

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*

Taylor Larson



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*

Taylor Larson

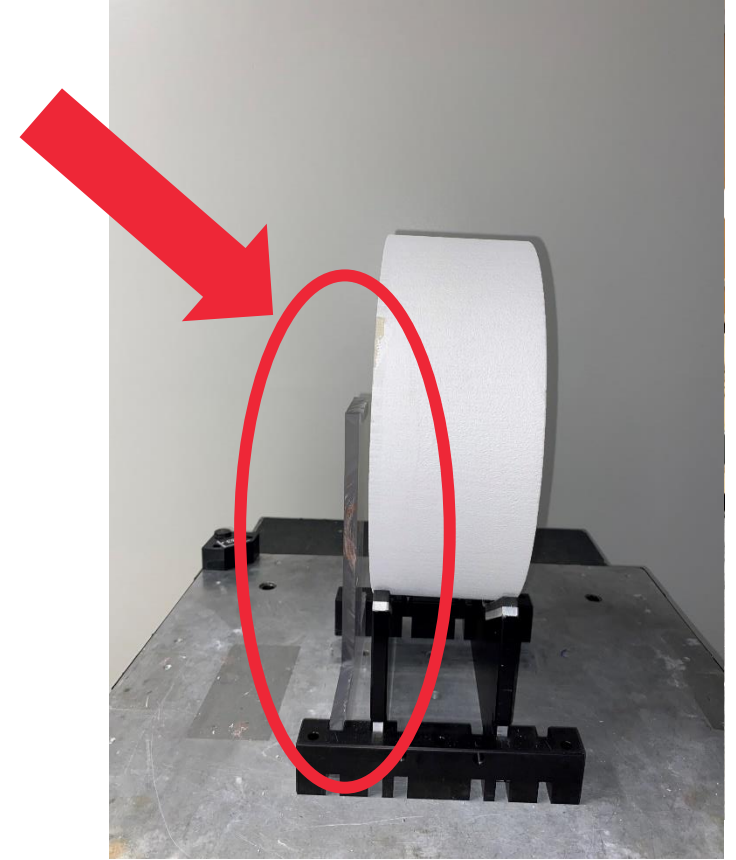
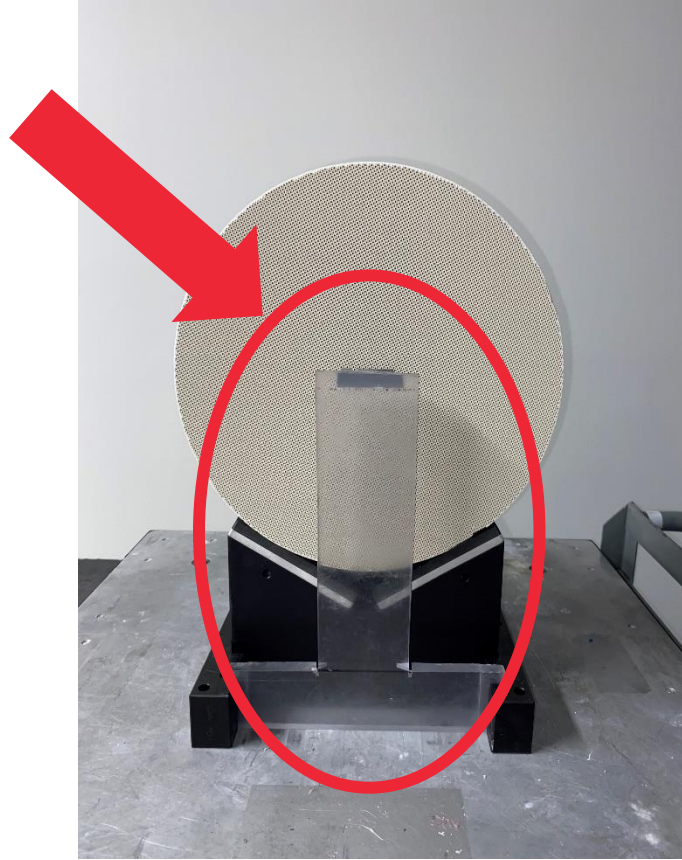


Project Objective

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

Taylor Larson

Project Background



Taylor Larson

Key Goals

Taylor Larson

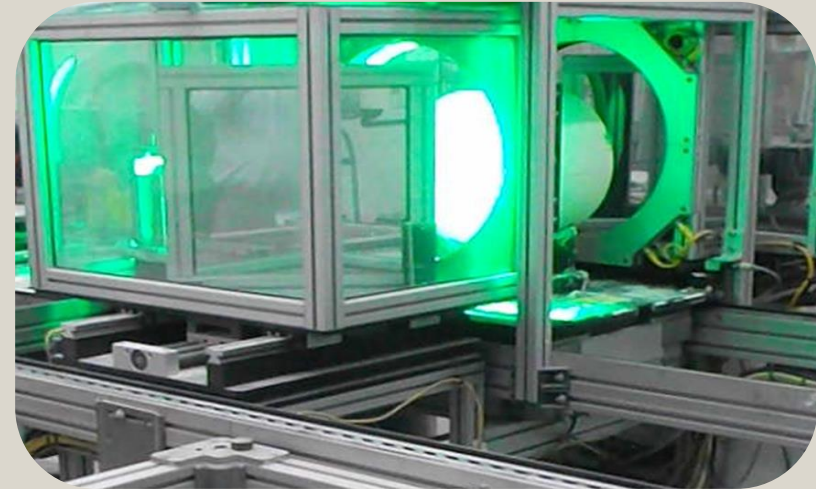


Key Goals

Prevent Damage



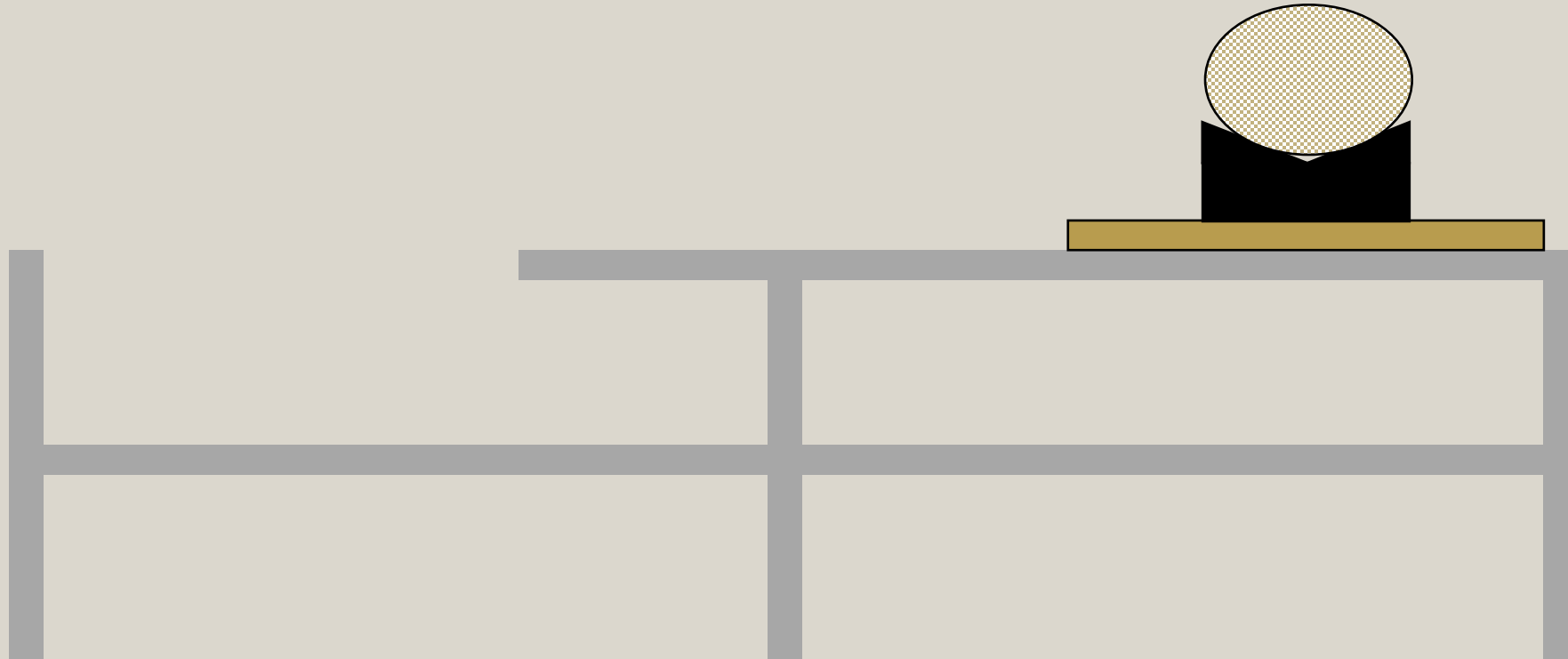
Limit Interaction



Taylor Larson

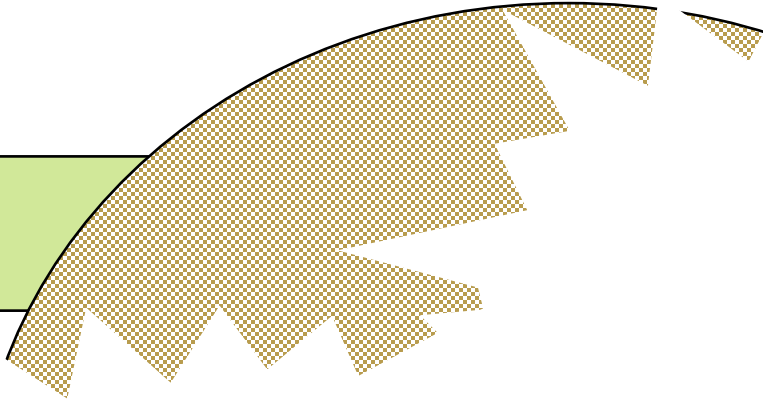
Key Goals

Integrate with conveyor system



Taylor Larson

Key Goals

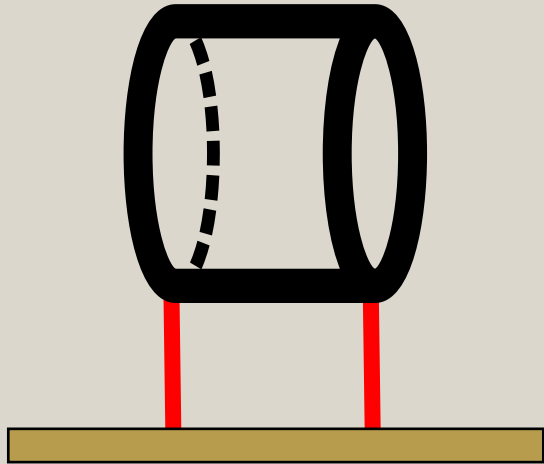


Critical Targets

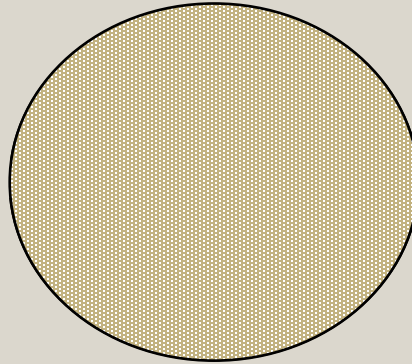
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Critical Targets

