



JOHN DEERE

Team #29: Chopper Blade Test System

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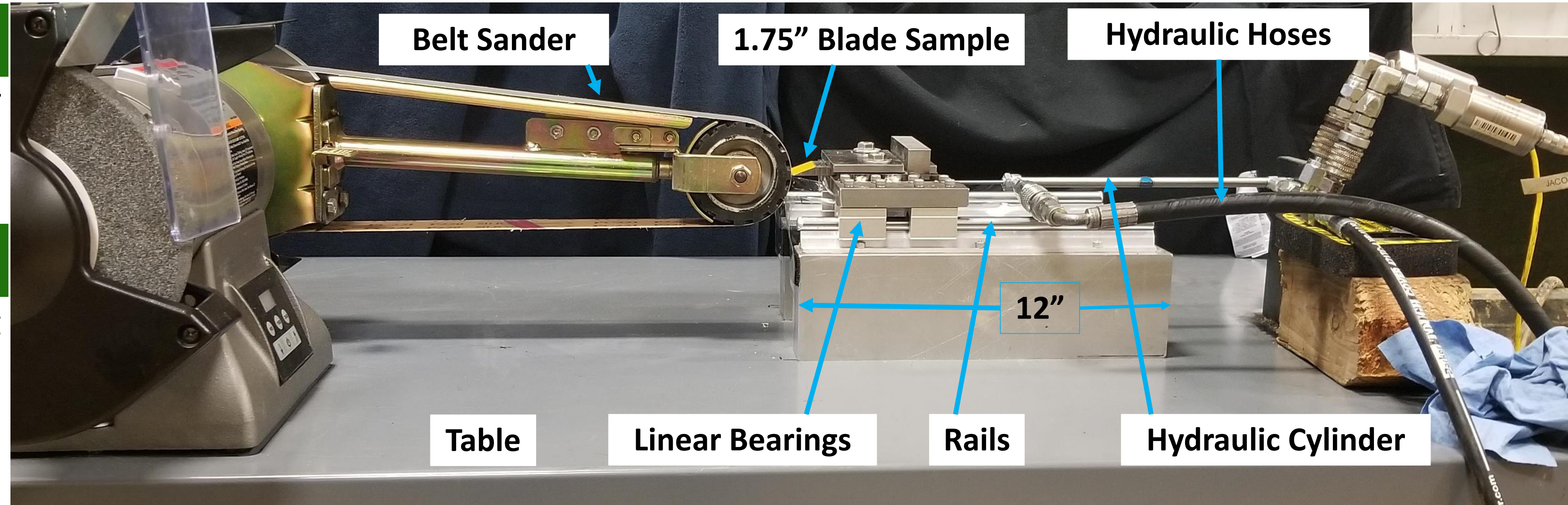
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Objective Statement

To design a chopper blade system that tests wear resistance of different blade materials to produce a more cost efficient blade for the sugarcane farmer.

Background

The sugarcane harvester uses two counter-rotating drums, each with four chopper blades, which wear from blade contact and crop abrasion. John Deere sponsored this project to design a system that tests the abrasion resistance of different blades.



