



Team 506: Corning Plugger Pallet Short Part Stabilization

Pawel J. Grum | Robert C. Kosmas | Taylor M. Larson | Segundo A. Sanchez | Jared T. White

Team Members



Pawel J.
Grum

*Mechanical Test
Engineer*



Robert C.
Kosmas

*Structural Design
Engineer*



Taylor M.
Larson

*Dynamics
Engineer*



Segundo A.
Sanchez

*Materials Analysis
Engineer*



Jared T.
White

*Manufacturing
Engineer*

Segundo Sanchez



Sponsors and Advisors

Jeffery Roche



Engineering Mentor

*Heavy Duty Project
Manager*

Jeffery Stott



Engineering Mentor

*Equipment Engineering
Manager*

Eric Hellstrom, Ph.D



Academic Advisor

*Materials Science
Program Director*

Segundo Sanchez

Background

Segundo Sanchez



Project Objective

The objective of this project is to produce a stabilization system to protect ceramics on Corning's conveyor while reducing the required manual labor.

Segundo Sanchez

Project Background



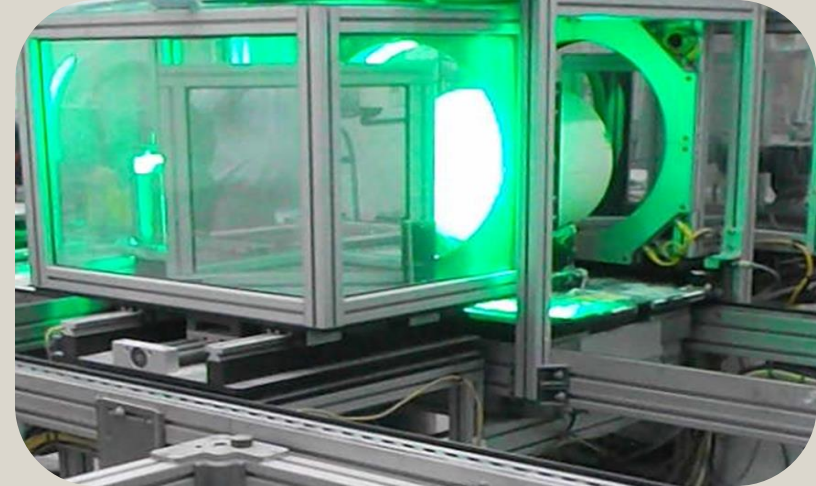
Segundo Sanchez

Key Goals

Prevent Damage



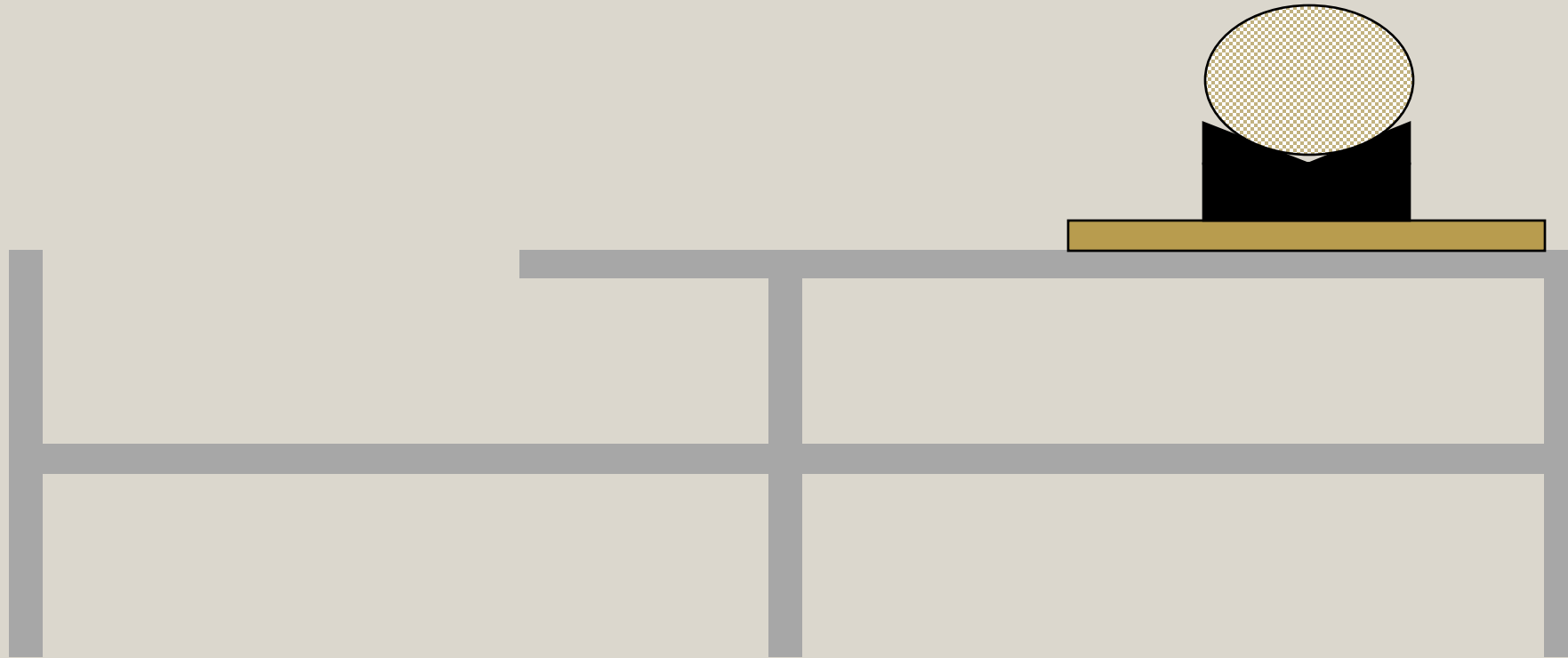
Limit Interaction



Segundo Sanchez

Key Goals

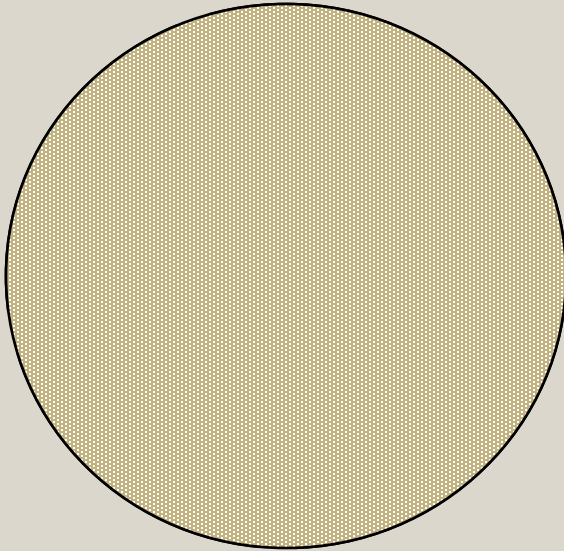
Integrate with Conveyor System



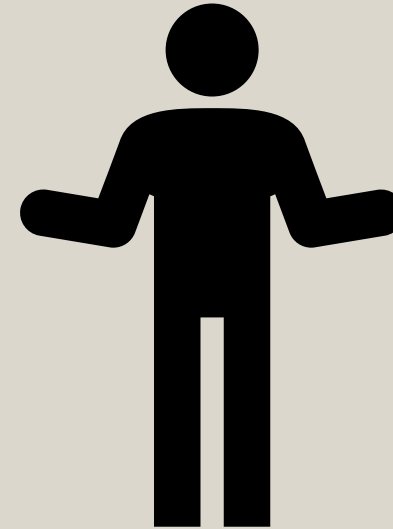
Segundo Sanchez

Critical Targets

Prevent Damage
0%



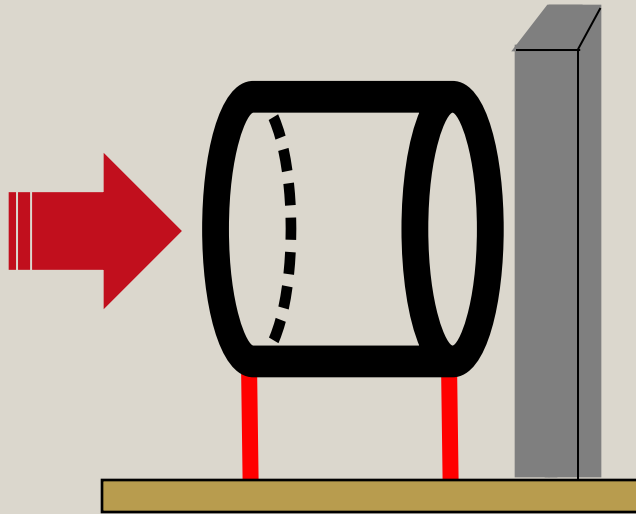
Limit Manual Labor
1 Person



Segundo Sanchez

Critical Targets

Withstand Load
8 lbs

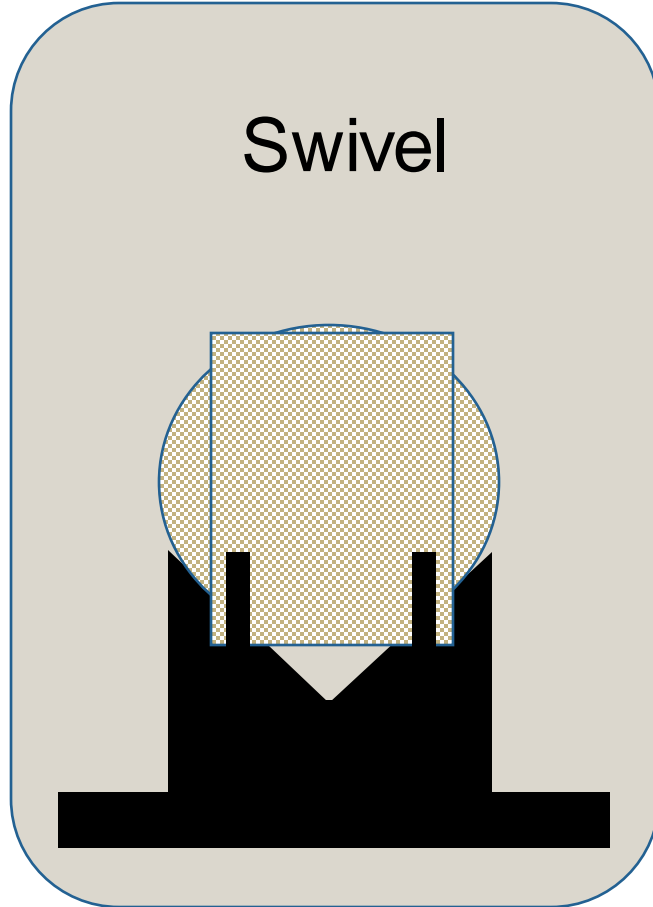
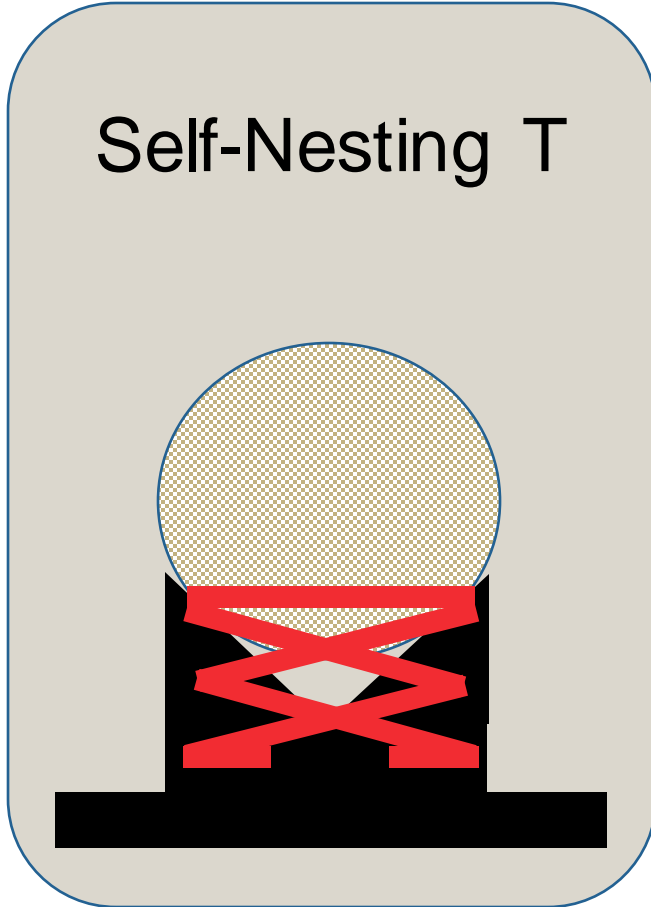
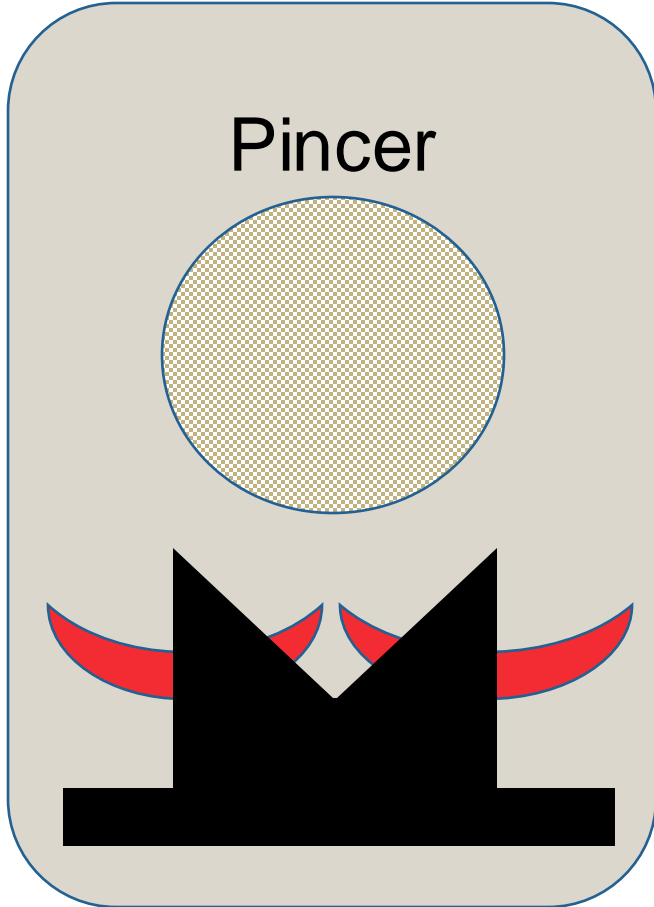


Reveal Ceramic Face
48 sec



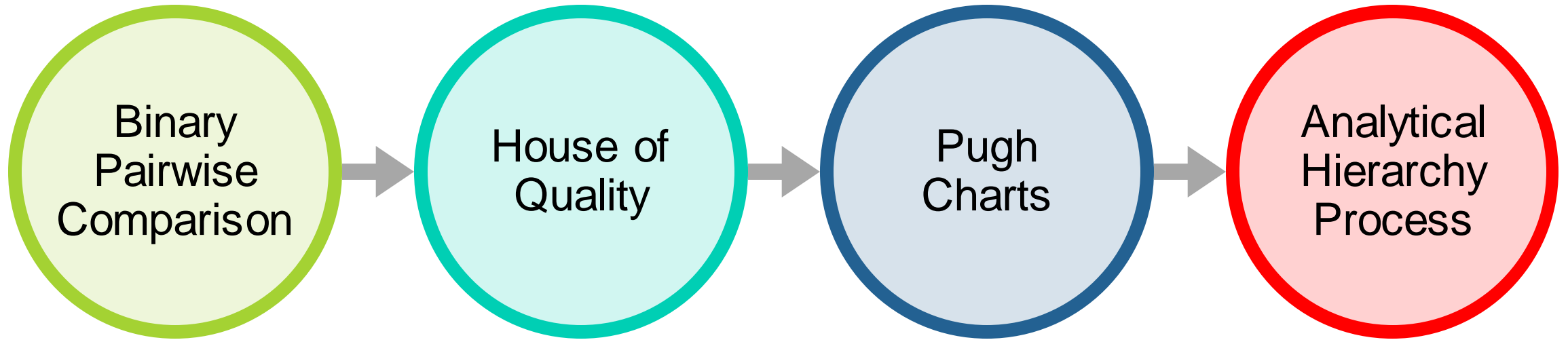
Segundo Sanchez

Top 3 Concepts Generated



Segundo Sanchez

Concept Selection



Segundo Sanchez

Final Selection

Self-Nesting T

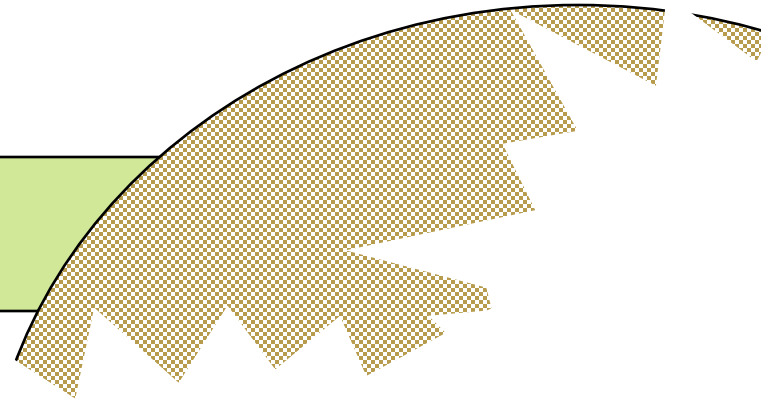
- Similar to working design
- Trigger activated and collapsible
- Uses mechanism on conveyor to activate