Secure Ceramic
1 DOF



Prevent Damage
0%



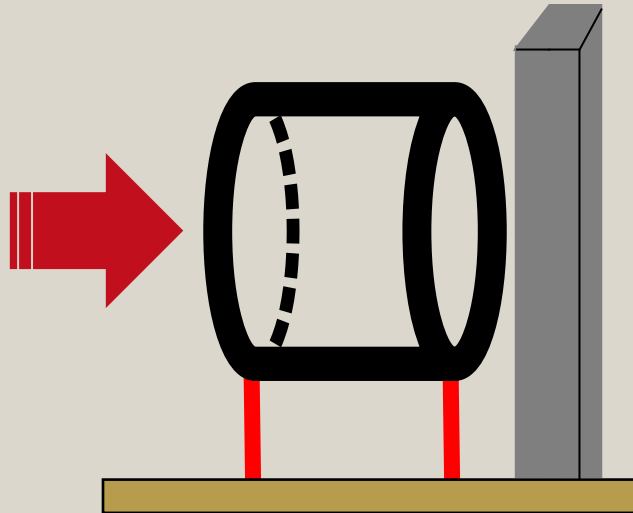
Limit Manual
Labor
1 Person



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Critical Targets

Withstand Load
8 lbs



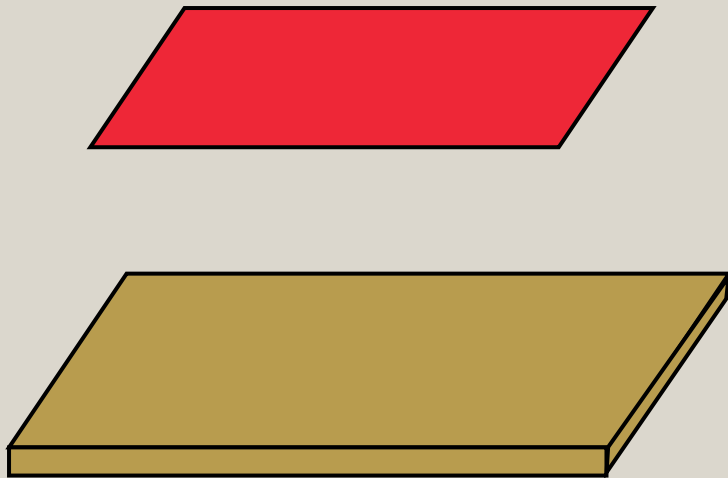
Reveal Ceramic Face
48 sec



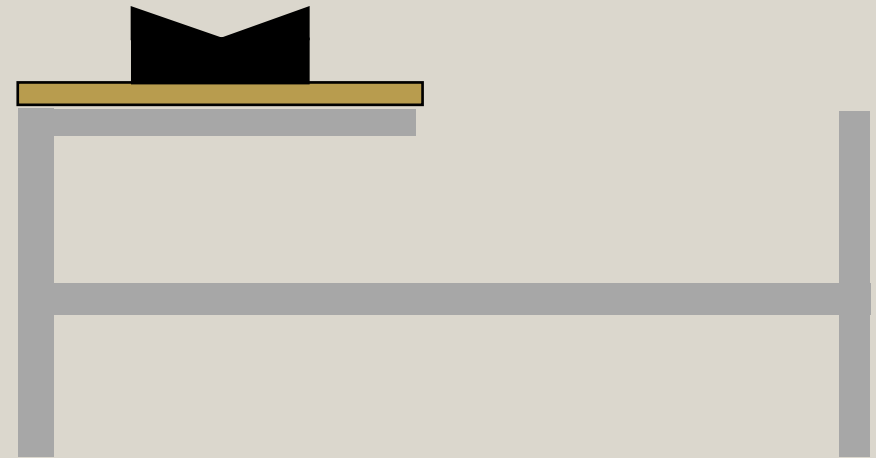
Taylor Larson

Critical Targets

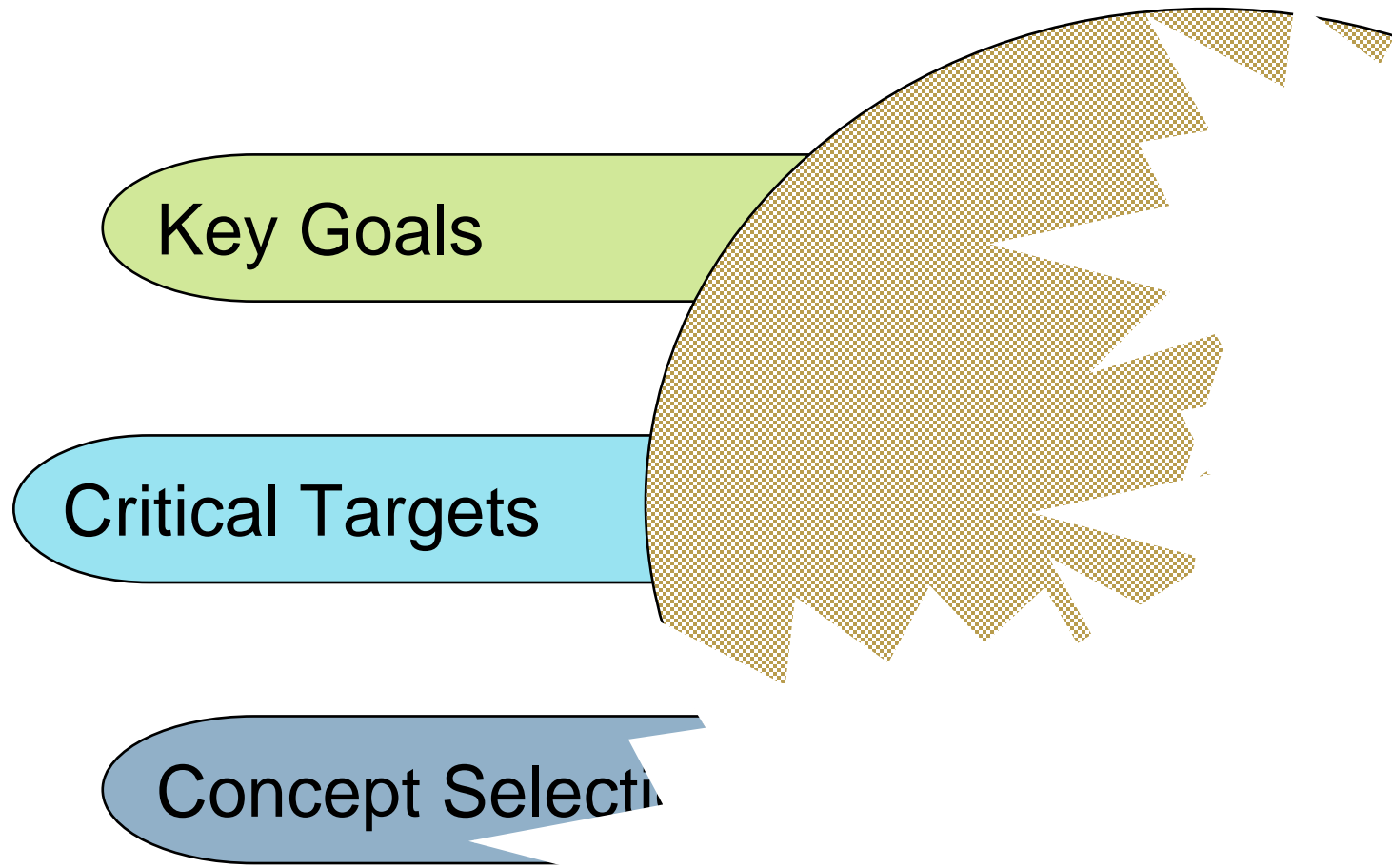
Integrate with Pallet
297 in²



Fit Return System
6 in



Taylor Larson



Taylor Larson

Concept Generation Tools

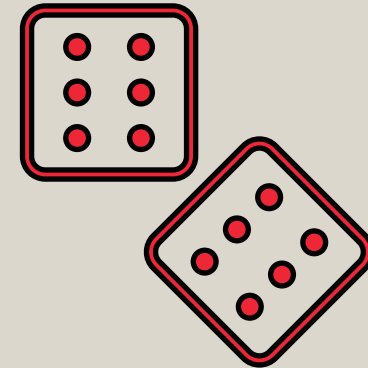
Biomimicry



Brainstorming

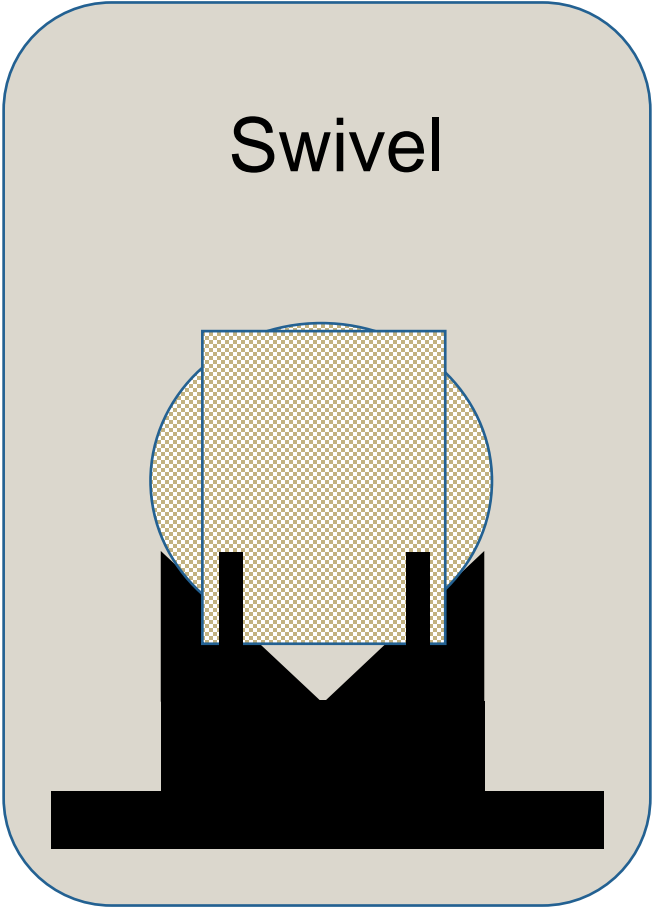
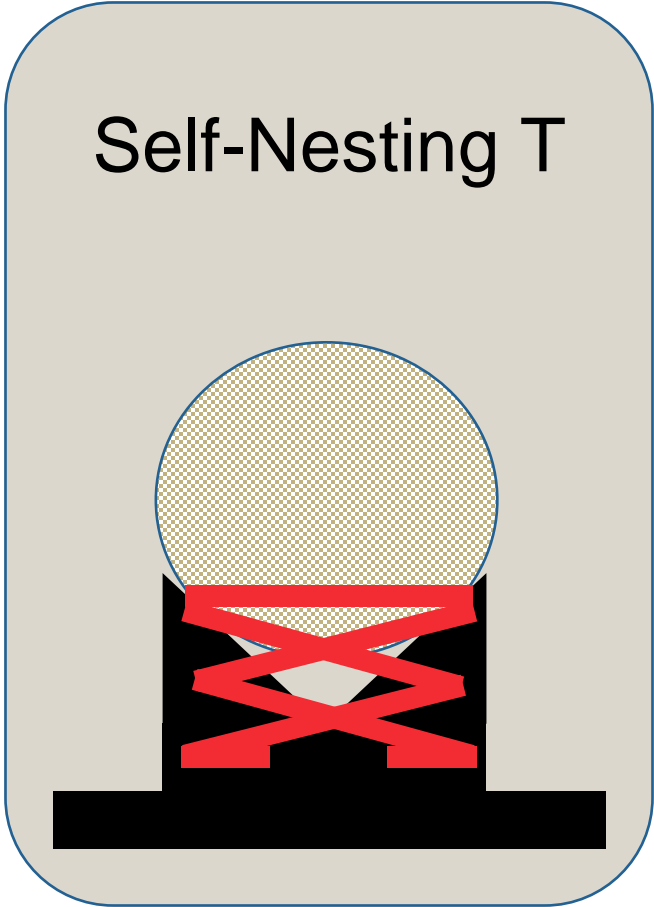
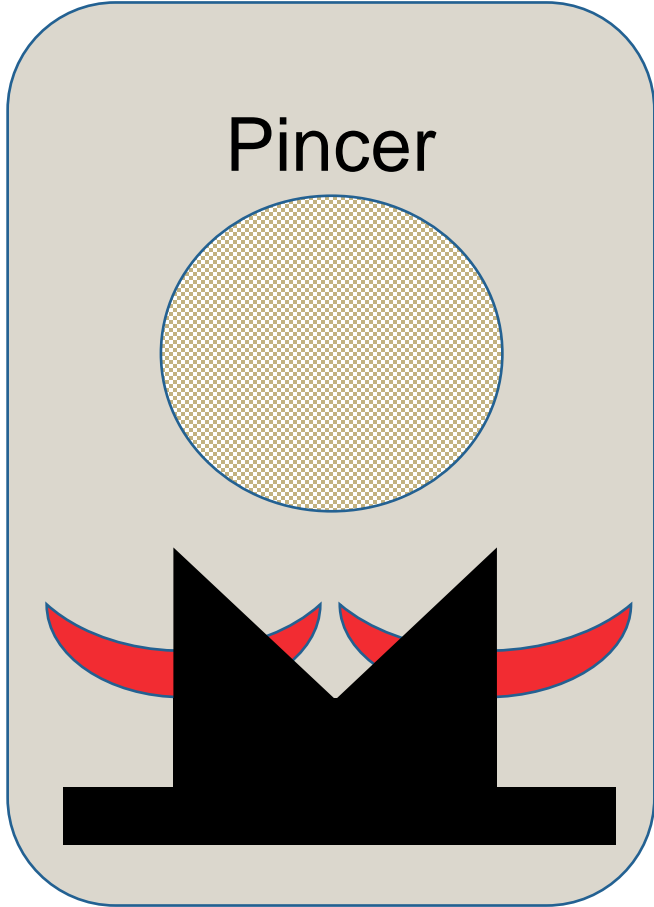


Crapshoot



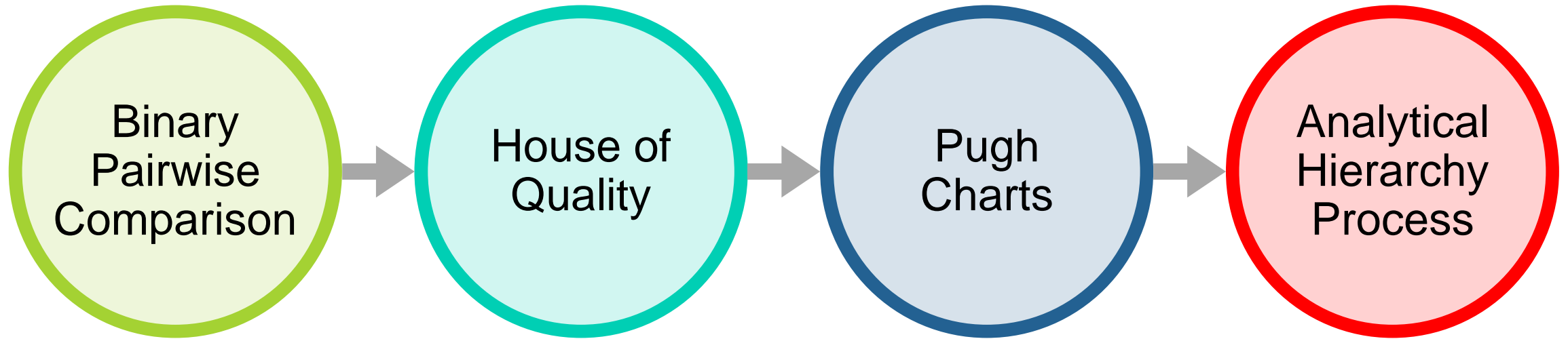
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Top 3 Concepts Generated



