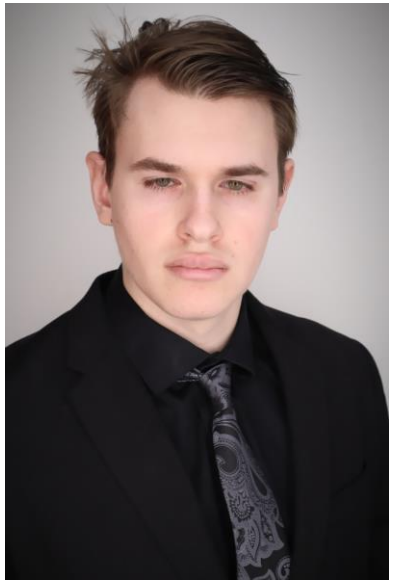
FAMU-FSU College of Engineering

Design Review 6

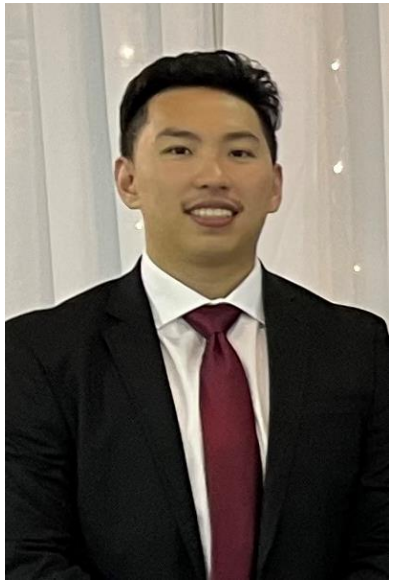
Team 509 - Corning

Team Introductions

Anthony Arroyo
Manufacturing Engineer



Austin Cramer
Control Systems Engineer



Khanh Nguyen
Material Specialist

William Shuman
Testing Specialist

Nathan Thompson
Design Engineer

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Sponsor and Advisor

Project Sponsor
Jeffery Roche
Project Manager

Project Sponsor
Trent Brush
Additive Manufacturing Engineer

Project Sponsor
Justin Barber
Additive Manufacturing Engineer

Project Advisor
Dr. McConomy, Ph.D.
Professor

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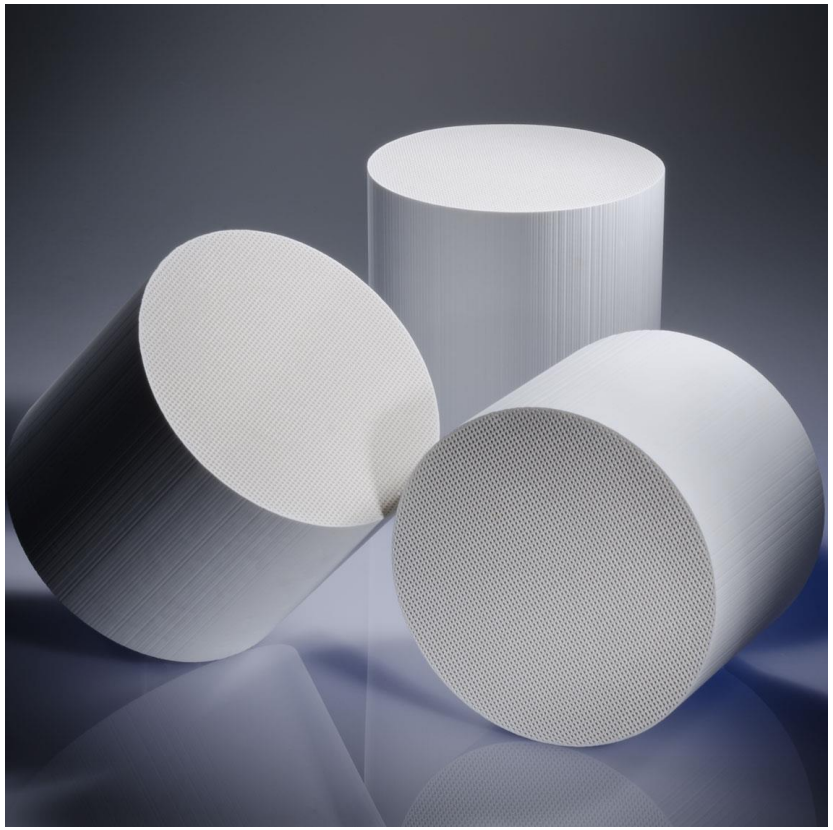
Objective

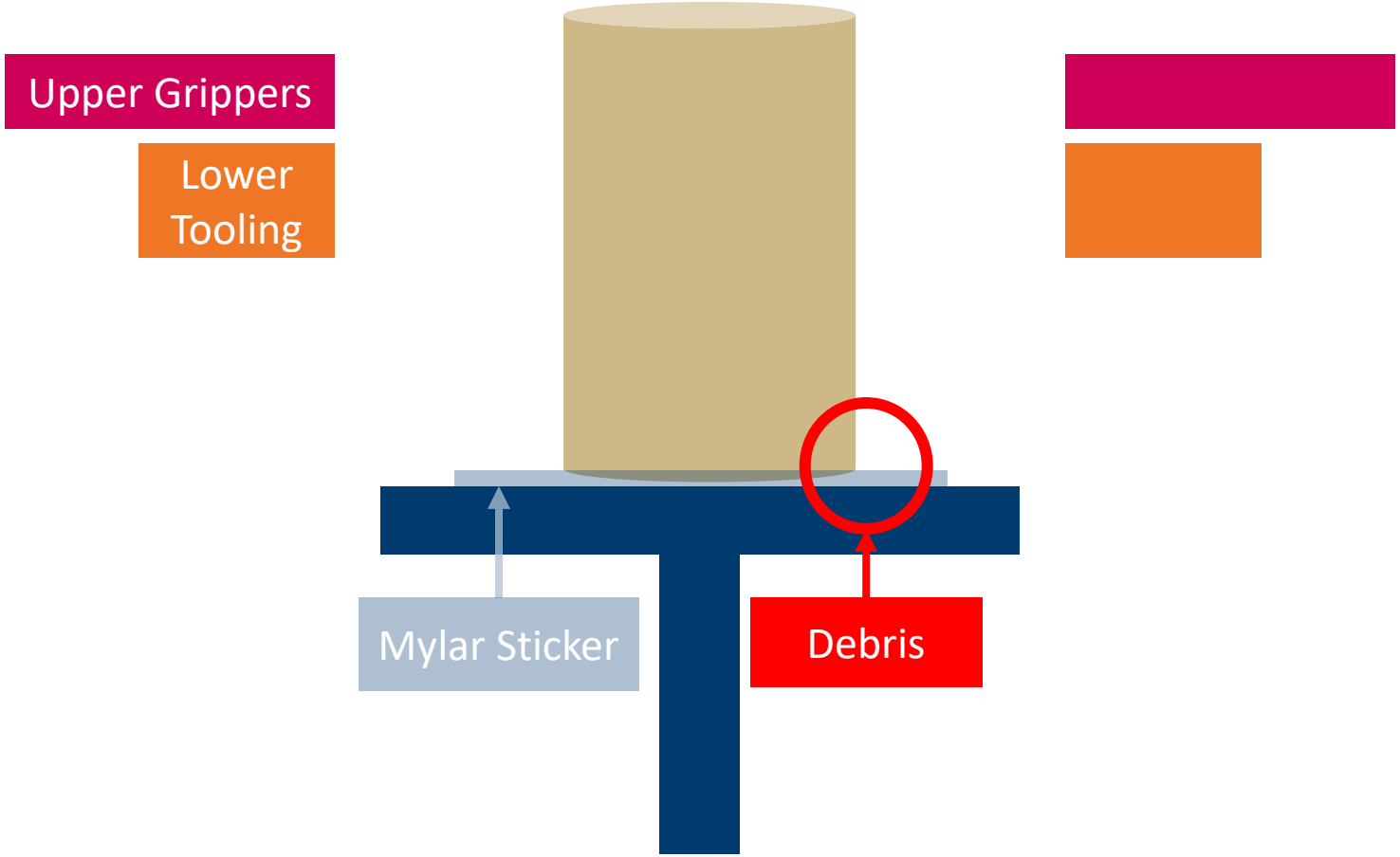
The objective of this project is to mitigate debris on the mylar sheet during the justification process by reducing the area in which debris can fall.

Background

- Diesel Particulate Filters(DPFs) are used to filter diesel exhaust gasses.
- Made of an extruded cellular ceramic material.
- Cement is pumped in from both sides to plug alternating holes and create forced airflow through the porous ceramic