Manufacturing

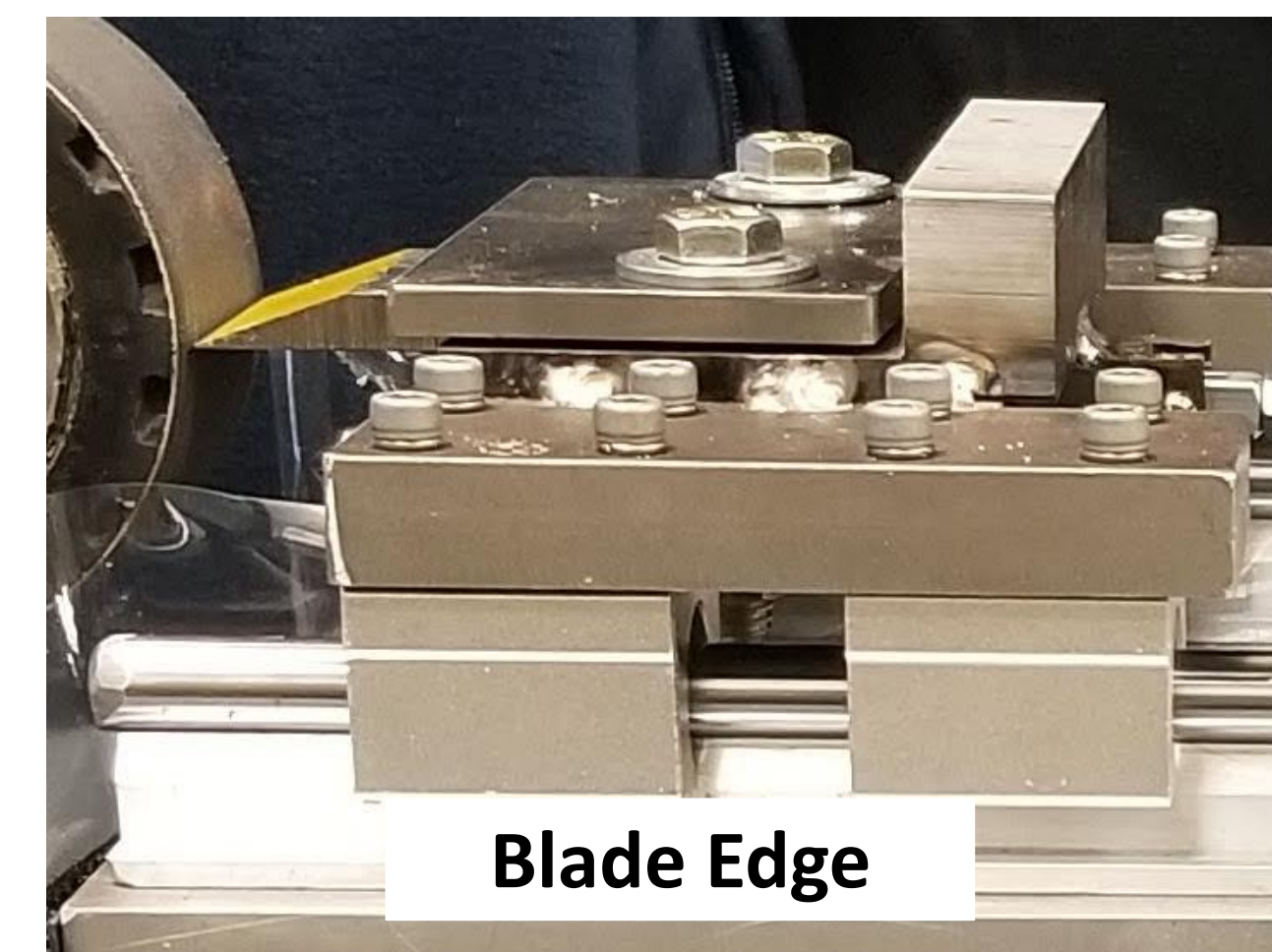
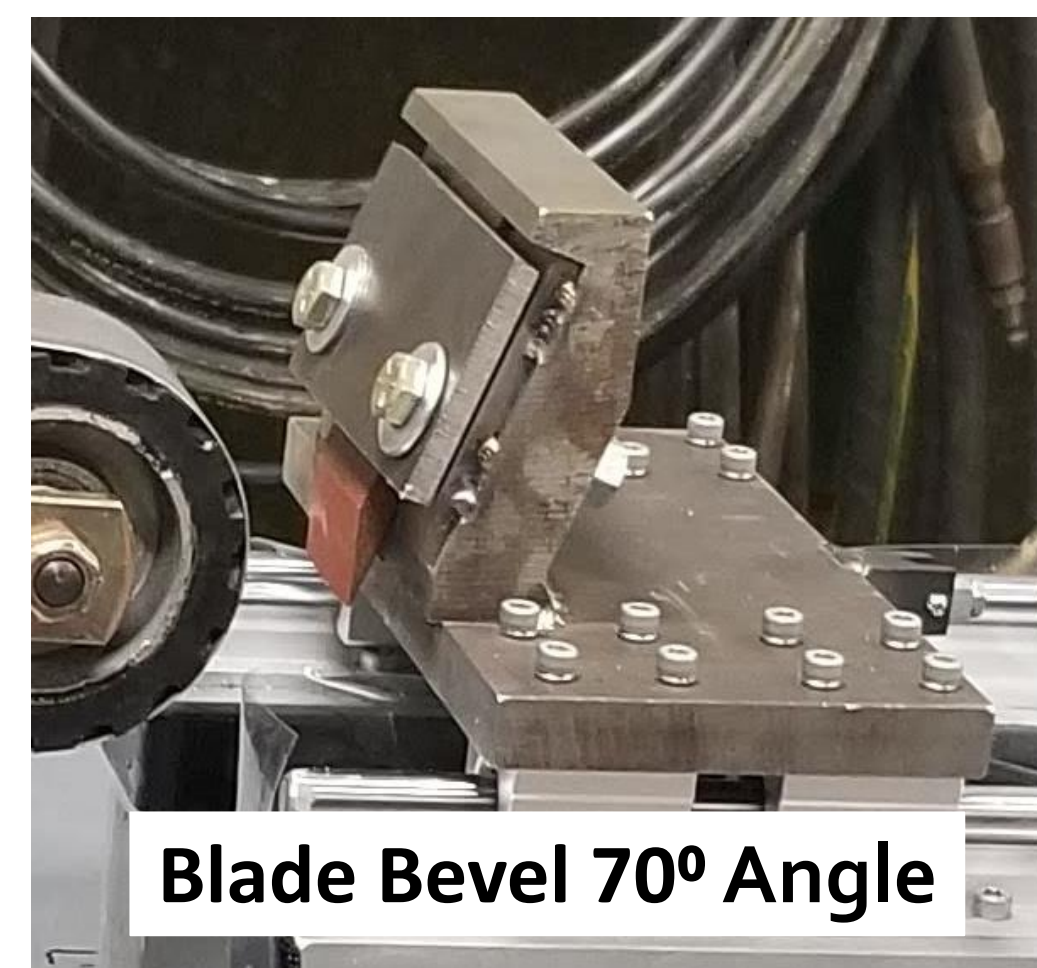
- Waterjet Cutting
- Wire Cut EDM
- Welding
- Drilling
- Milling
- Sanding
- Boring
- Tapping
- Bolting