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Concept Selection



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Final Selection

Self-Nesting T

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

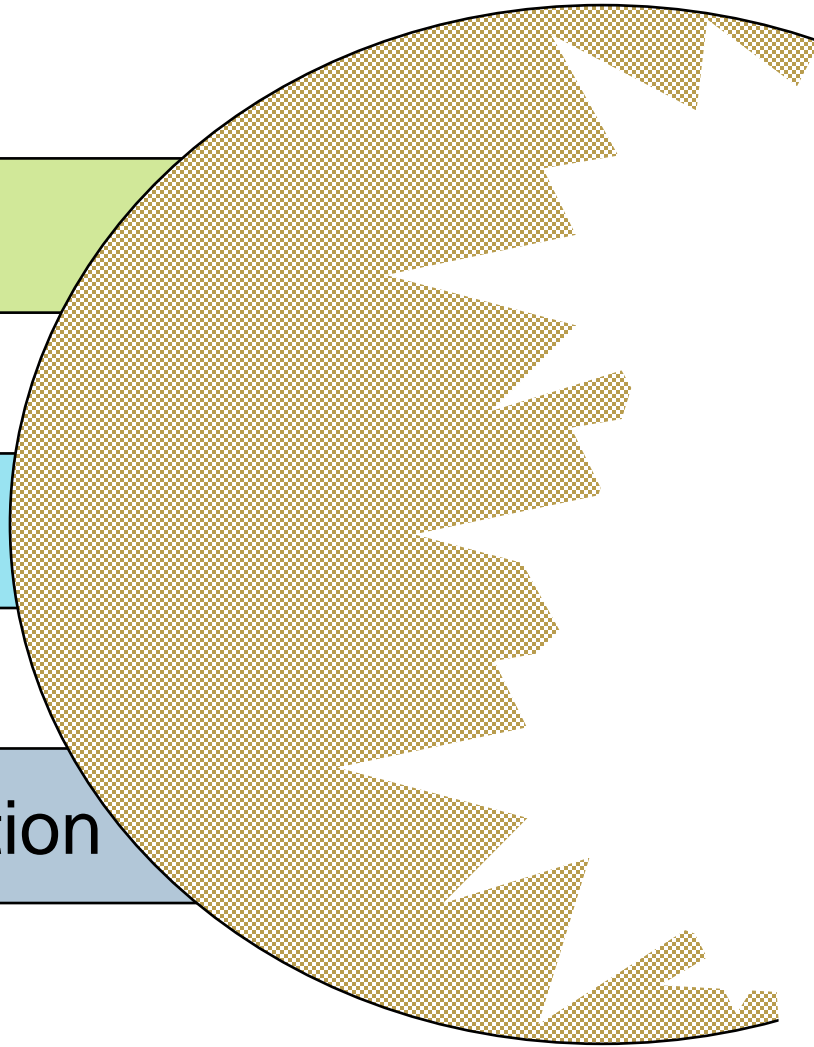


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Key Goals

Critical Targets

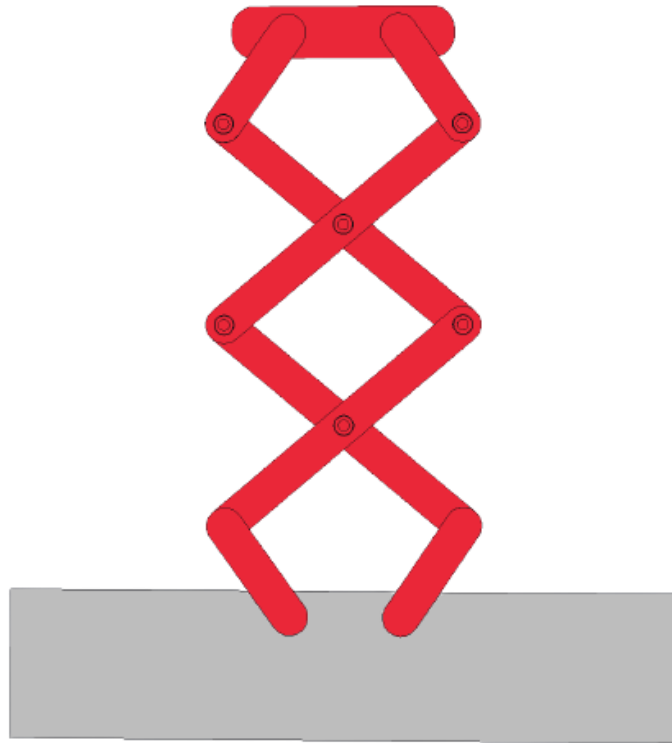
Concept Selection



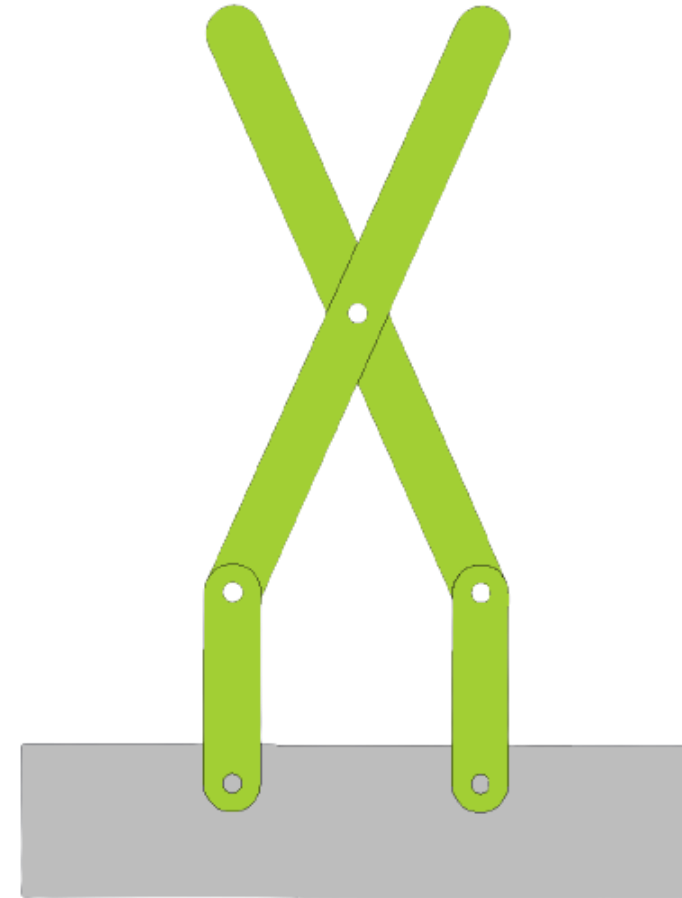
Design Update

Jared White

Design Update



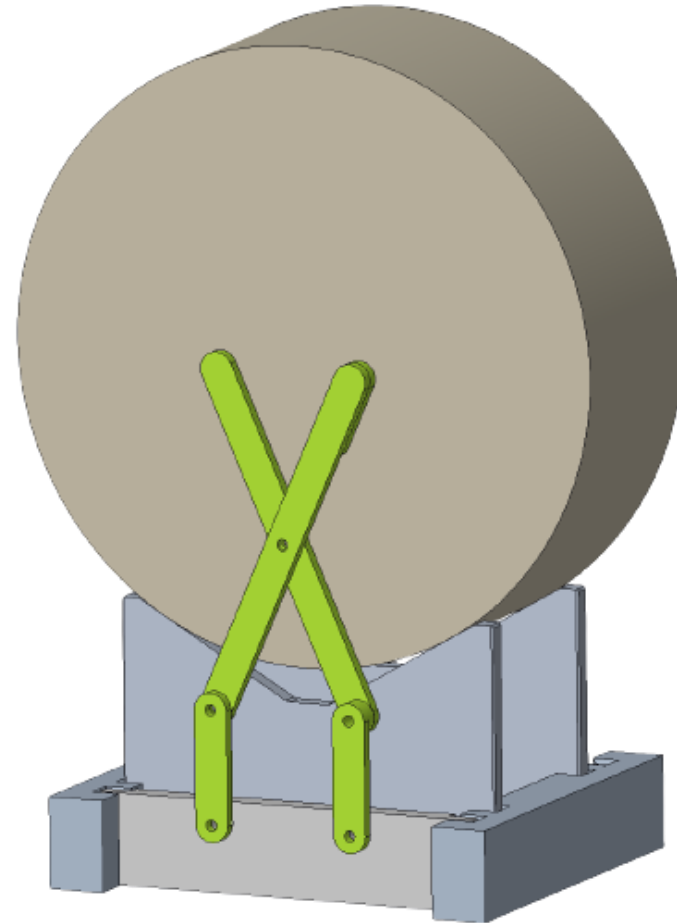
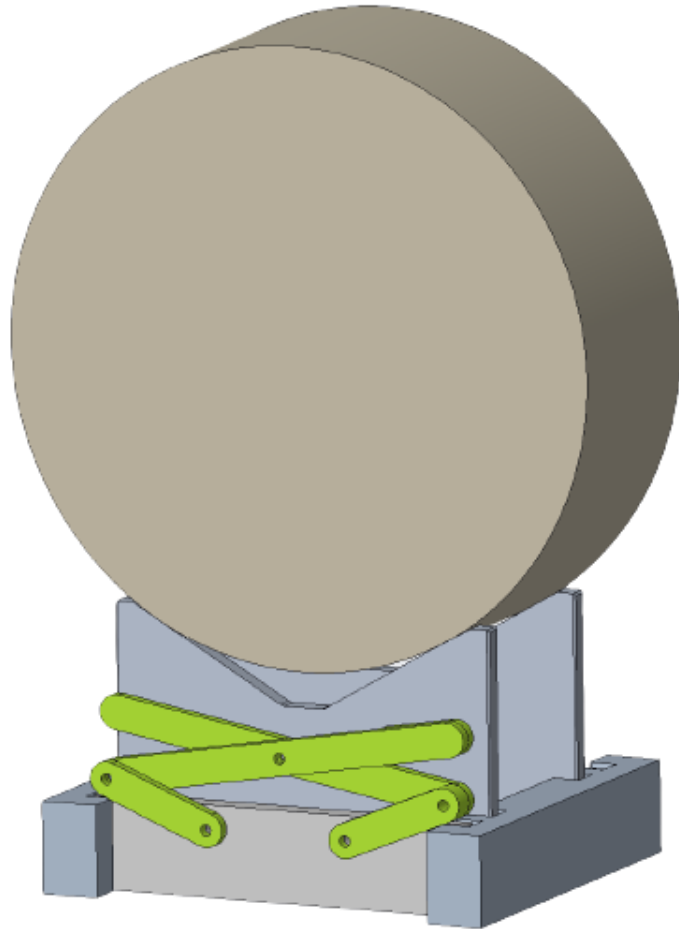
Original Design



Current Design

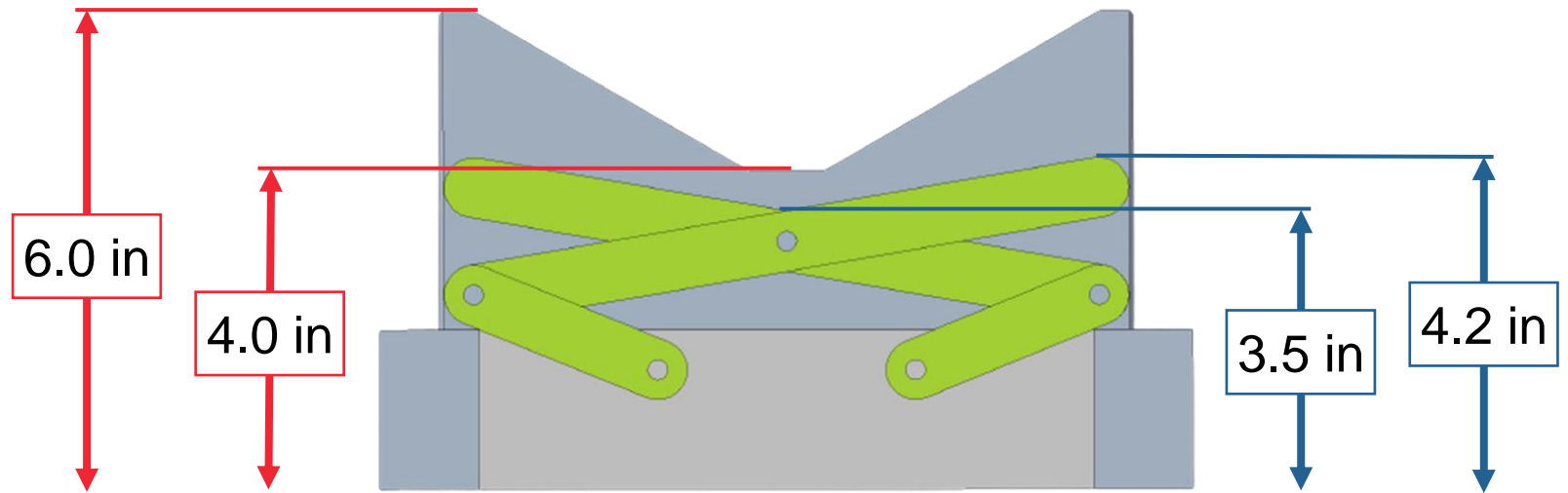
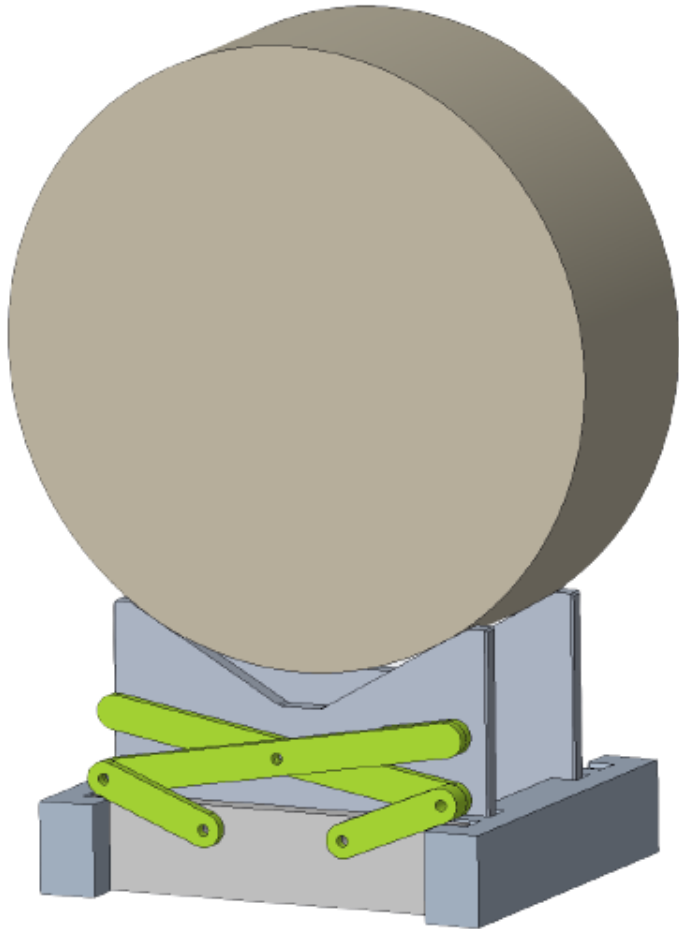
Jared White

Vertical Retraction and Expansion



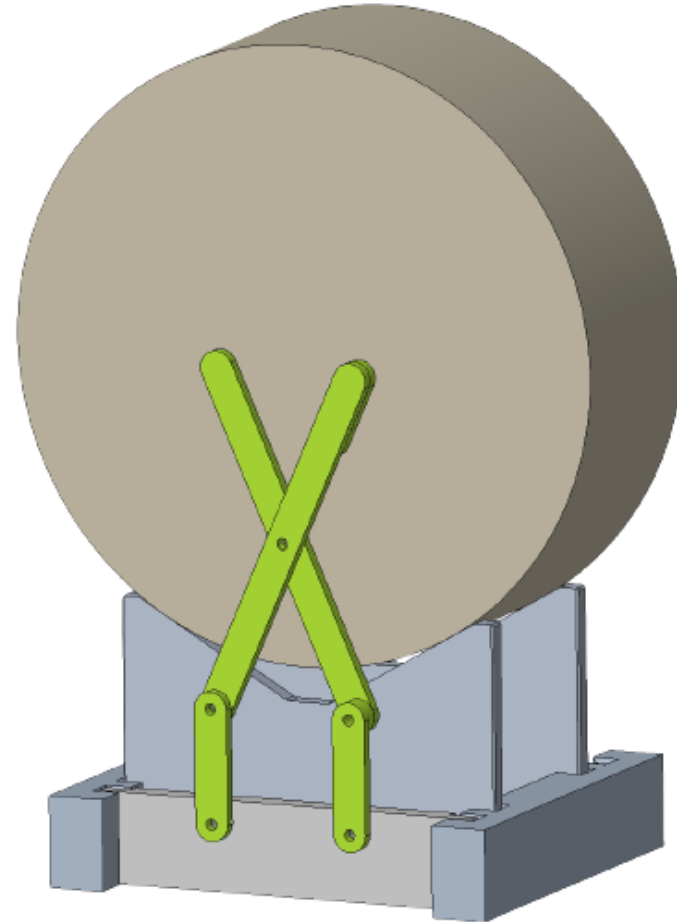
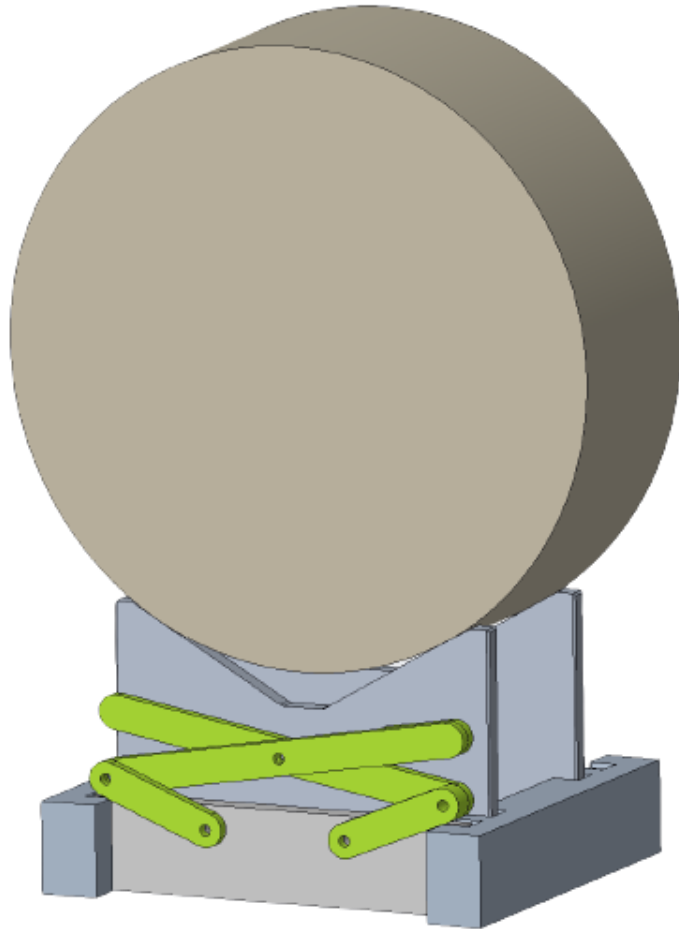
Jared White