Project Summary



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Key Goals and Targets

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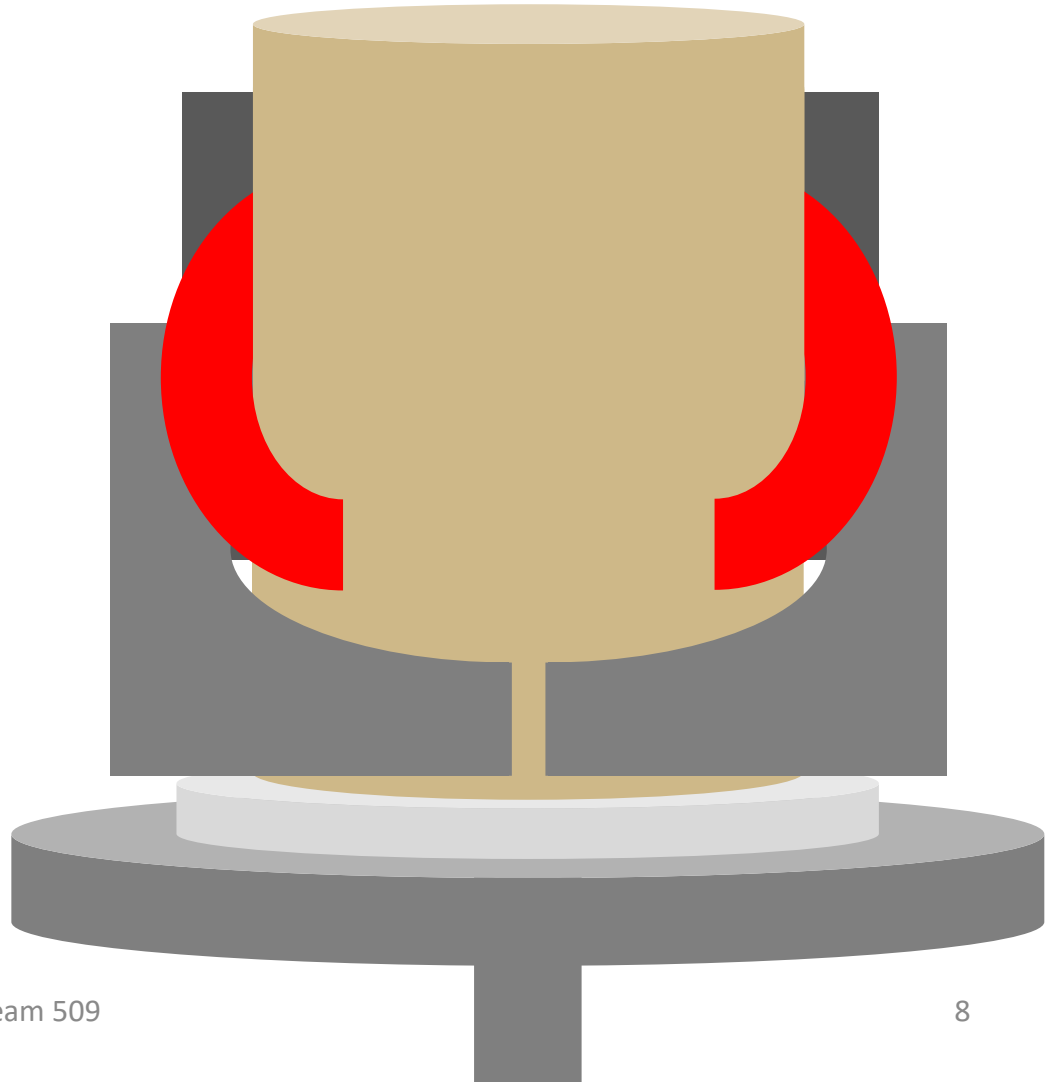
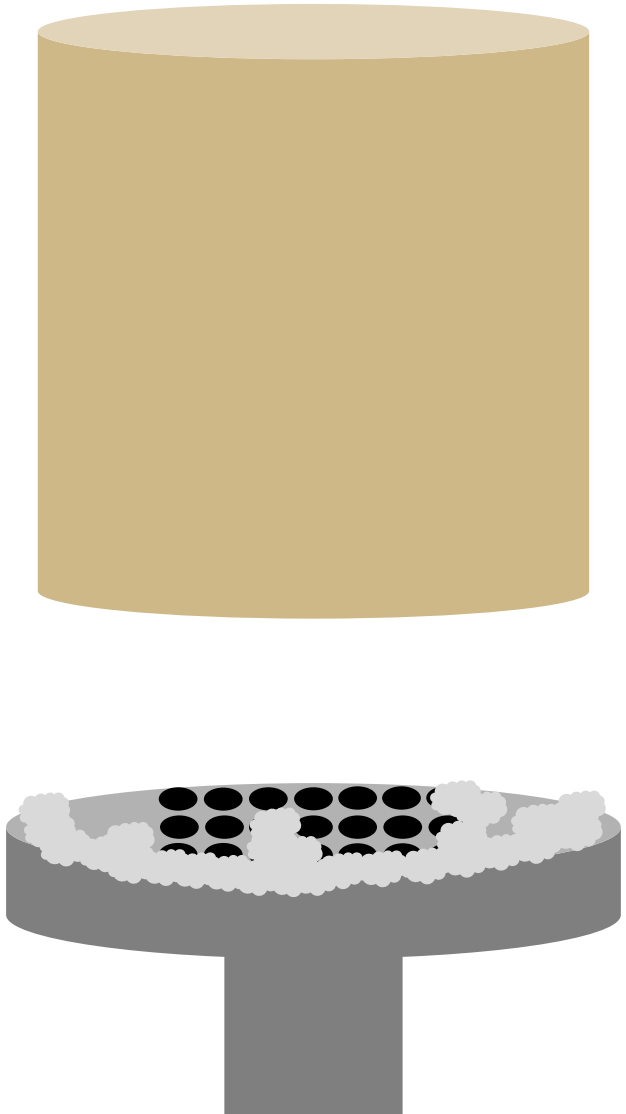
Prevent Debris on Mylar



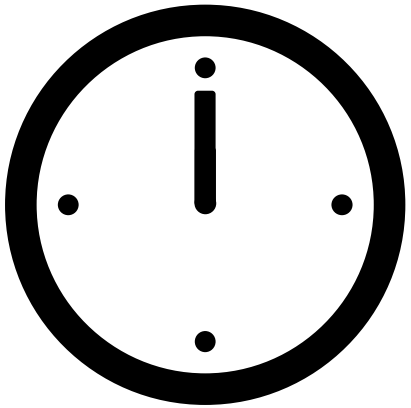
Reduce from 0.8 g to 0.4g of debris

Reduce Filler Waste

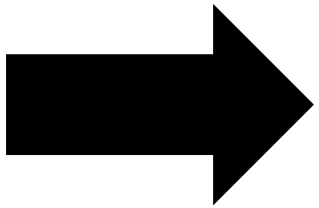
Reduce number of parts fixed per day from 150 to 50 parts

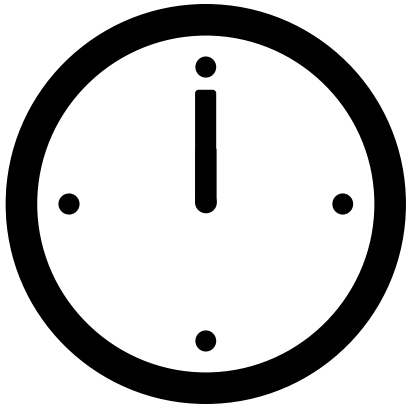


Reduce Downtime



27 Hours





9 Hours

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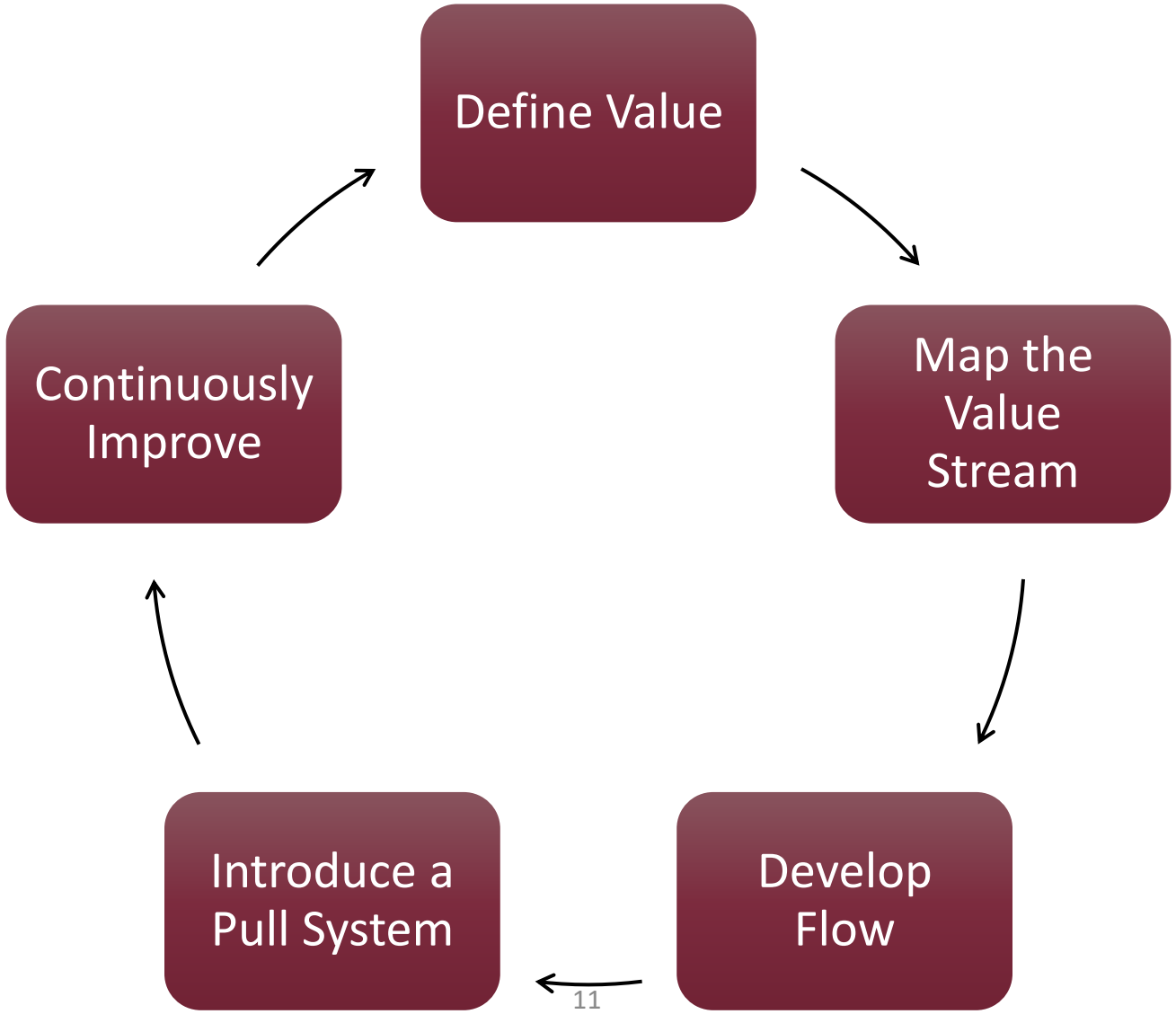
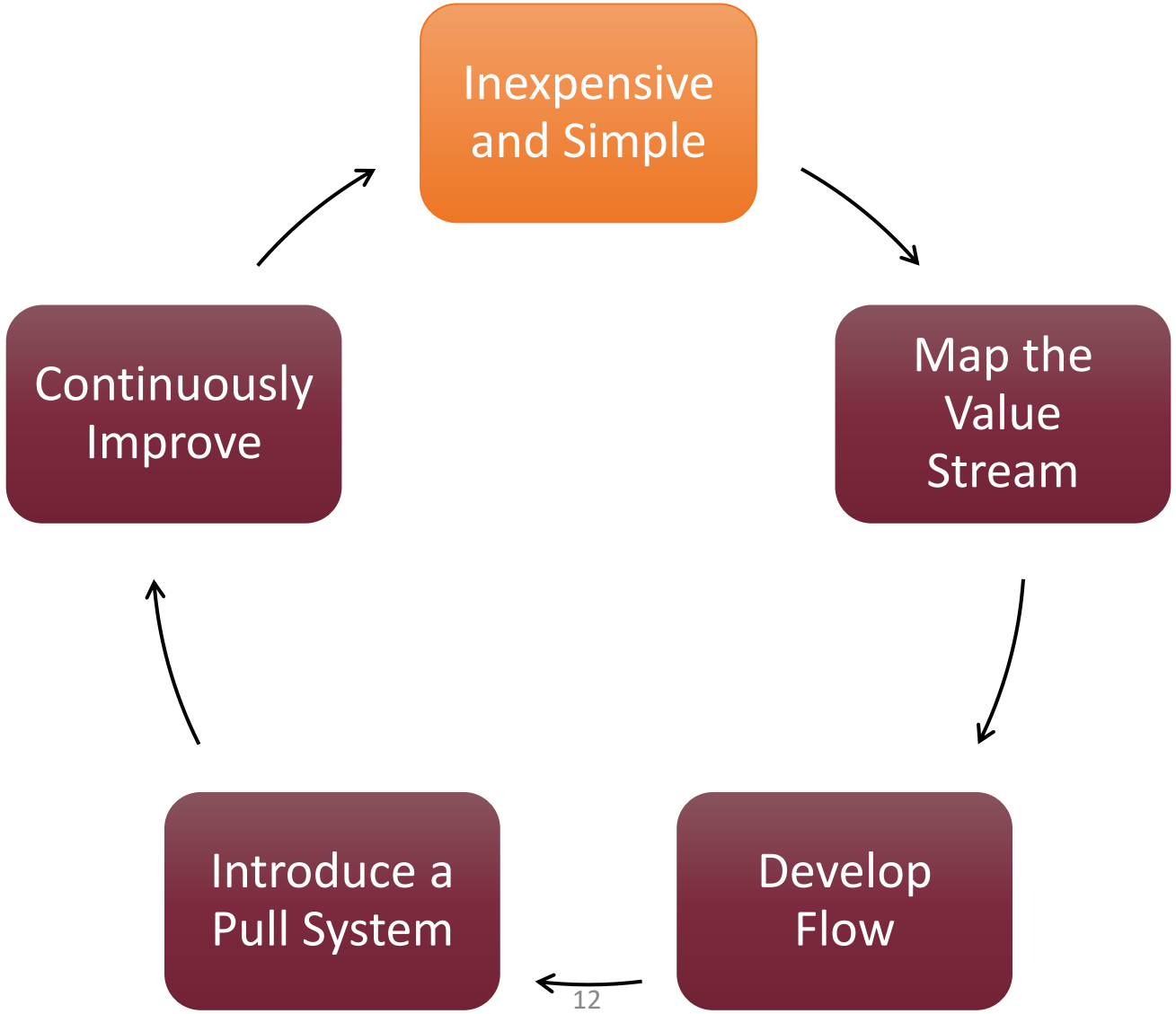
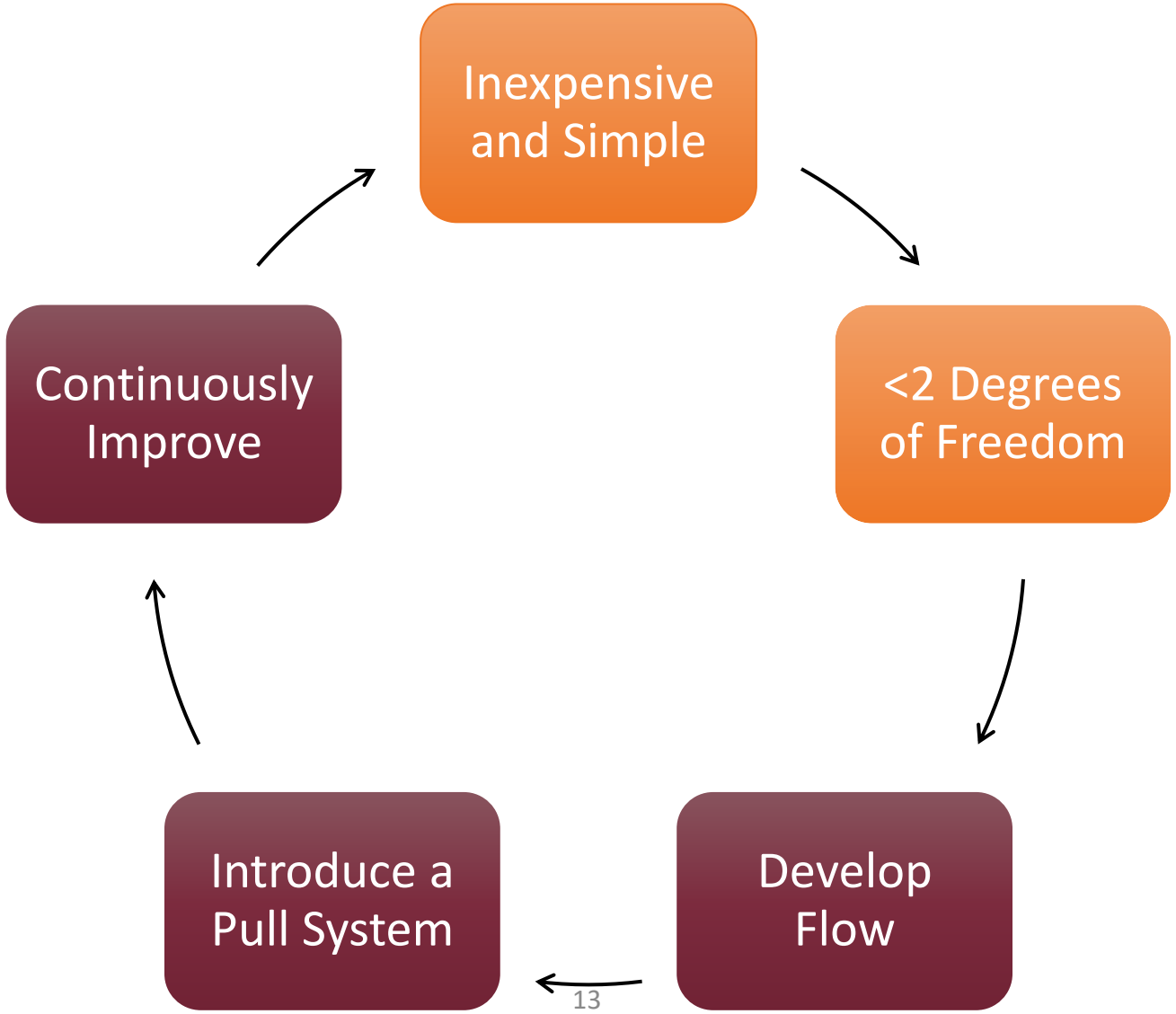
Lean Manufacturing



