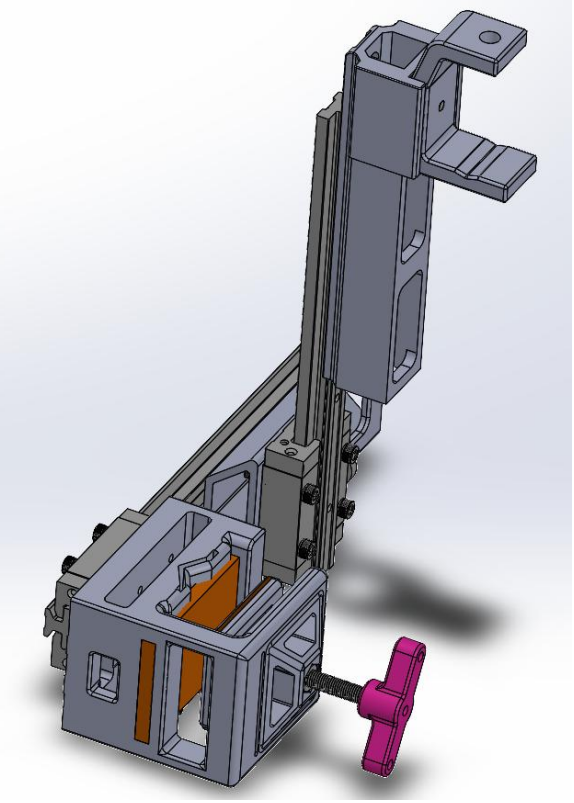
Impact

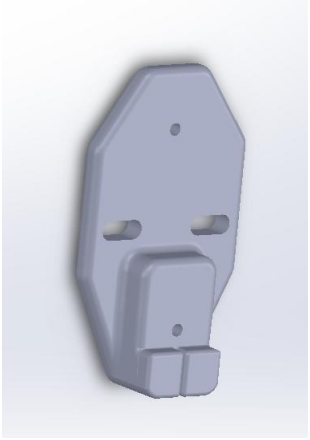
Cost savings compared to supplier's quote

Reduced rework/ rejects for braid PPI

First communication with equipment supplier

Improved fixture and process manufacturability.



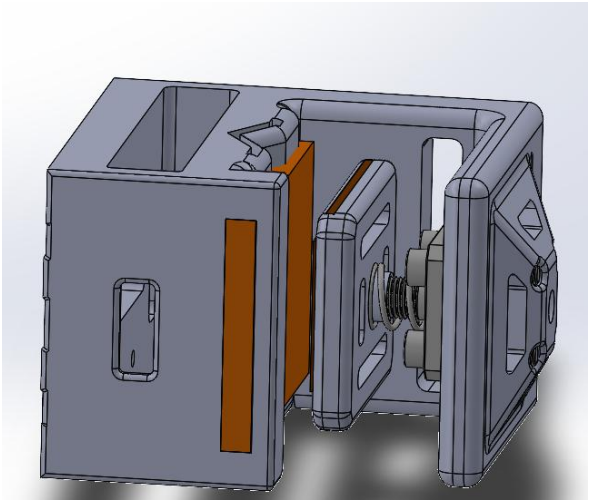


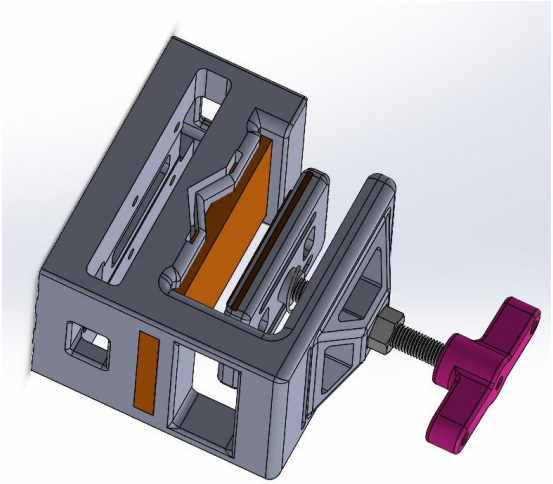
Vertical Catheter Braiding Machine Fixture

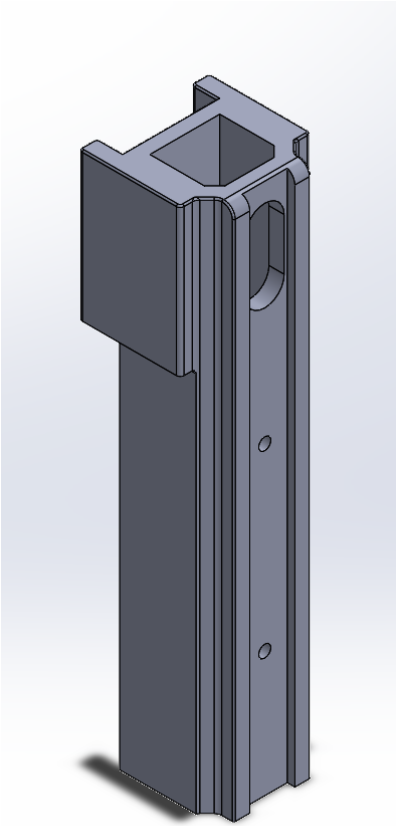
Dimensioned to assure correct assembly

Slotted design to hold silicon without the need to gluing it

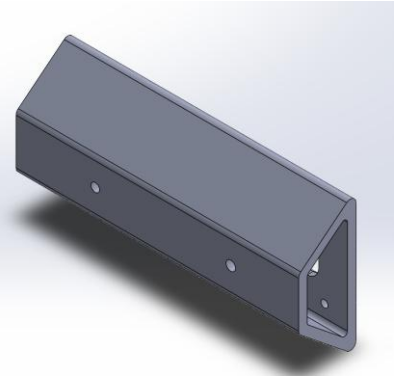
Slots to reduce material consumption and print time







Slots to prevent cup formation



Linear coupling to facilitate sliding motion

Springs and adjustable knob to accommodate diameter change over length

Slots for better visibility during assembly

Recesses to prevent vibrations