Vertical Retraction and Expansion



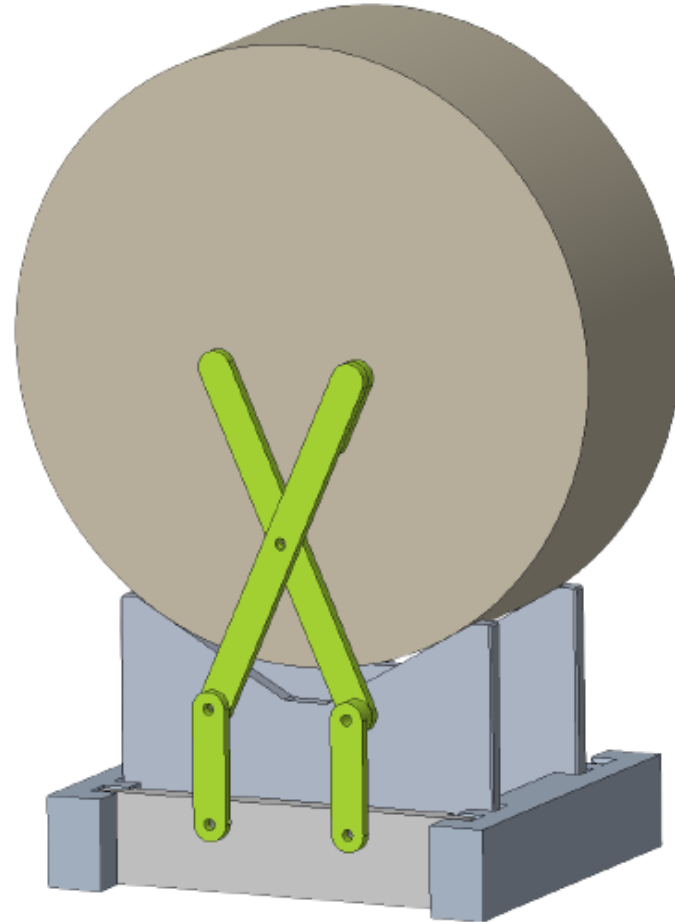
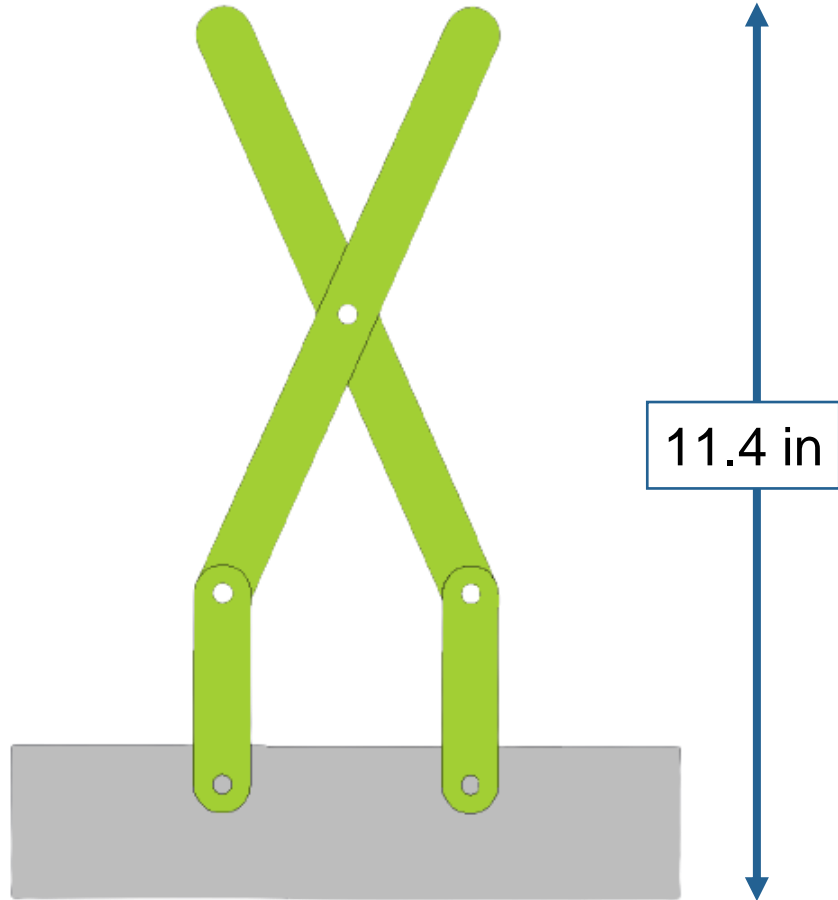
Jared White

Vertical Retraction and Expansion

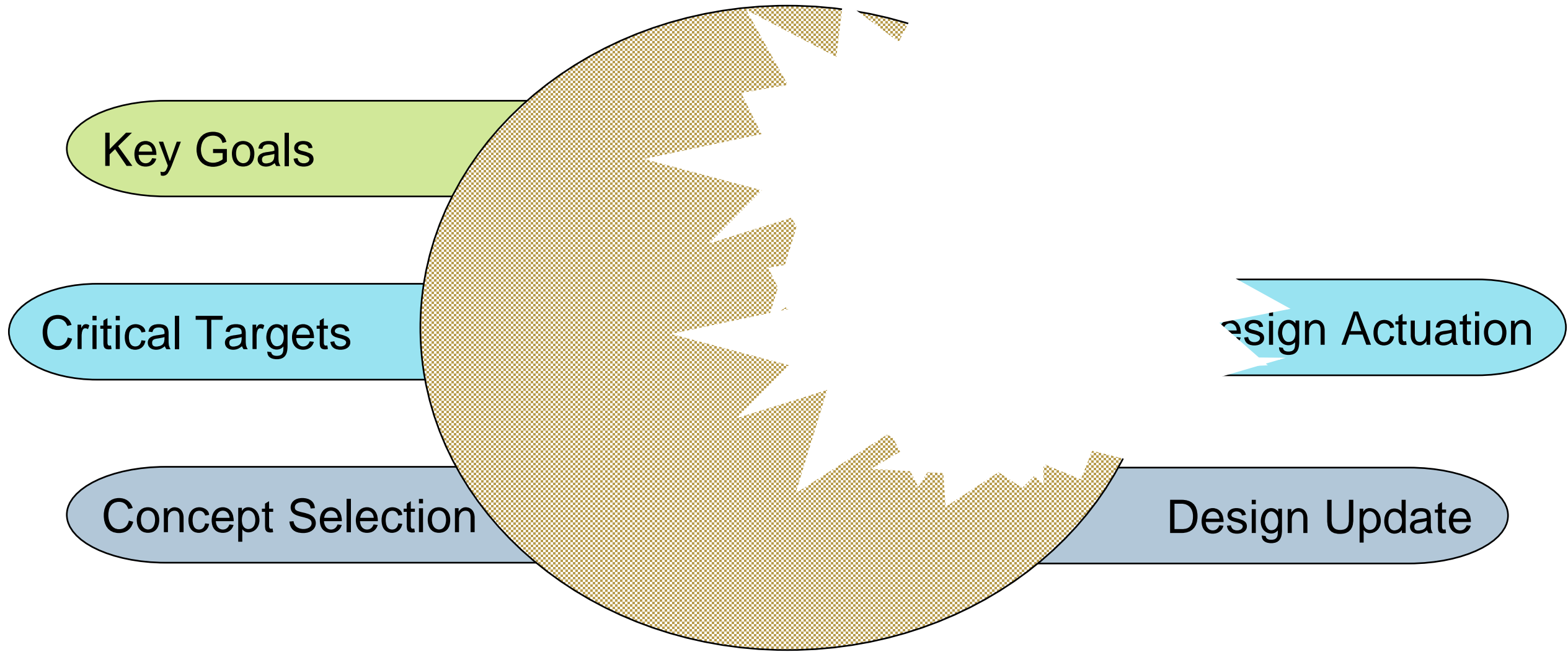


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Vertical Retraction and Expansion



Jared White

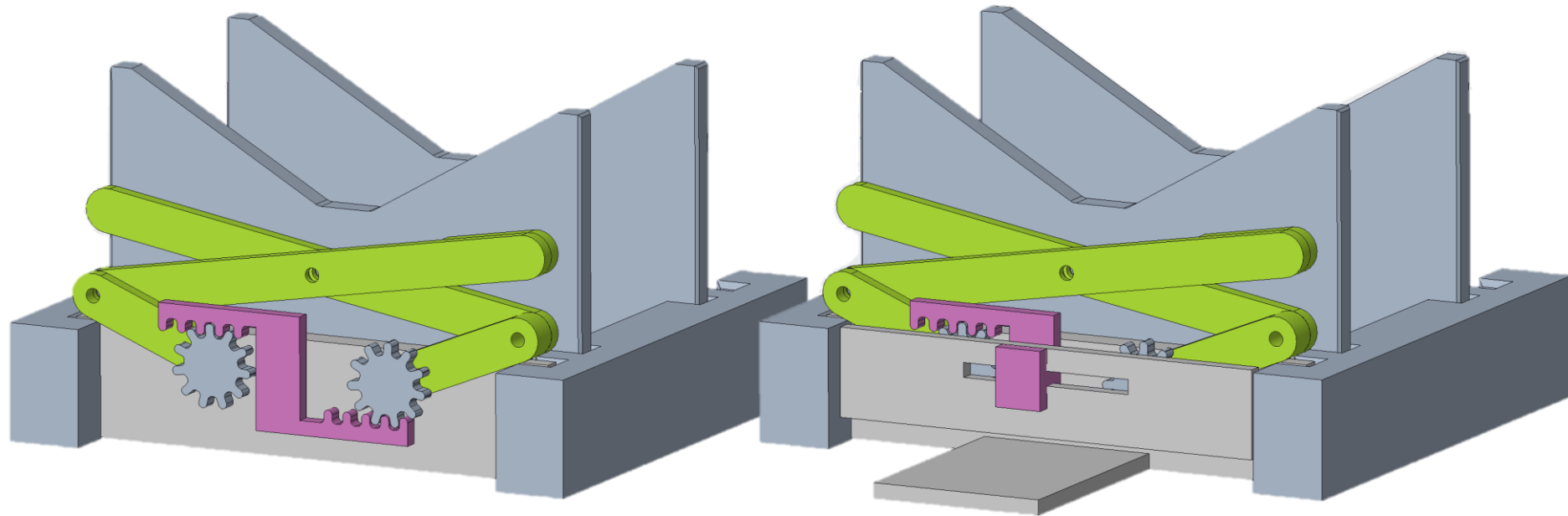


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Vertical Retraction and Expansion

Gear and Rack Slider

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

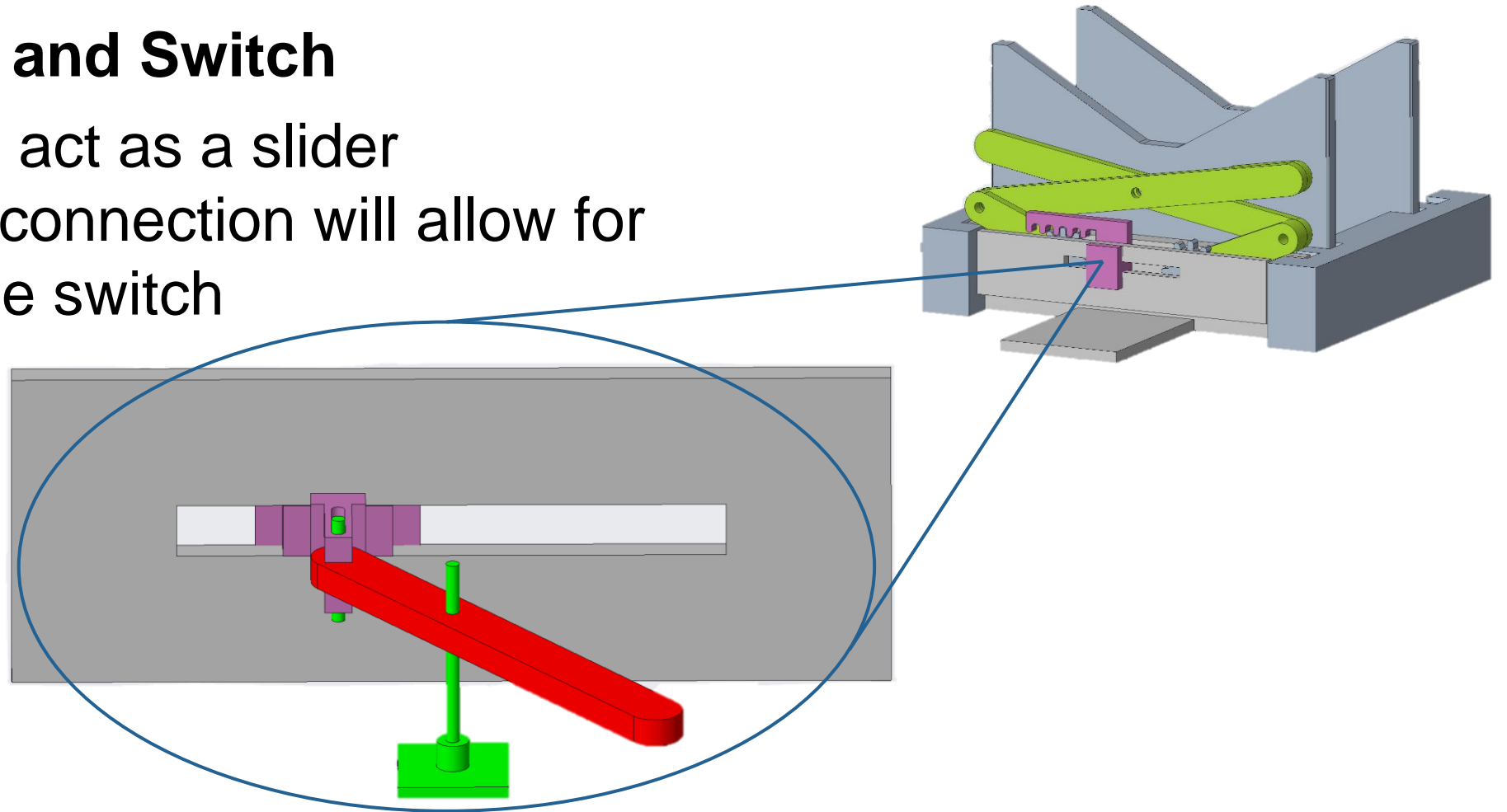


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Vertical Retraction and Expansion