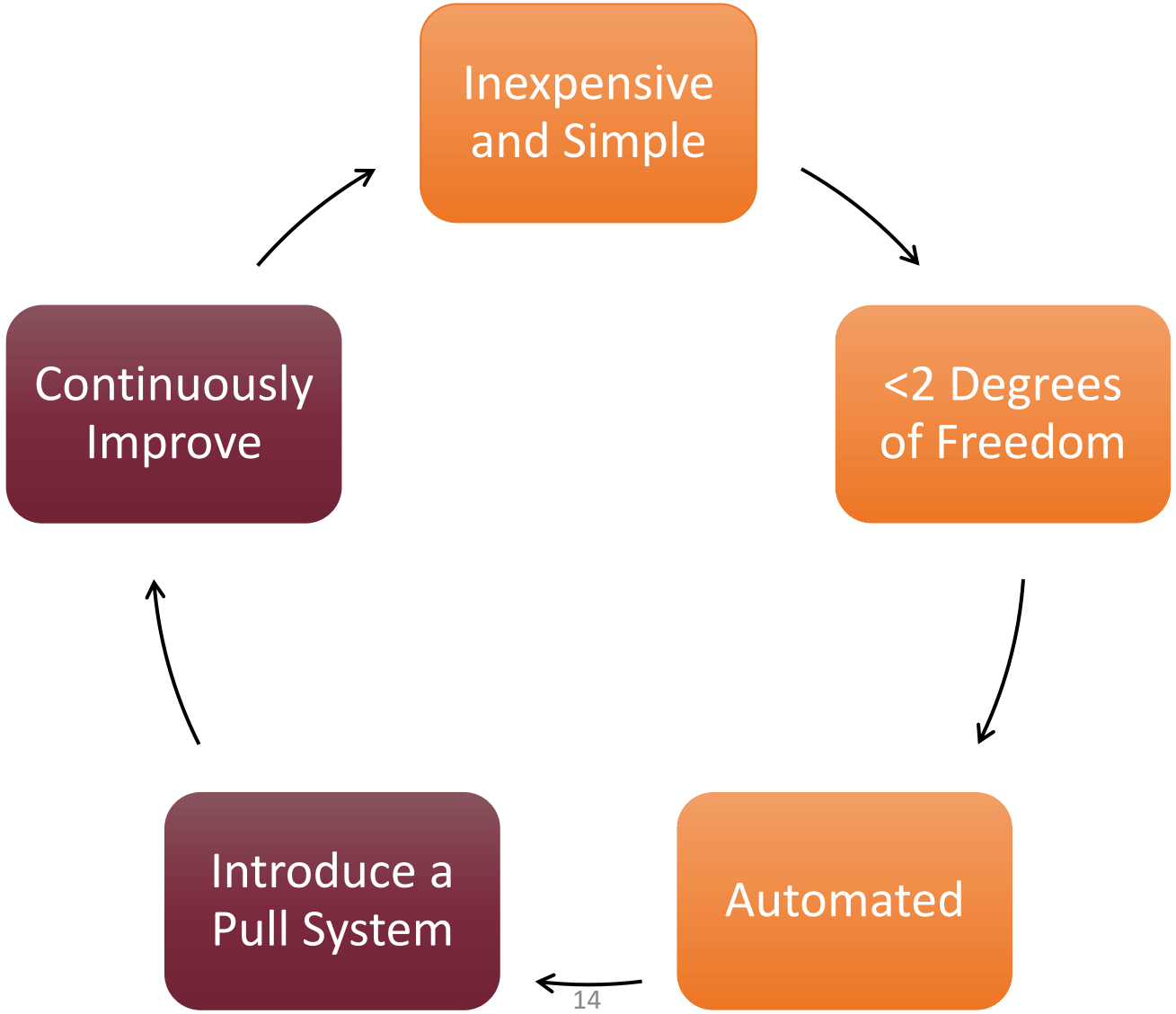
Lean Manufacturing



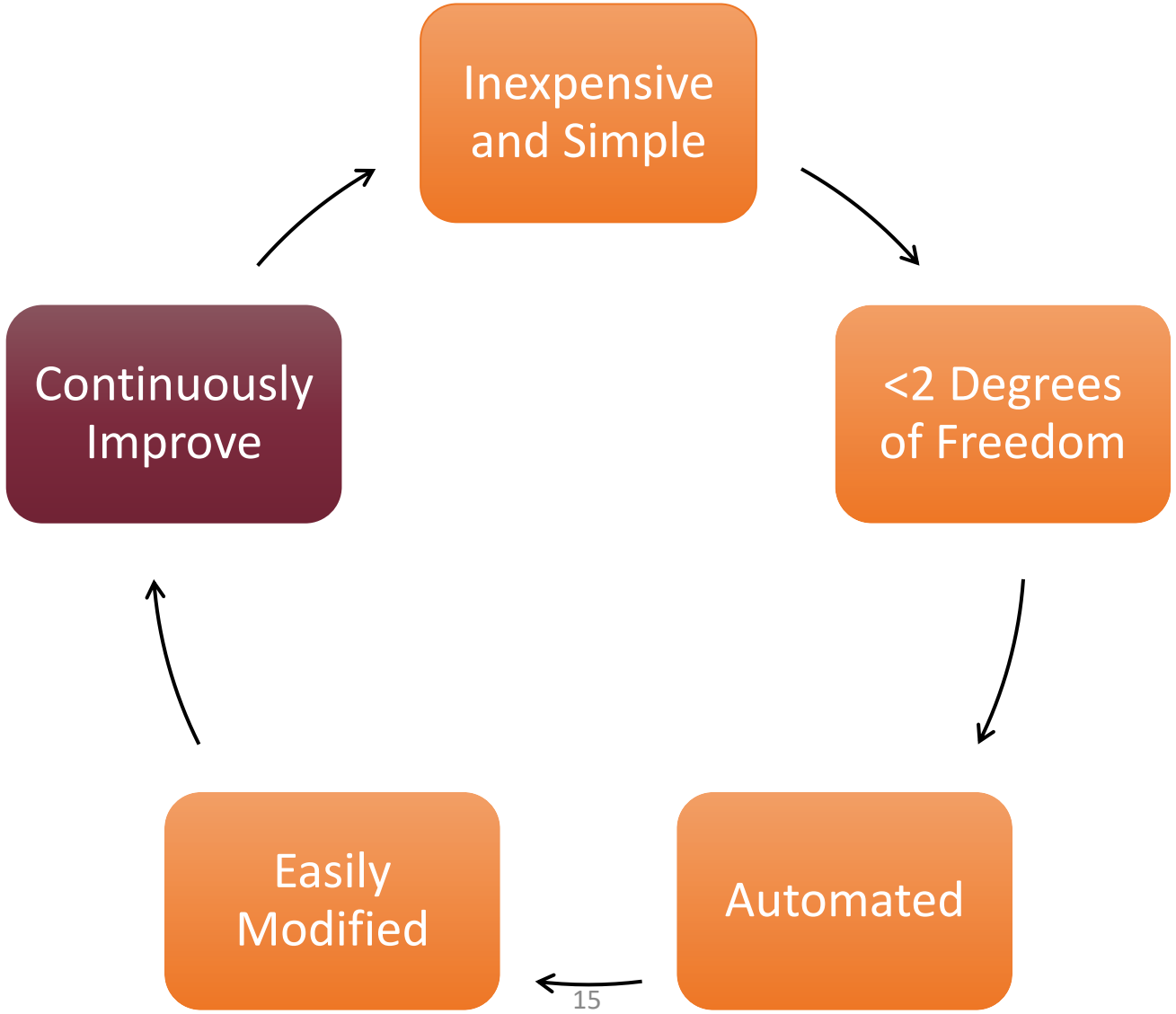
Lean Manufacturing



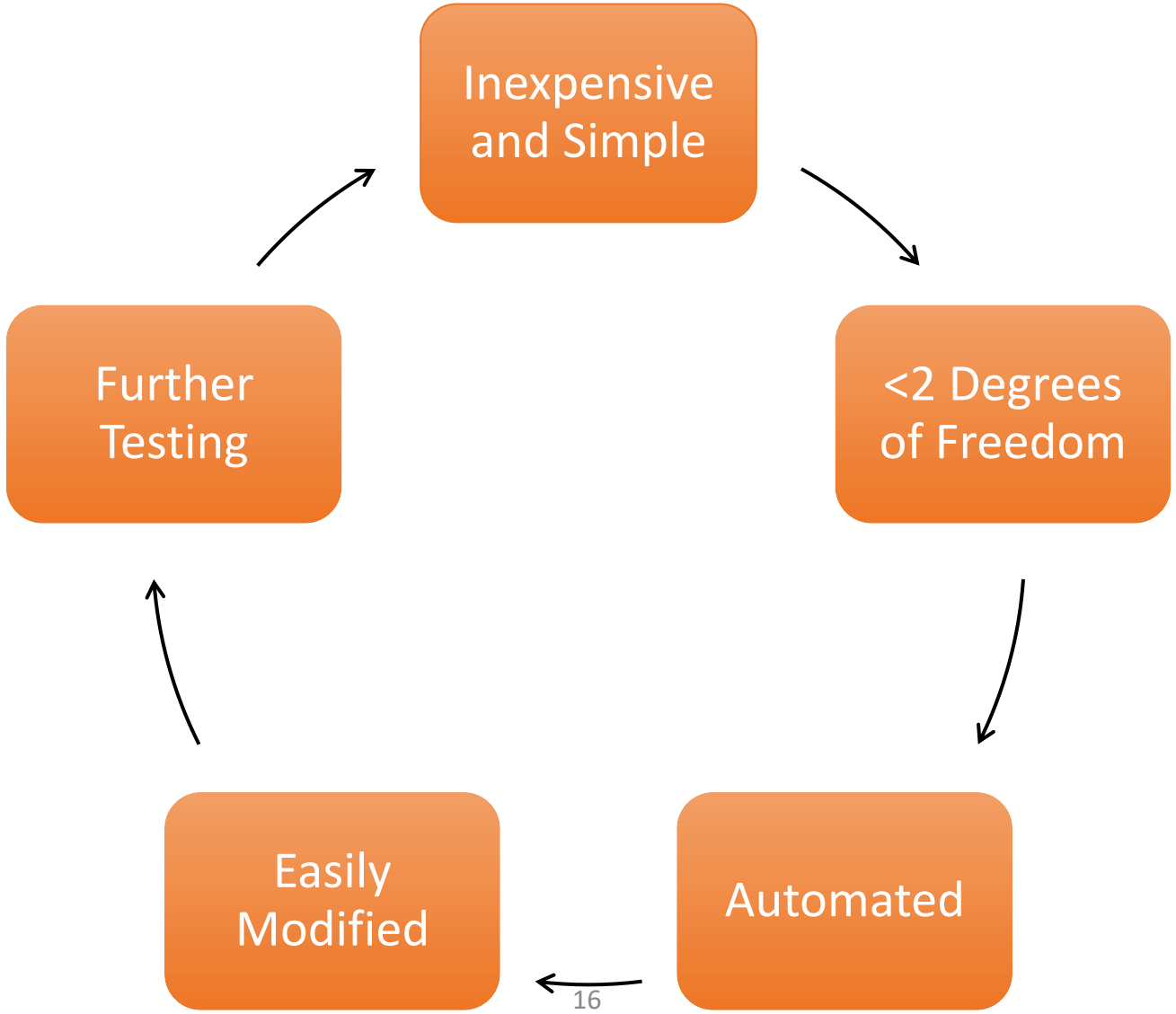
Lean Manufacturing



Lean Manufacturing



Lean Manufacturing



Concept Generation

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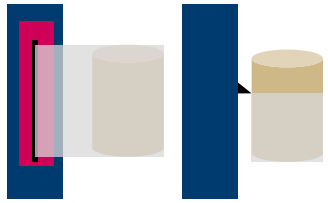
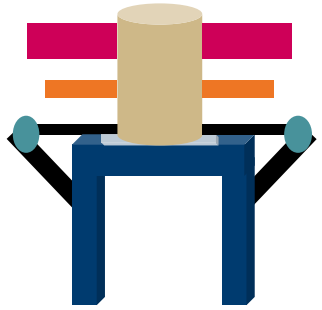
Medium Fidelity Concepts