Segundo Sanchez



Background

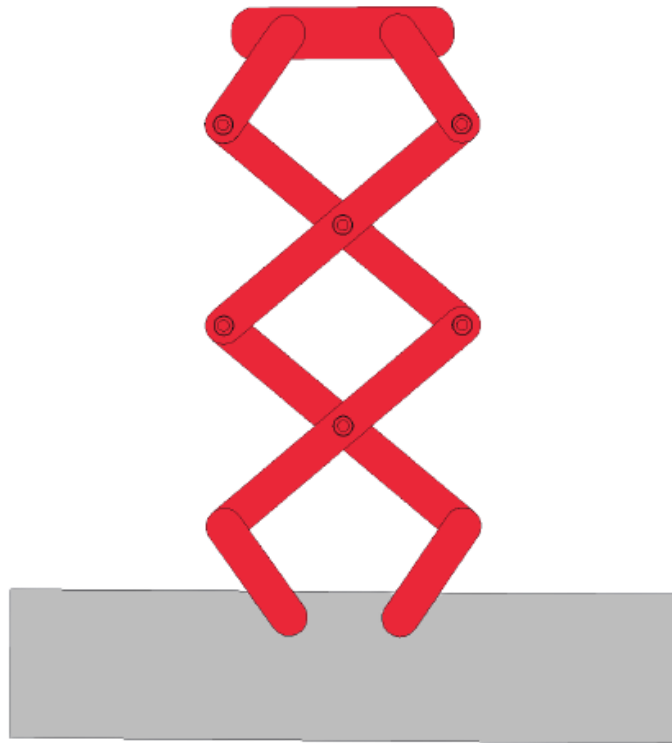


Lift Mechanism

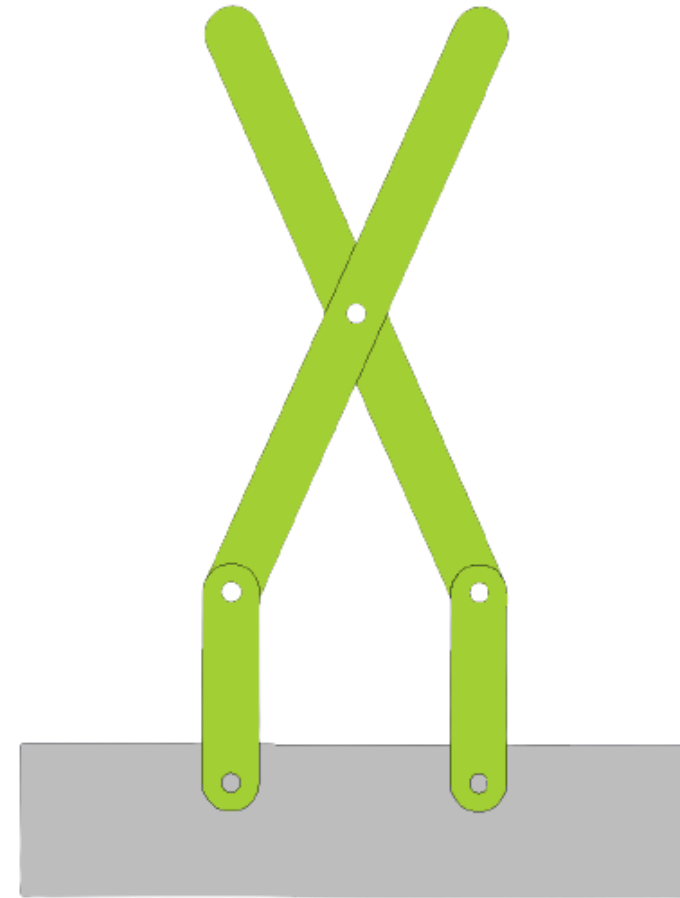
Segundo Sanchez



Design Update



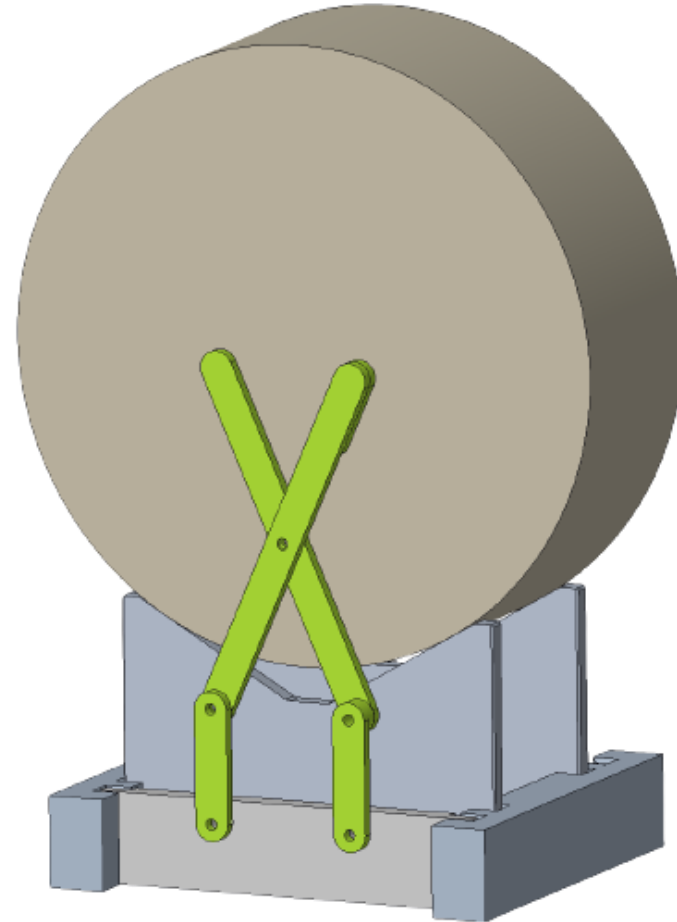
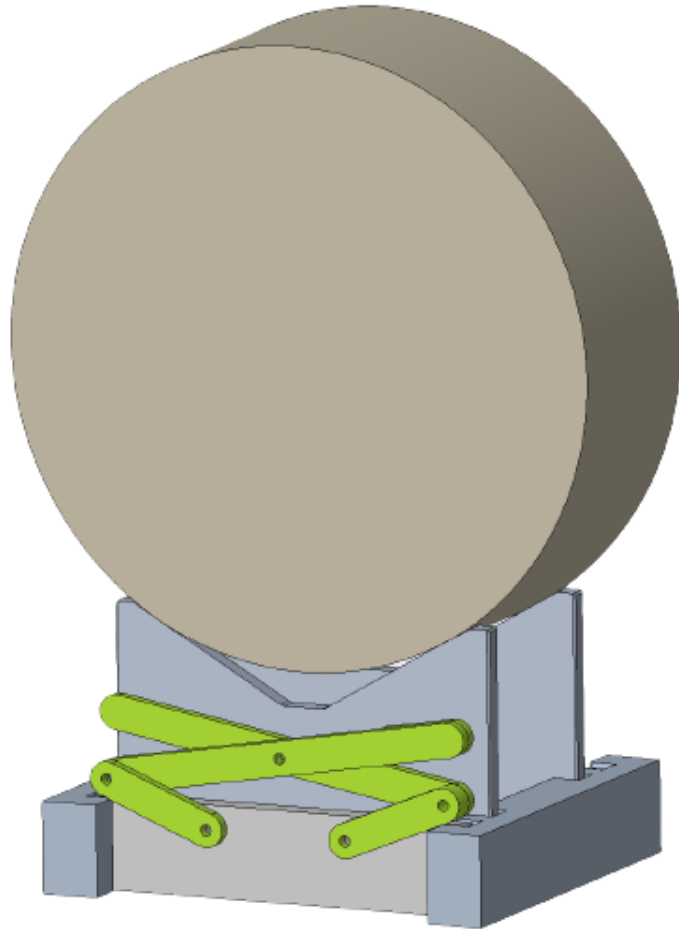
Original Design



Current Design

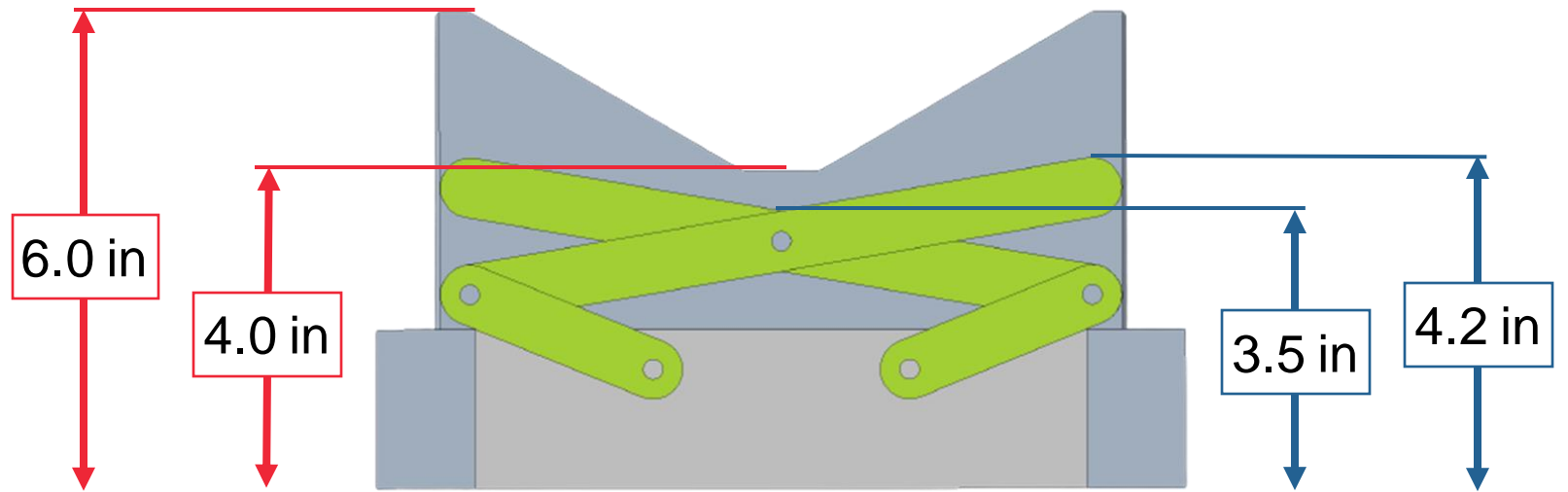
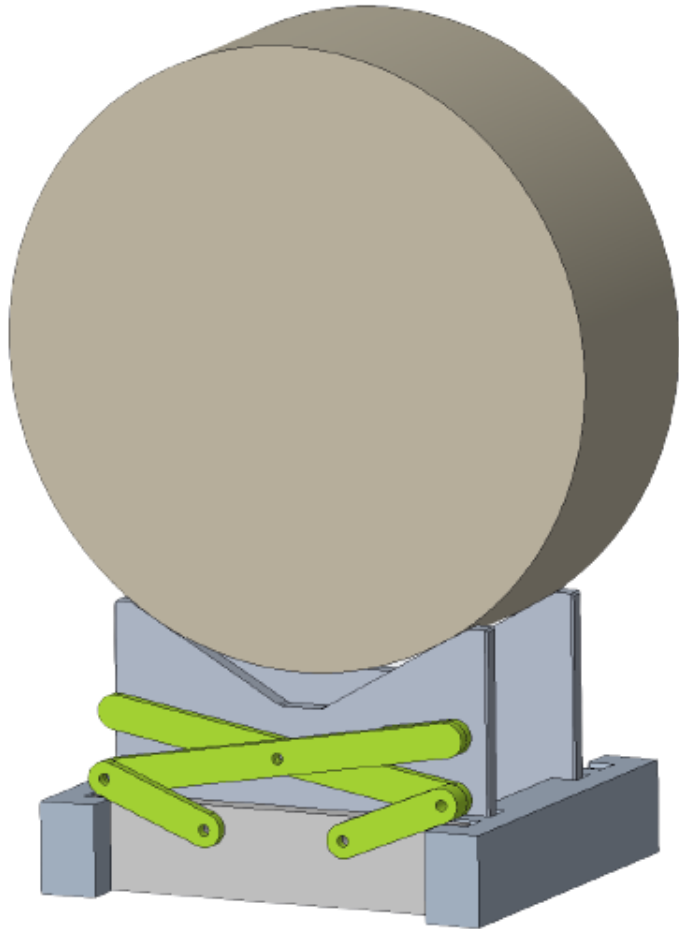
Jared White

Vertical Retraction and Expansion



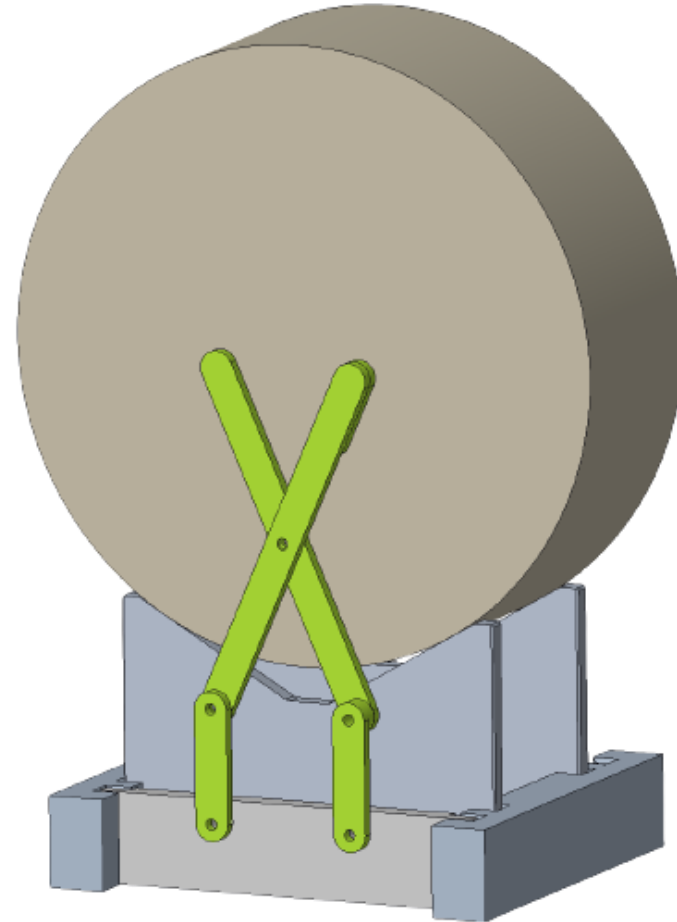
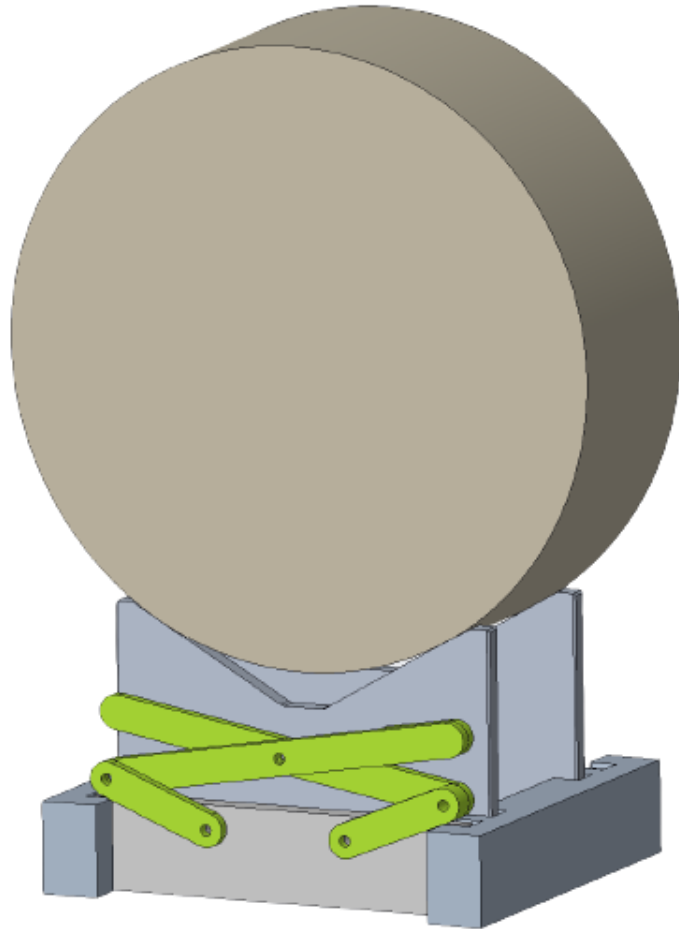
Jared White

Vertical Retraction



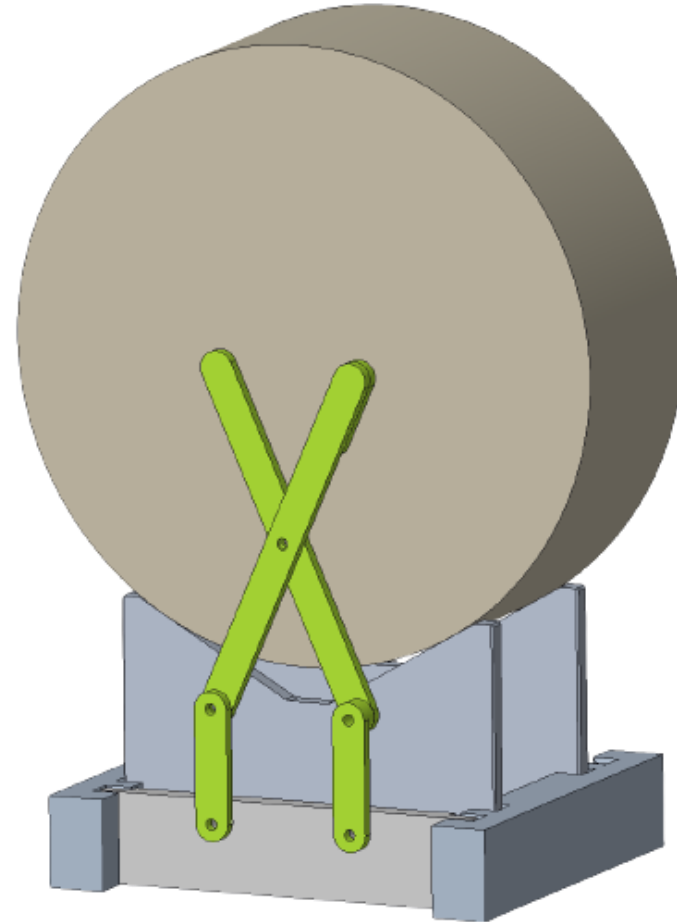
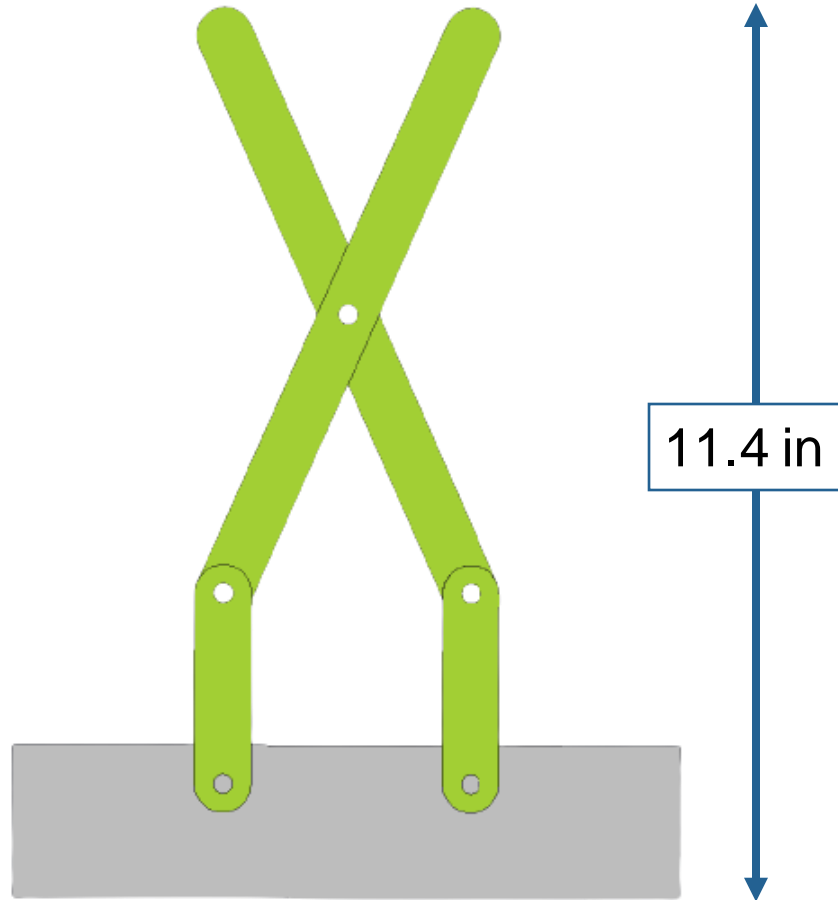
Jared White