Slider Joint and Switch

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

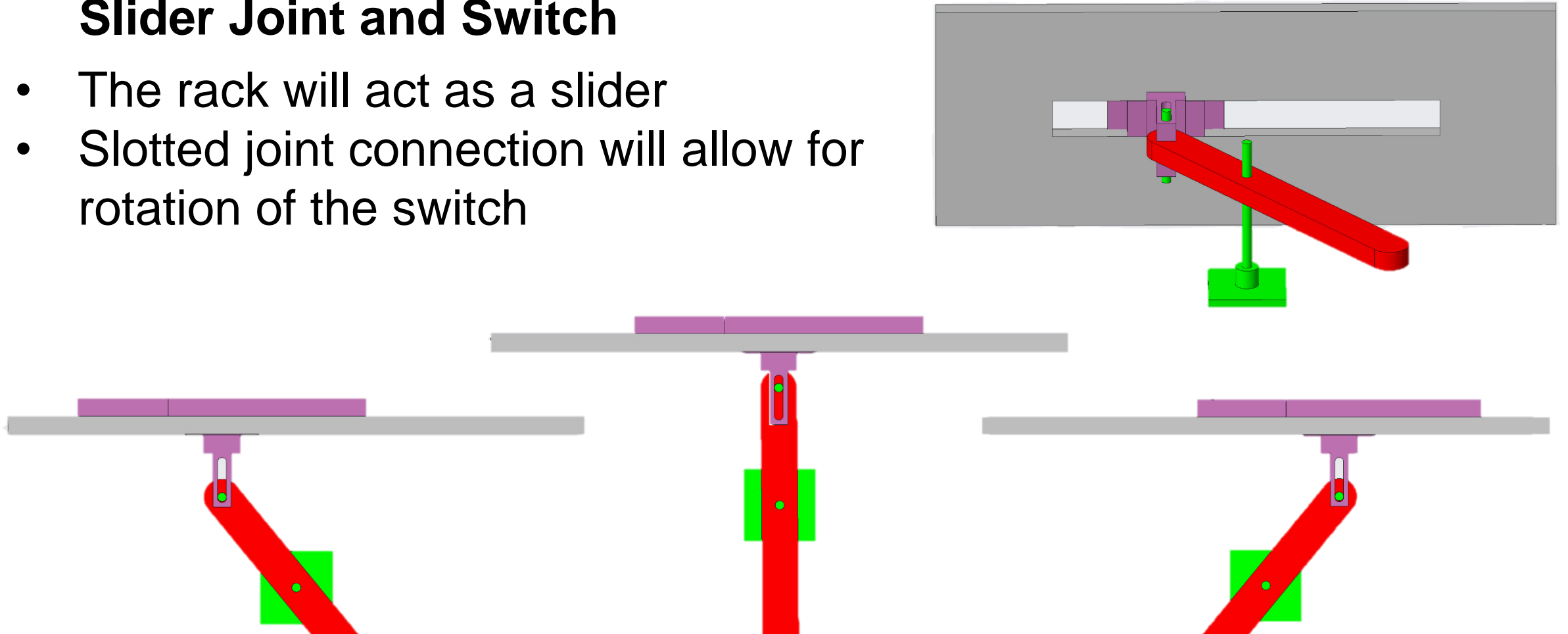


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Vertical Retraction and Expansion