Safety

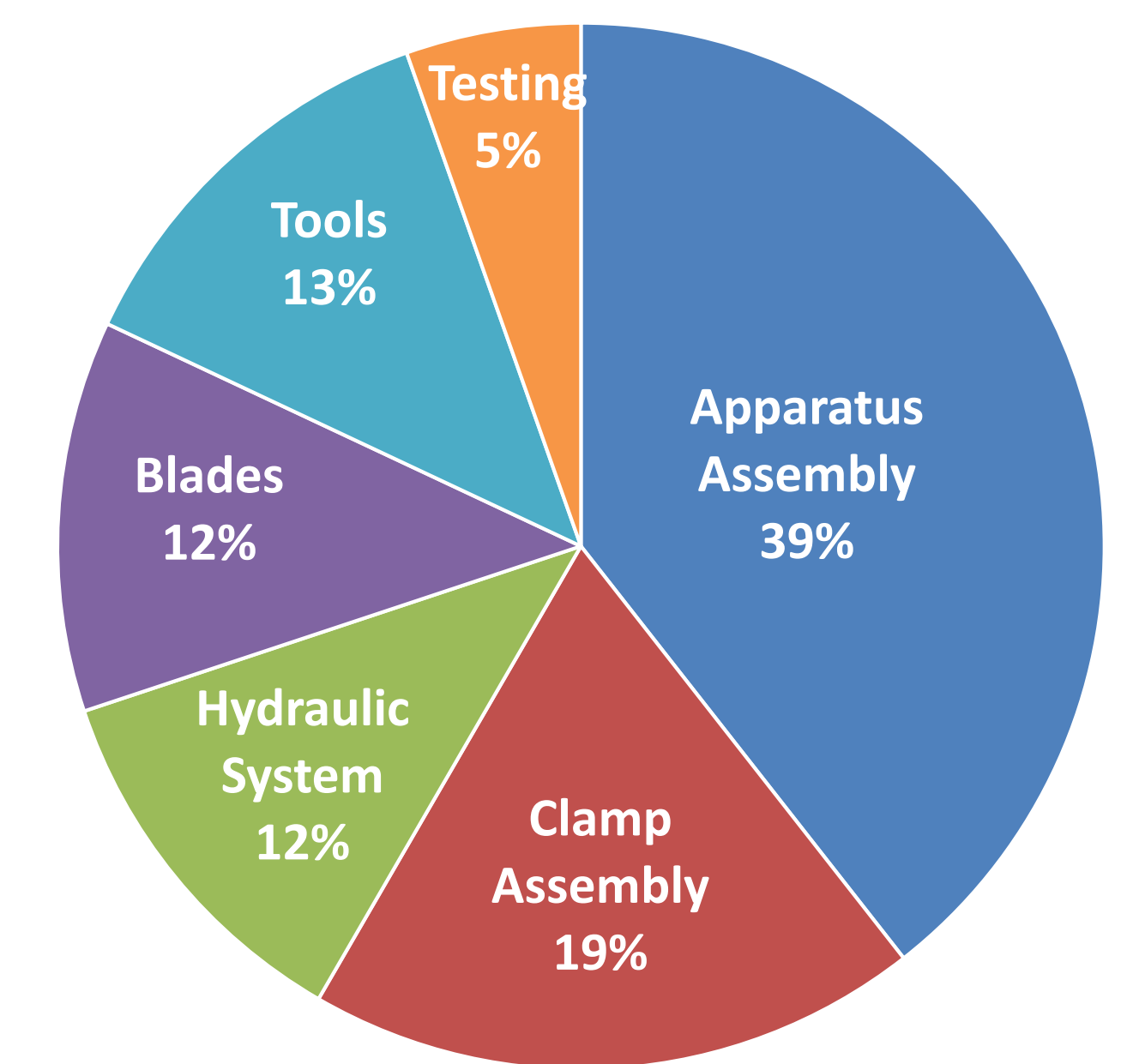
- External on/off switch.
- External emergency kill switch.
- Operator room when testing.
- High strength clamp to secure blade.
- Appropriate PPE required.