Vertical Retraction and Expansion

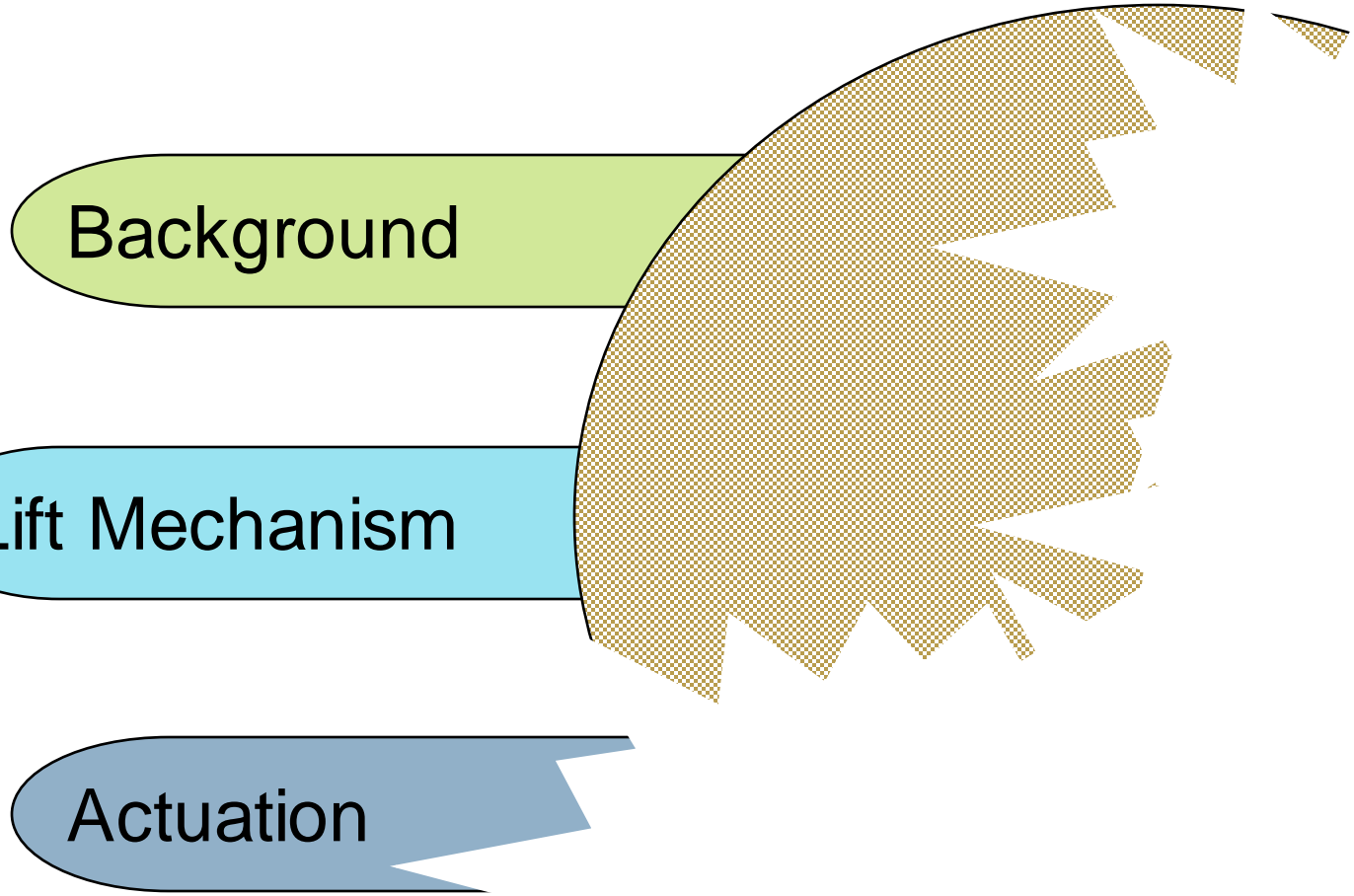


Jared White

Vertical Expansion



Jared White



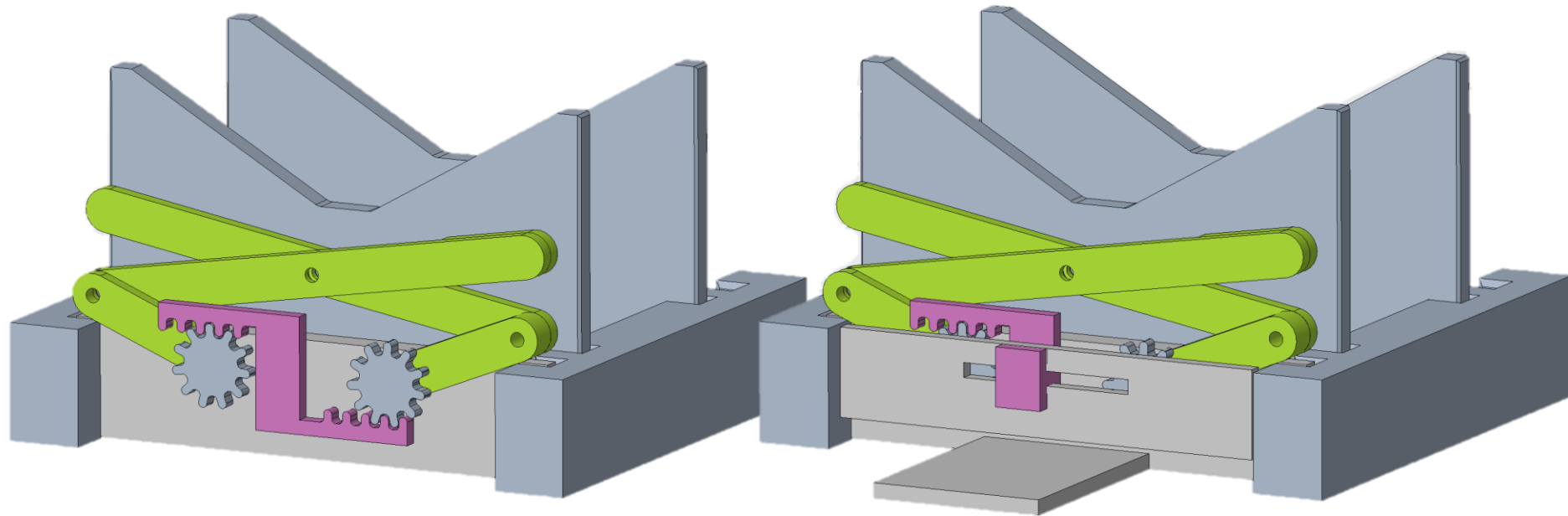
Jared White



Actuation Mechanism

Rack and Pinion Slider

- “Z” shaped rack allows simultaneous rotation
- Slides in a slot on the outer wall
- Raised outer wall allows for particle flow

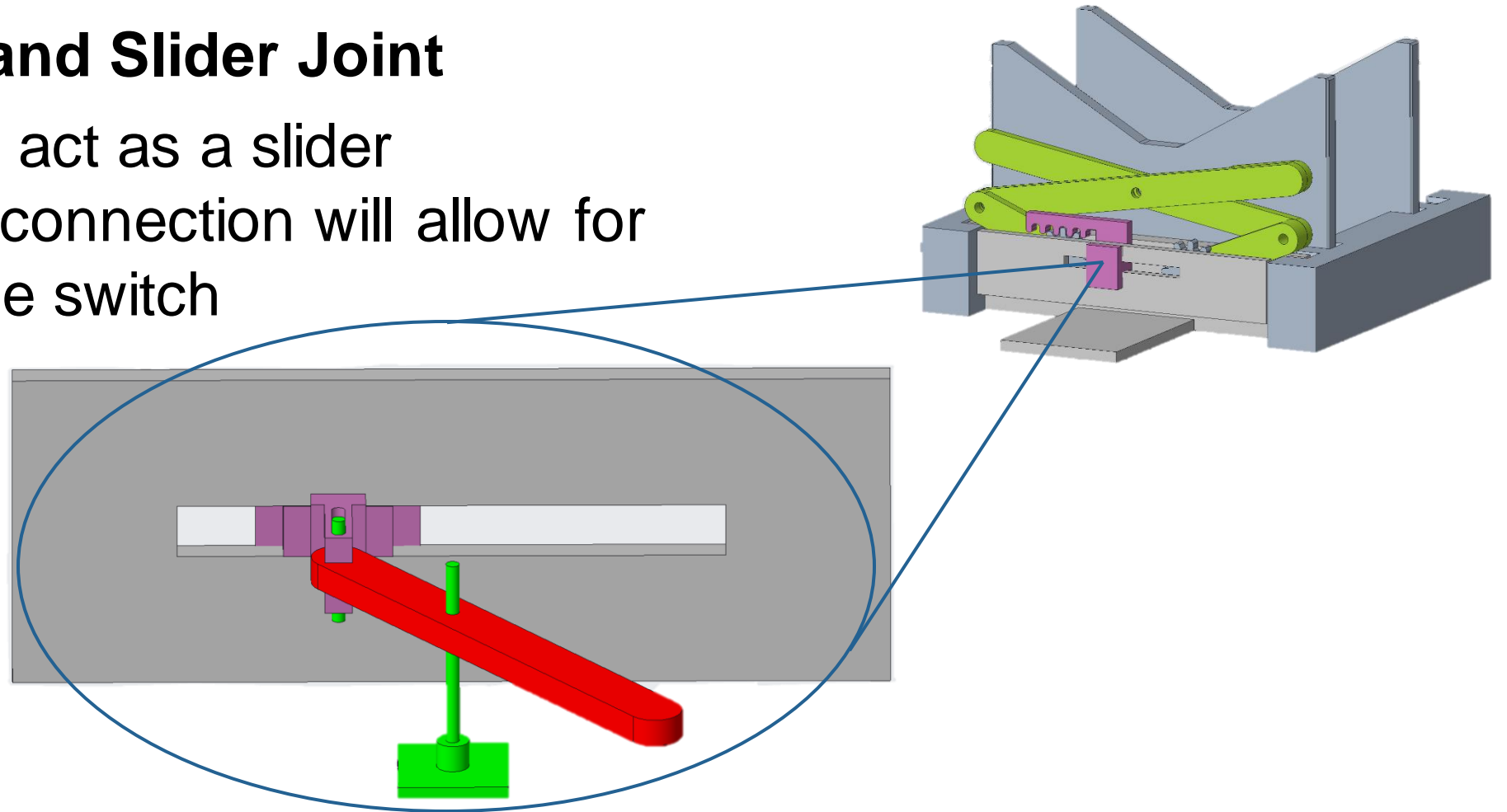


Jared White

Actuation Mechanism

Lever Arm and Slider Joint

- The rack will act as a slider
- Slotted joint connection will allow for rotation of the switch

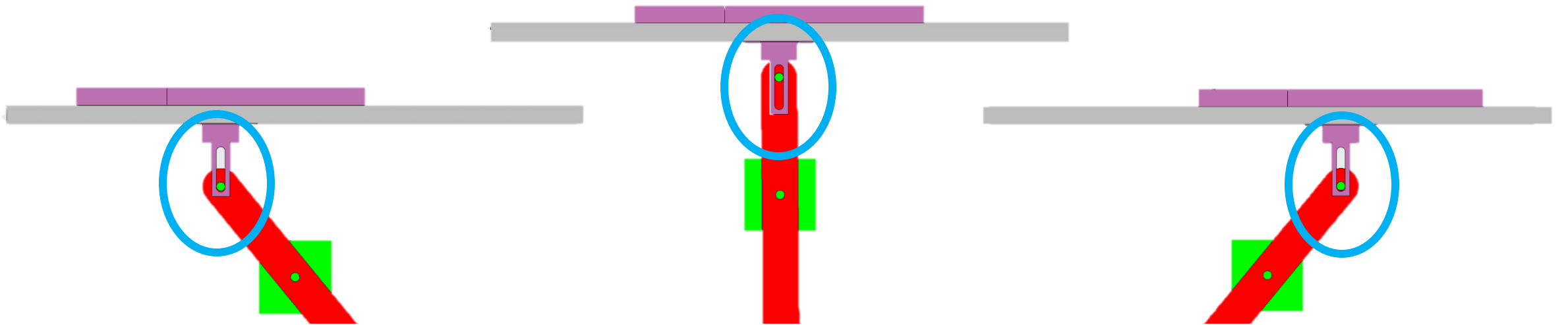
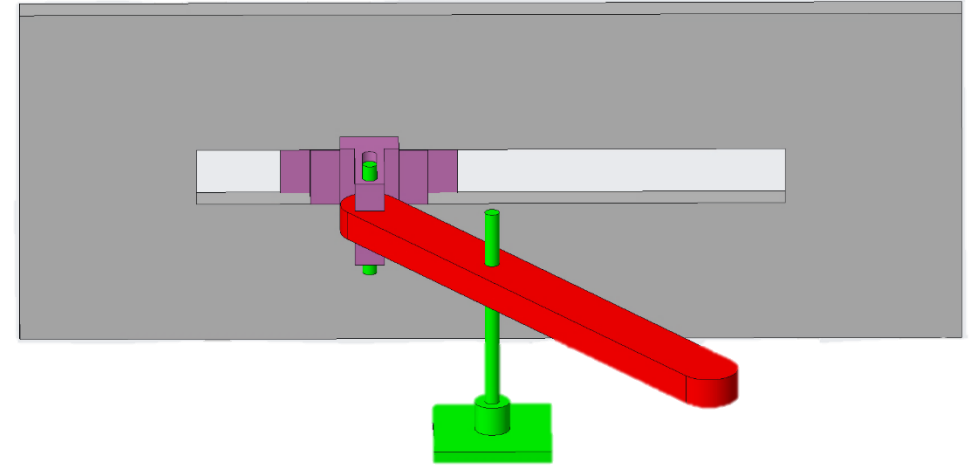