Slider Joint and Switch

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



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Material Selection

Base and Linkages

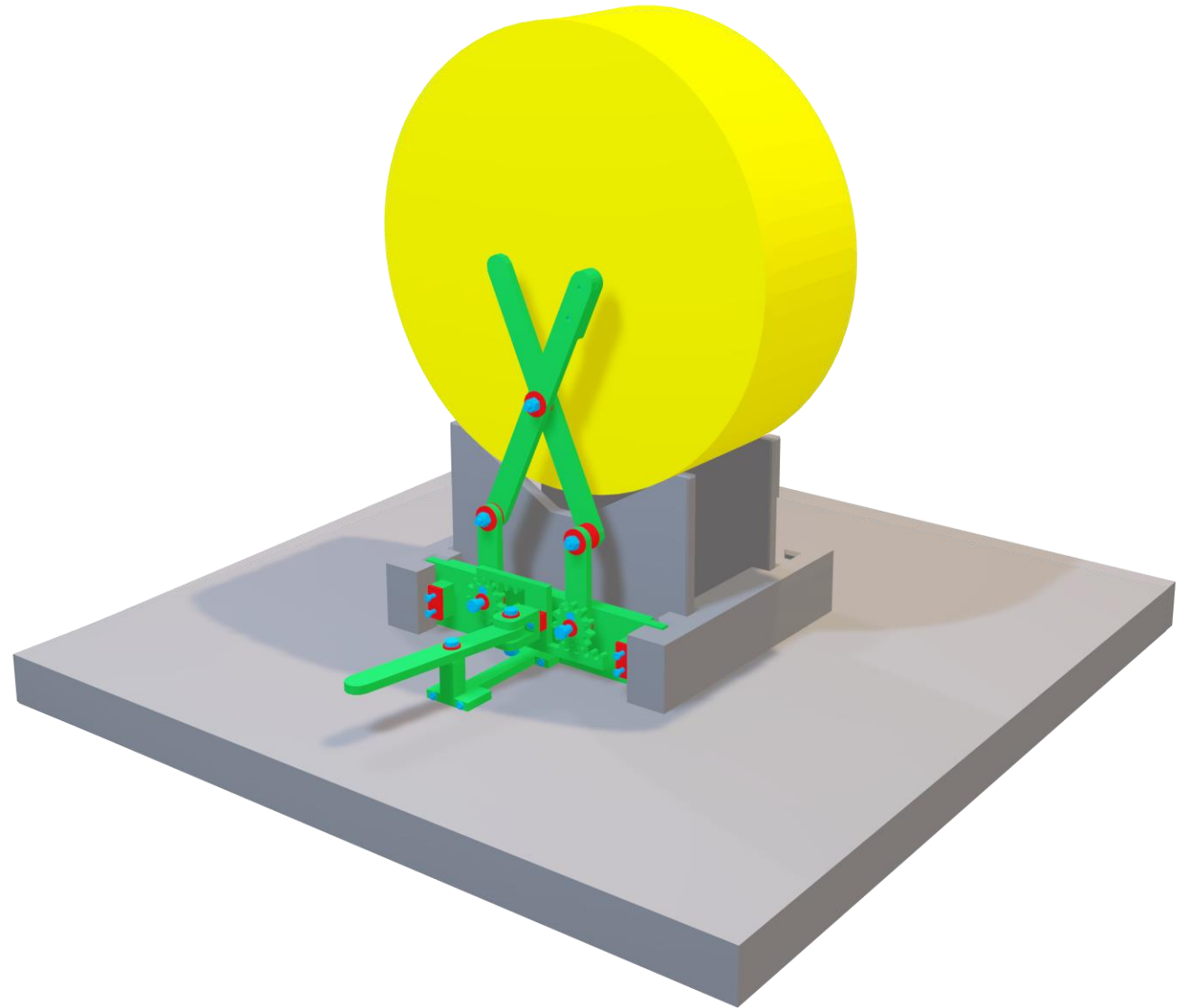
- Aluminum 6061

Joints

- Alloy steel shoulder bolts

Washers and Spacers

- UHMW Polyethylene



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Key Goals

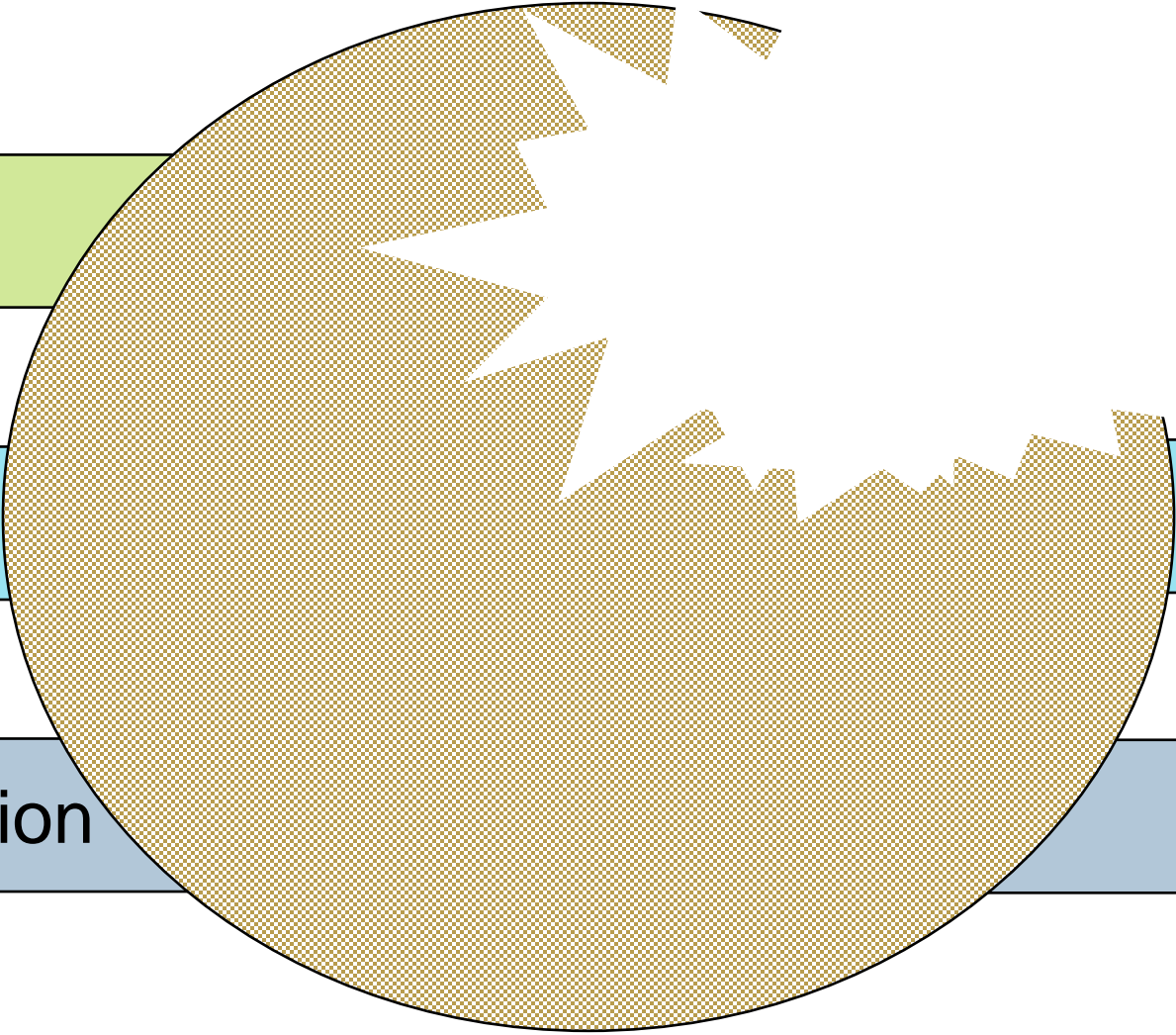
Conceptual Design

Critical Targets

Design Actuation

Concept Selection

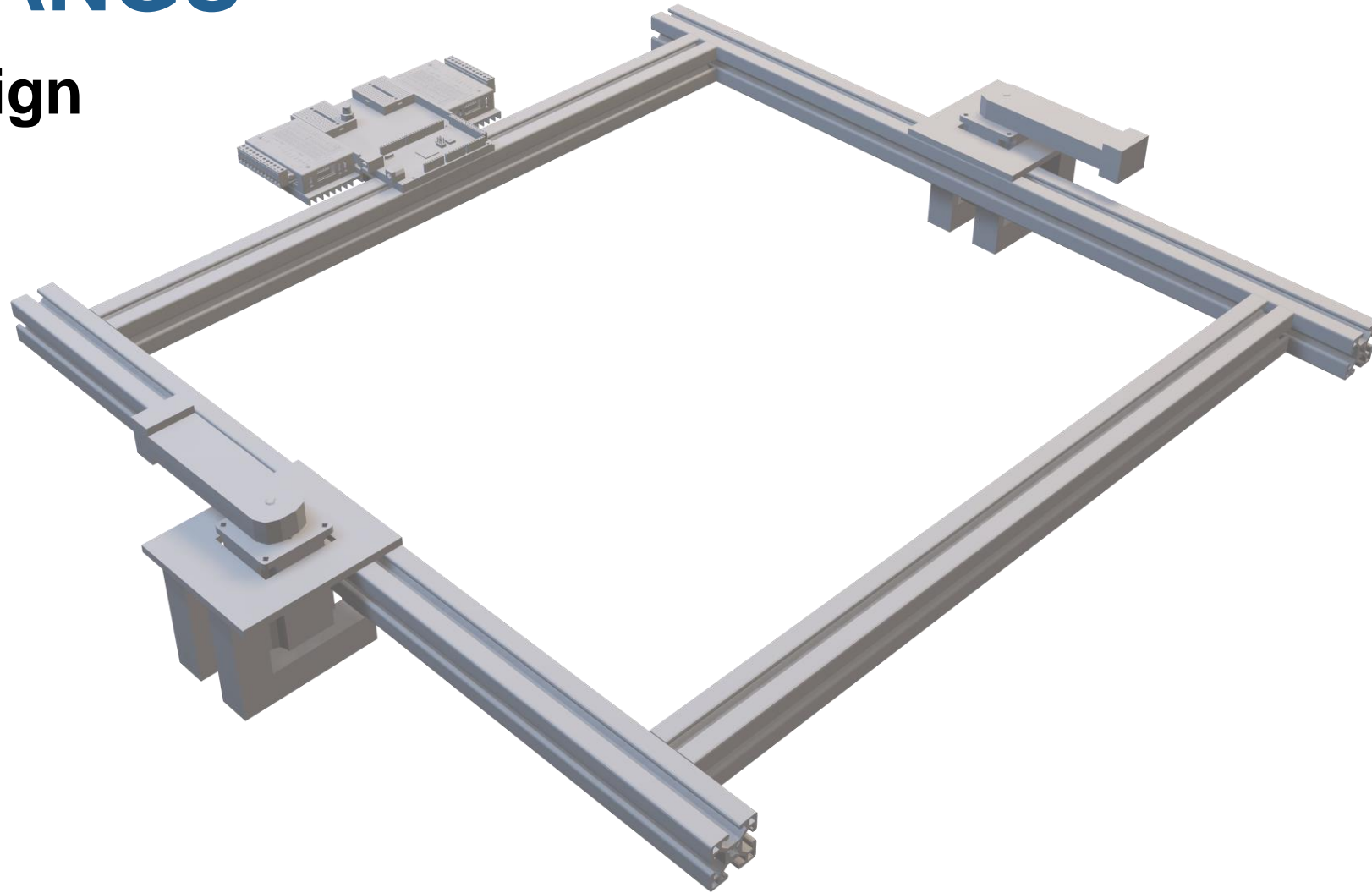
Design Update



Pawel Grum

OVERHANGS

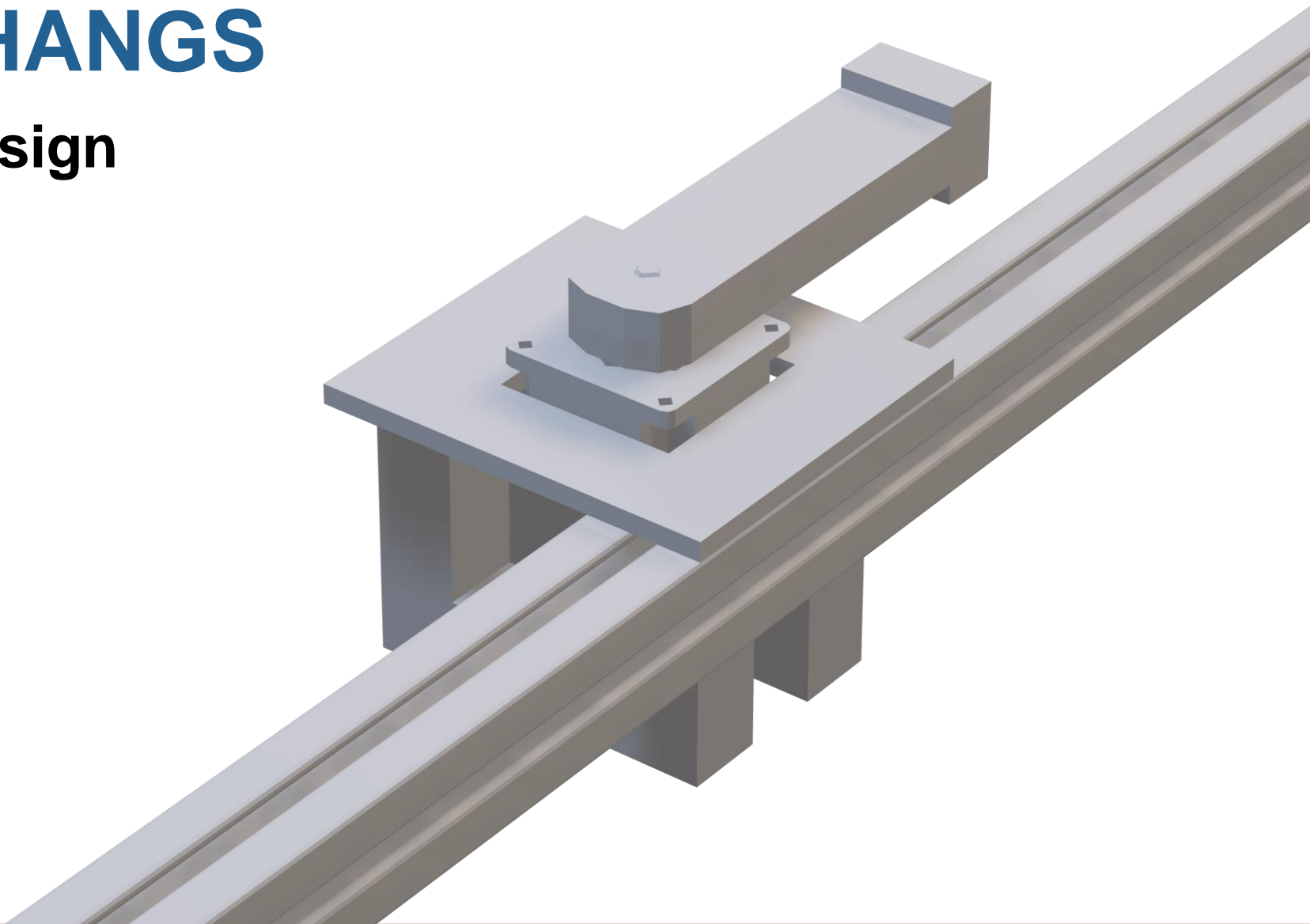
Full Design



Pawel Grum

OVERHANGS

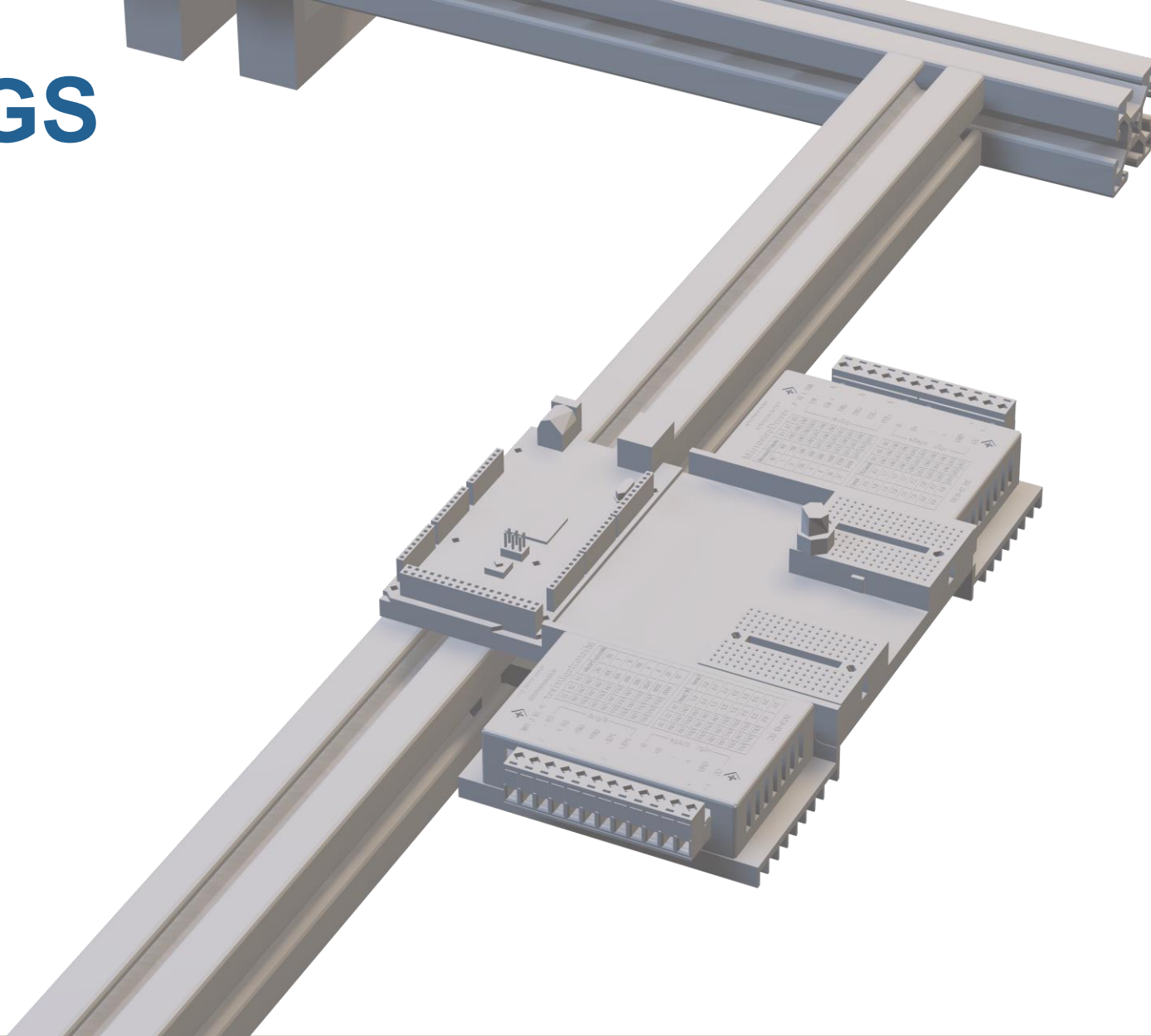
Full Design



Pawel Grum

OVERHANGS

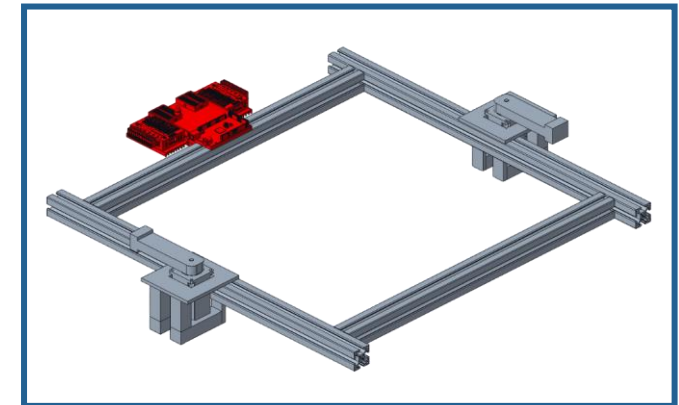
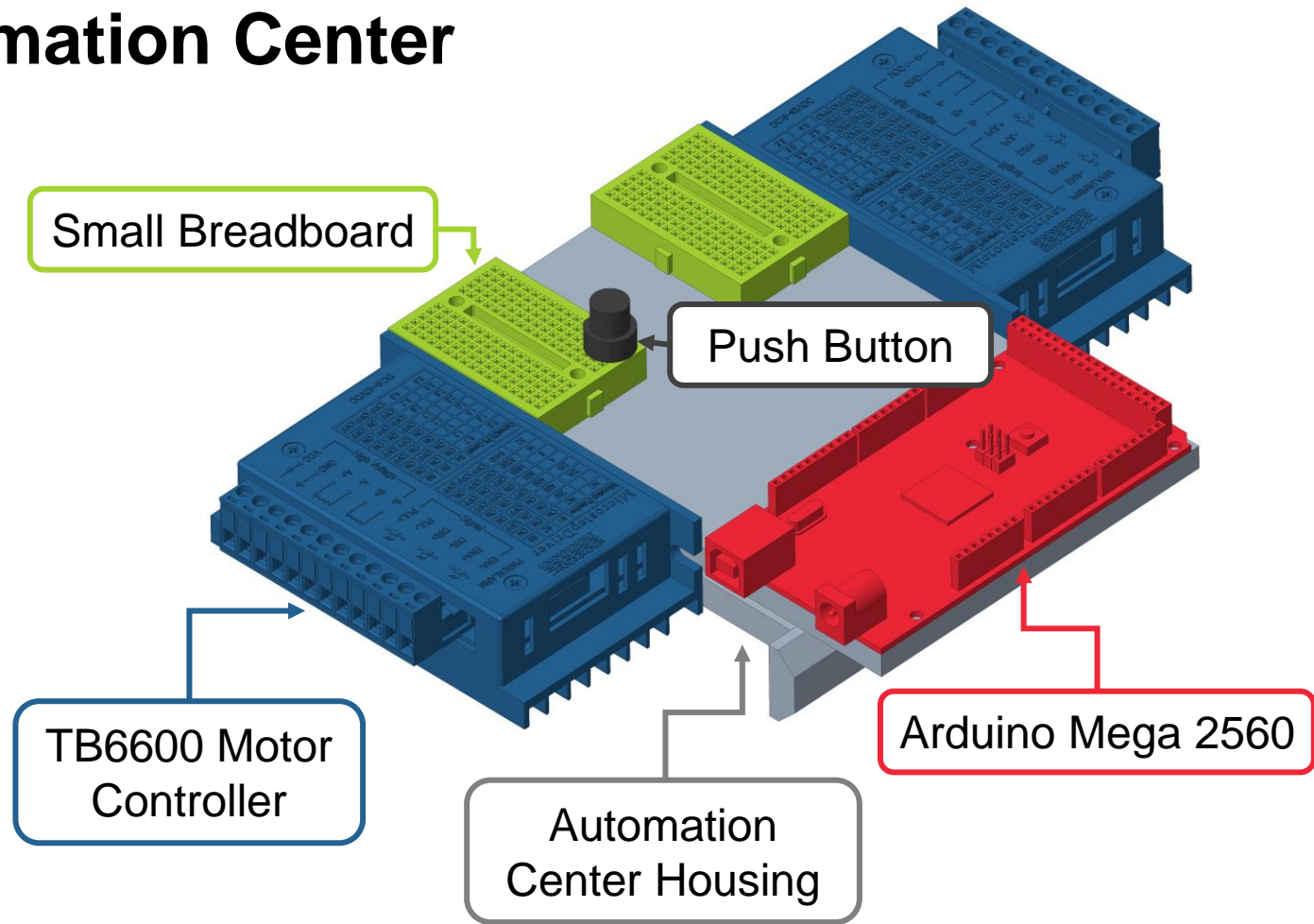
Full Design



Pawel Grum

OVERHANGS

Automation Center

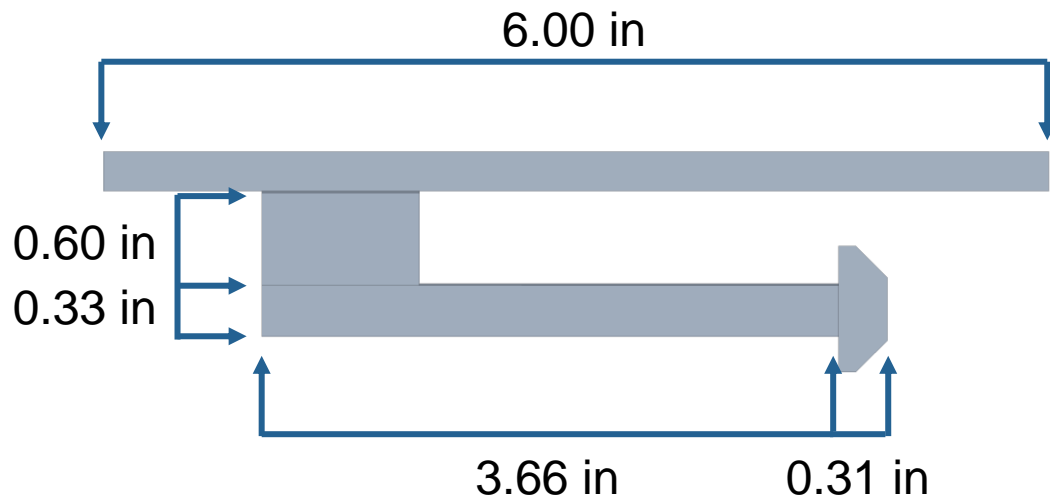


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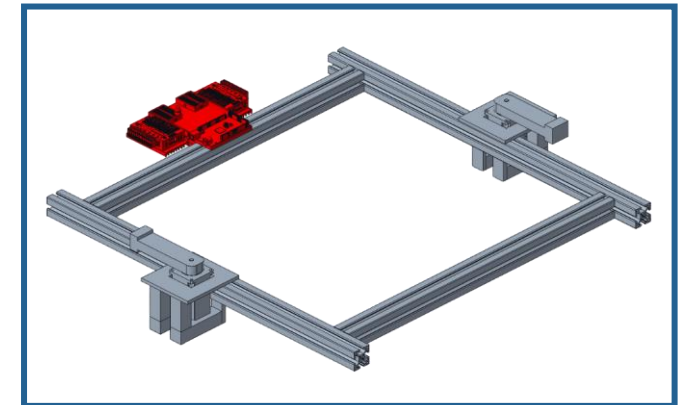
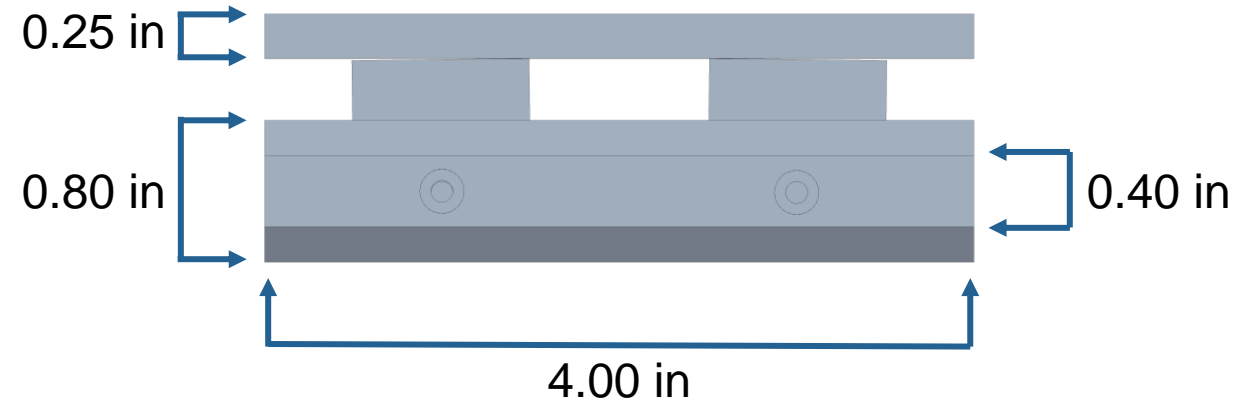
OVERHANGS

