

Team Lockheed Poster Presentation

Zachary Pavel, Benjamin Hornberger, Sierra Smith, Vincent Palermo,
Xiwen Liu, Zach Blanchard, Zhenshan Shi

Faculty Advisor: Douglas Willard, Dept. of Mechanical and Civil Engineering, Florida Institute of Technology



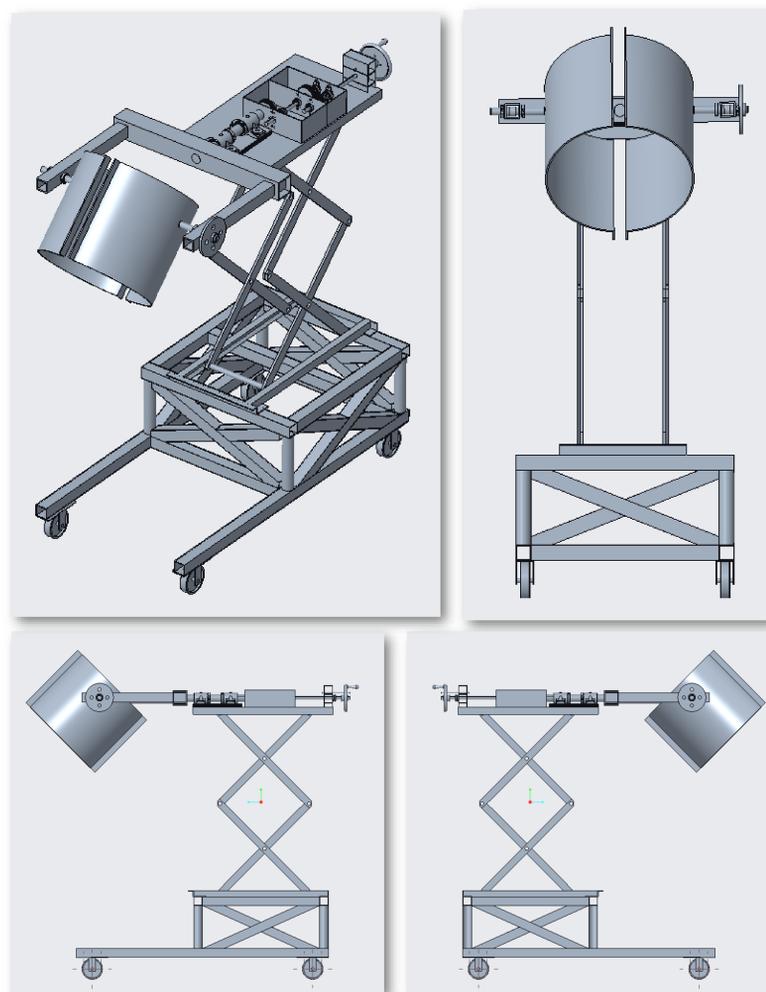
MISSION STATEMENT

- Due to its slow response speed and increased safety risks for operators, the traditional crane has lost its dominance in operations, necessitating the design of a new mechanical device to replace it and address these issues.

OBEJECTIVES

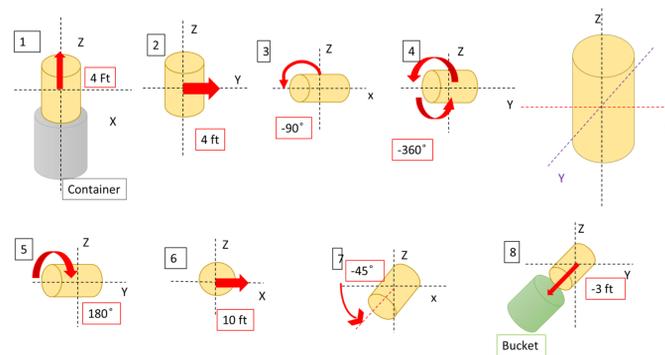
- Design, build, and showcase a machine that can handle a 200lb cylinder, maneuver it in 5 degrees of freedom while performing specific operations, all without the need for overhead lifting devices.

FULL ASSEMBLY



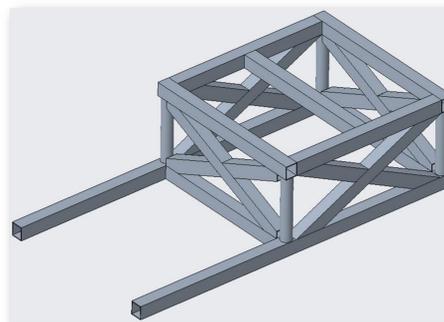
OPERATION

- The machine consists of several key parts including the base, claws, transmission, and scissor lift.



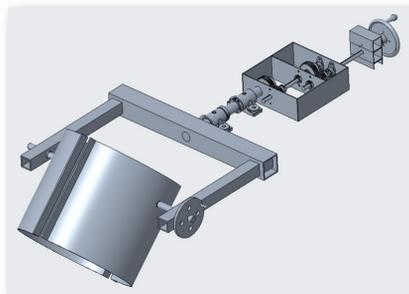
FOUNDATION & LIFT SUBSYSTEMS

- Using Creo for modeling test and operating test.
- Minimum Yield Margin of Safety (M_{sy}) is 10.9
- Minimum Ultimate Margin of Safety (M_{su}) is 7.53



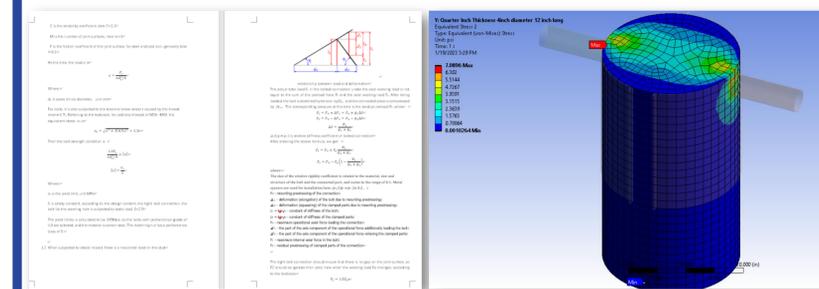
CLAW SUBSYSTEM

- Used Auto CAD and Creo for modeling and testing
- Minimum Yield Margin of Safety (M_{sy}) is 2.14
- Minimum Ultimate Margin of Safety (M_{su}) is 1.07
- Utilizes a 4:1 Gear Ratio



SAFETY

- Use engineering design handbook calculations for safety compliance.
- Use ANSYS Workbench software to simulate and predict system safety by applying FEA and other computational methods to evaluate system behavior.



FUTUREWORK & SOCIAL EFFECT

- Could be more cost-effective and efficient than cranes, potentially reducing costs and increasing productivity.
- Improve safety in worksites, reduce costs, and increase productivity.
- Potentially create new job opportunities in the development, installation, and maintenance of the new system.

ACKNOWLEDGEMENT

- We thank Lockheed for their generous funding and support, as well as Austin Taft and Brandon Nauman for their invaluable contributions to this project. We also appreciate the support of our colleagues and friends.