Jared White

Actuation Mechanism

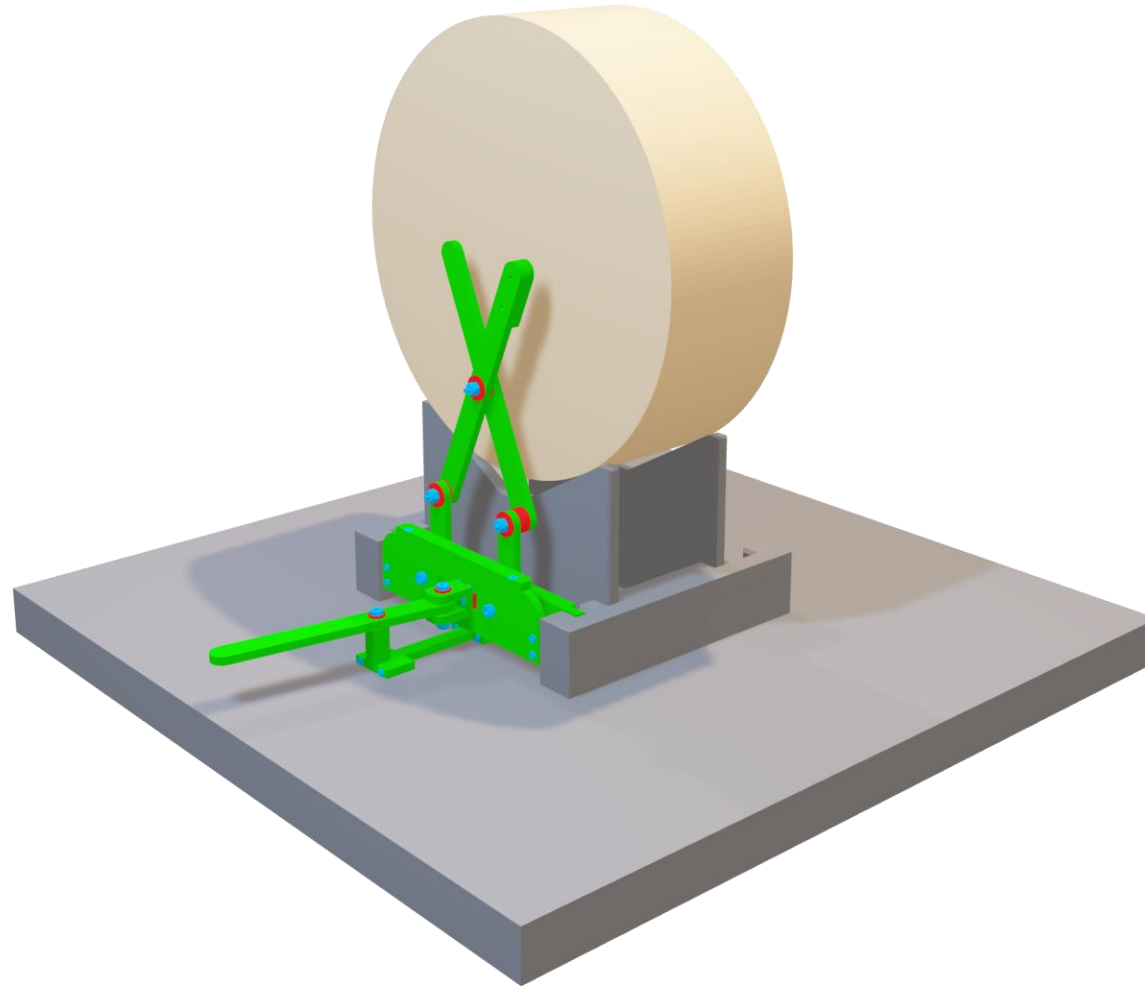
Lever Arm and Slider Joint

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Jared White

Final Design

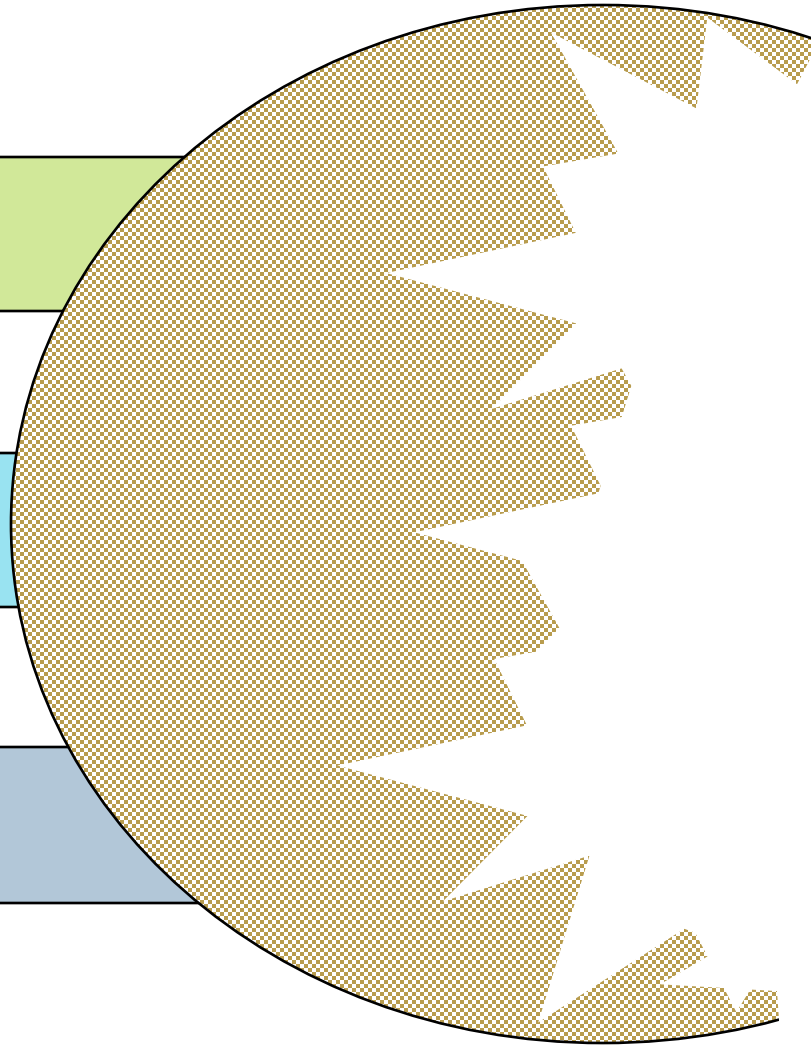


Jared White

Background

Lift Mechanism

Actuation

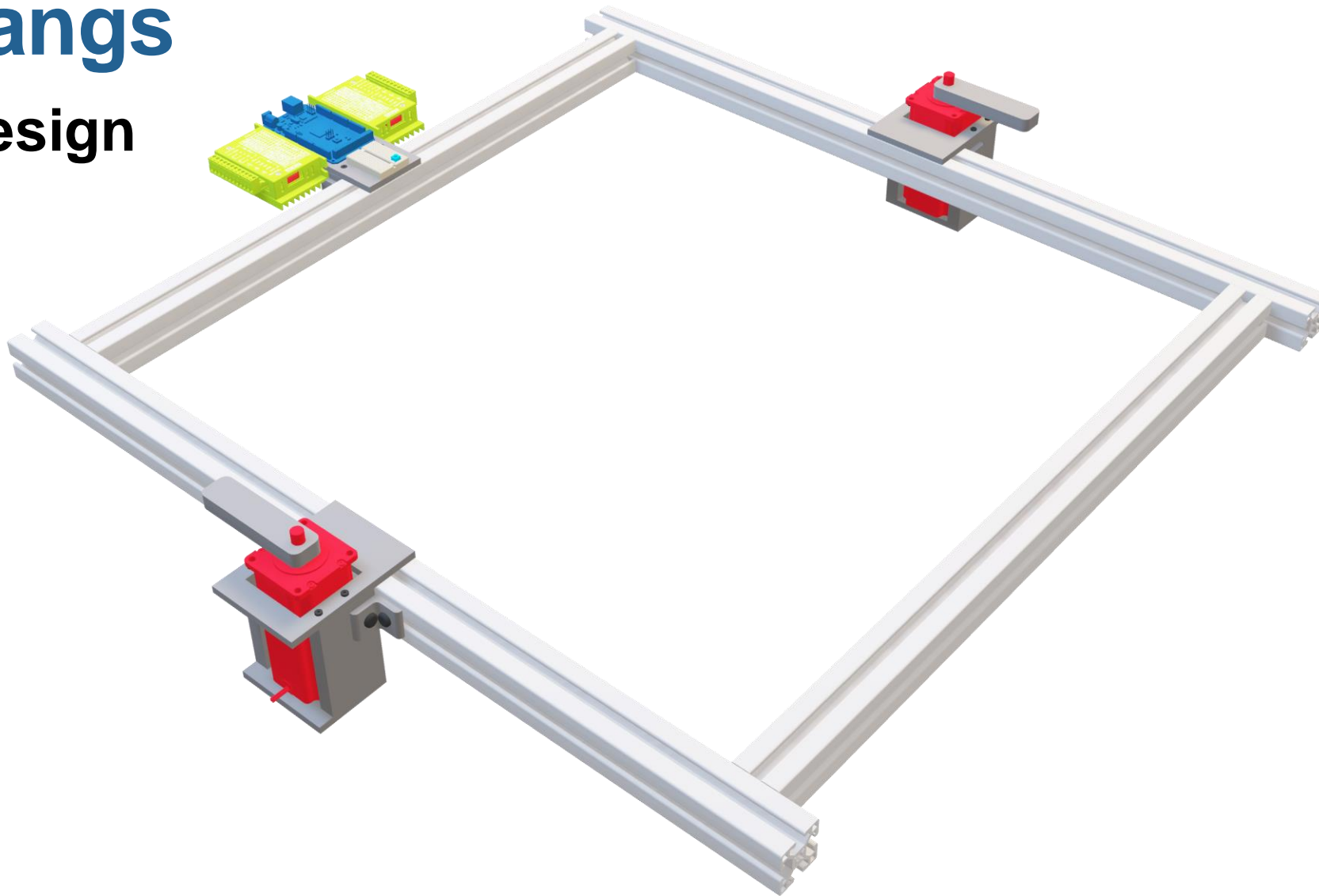


Overhang Design

Jared White

Overhangs

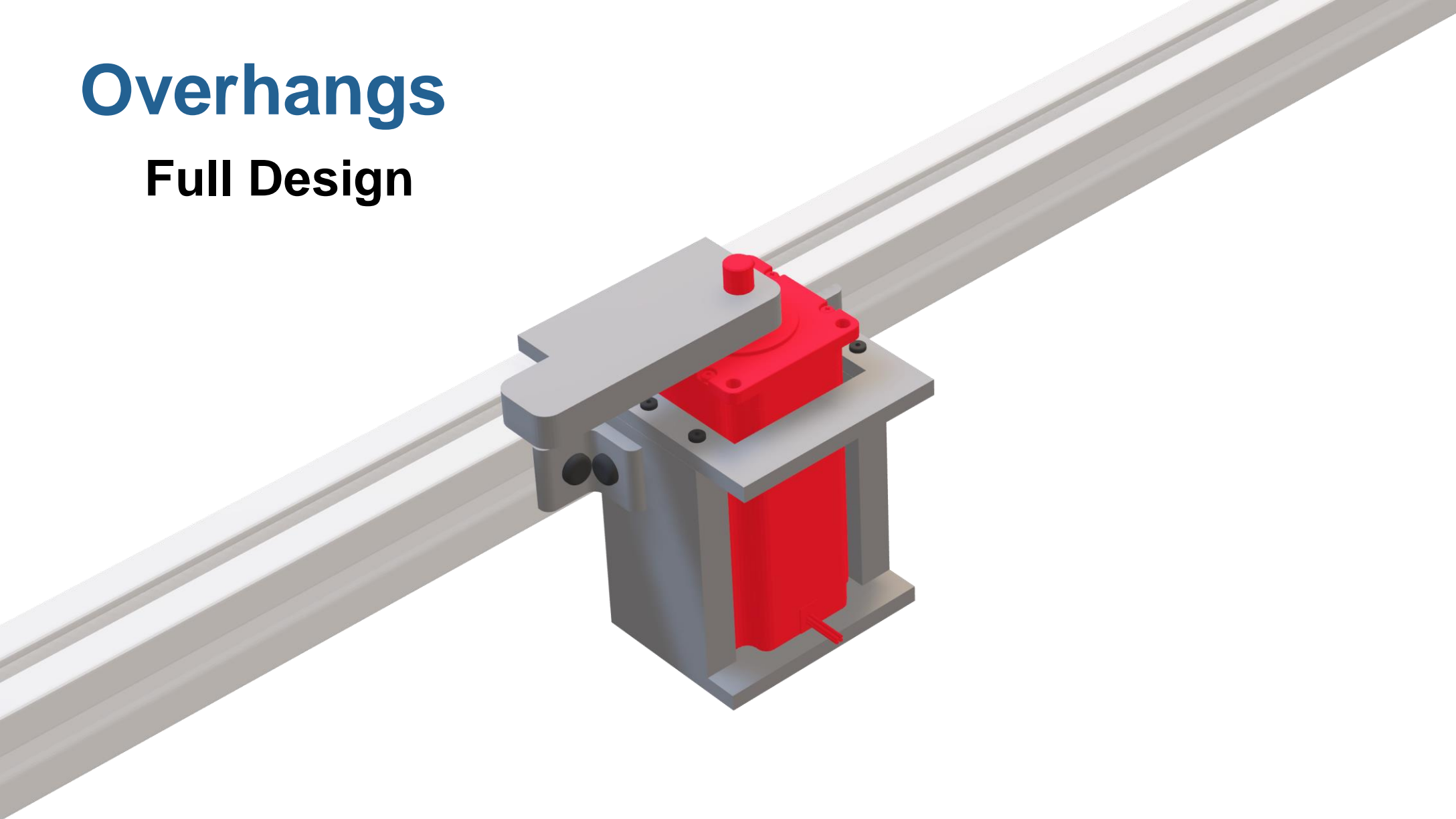
Full Design



Pawel Grum

Overhangs

Full Design

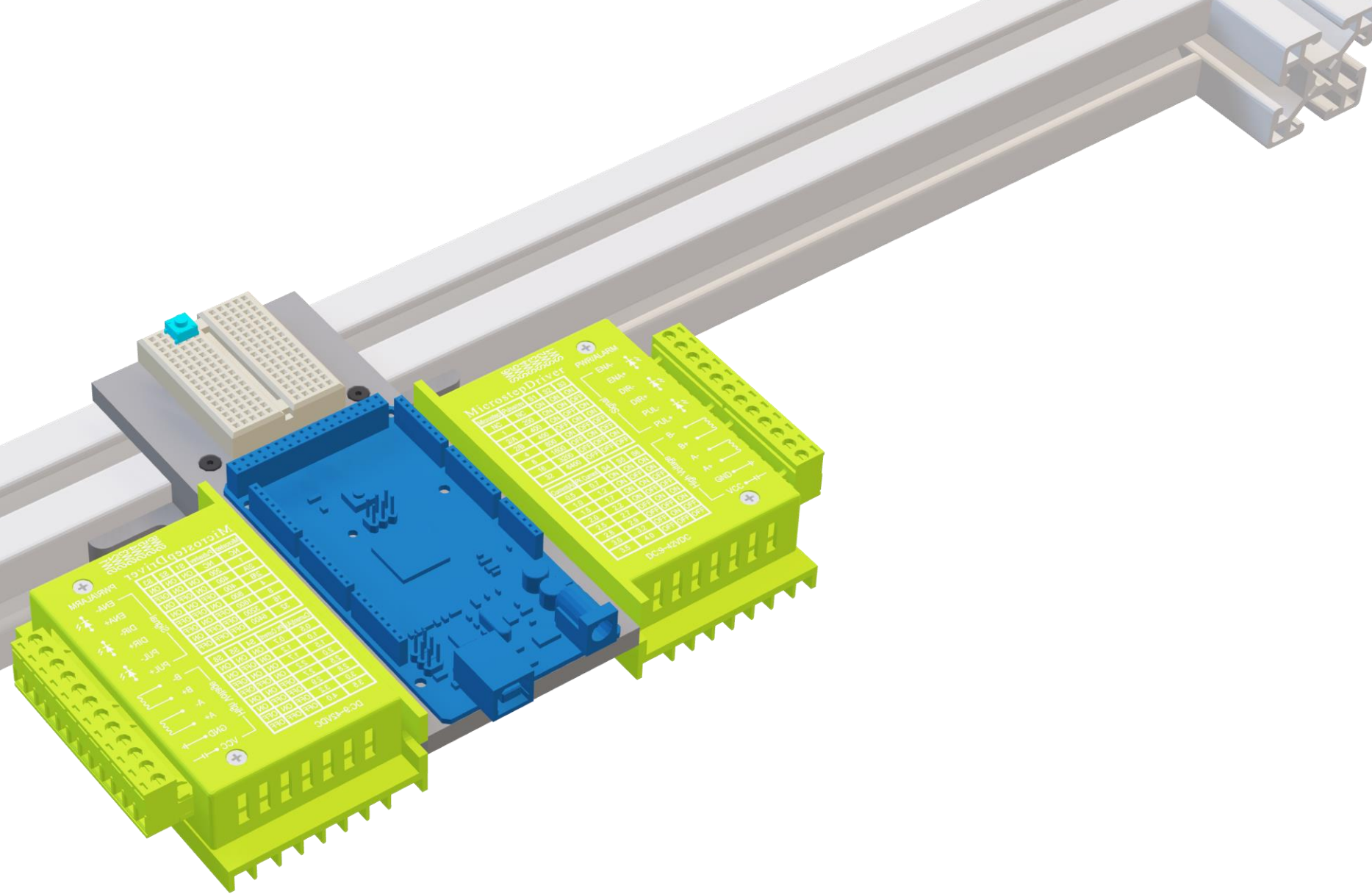


Pawel Grum



Overhangs

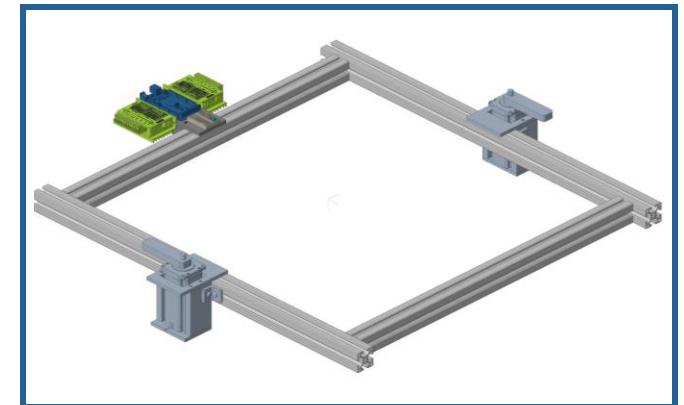
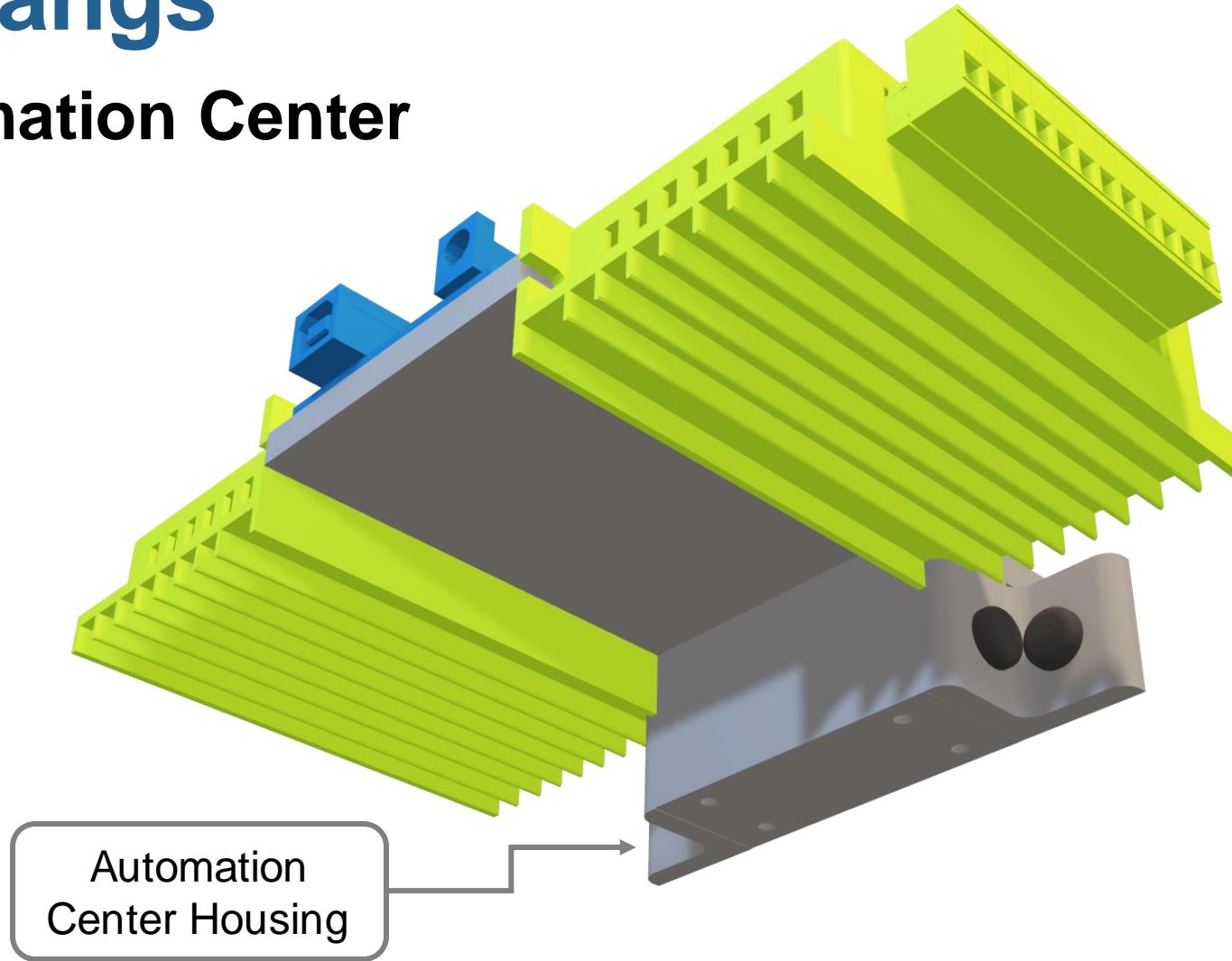
Full Design



Pawel Grum

Overhangs

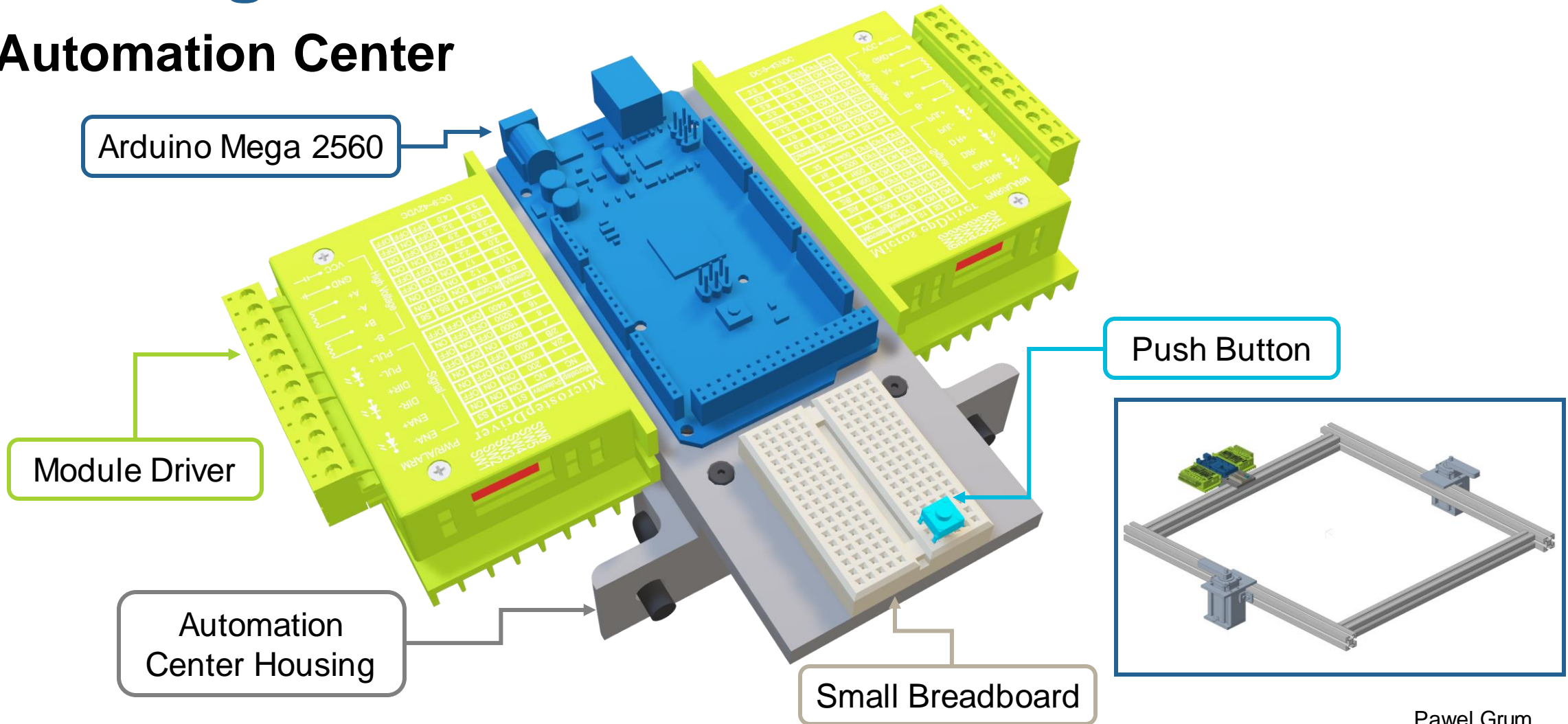
Automation Center



Pawel Grum

Overhangs

Automation Center

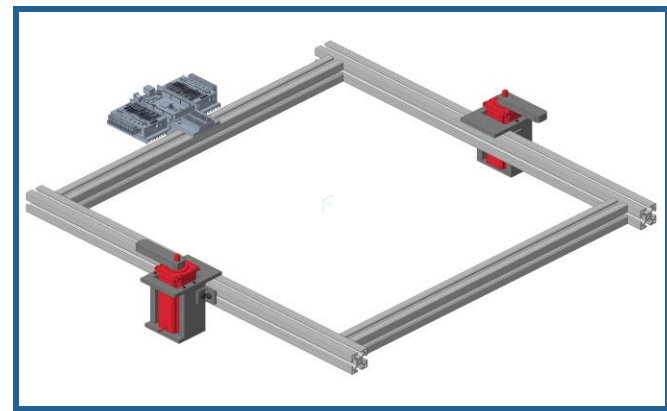
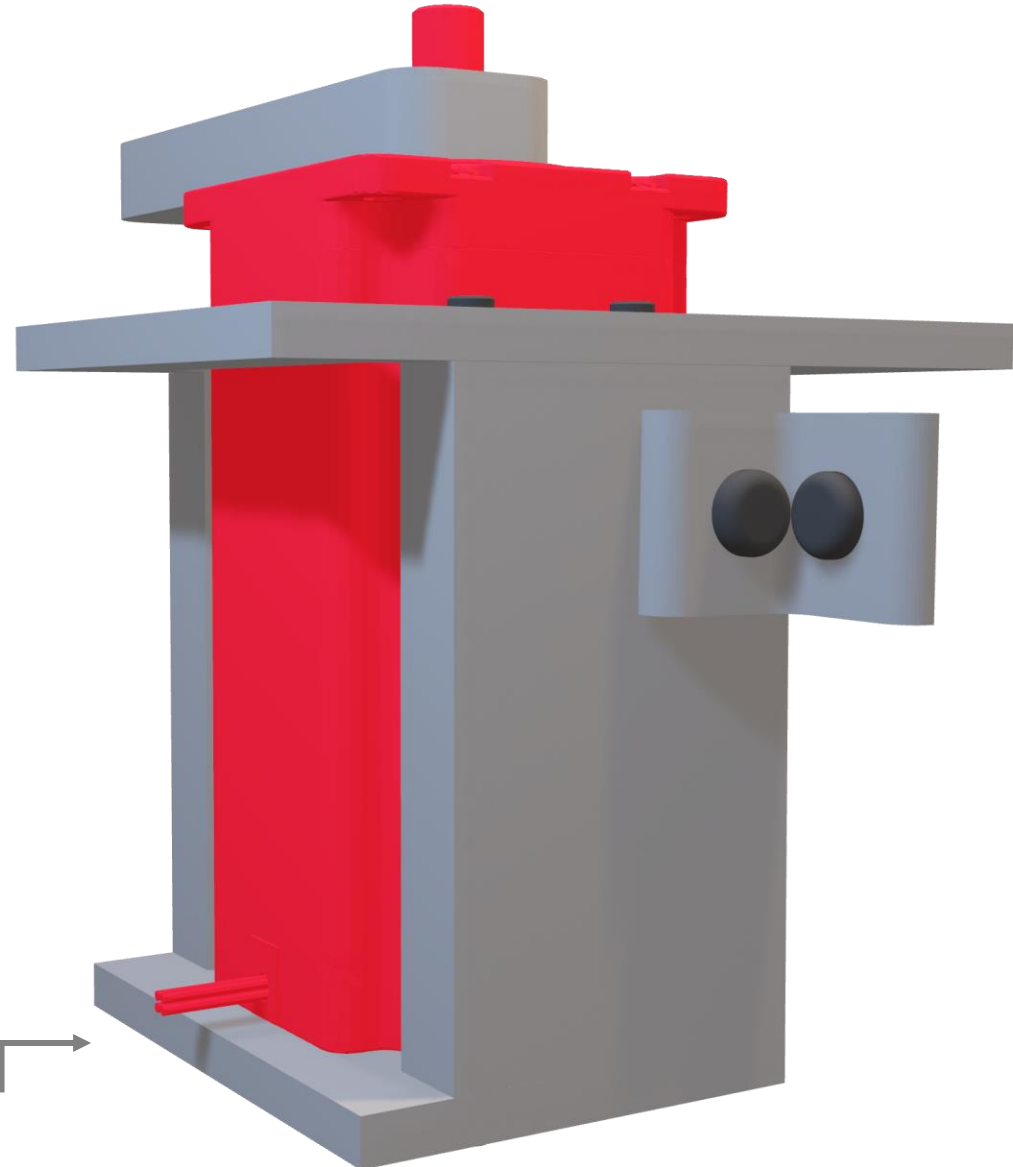