Automation Center Housing

Side View



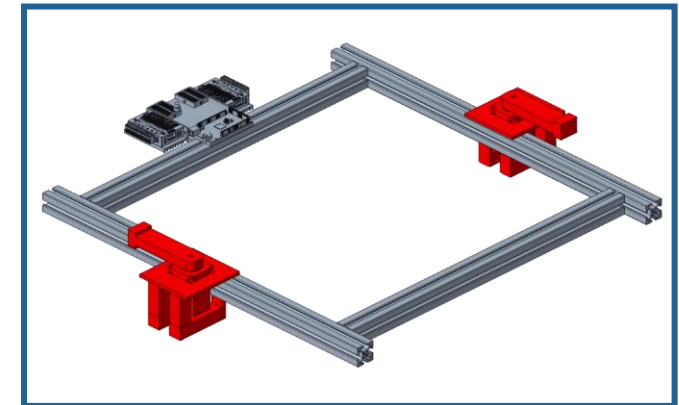
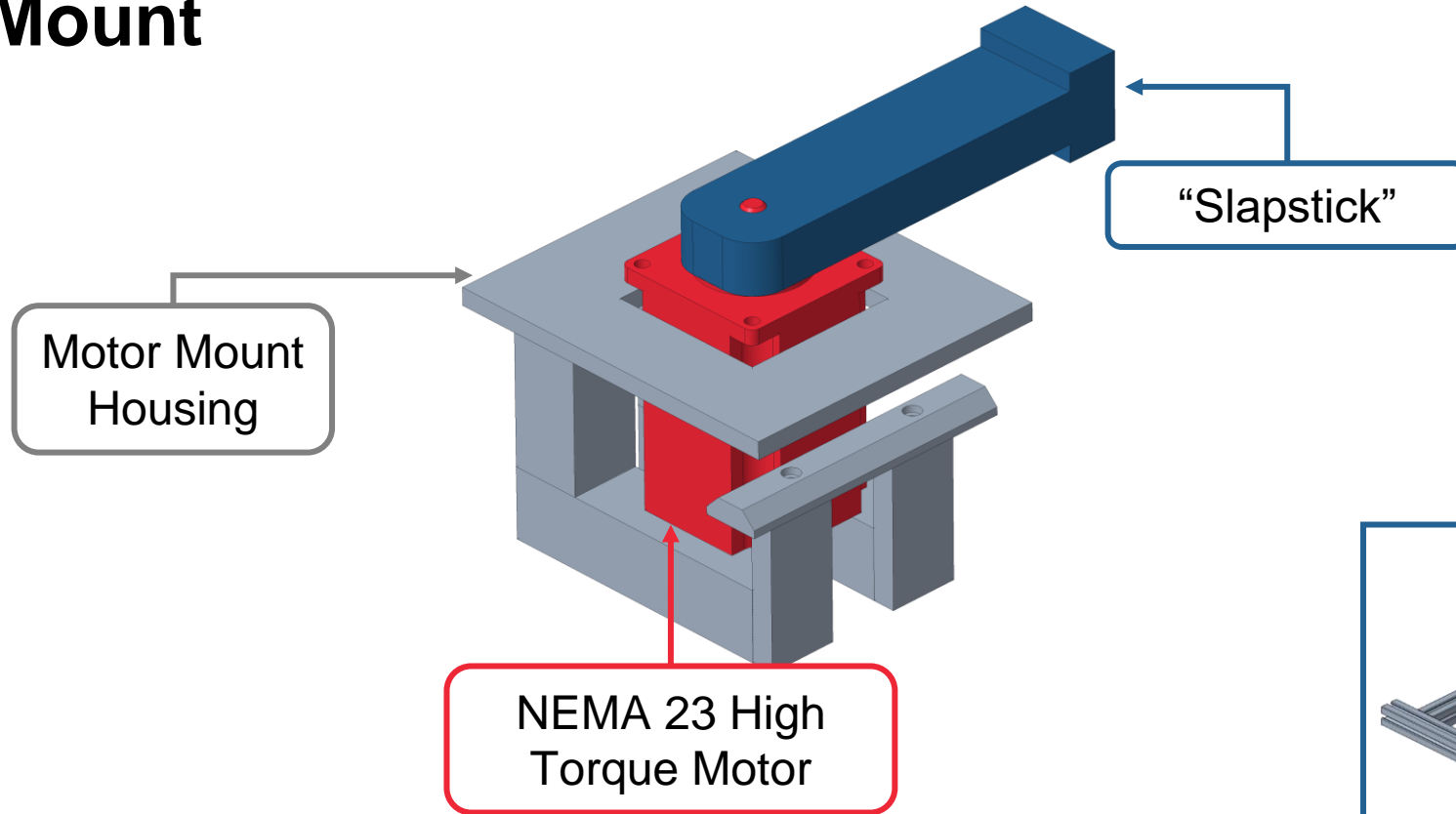
Front View



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OVERHANGS

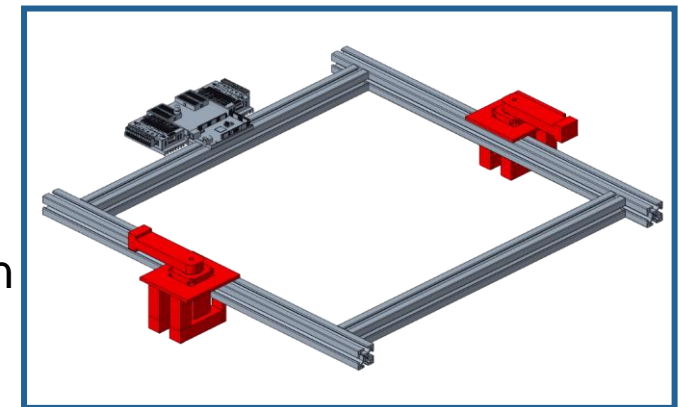
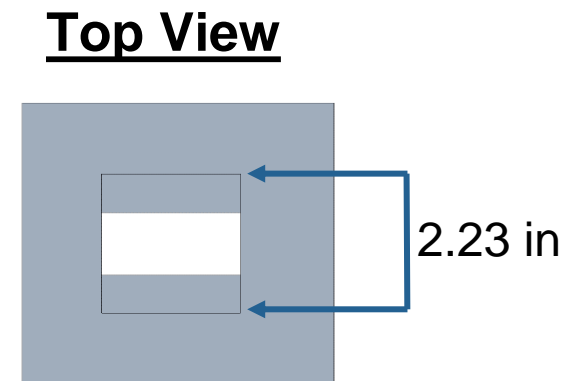
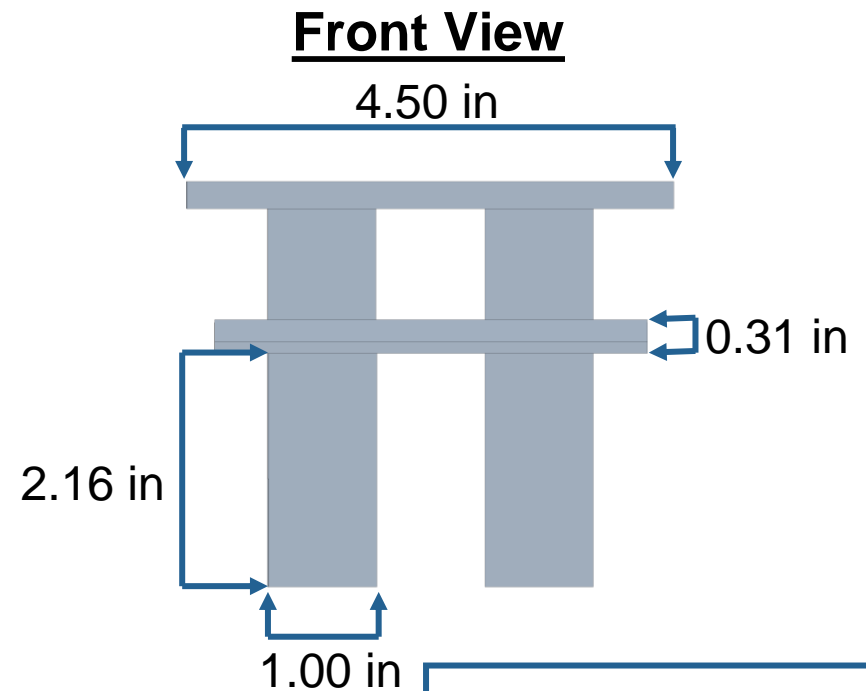
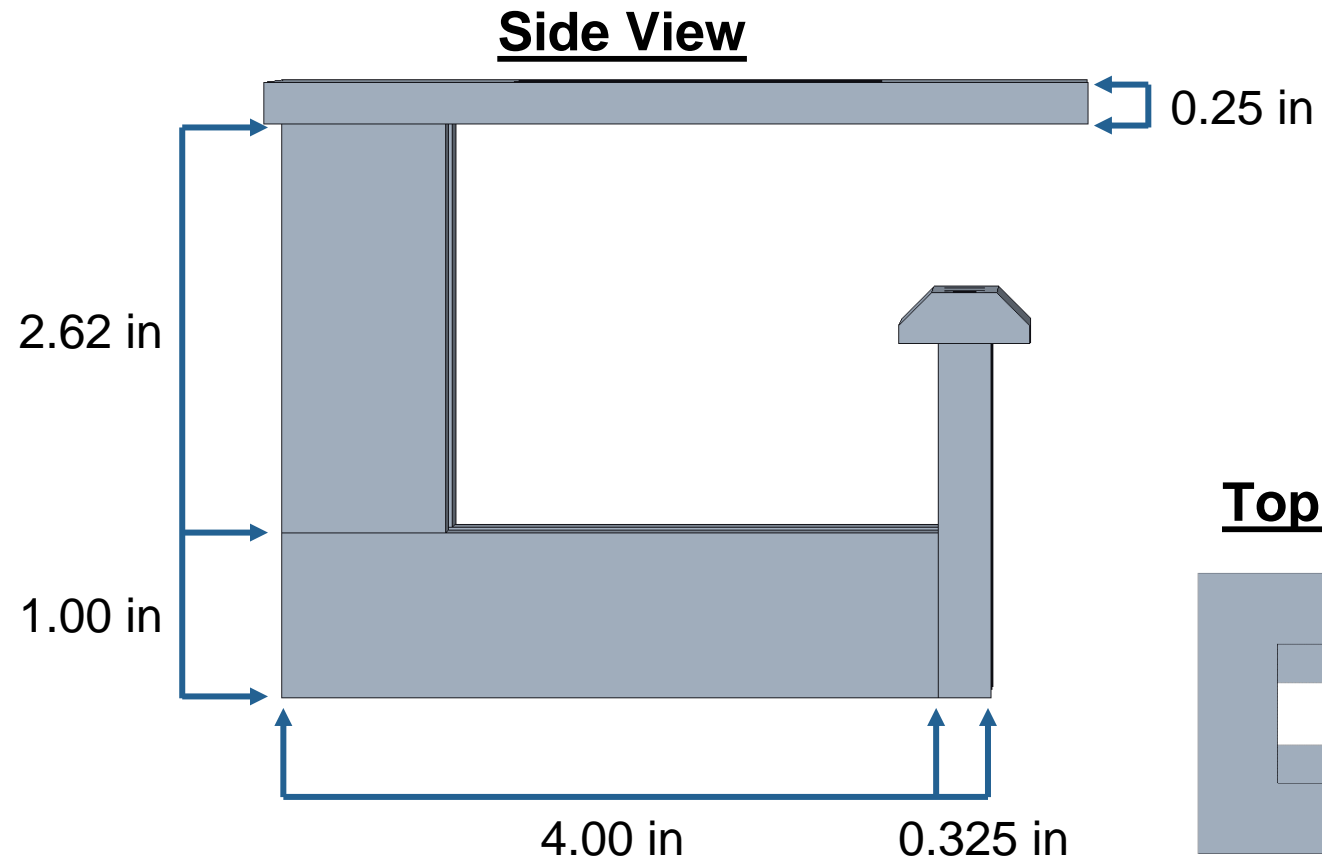
Motor Mount