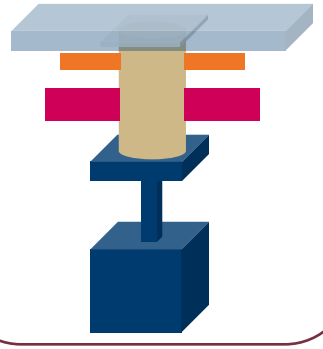
Plastic Wrapper



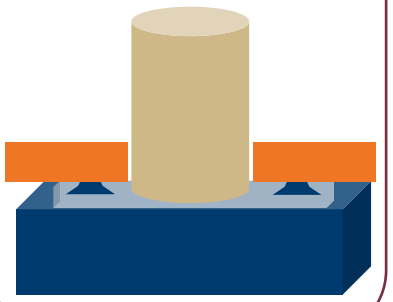
Mylar Defender



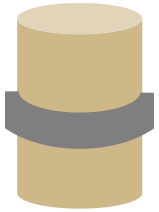
Inverted Justification



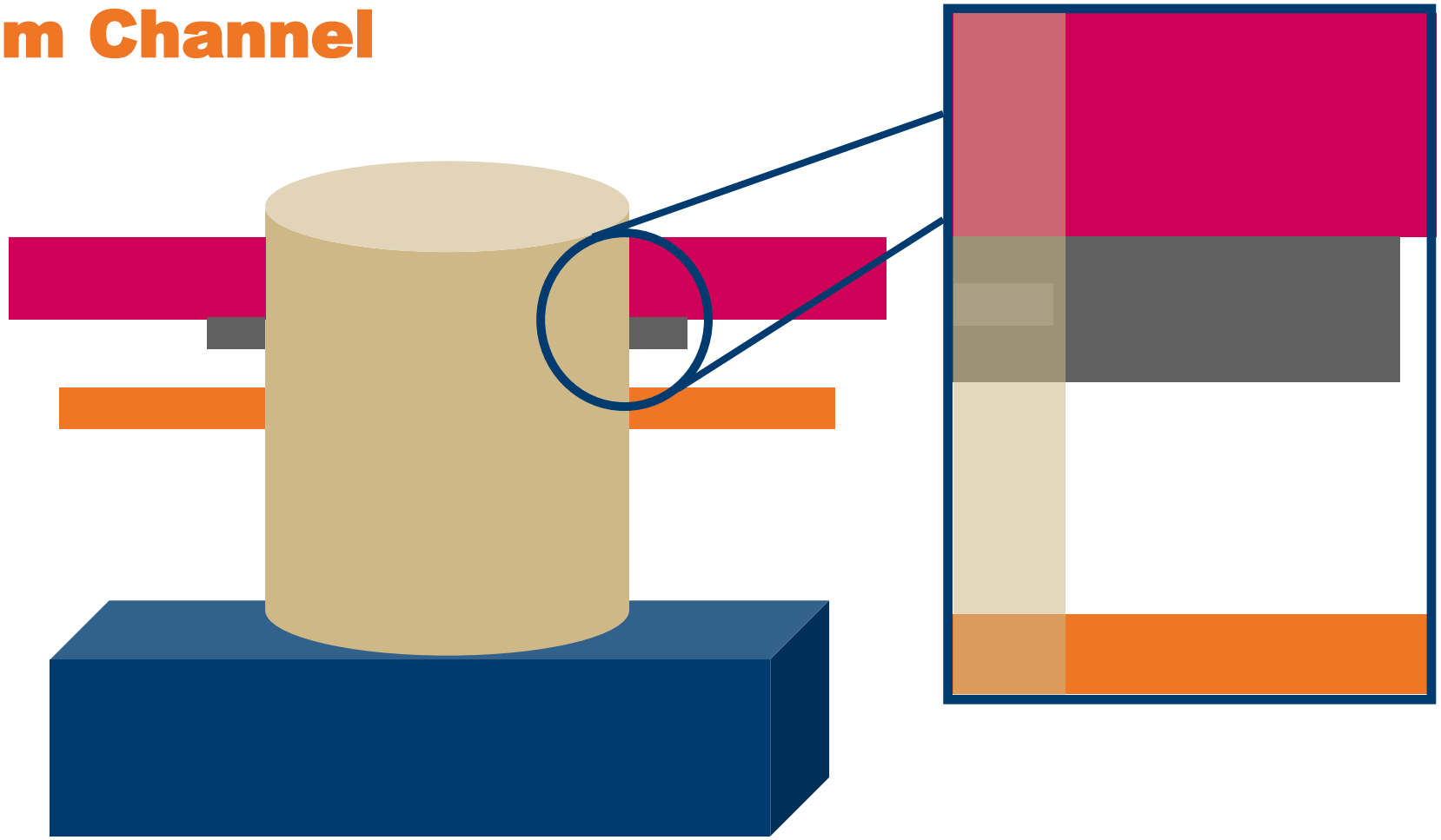
Mylar Vacuum Seal



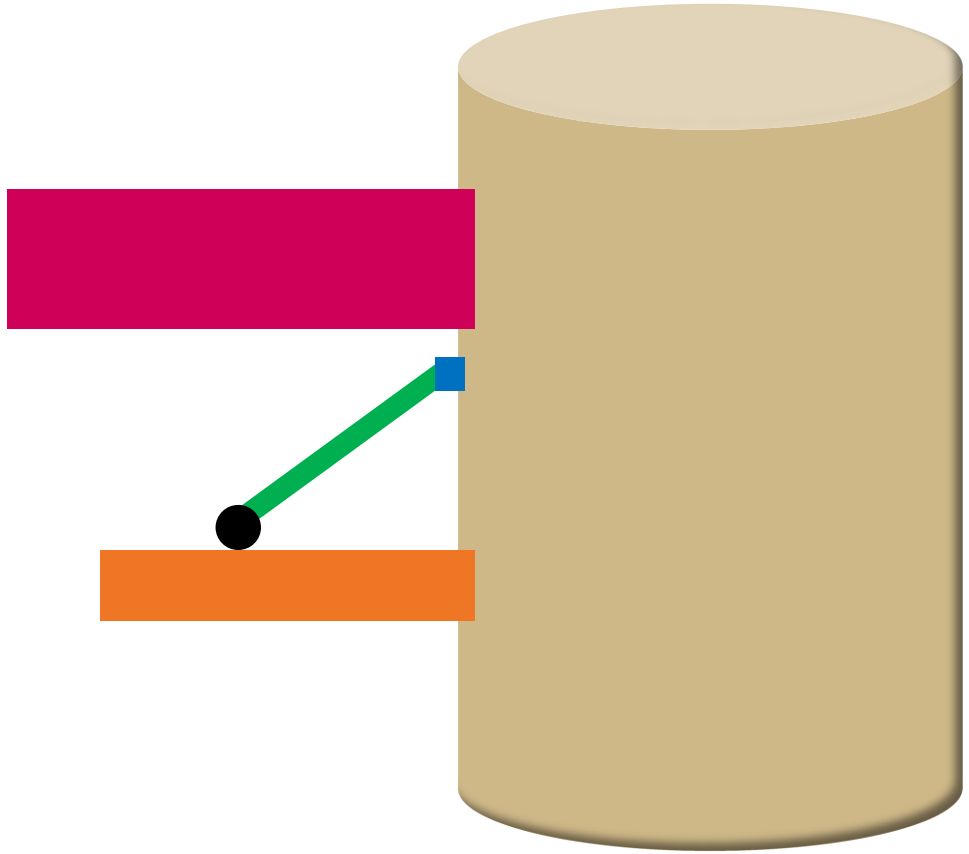
Ring On Mylar



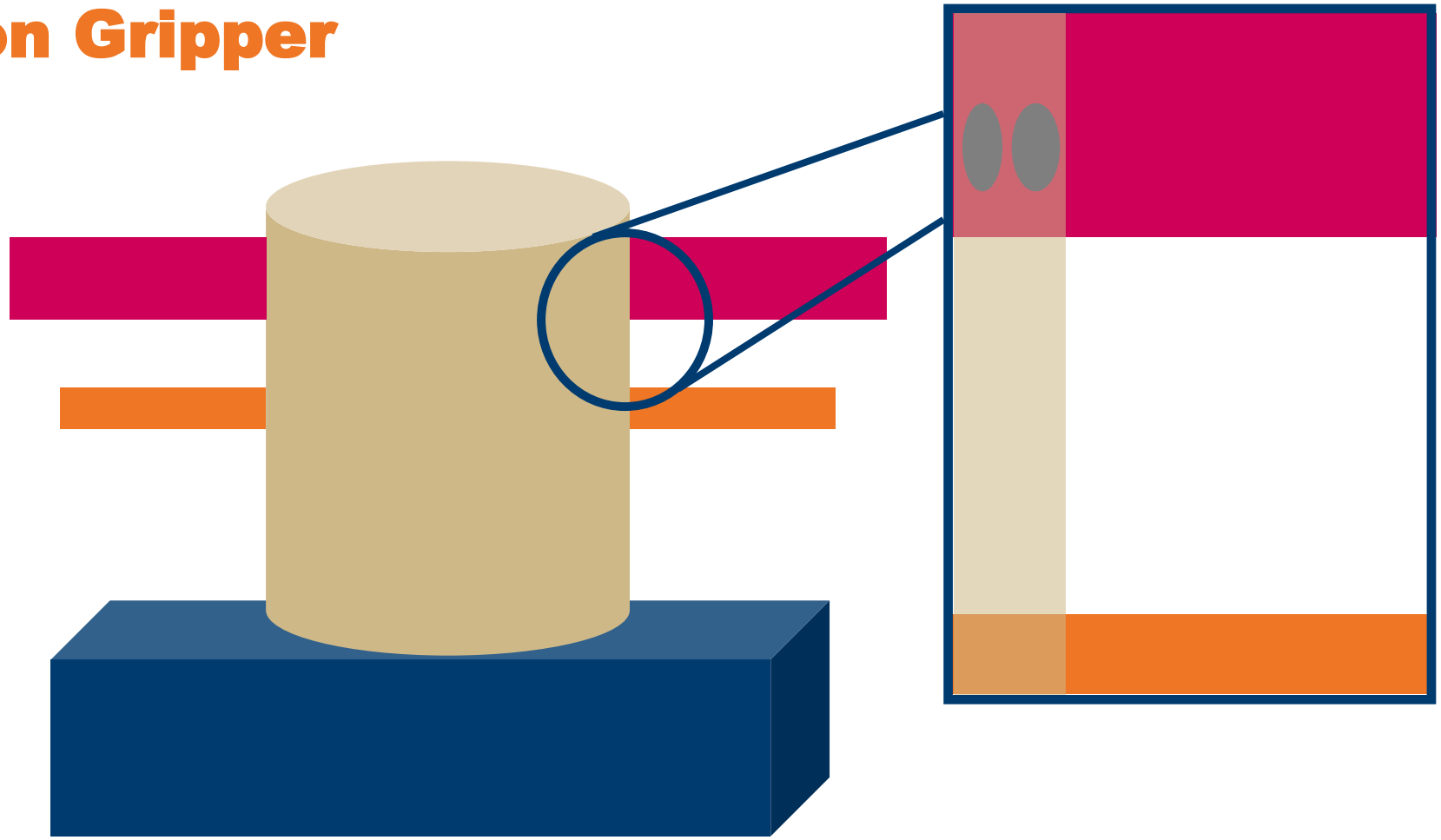
High Fidelity Concept:
Vacuum Channel



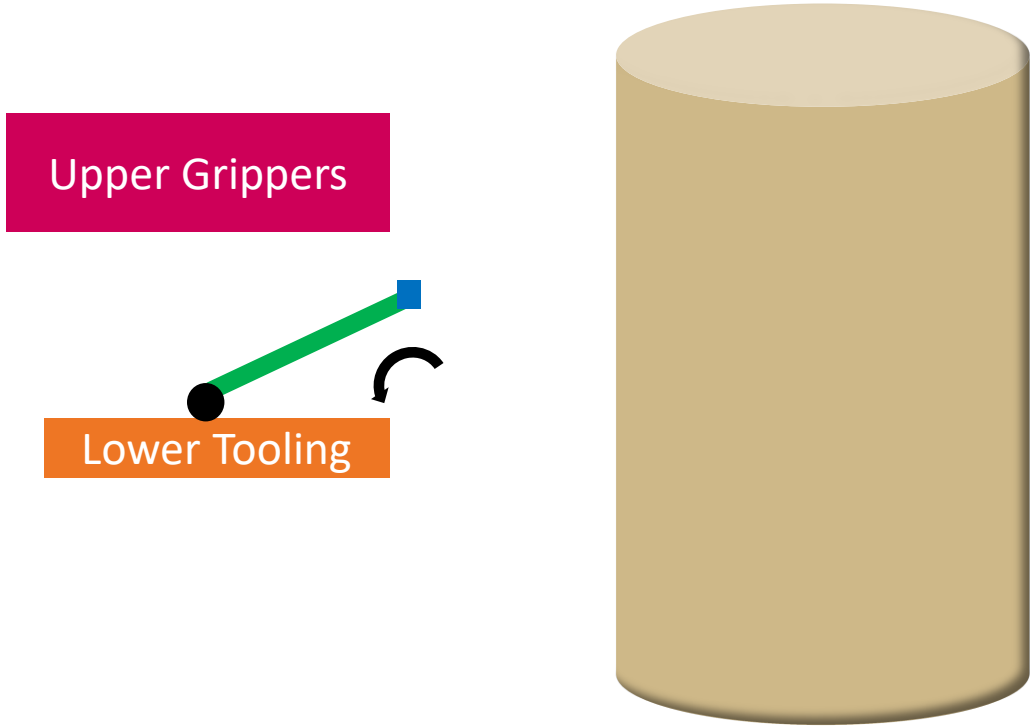
High Fidelity Concept:
Spring Ramp



High Fidelity Concept:
Suction Gripper



Final Selection
Spring Ramp



Update and Detailed Design

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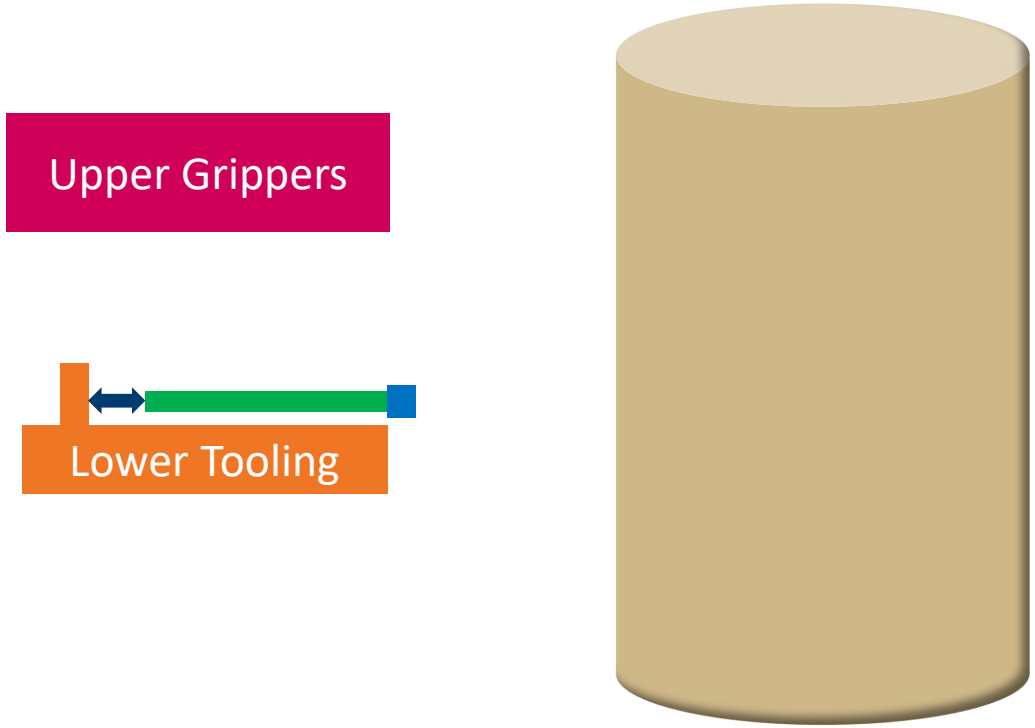
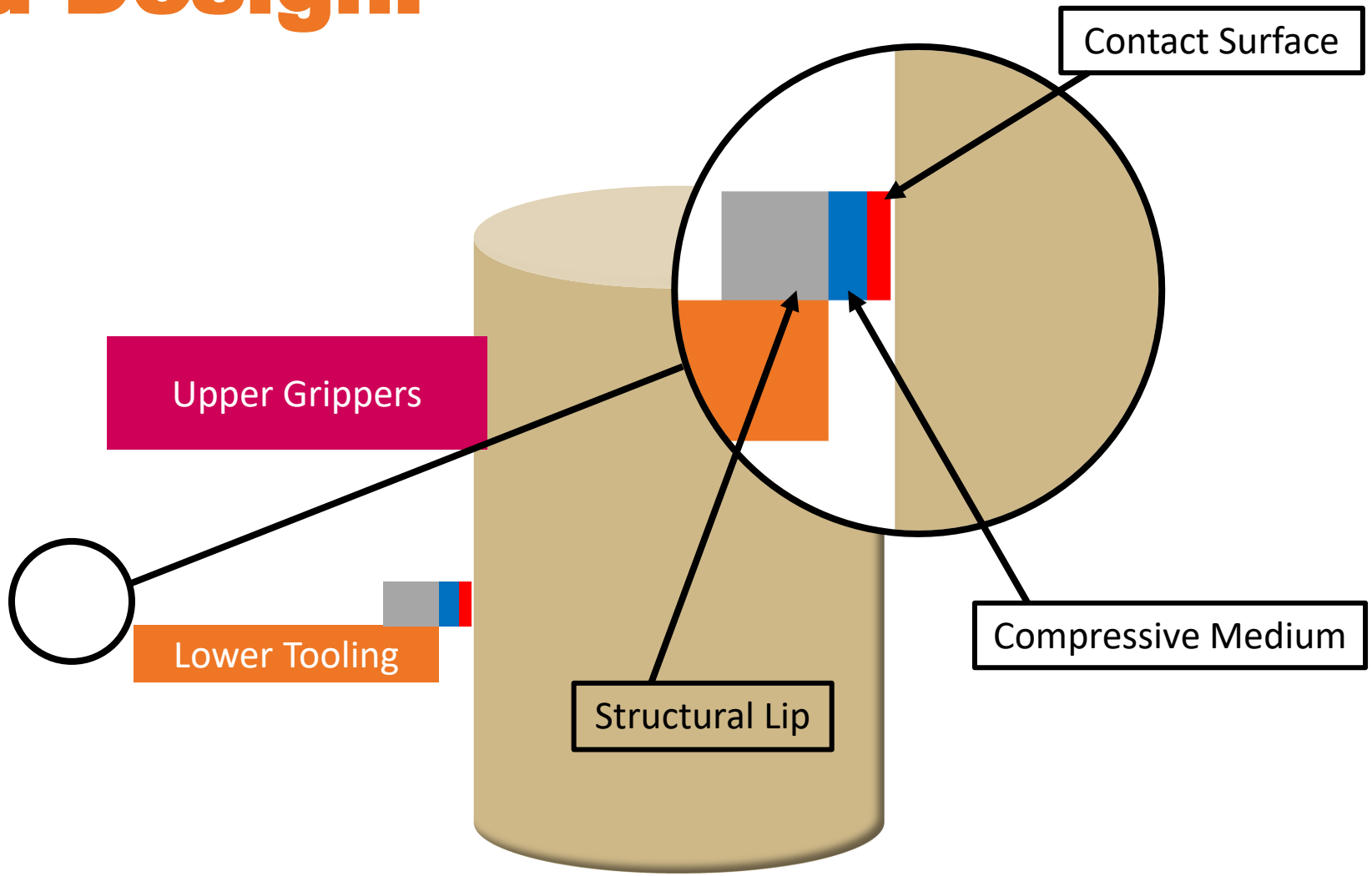
First Update:
Linear Spring