Pawel Grum

Overhangs

Motor Mount

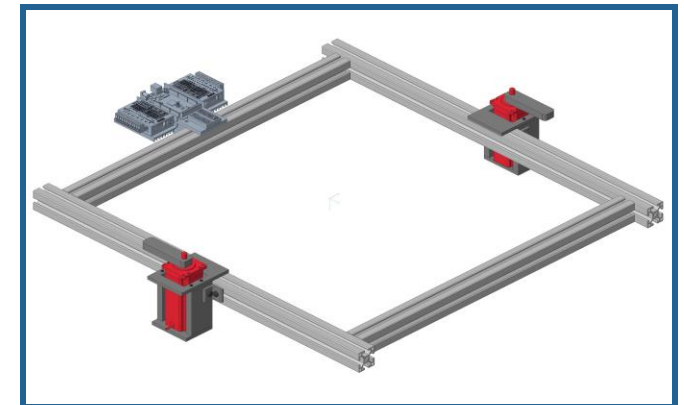
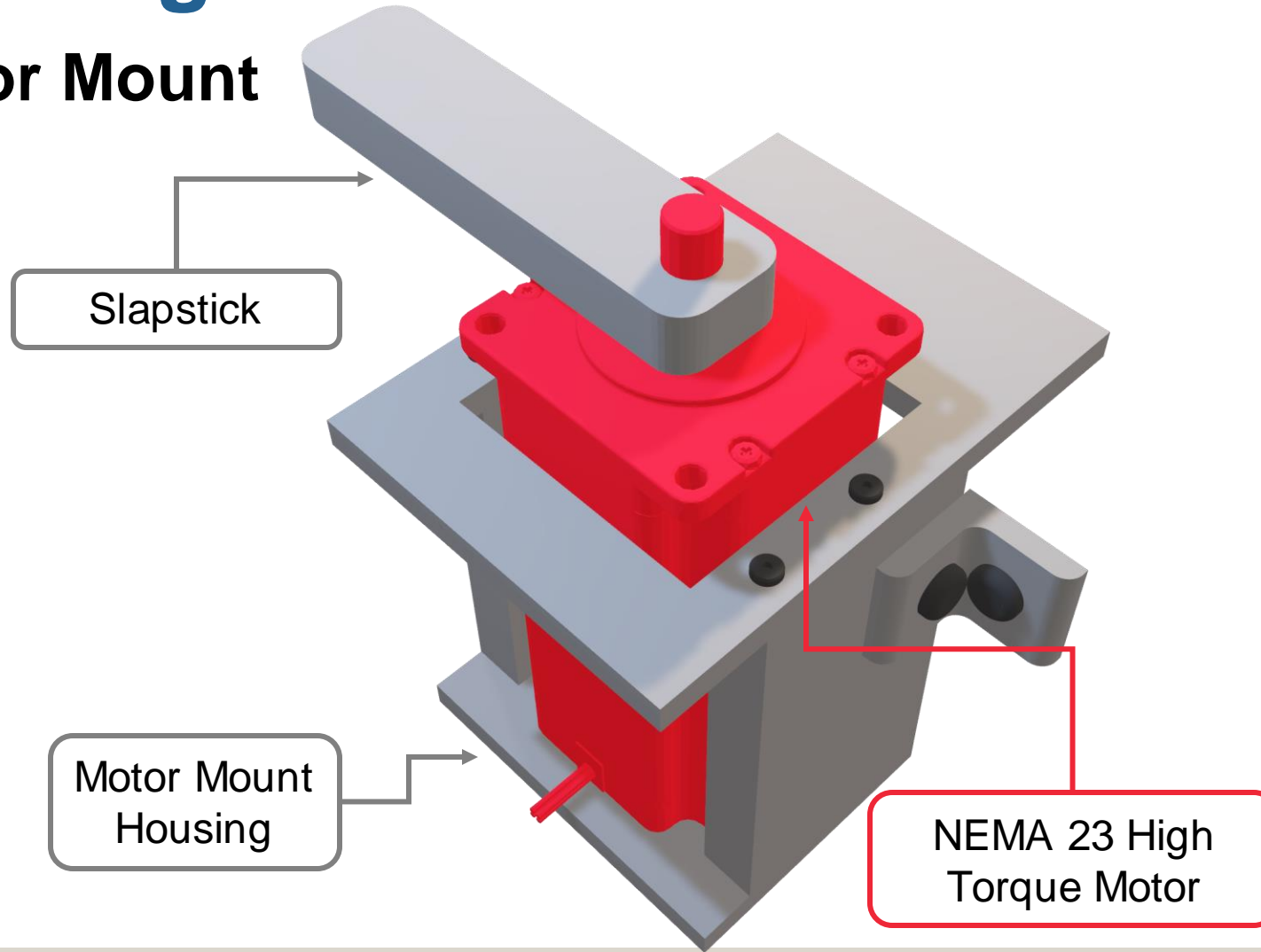
Motor Mount
Housing