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OVERHANGS

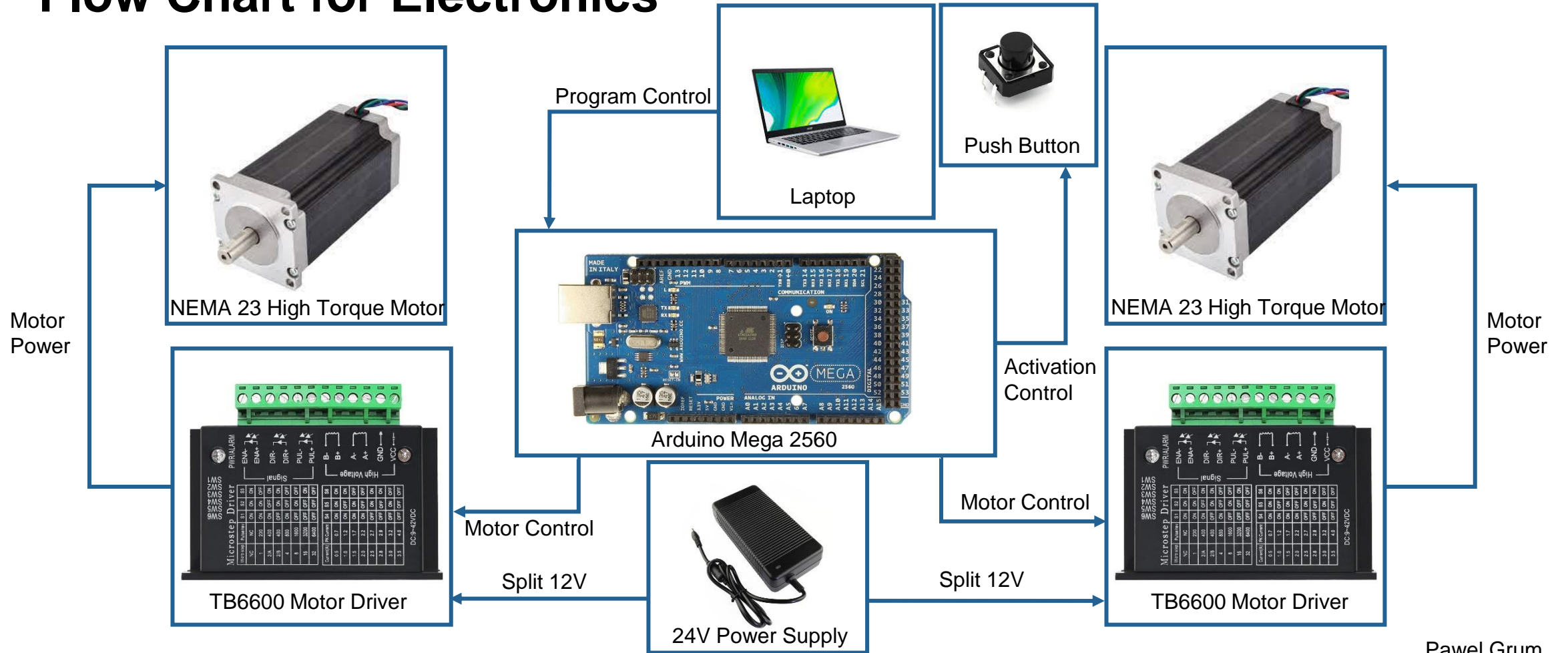
Motor Mount Housing



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CONNECTION MAP

Flow Chart for Electronics



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CONNECTION MAP

Corning RFID Integration

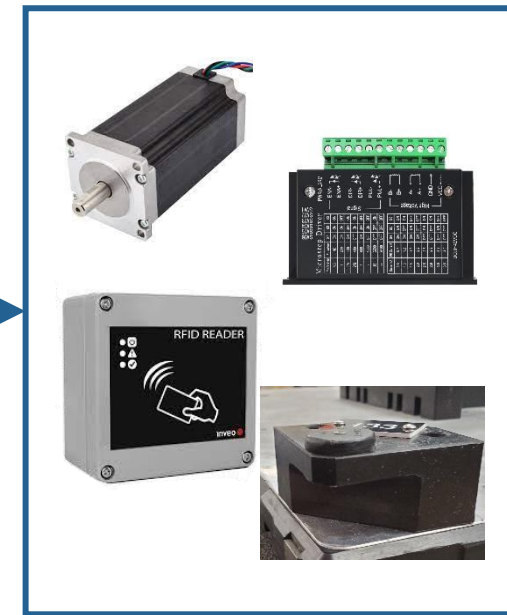
Our System



Corning's System



Integration

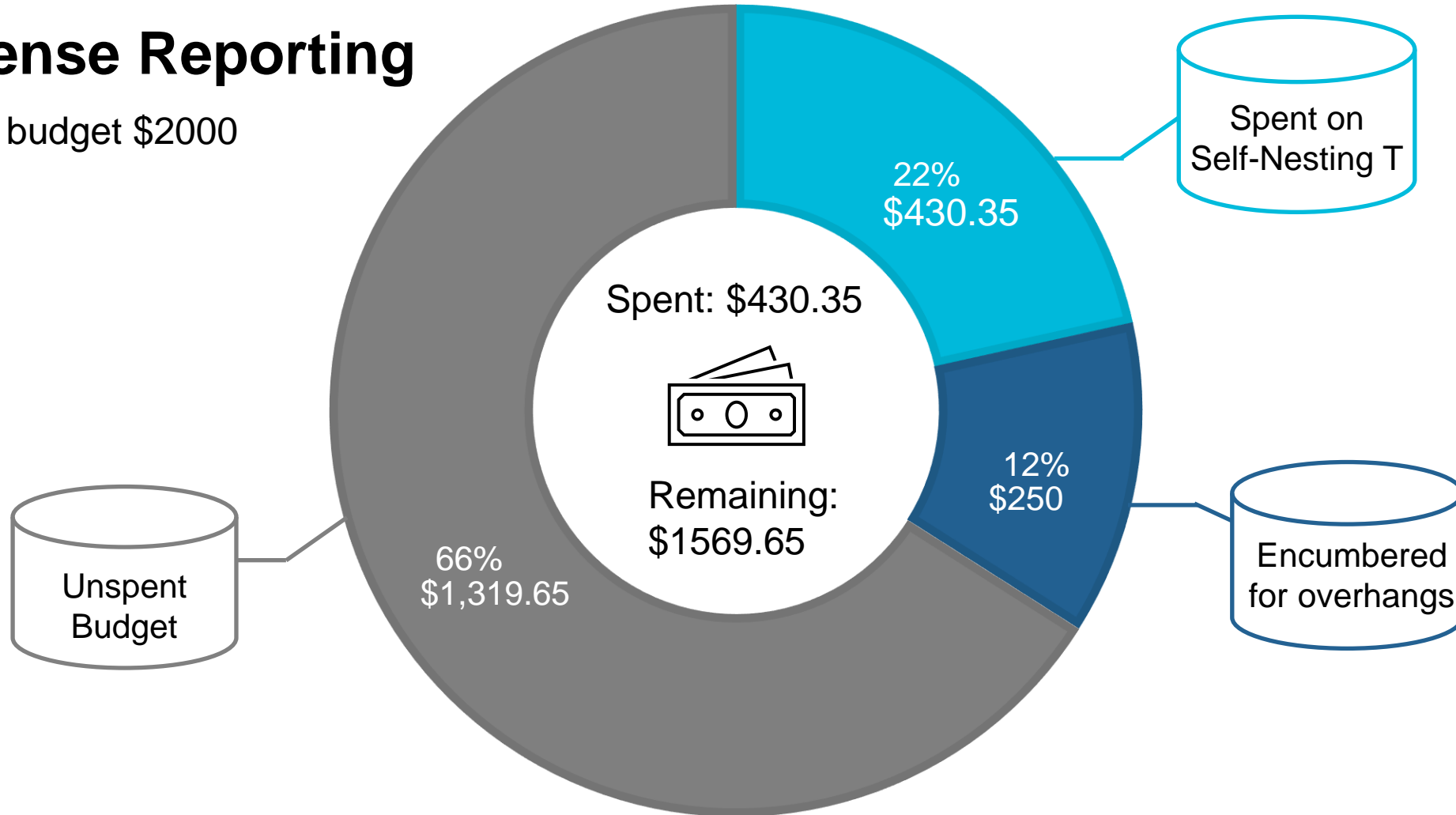


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BUDGET BREAKDOWN

Expense Reporting

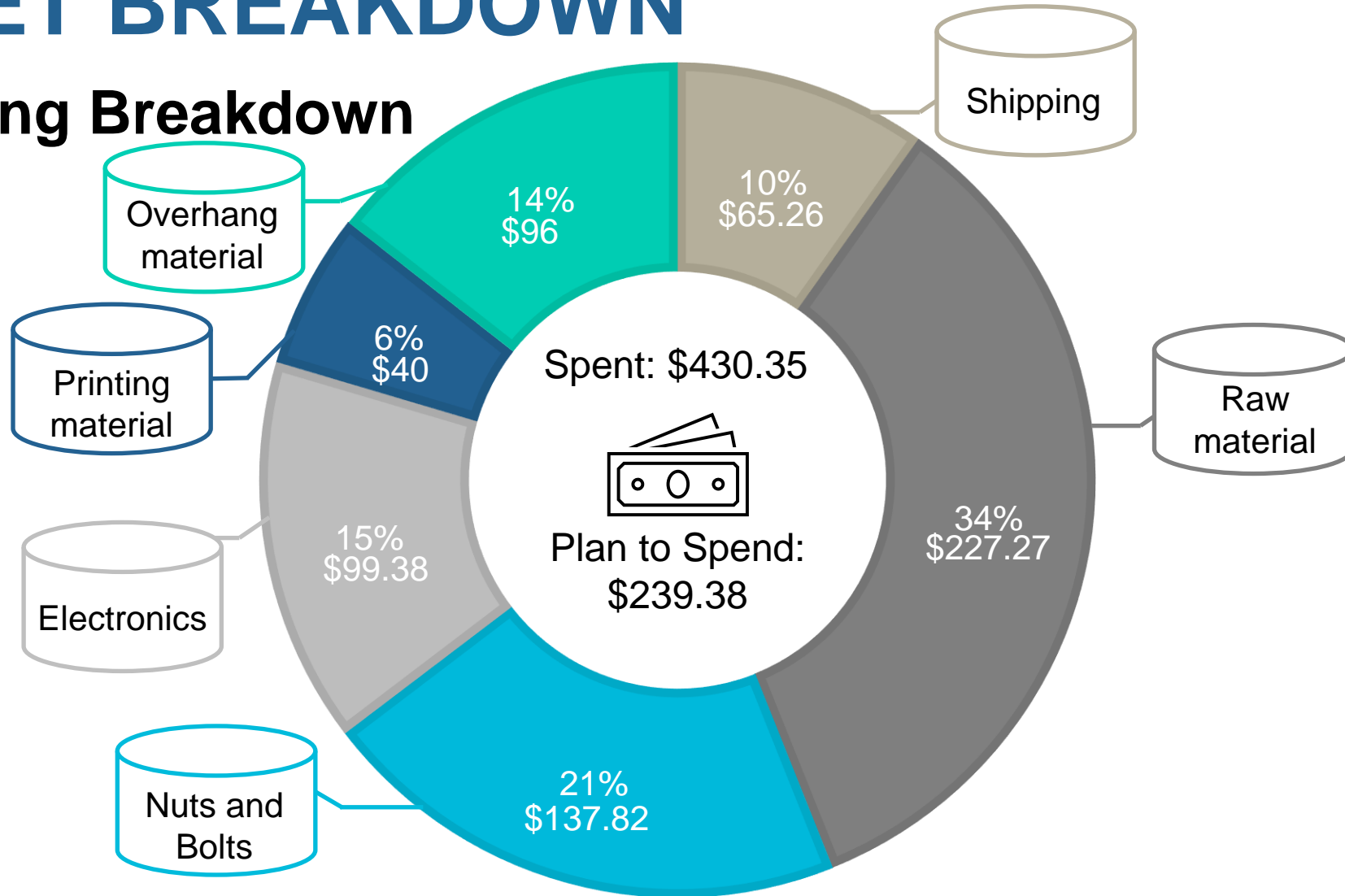
Project budget \$2000



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BUDGET BREAKDOWN

Spending Breakdown



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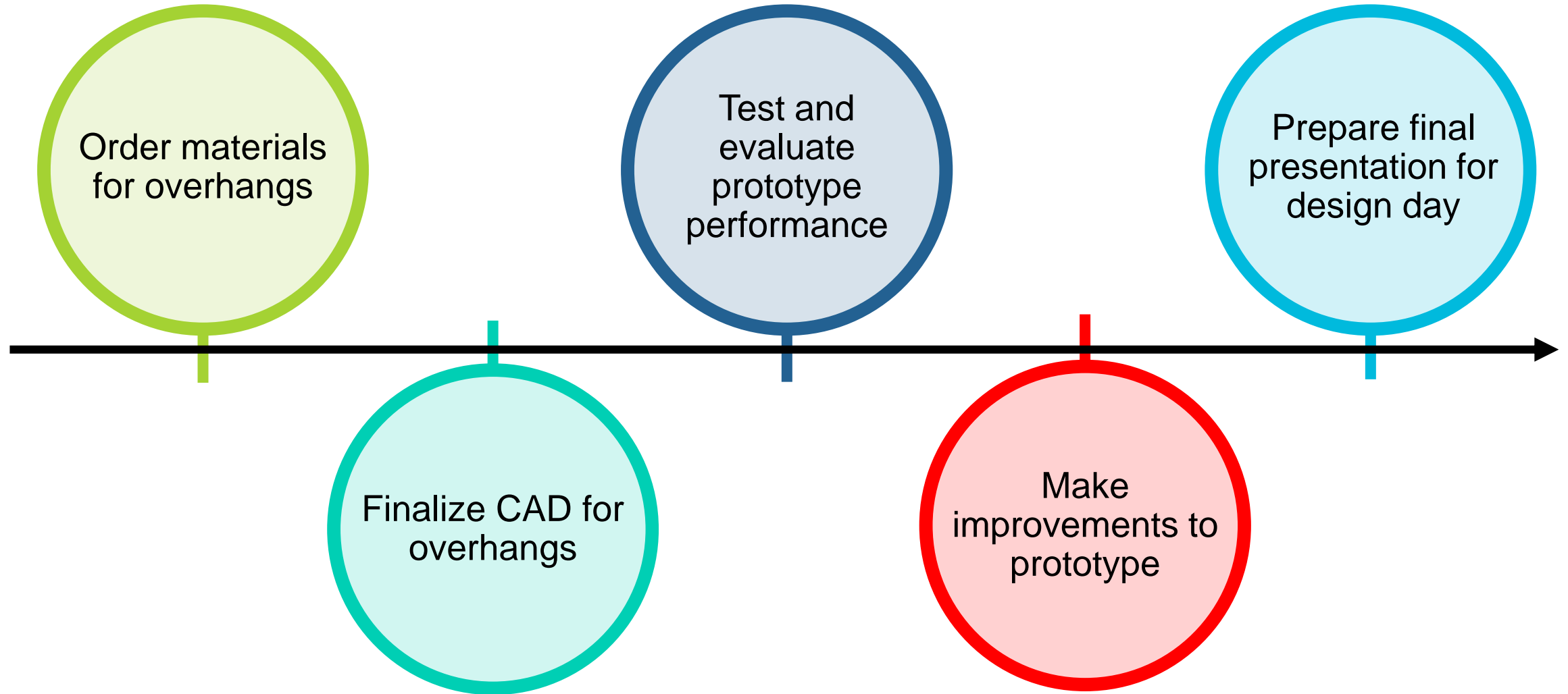
CURRENT CHALLENGES

- Finalize motorized overhang component selection
 - ❑ Determine final materials, motor type, and connection type
- Finalize motorized overhang CAD
 - ❑ Get CAD machine shop approved, order parts, and begin machining
- Test mechanisms durability
 - ❑ Mobility during harsh conditions, impact resistance, material resistance
- Improving initial prototype
 - ❑ Improvement to design, and functionality

Pawel Grum



FUTURE WORK



Pawel Grum

Thank you!

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