Detailed Design:
Offset Lip



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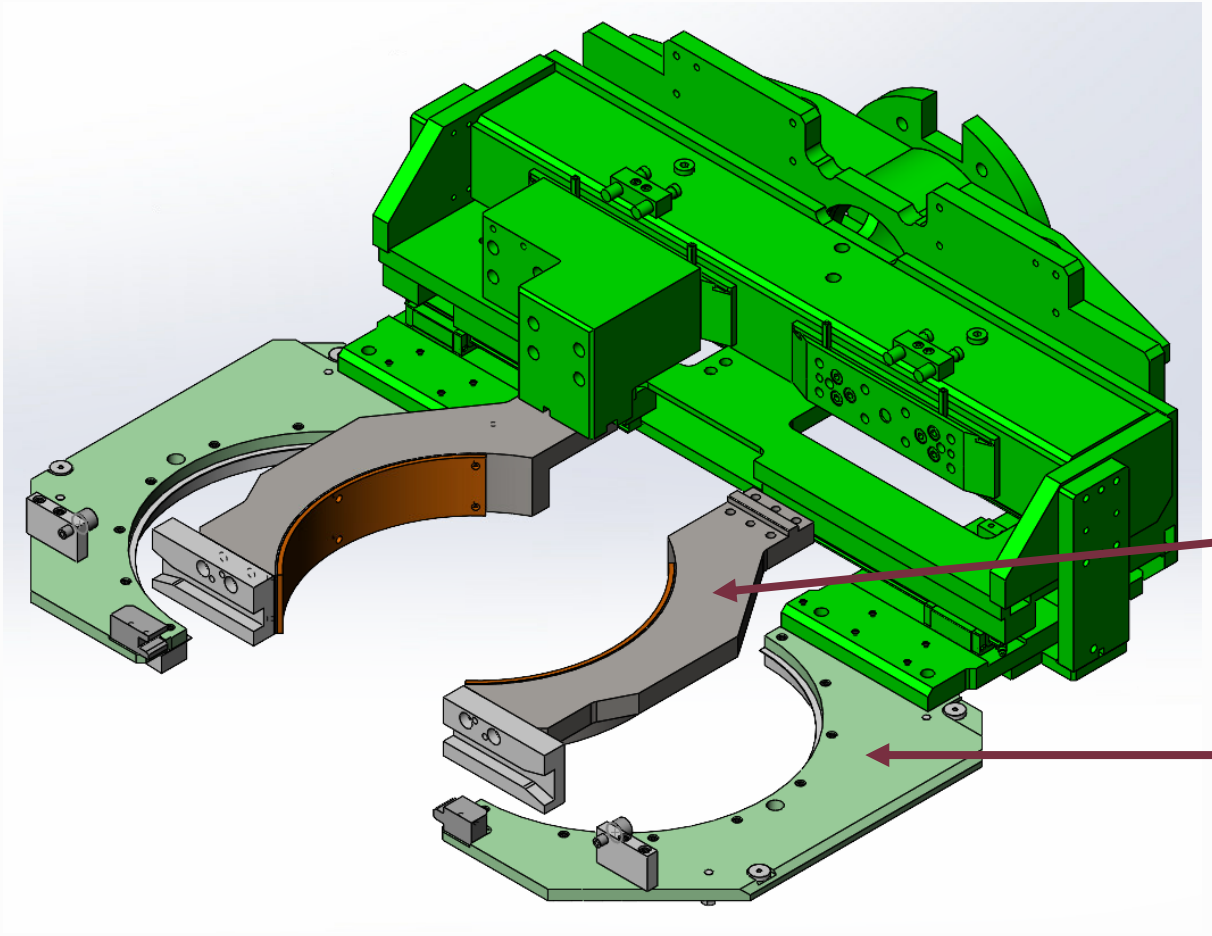
Corning Tooling



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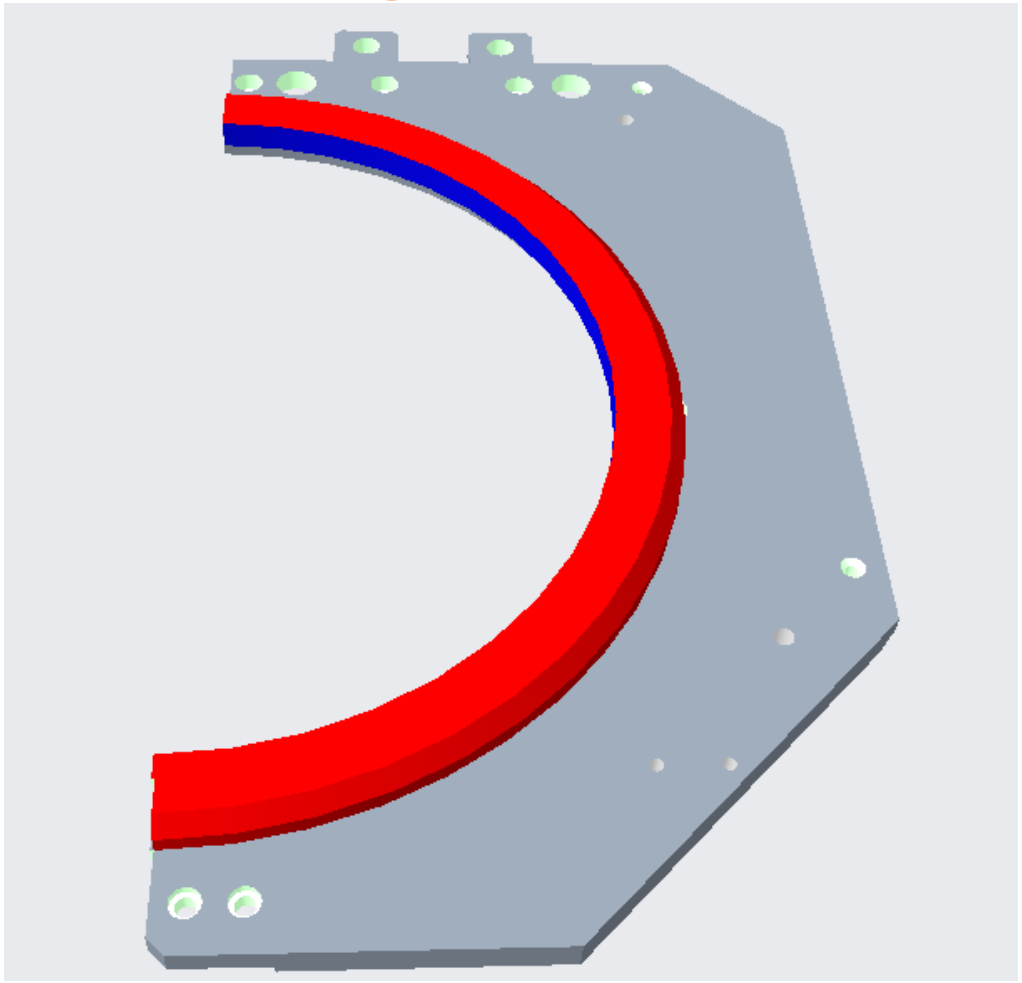
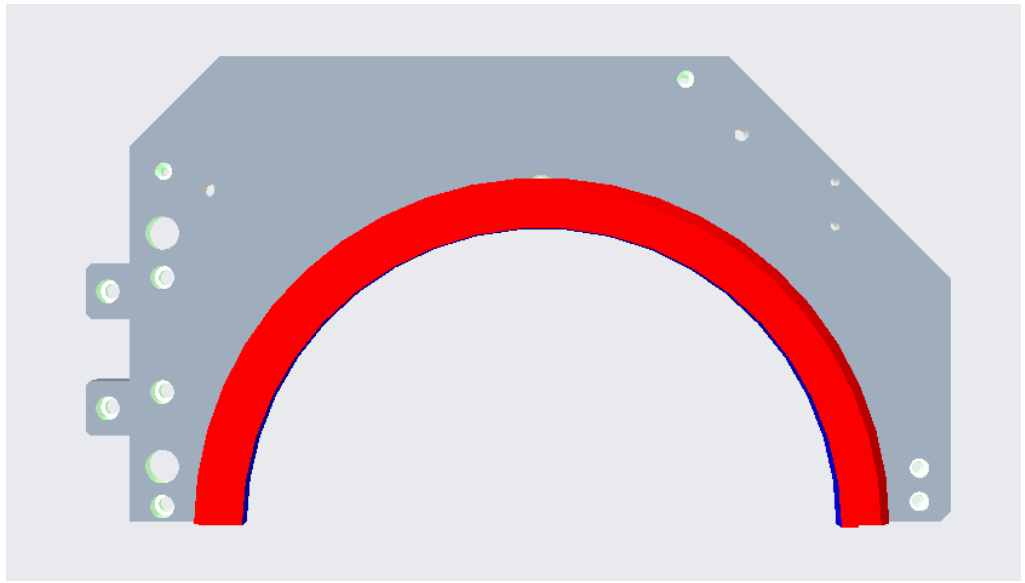
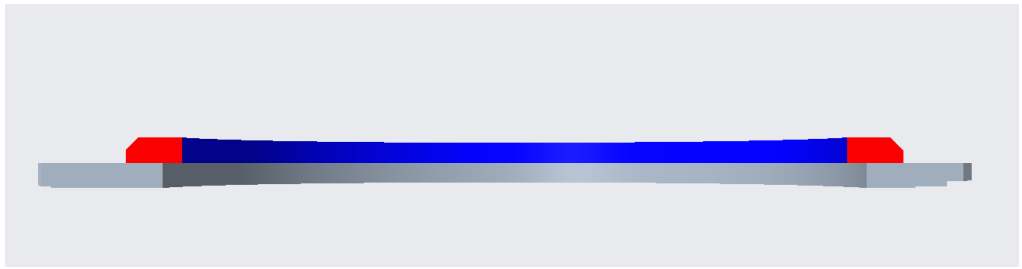
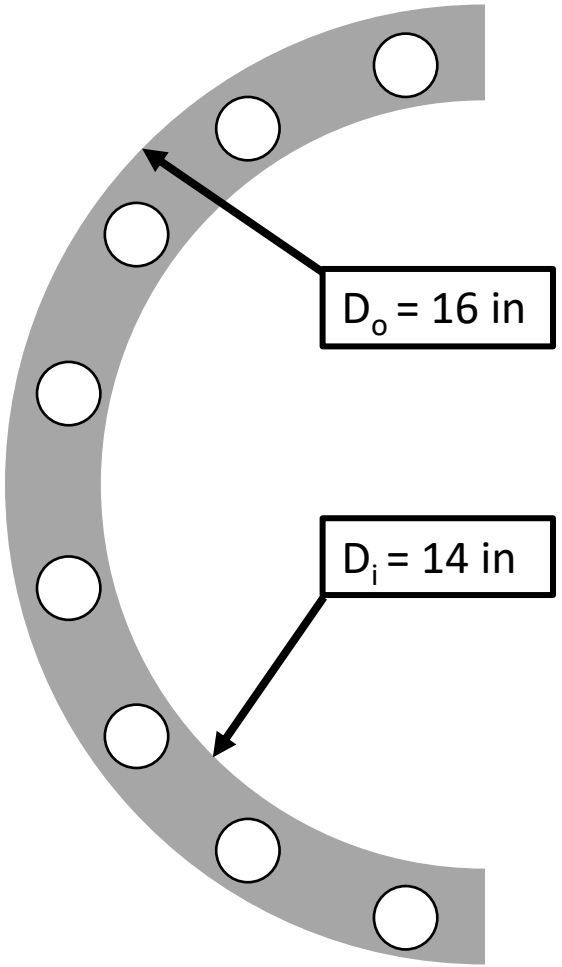
Prototype