Pawel Grum

Overhangs

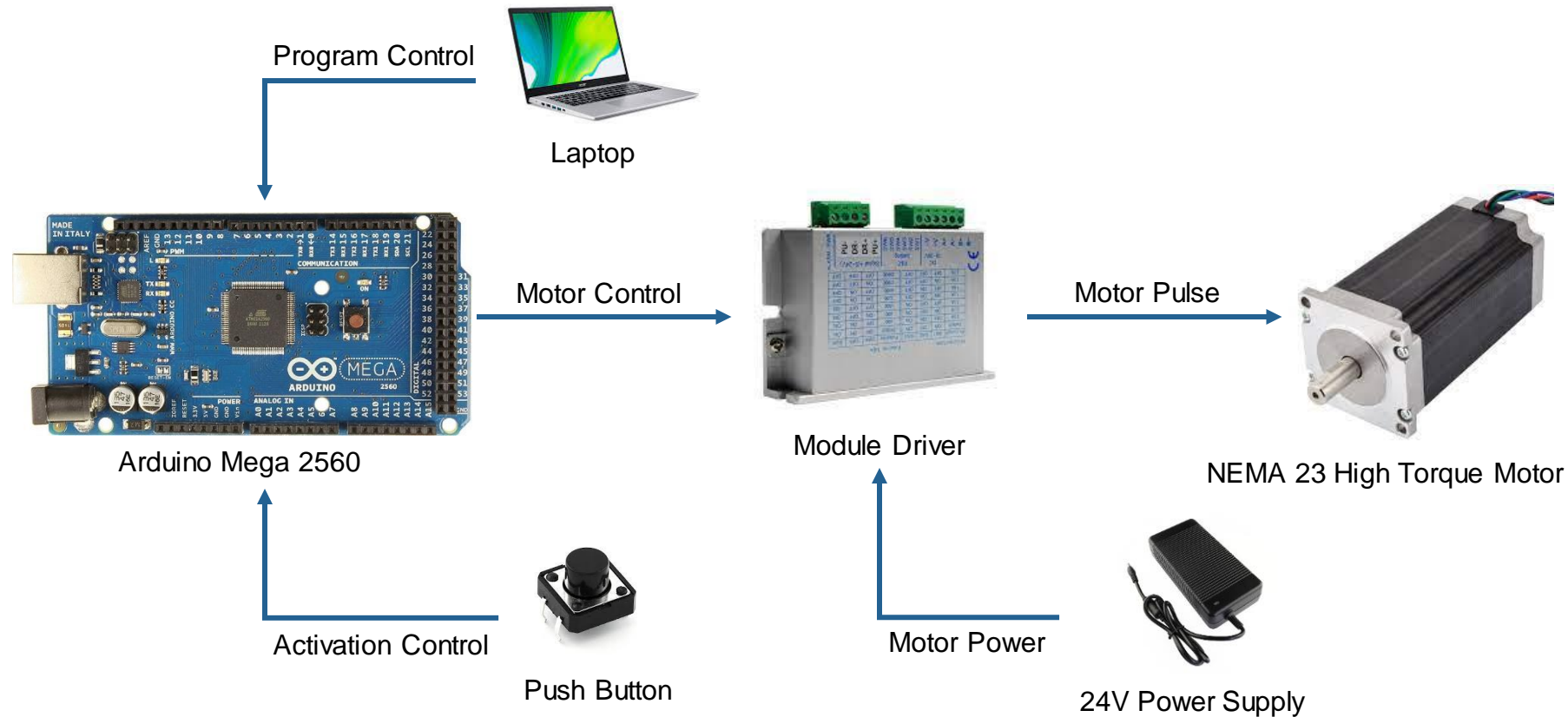
Motor Mount



Pawel Grum

Connection Map

Flow Chart for Electronics



Pawel Grum

Corning RFID Integration

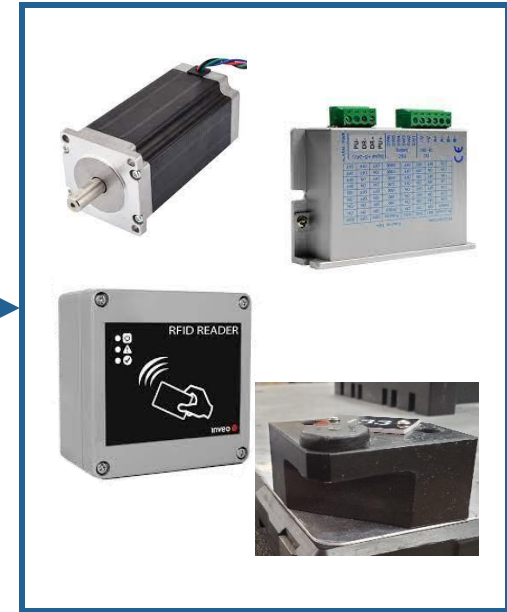
Our System



Corning's System

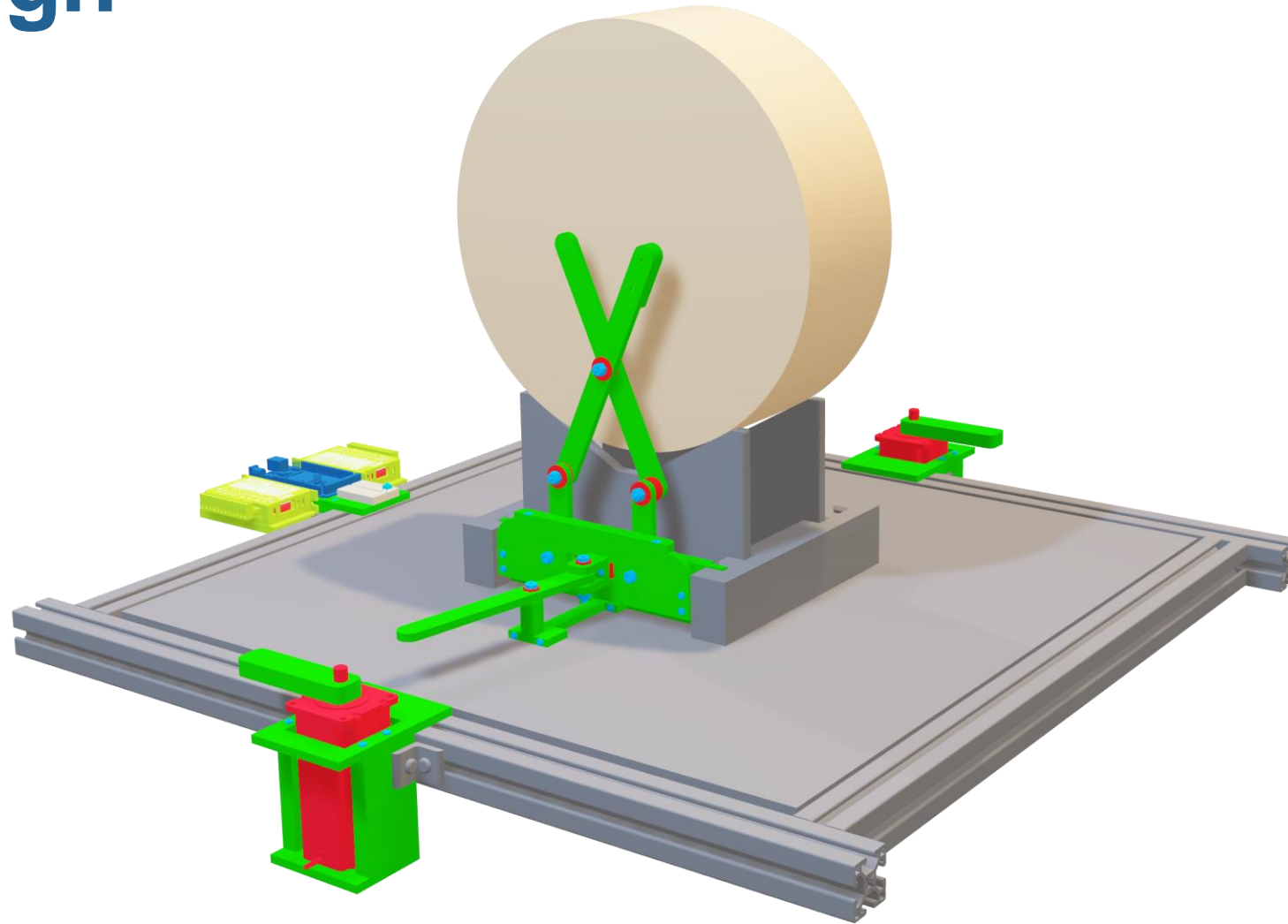


Integration

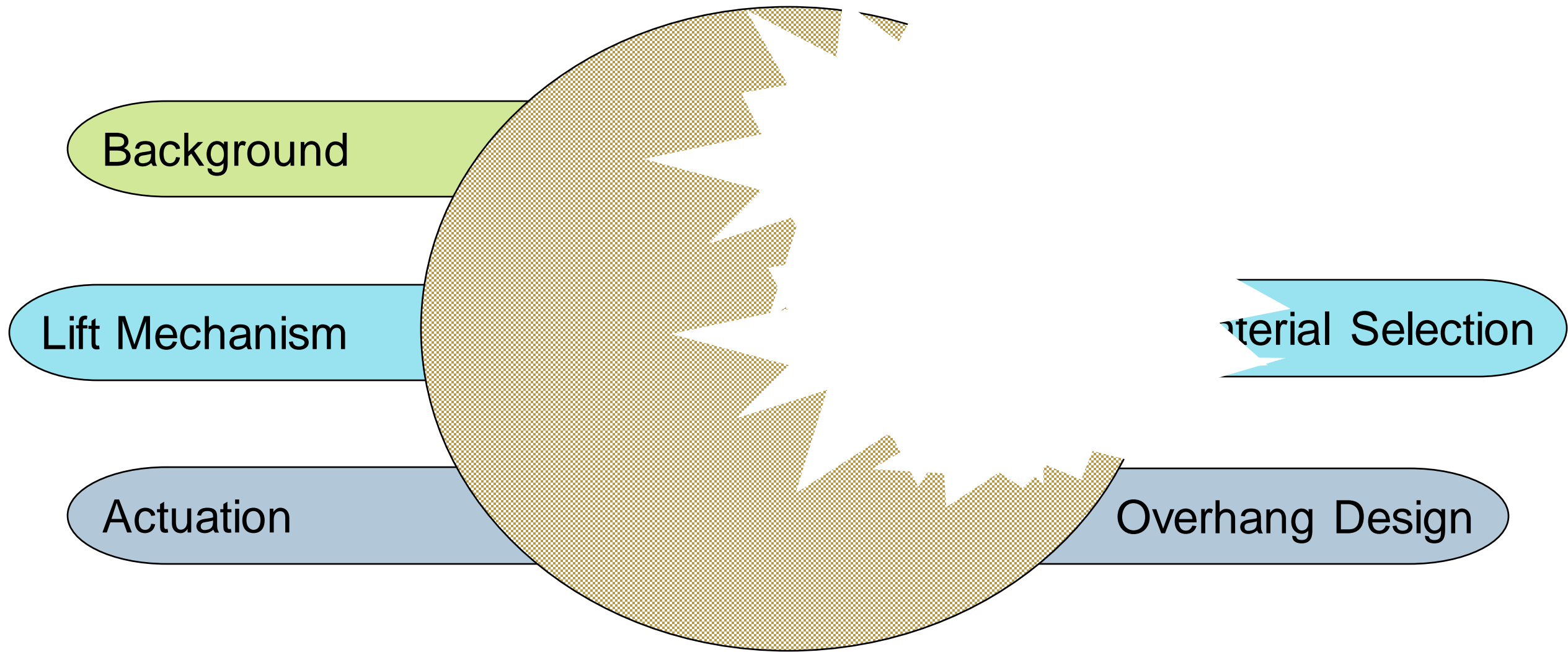


Pawel Grum

Full Design

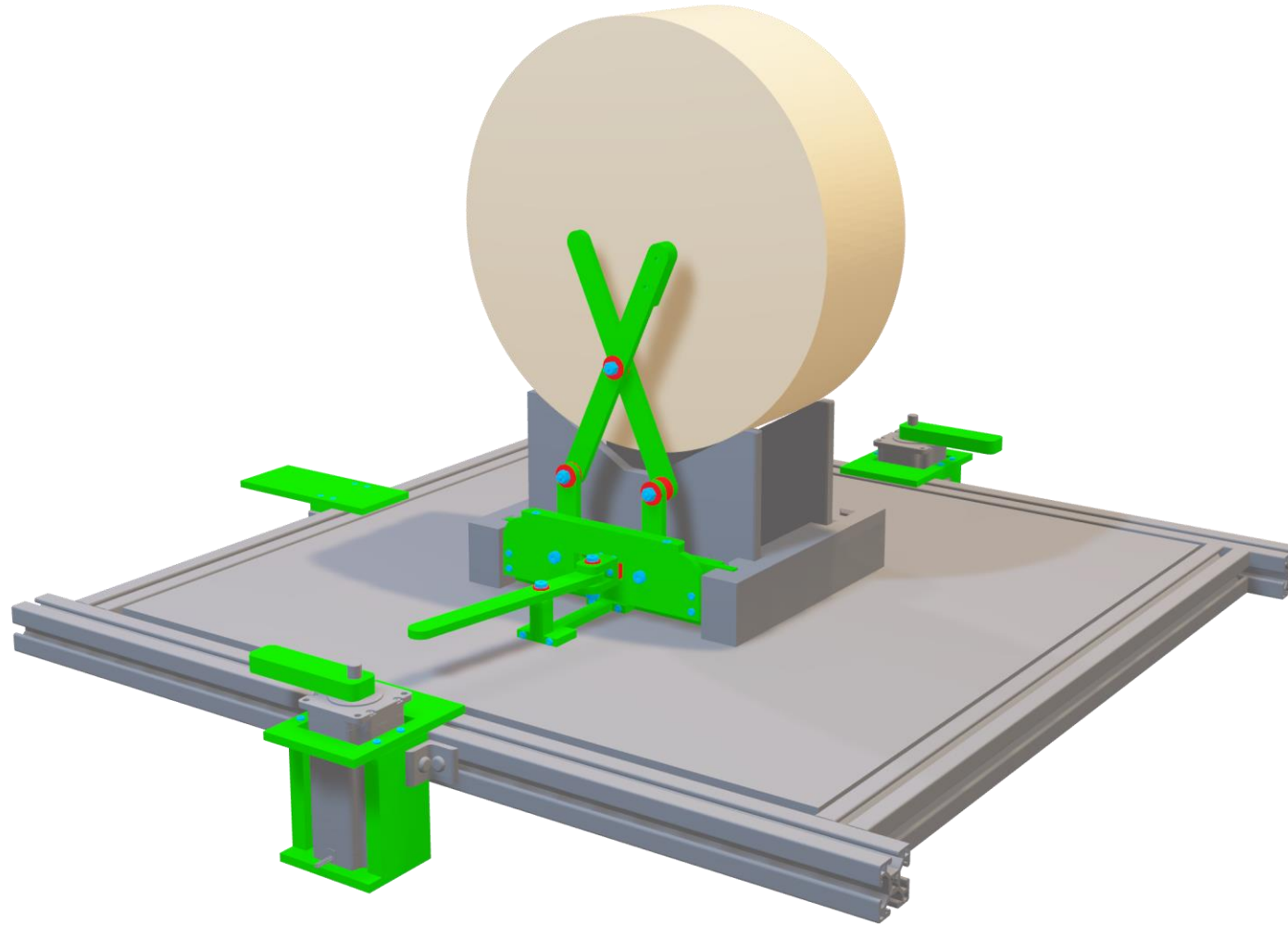


Pawel Grum



Pawel Grum

Material Selection

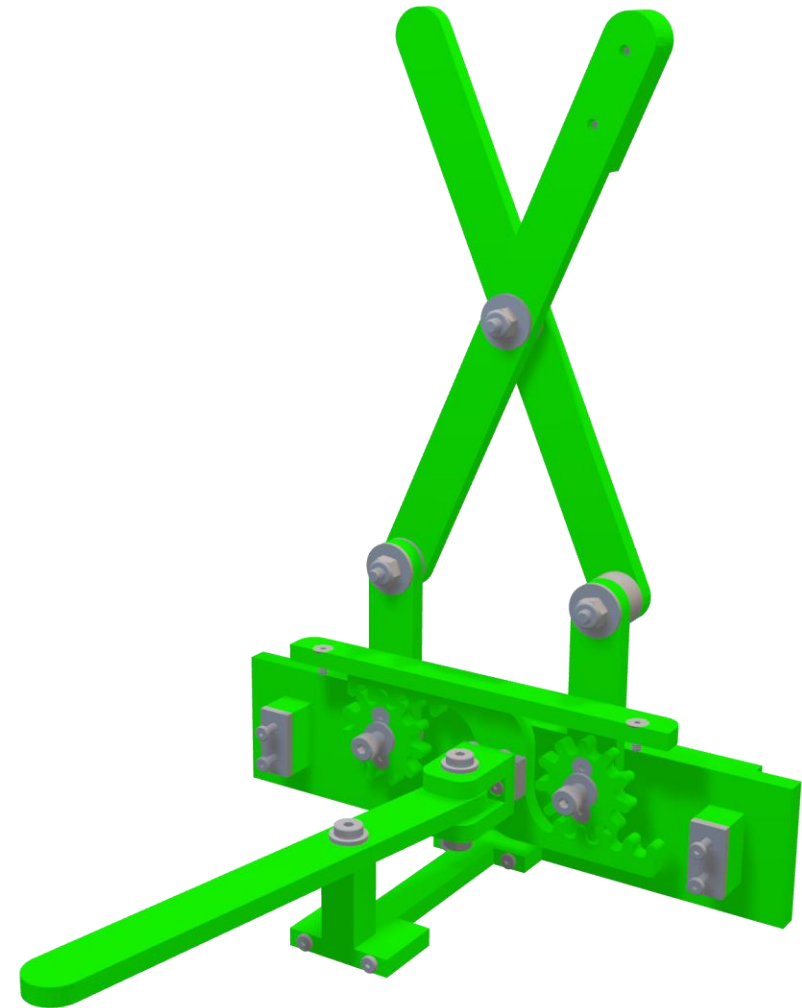
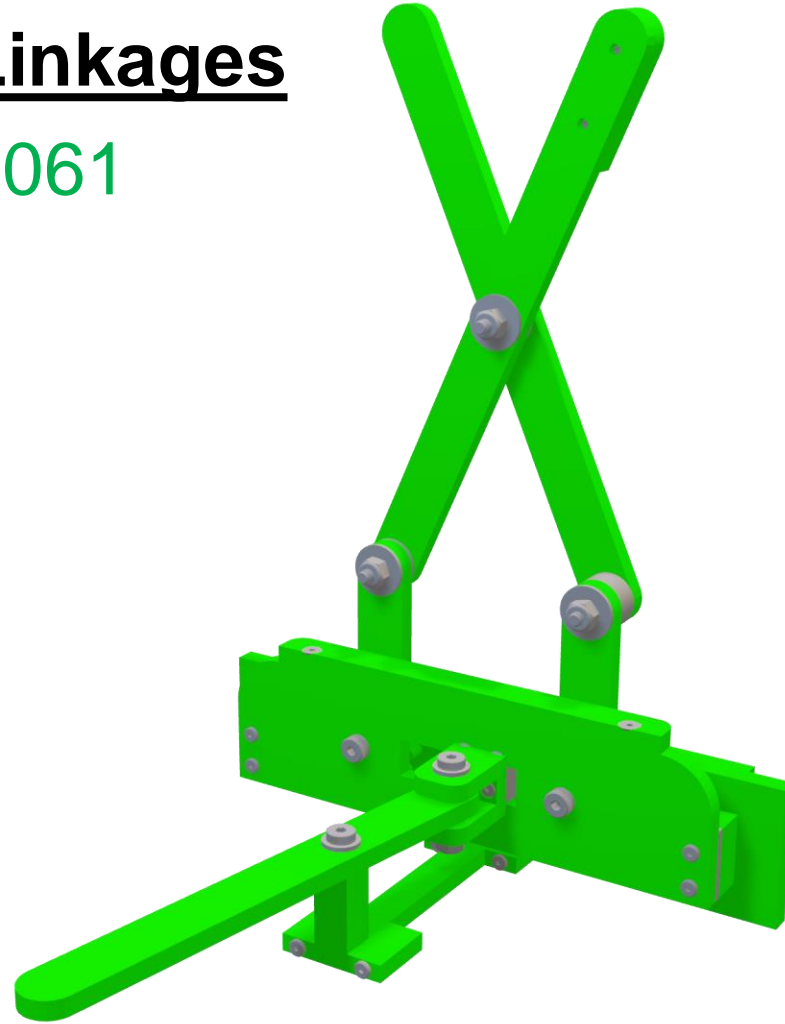


Taylor Larson

Material Selection

Base and Linkages

- Aluminum 6061



Taylor Larson

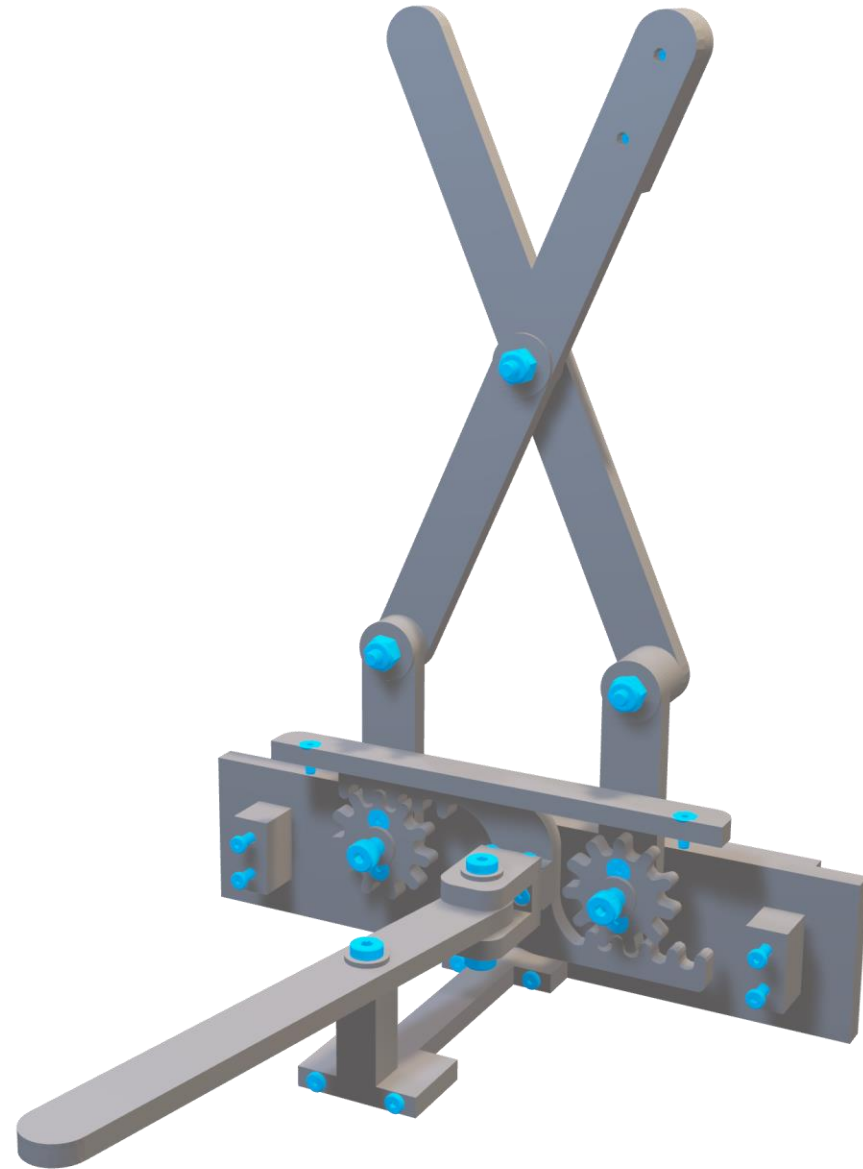
Material Selection

Base and Linkages

- Aluminum 6061

Hardware

- Alloy Steel Shoulder Bolts
- Alloy Steel Screws
- Aluminum-Nylon Lock Nuts



Taylor Larson

Material Selection

Base and Linkages

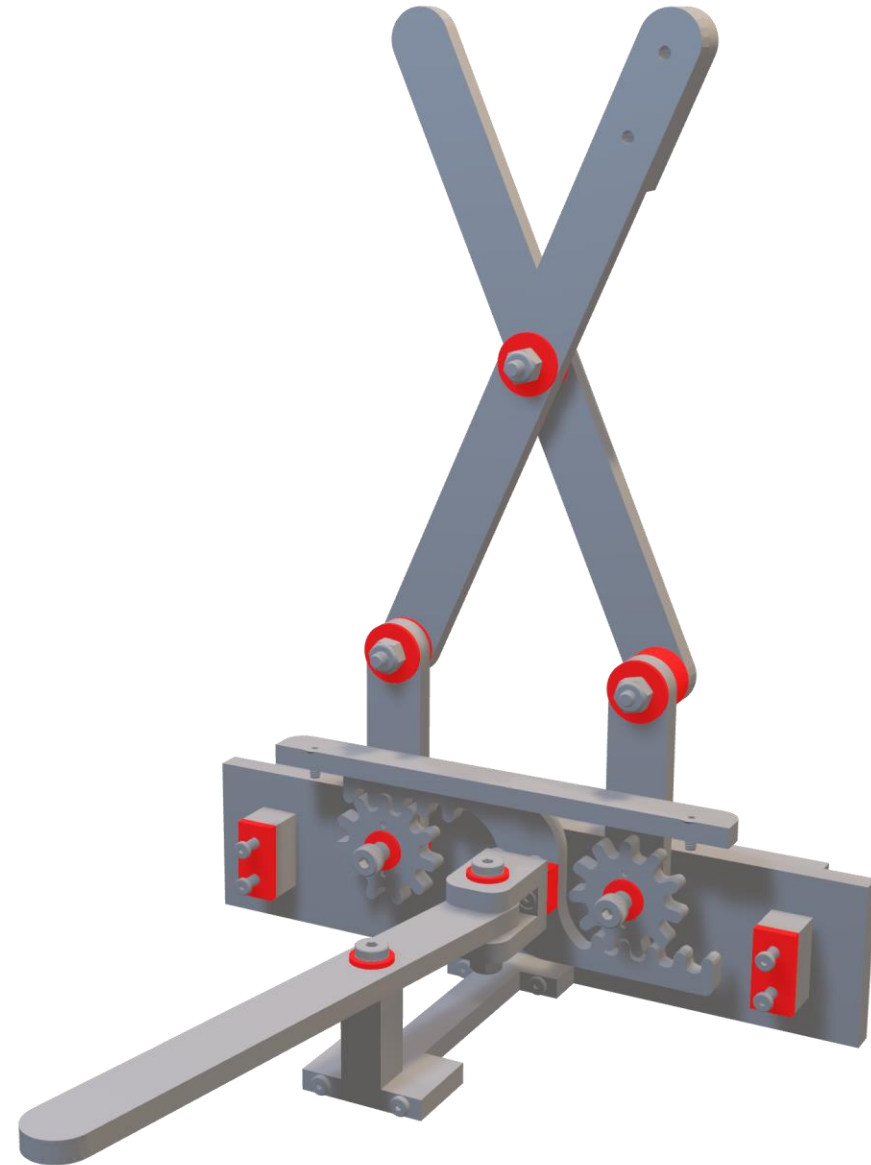
- Aluminum 6061

Hardware

- Alloy Steel Shoulder Bolts
- Alloy Steel Screws
- Aluminum-Nylon Lock Nuts

Washers and Spacers

- UHMW Polyethylene



Taylor Larson

Material Selection

Base and Linkages

- Aluminum 6061

Hardware

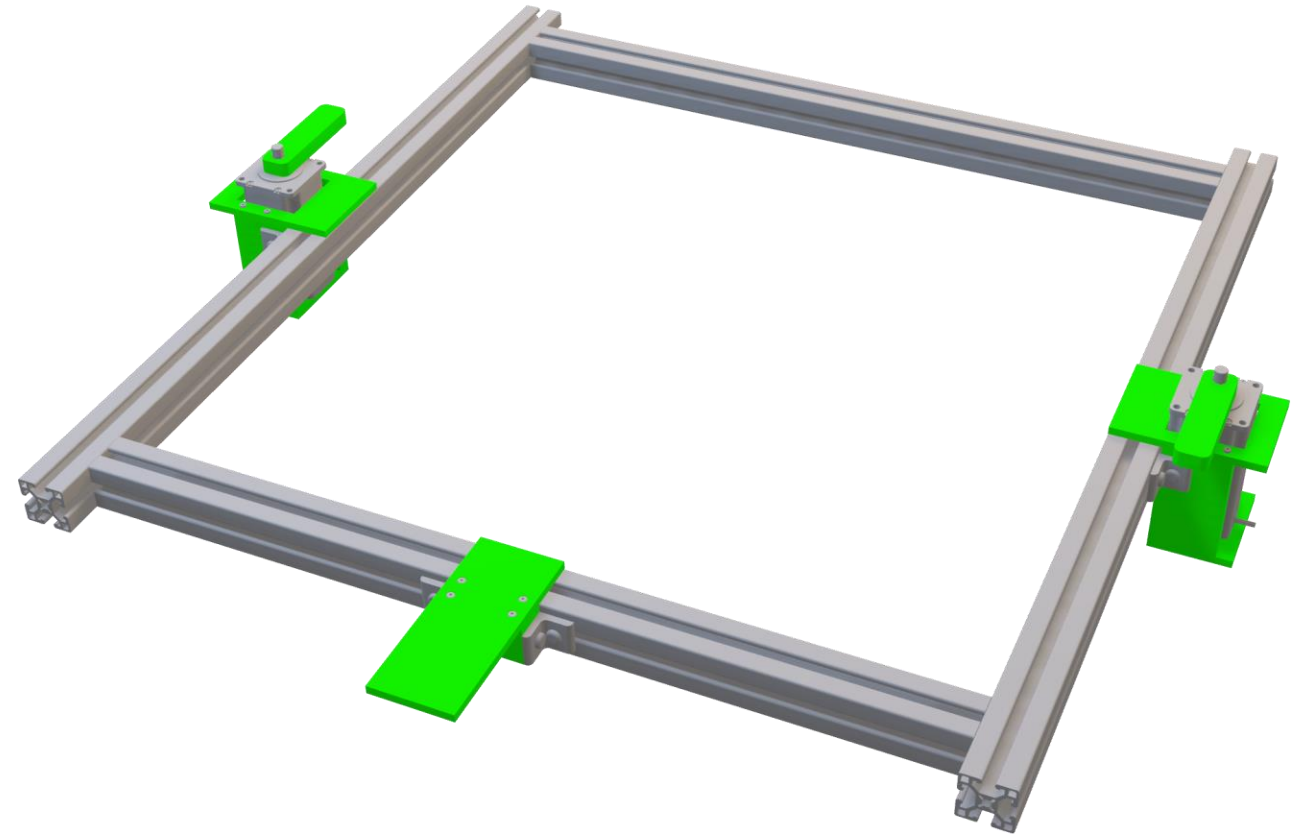
- Alloy Steel Shoulder Bolts
- Alloy Steel Screws
- Aluminum-Nylon Lock Nuts