Engineering Specifications

Specification	Requirement	Result
Apparatus Dimensions	≤ 10' L x 6' W x 10' H	4' L x 2.5' W x 4' H
Apparatus Weight	≤ 1500 lbs	276 lbs
Project Budget	≤ \$6,000	\$4,000
Feedback Window	≤ 36 hours	6 minutes
Testing Consistency	≤ ± 10% precision	± 10%
Blade Replacement Time	≤ 20 minutes	2 minutes

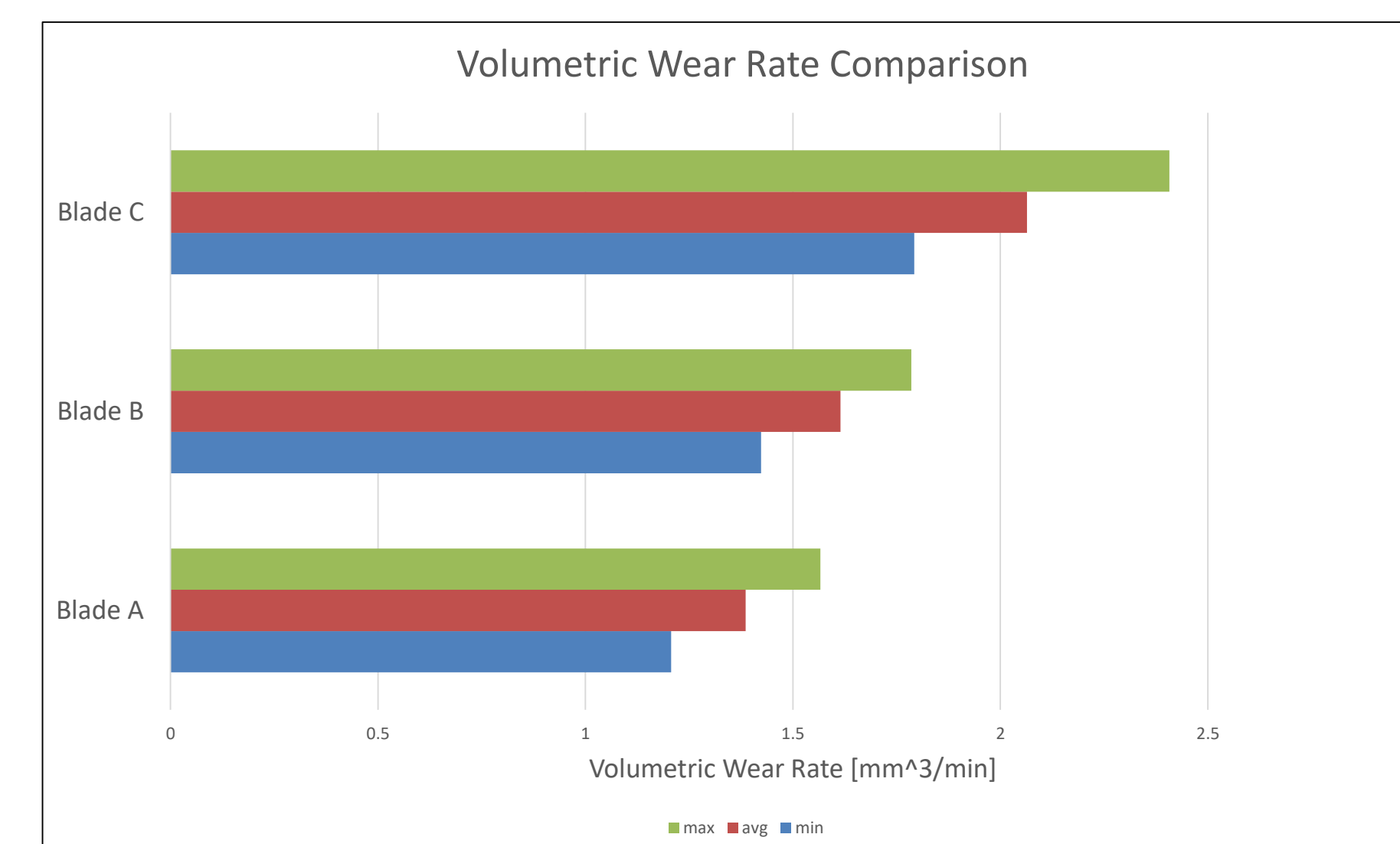
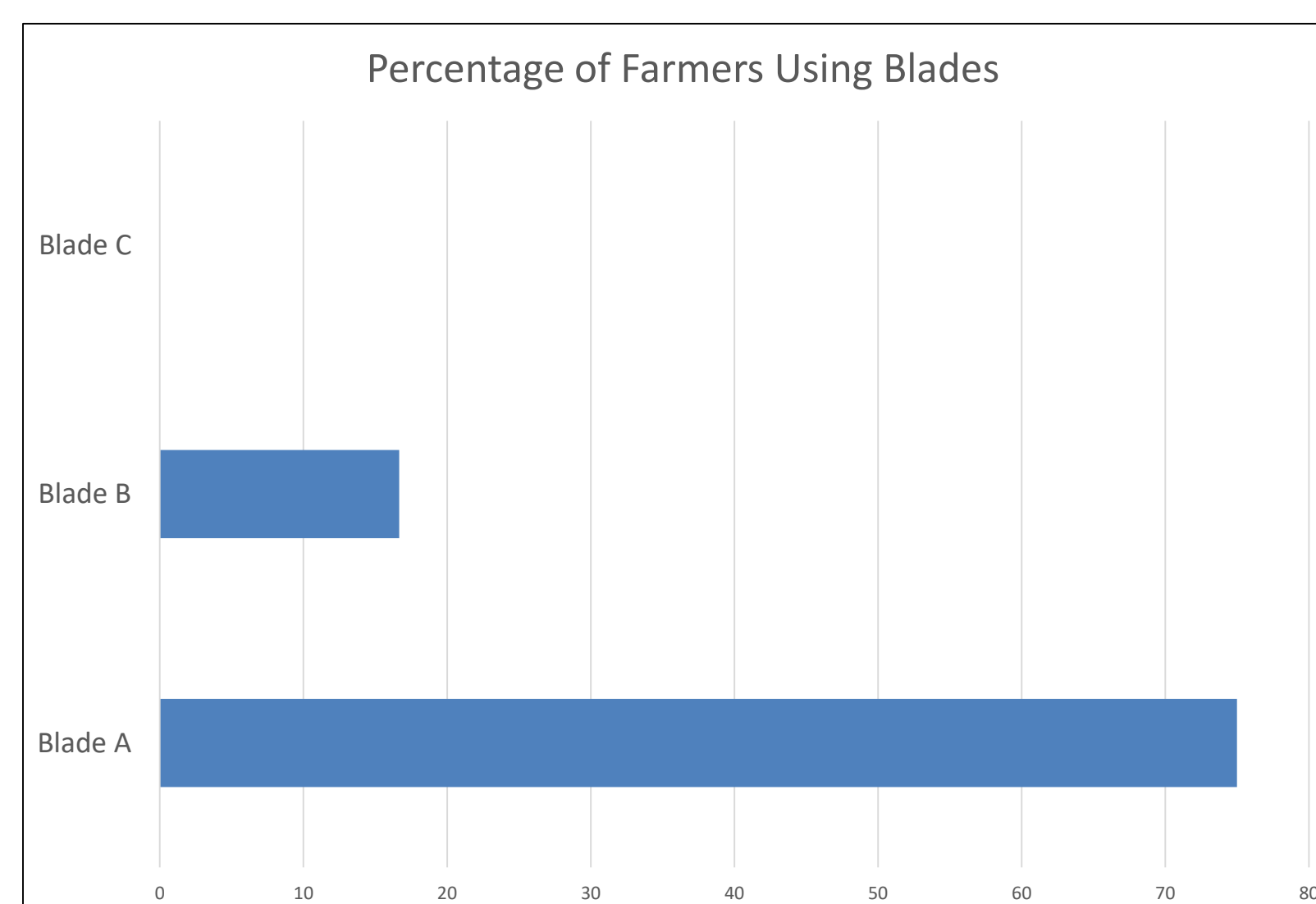
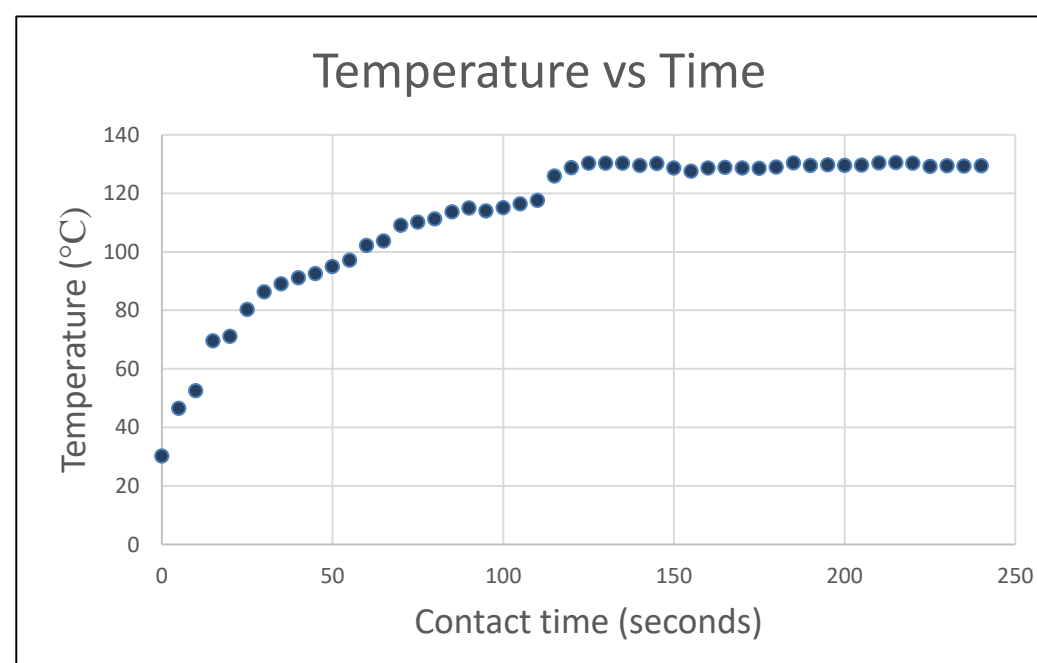


Budget



Analyses

- Heat Generated
- Vibration
- Bolt Analysis
- Force Analysis



September

- Project Definition
- Objective Statement
- Develop E-Spec

October

- Concept Generation & Selection
- Preliminary Analysis

November

- Detailed Analysis
- Develop Embodiment
- Preliminary Testing

December

- Review Presentation Feedback

January

- Design Revisions
- Purchasing

February

- Begin Manufacturing

March

- Finish Manufacturing
- Begin System Testing

April

- Finish System Tests
- Conduct Wear Tests
- Data Analysis