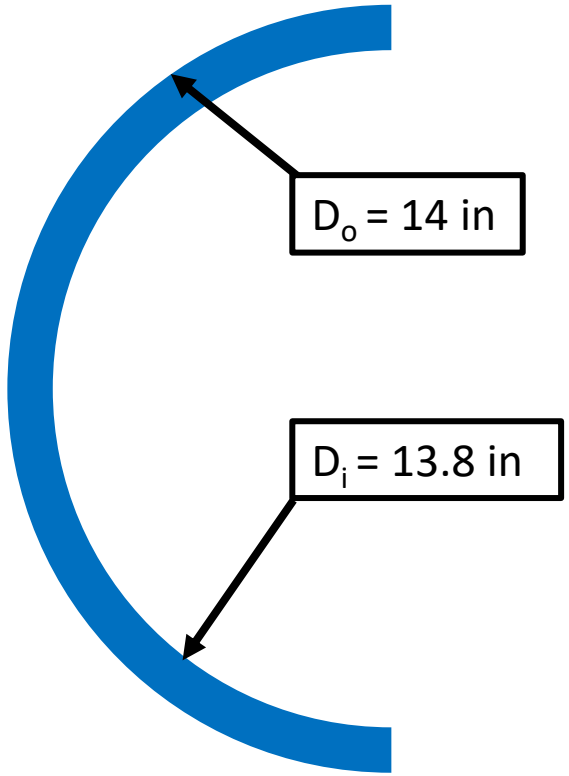


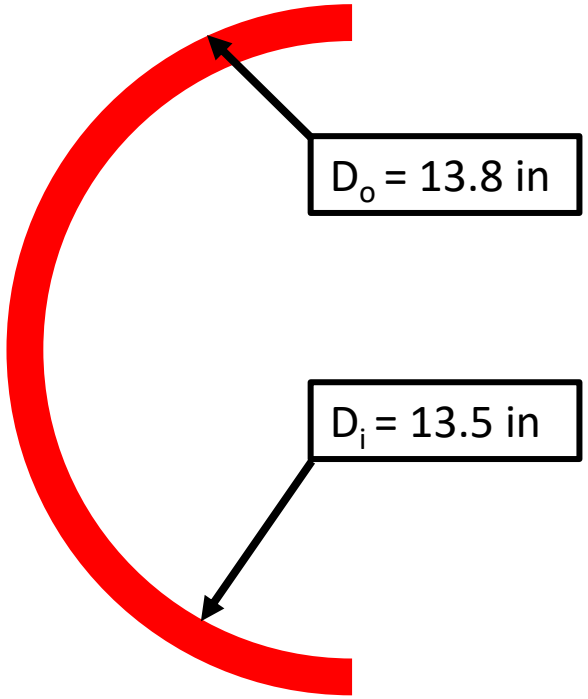




Specifications







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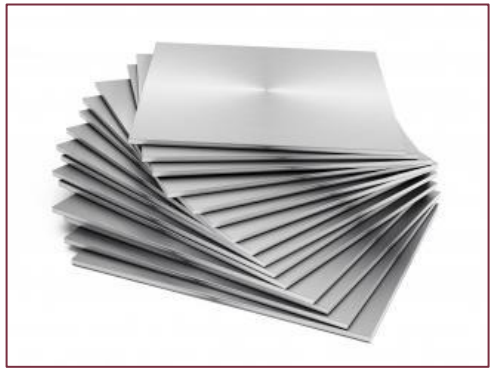
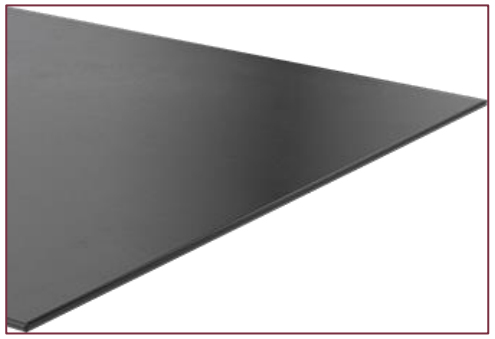
Material Selection

6061 Aluminum

- Ease of machining
- Lightweight
- Strong for application





40 OO Rubber

- Desired durometer
- Soft medium

Material Selection

UHMW

- Low friction value
- Abrasion resistant
- Used by Corning

Acrylate Adhesive

- Low Cost
- Bonds well with materials used

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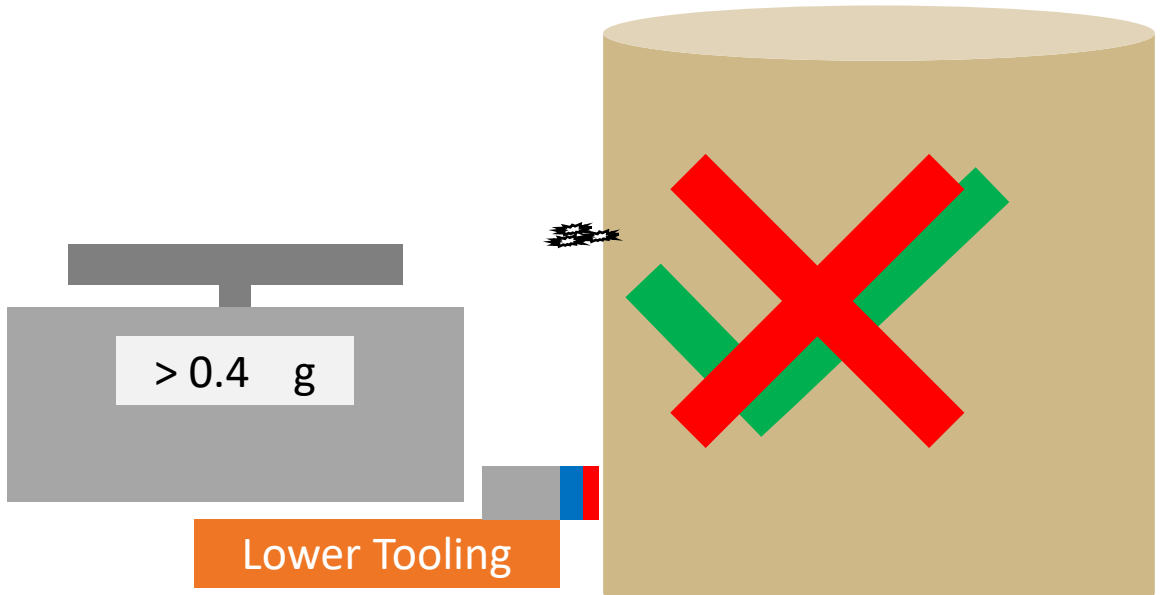
Testing

Debris Test



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Debris Test Results

Right Test:
Dropped 0.89 g of debris
Goal: < 0.4 g

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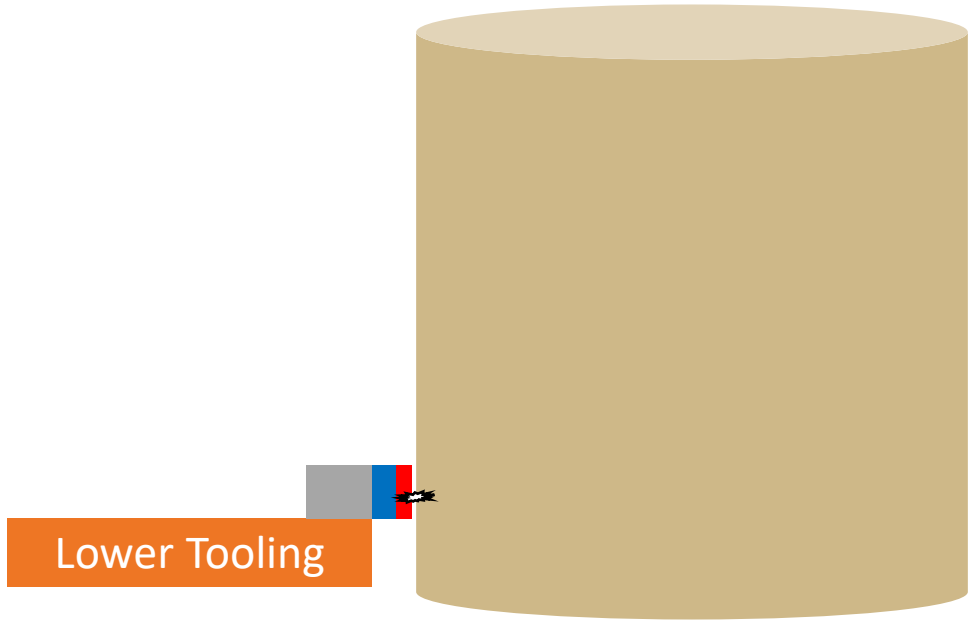
Friction Test