Washers and Spacers

- UHMW Polyethylene

Mounts and Slapstick

- Aluminum 6061

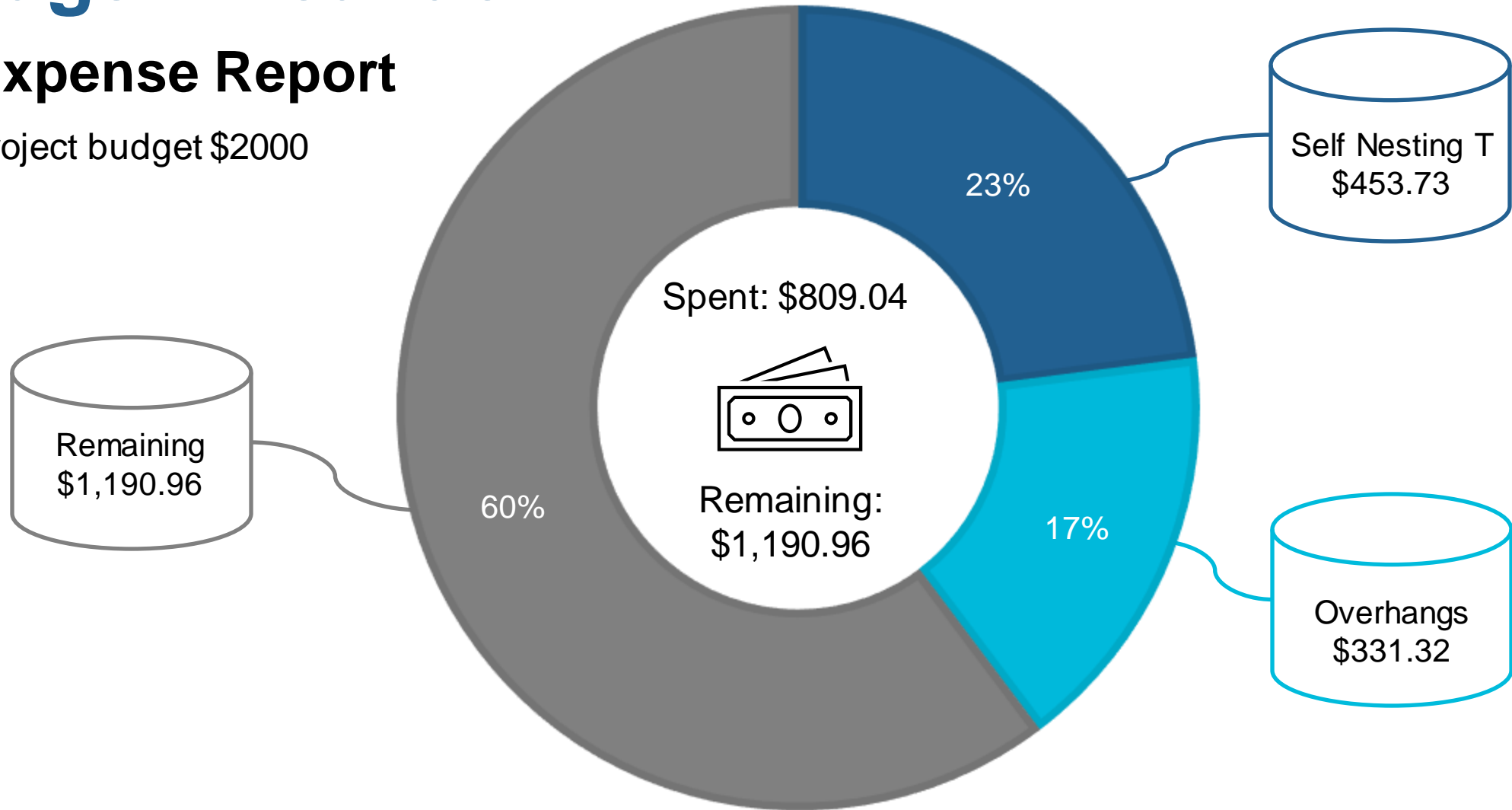


Taylor Larson

Budget Breakdown

Expense Report

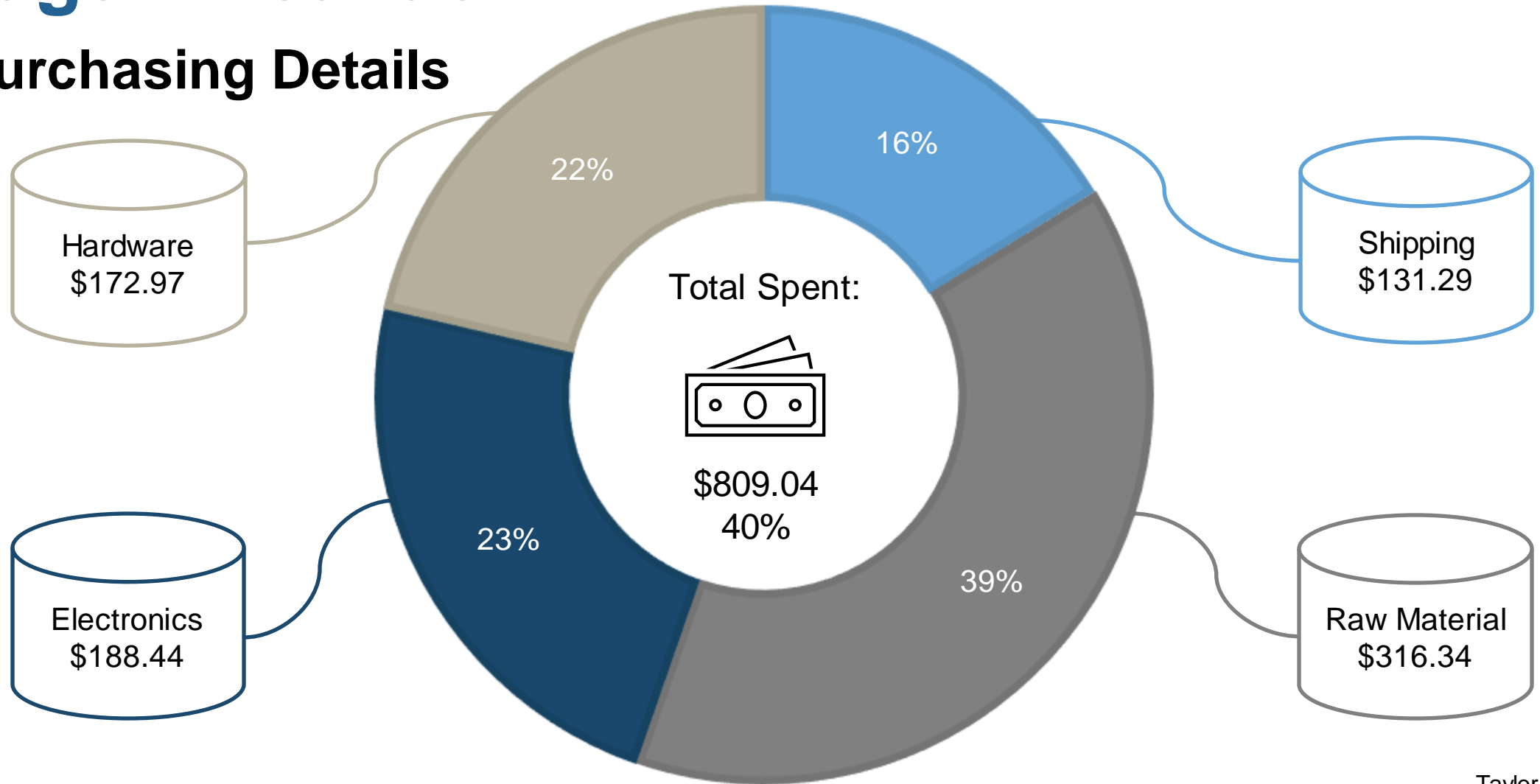
Project budget \$2000



Taylor Larson

Budget Breakdown

Purchasing Details



Taylor Larson

Background

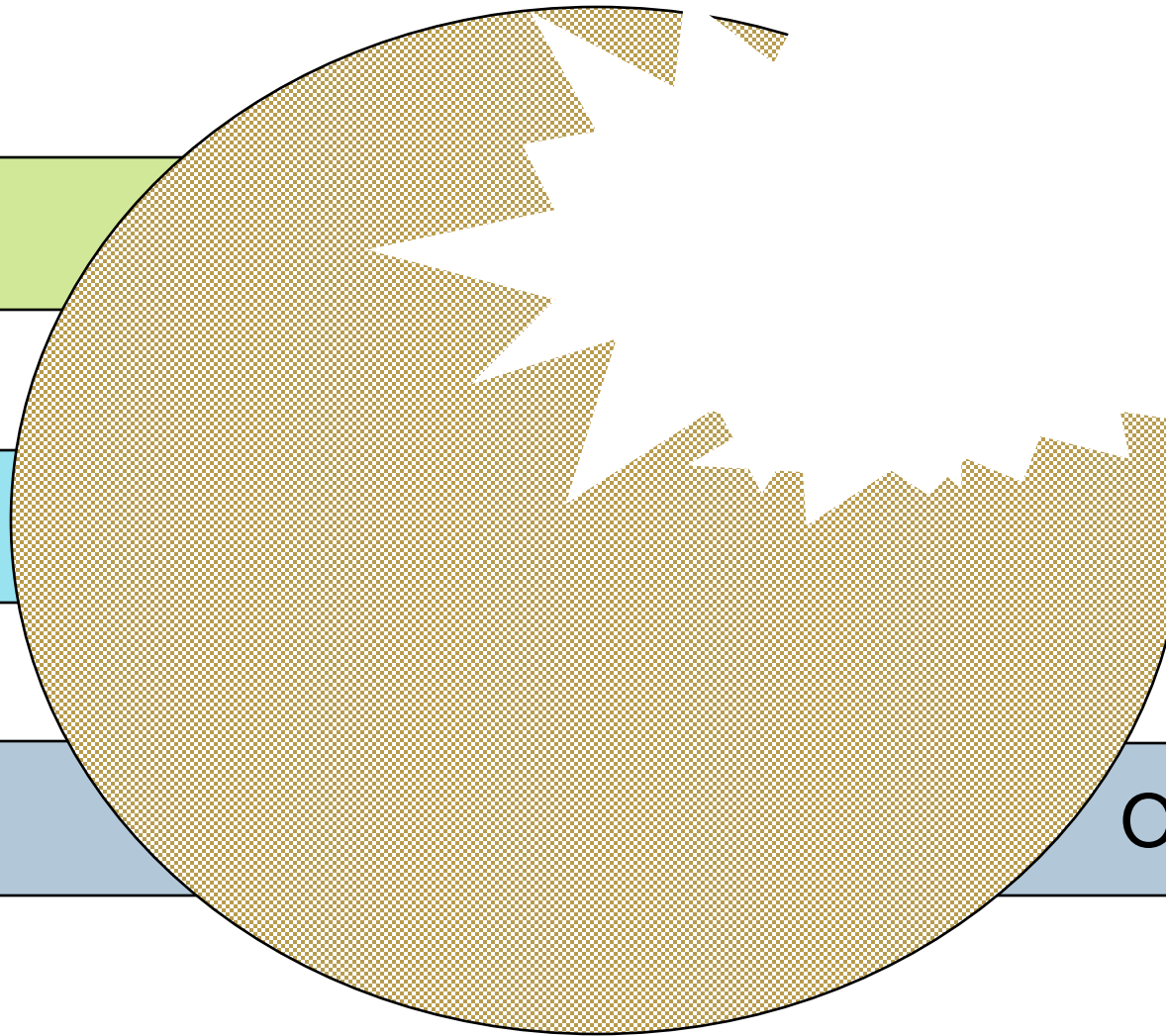
Validation

Lift Mechanism

Material Selection

Actuation

Overhang Design

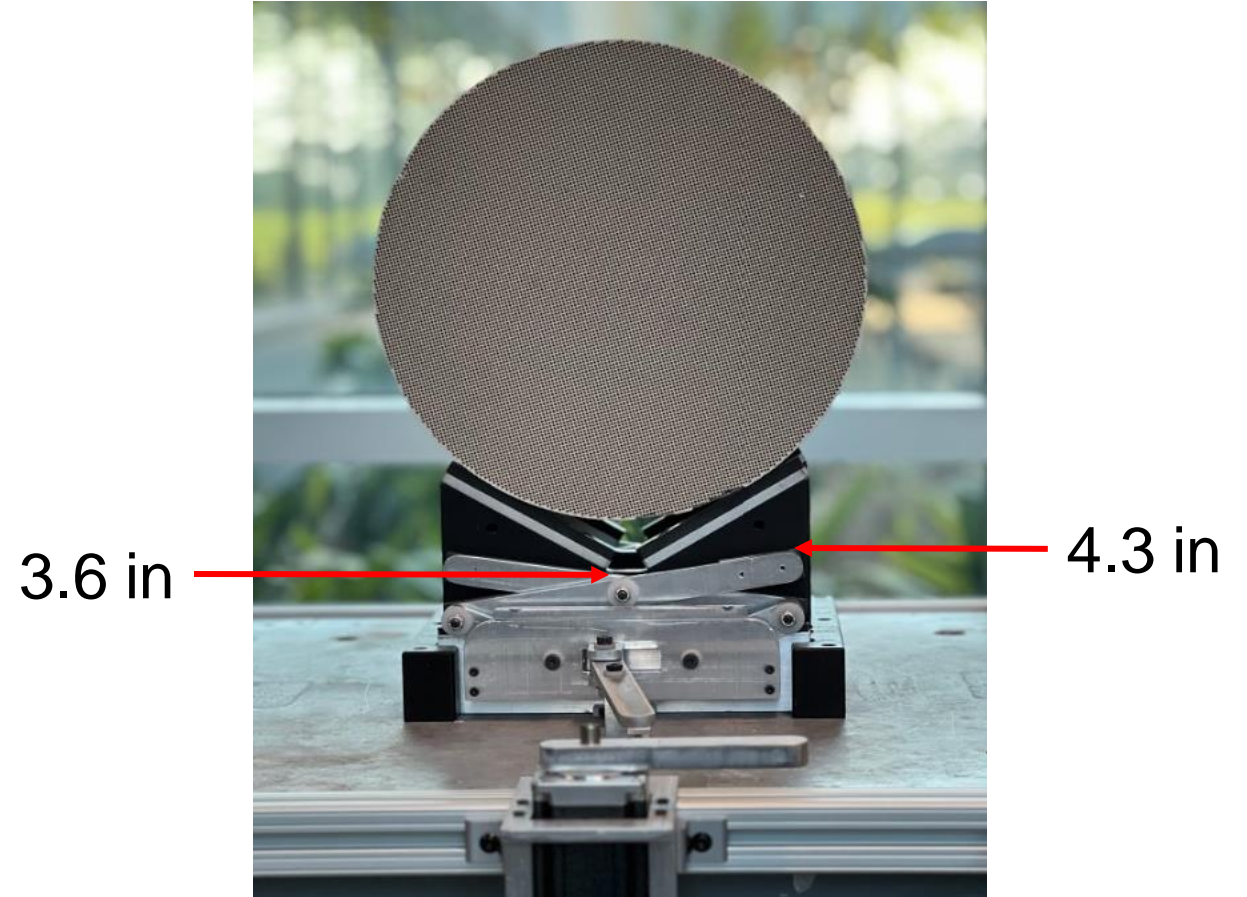


Taylor Larson

Validation

Retraction and Expansion

	Target	Measured
Retraction Height	<6 in	4.3 in

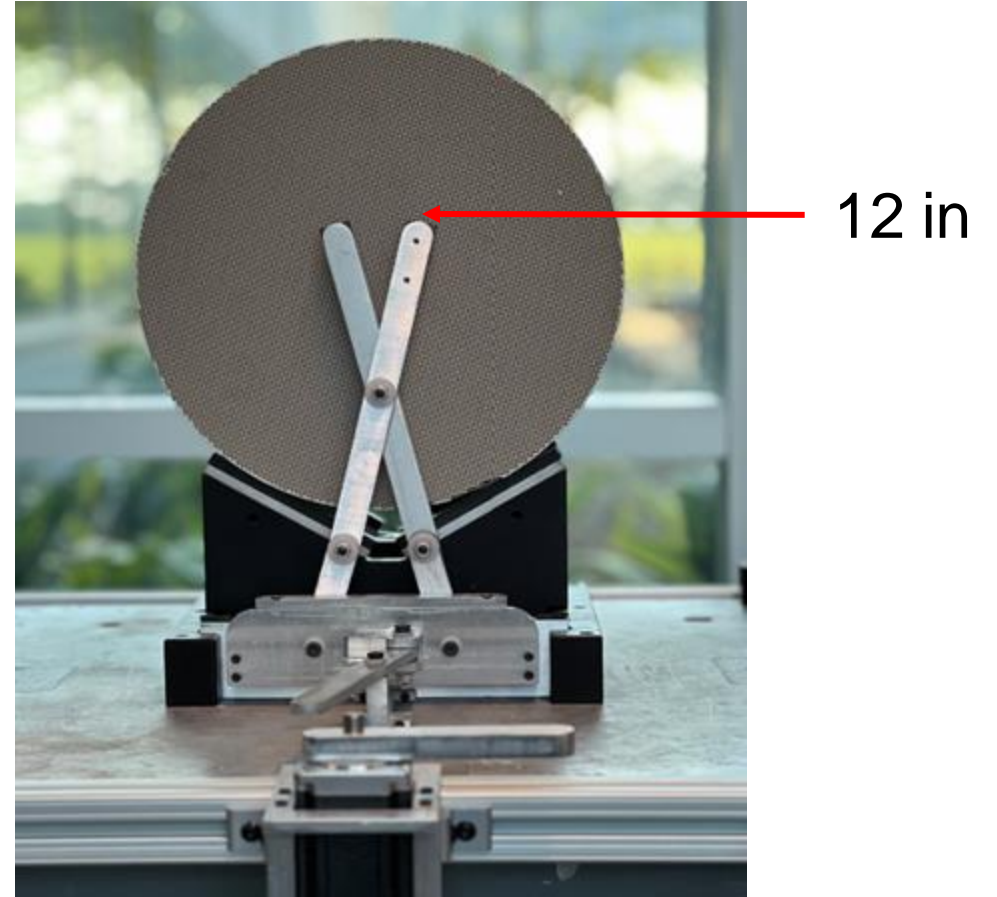


Robert Kosmas

Validation

Retraction and Expansion

	Target	Measured
Retraction Height	<6 in	4.3 in
Middle Joint Height	<4 in	3.6 in
Expansion Height	11 in	12 in

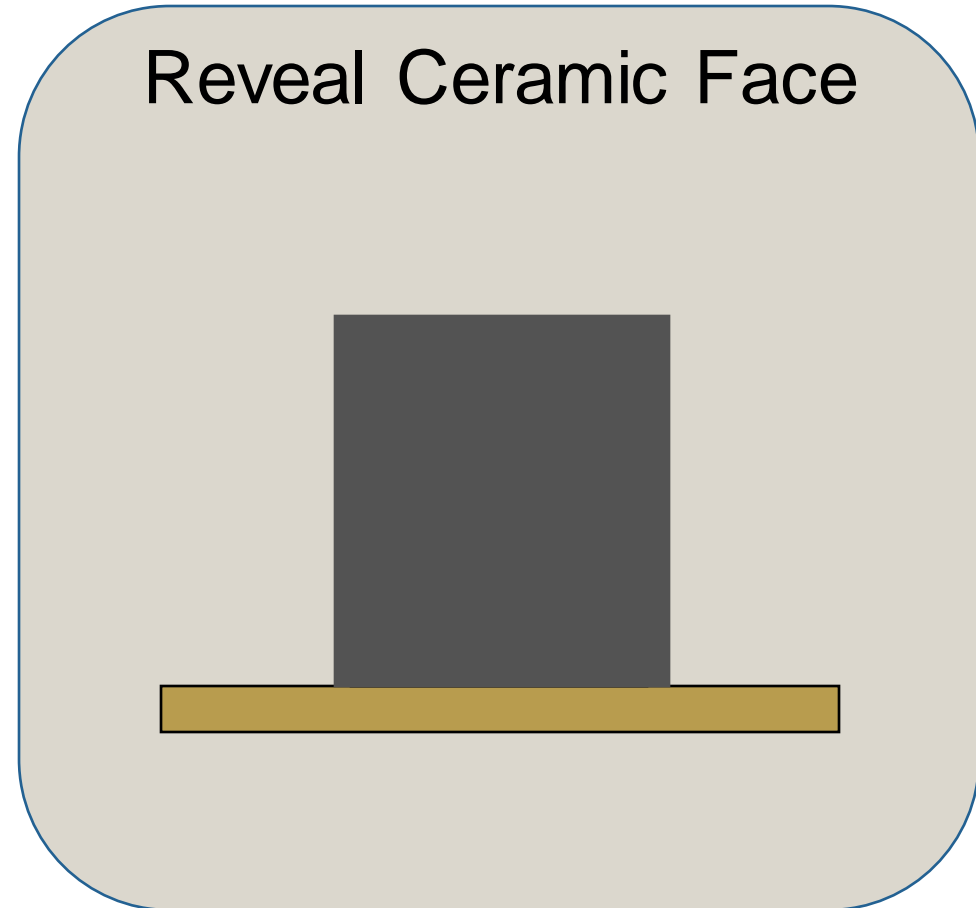


Robert Kosmas

Validation

Actuation Time

Time	Target	Measured
	48 sec	<5 sec

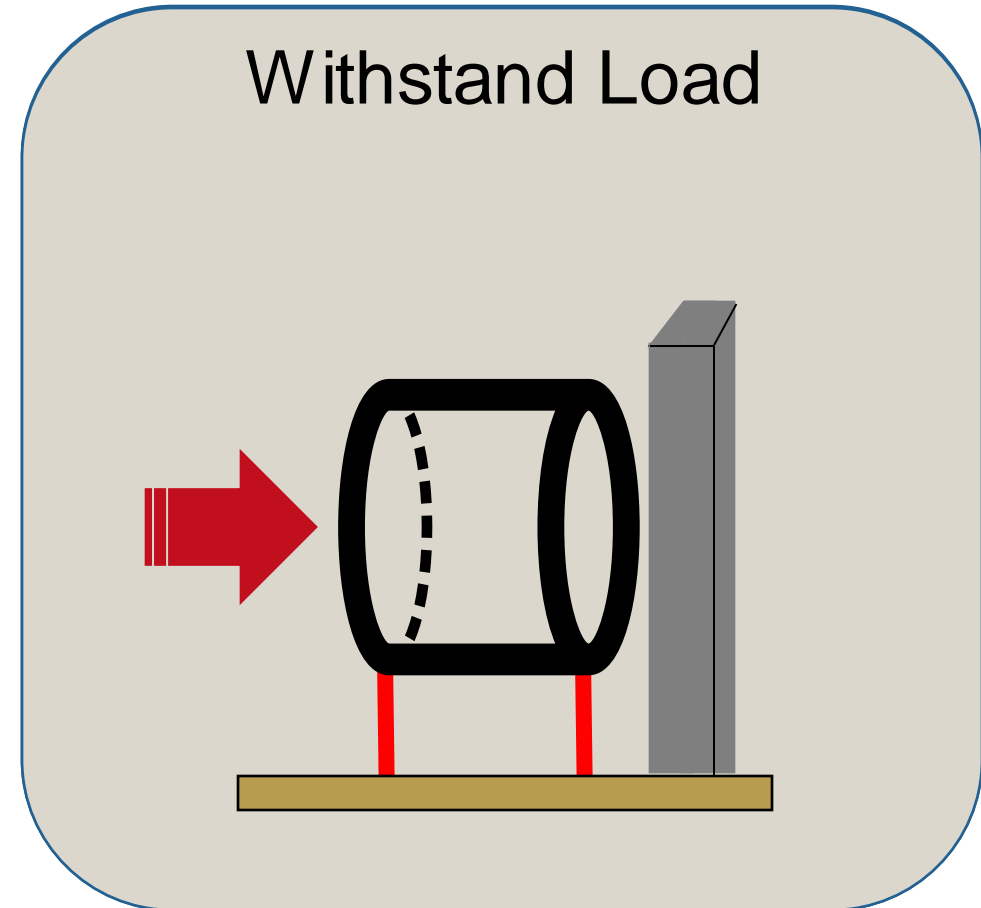


Robert Kosmas

Validation

Load

	Target	Measured
Load	8 lbs	10 lbs

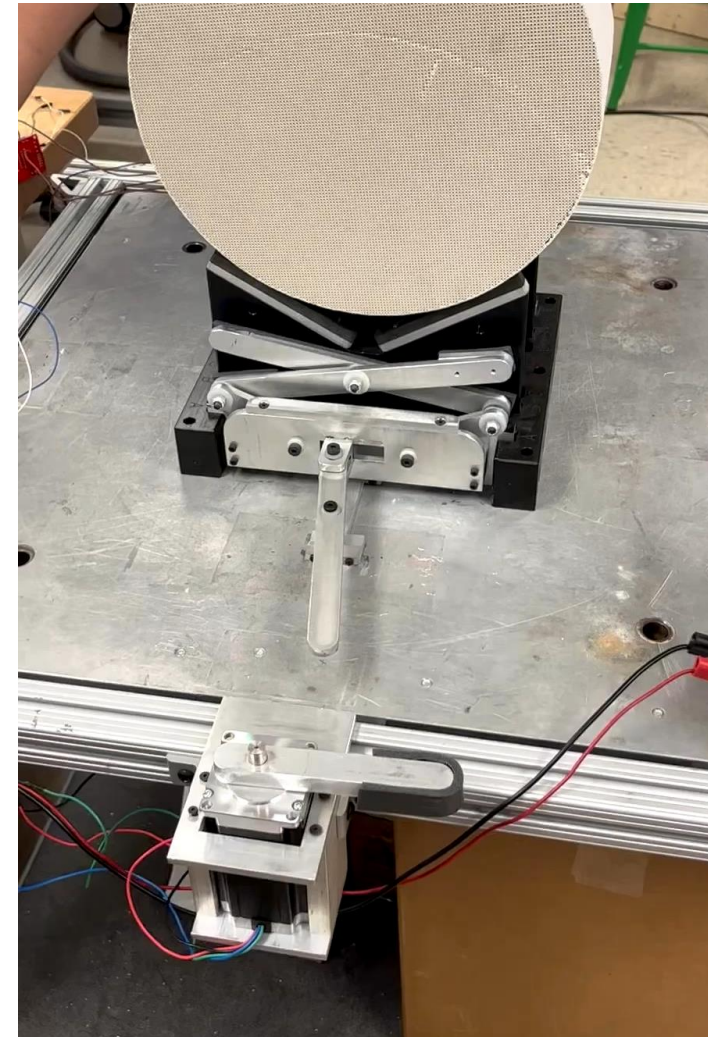


Robert Kosmas

Validation

Limit Manual Labor

	Target	Measured
Interactions	1	0



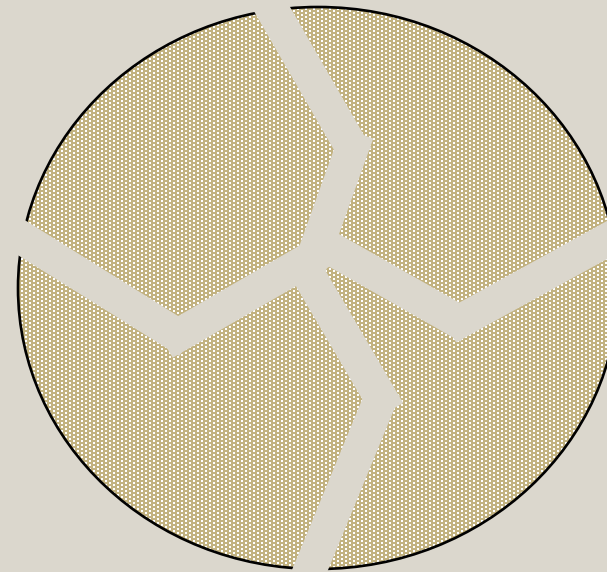
Robert Kosmas

Additional Testing

Vibration Testing



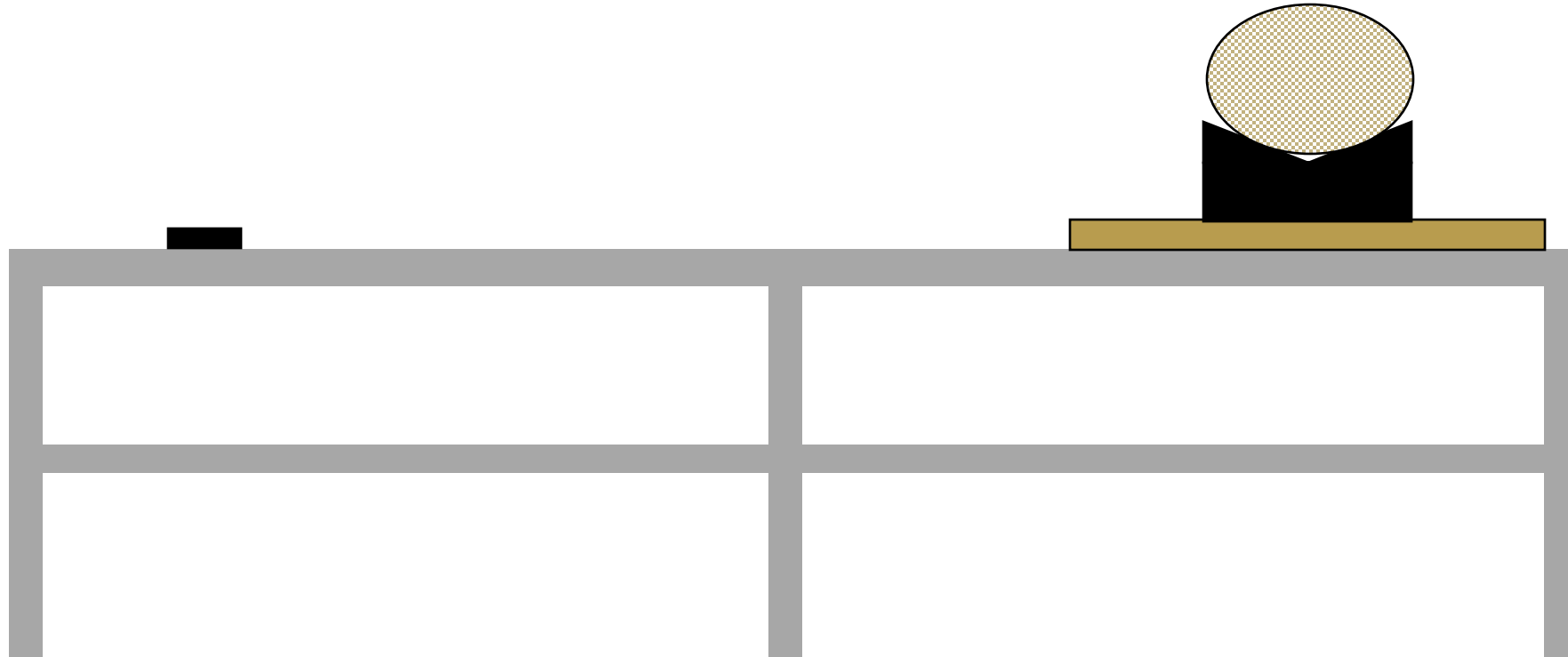
Prevent Damage



Robert Kosmas

Additional Testing

Impact Testing



Robert Kosmas

Improvements

Re-design the engagement method from the conveyor to the device

Select better hardware, and use bolts with matching hex size

Further evaluate the cycle life and resistance of the UHMW

Robert Kosmas

Lessons Learned

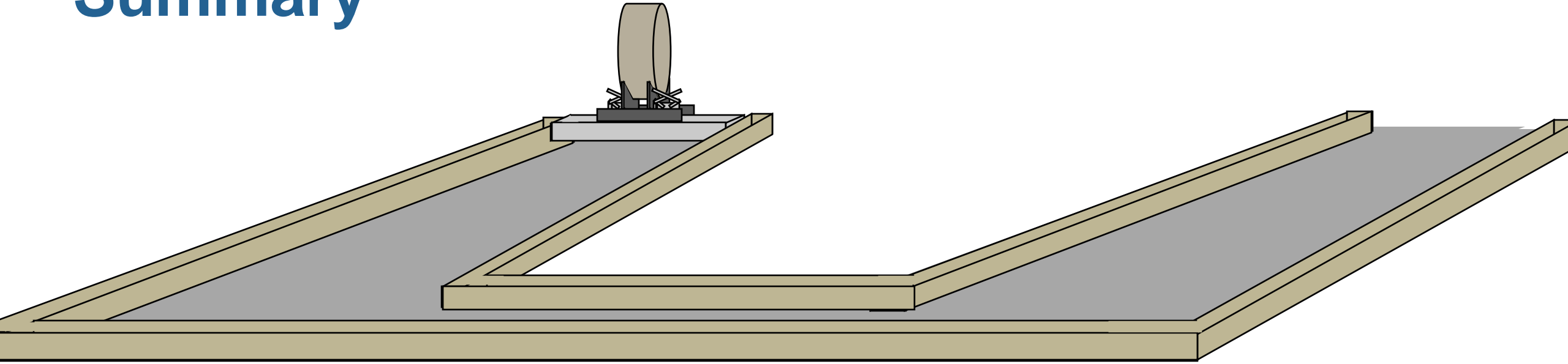
Criticism often means
you are off to a good
start.

Don't reinvent the
wheel. Keep it simple.

It's okay if the
prototype is not perfect
the first time. That's
why it's called a
"prototype".

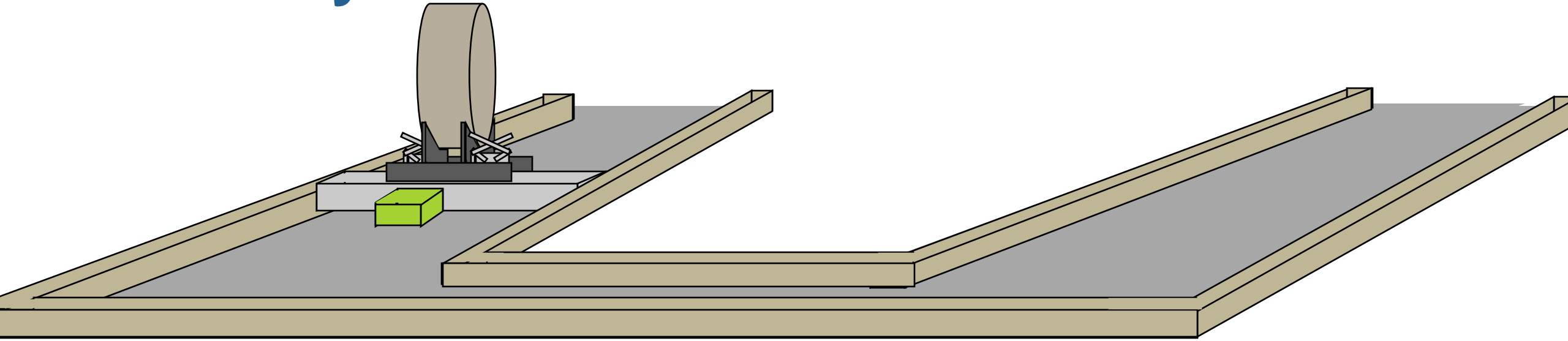
Robert Kosmas

Summary



Robert Kosmas

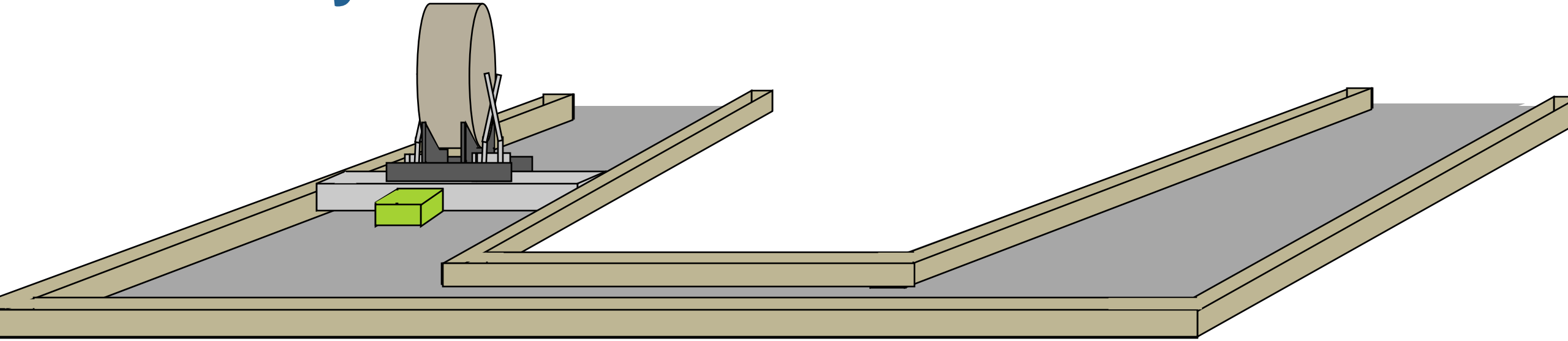
Summary



The Self-Nesting T was designed to protect ceramics traveling along a conveyor line, while also limiting the required interactions from plant employees.

Robert Kosmas

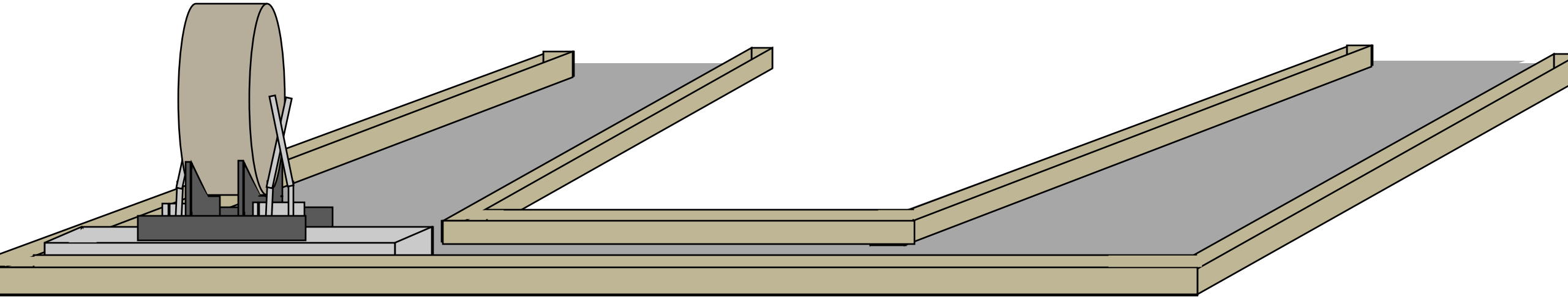
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Robert Kosmas

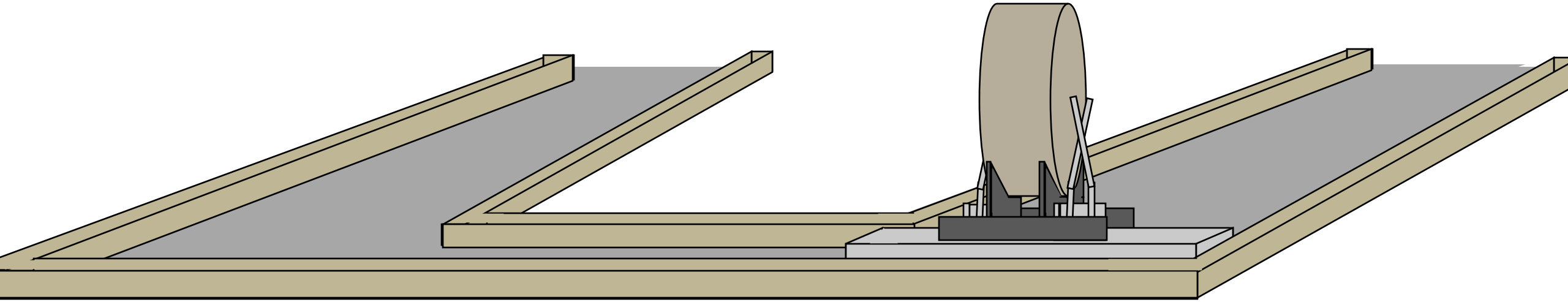
Summary



Multiple concepts were generated but the Self-Nesting T was the final selection. It was also highly favored due to it being modeled after the T design that's proven to minimize damage.

Robert Kosmas

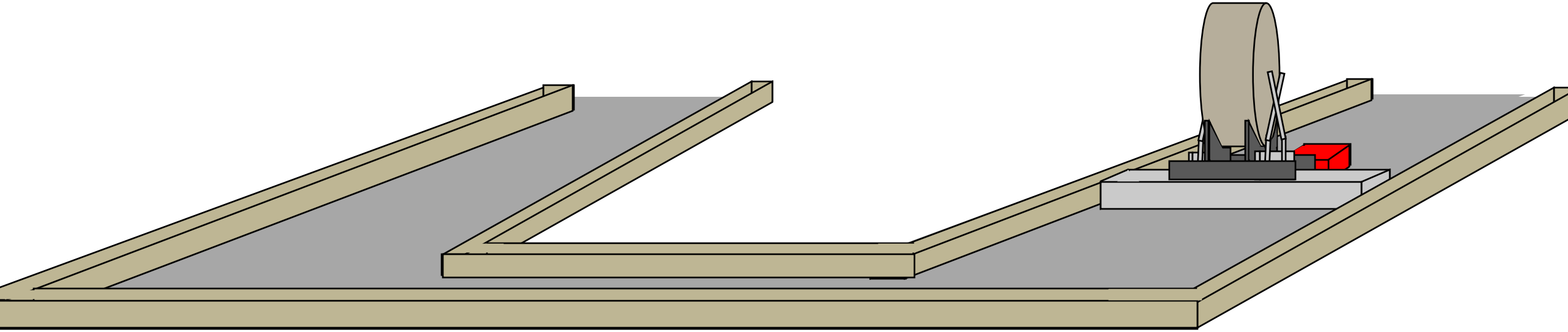
Summary



The designs critical targets have been validated. This allows the team to know that the projects goals have been accomplished.

Robert Kosmas

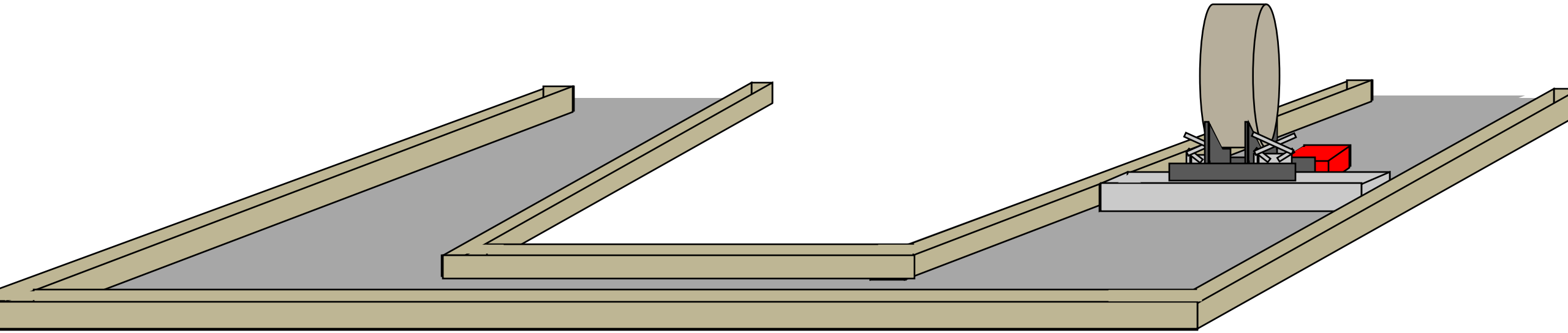
Summary



Corning will be able to implement our design into the current manufacturing plant system. Allowing for their ceramics to be protected, while also reducing the required manual labor by being actuated mechanically.

Robert Kosmas

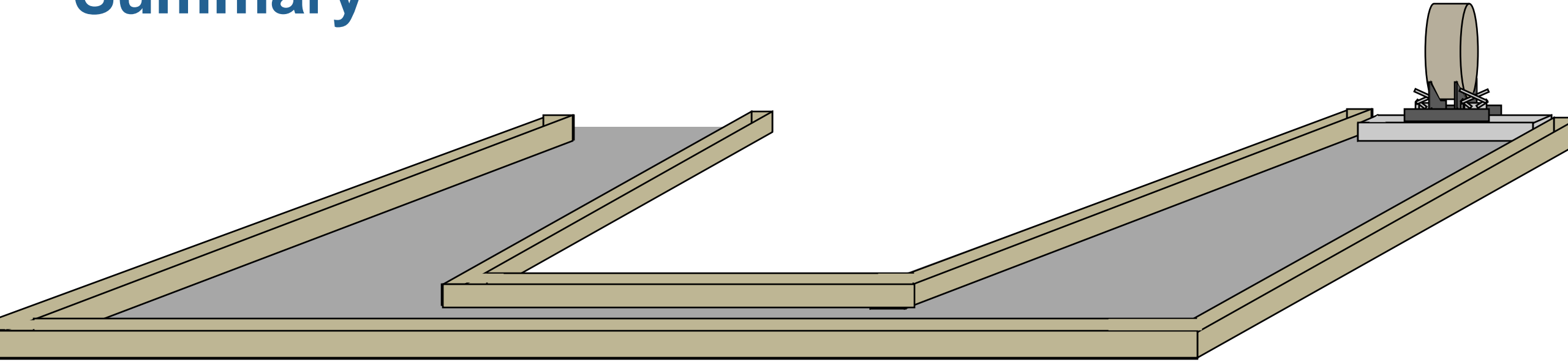
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Robert Kosmas

Summary



Corning will be able to implement our design into the current manufacturing plant system. Allowing for their ceramics to be protected, while also reducing the required manual labor by being actuated mechanically.

Robert Kosmas

Thank you!

Pawel J. Grum | Robert C. Kosmas | Taylor M. Larson | Segundo A. Sanchez | Jared T. White

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