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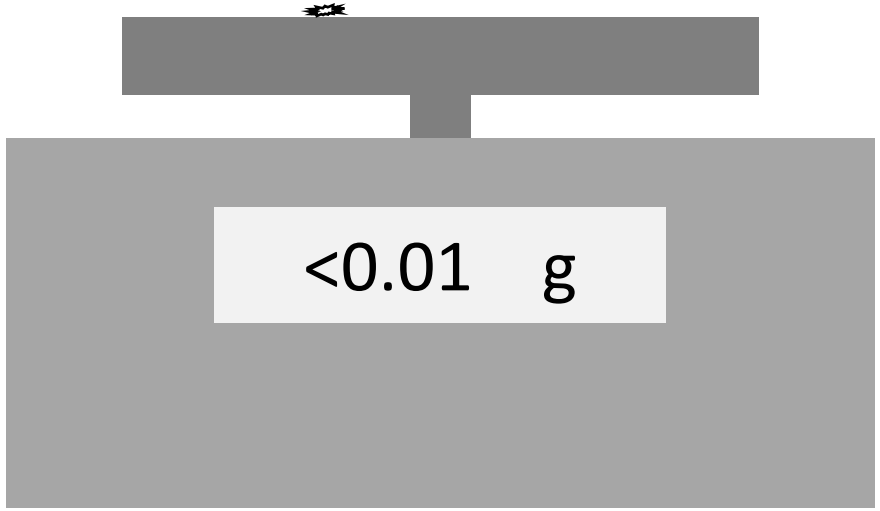
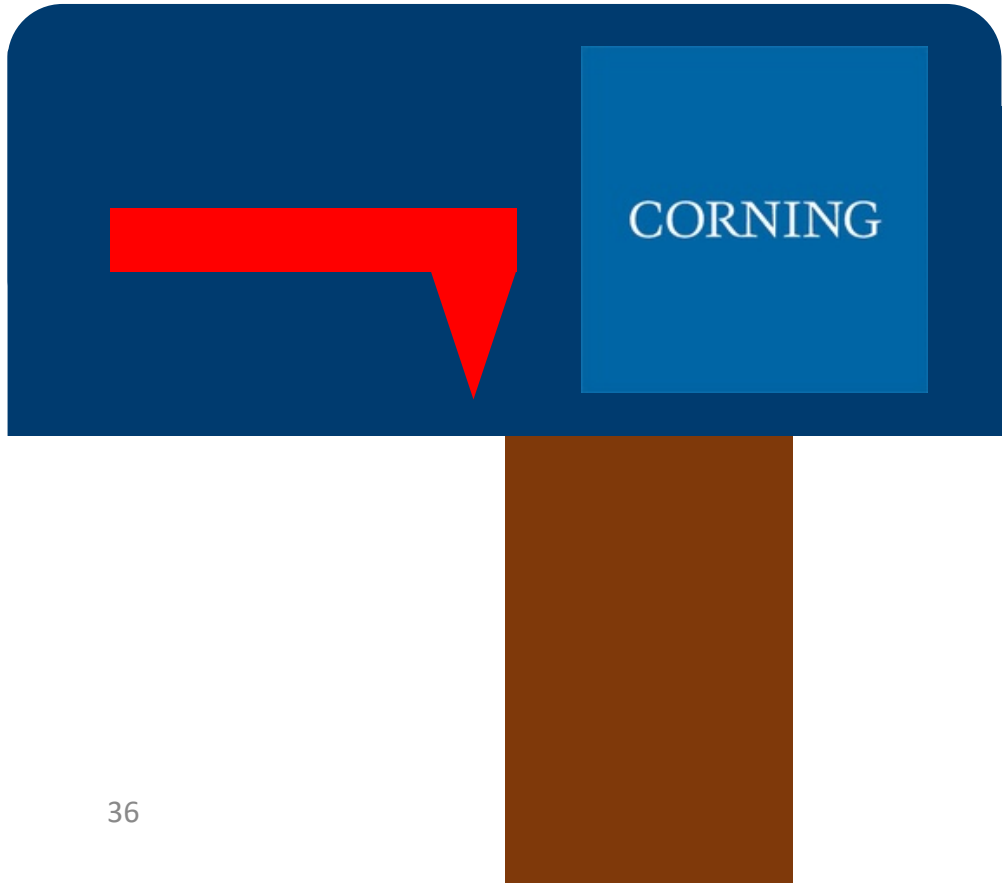
Friction Test Results



Testing at Corning

Lower Tooling



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Project Overview

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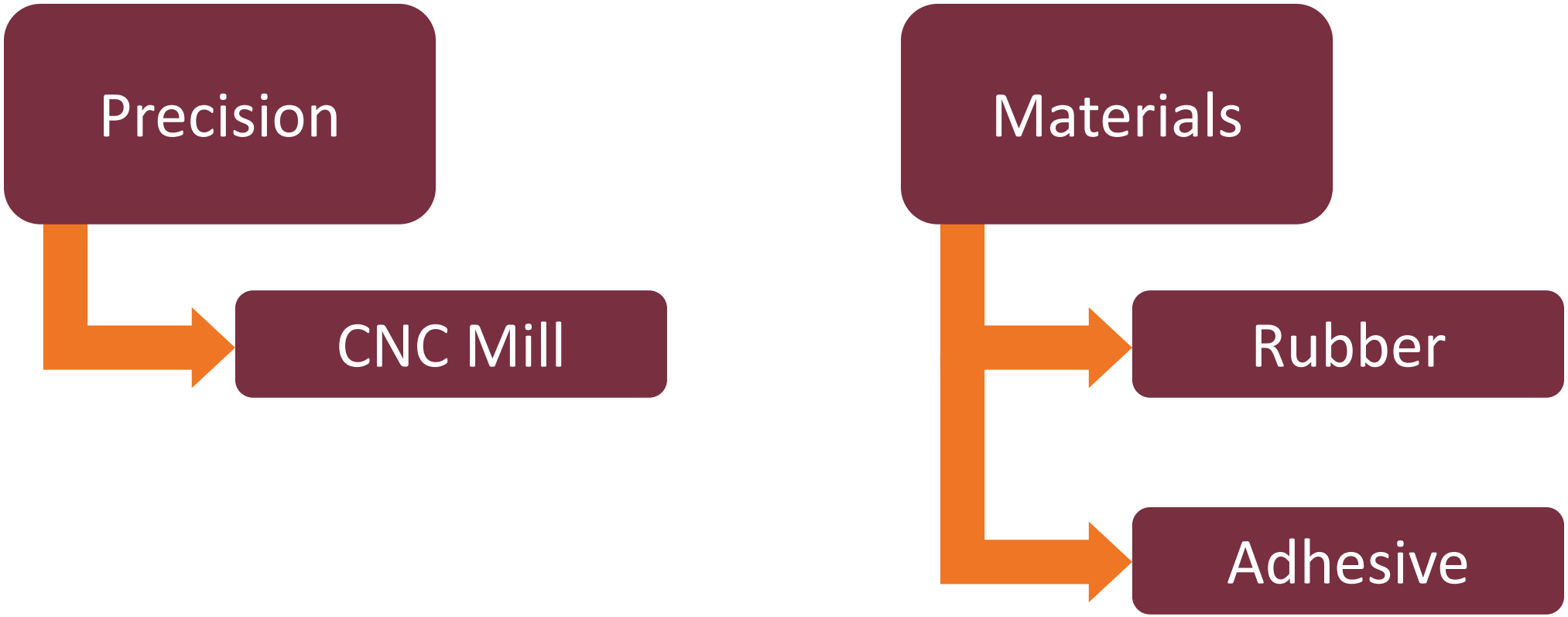
Future Improvements



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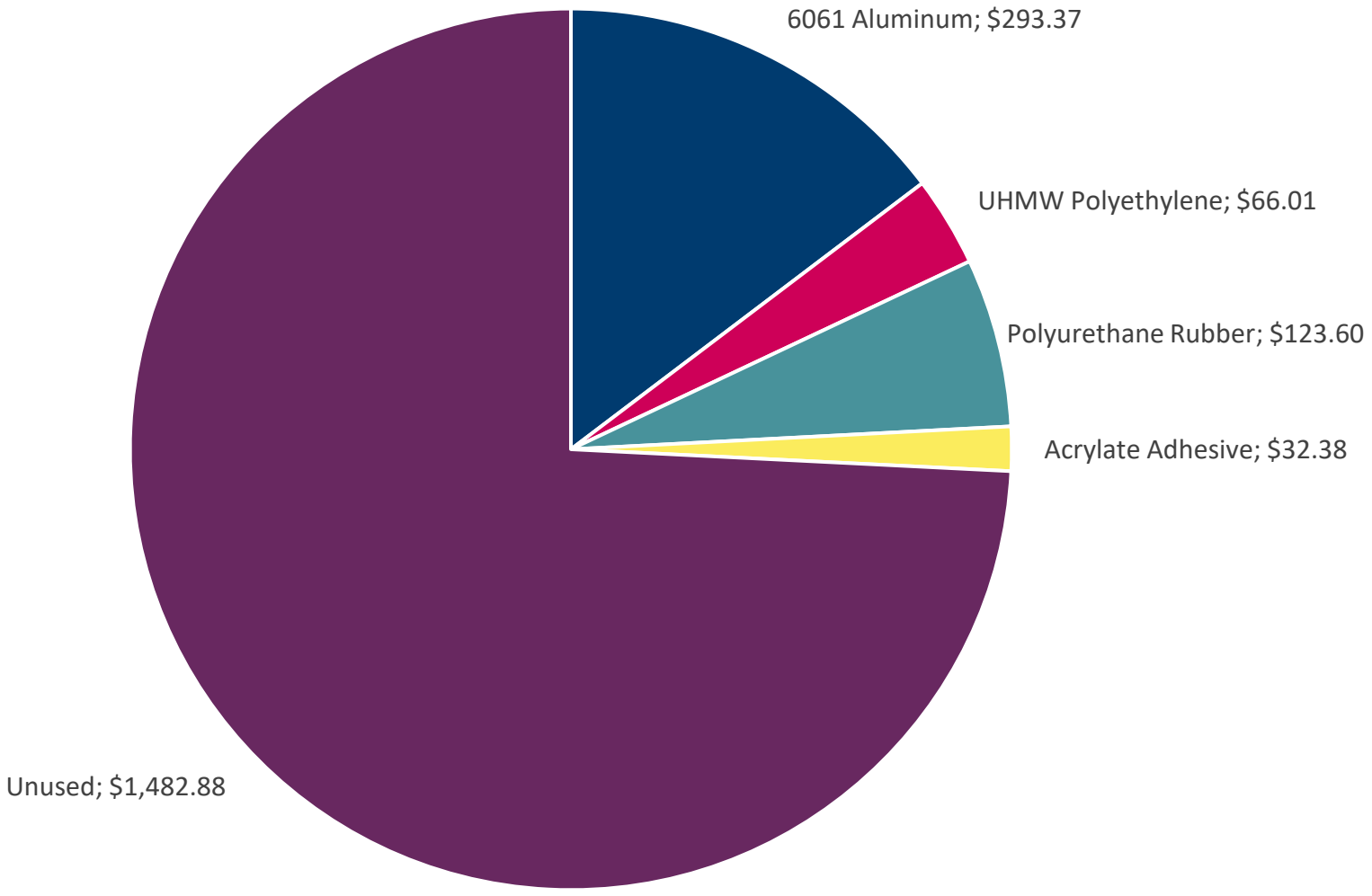
Budget

- 6061 Aluminum
- UHMW Polyethylene
- Polyurethane Rubber
- Acrylate Adhesive
- Unused



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Future Improvements

Precision

- CNC
- Waterjet

Material

- Better rubber
- Attachment choice

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Lessons Learned

Simplicity

Act

Discuss

Plan

Record

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Thank You

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Key Goals and Targets

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Concept Generation

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Update and Detailed Design

Nathan Thompson

Team 509 23

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Testing

Khanh Nguyen

Team 509 31

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Project Overview

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