

Tram Brakes

Final Presentation

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- Project Sponsor
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Project Background:

- Tram located at residence
- Driveway rises at 30° slope
- Carries people and cargo
- Operates on one pull cable
- Emergency Braking system required



Mission Statement:

- Design and prototype braking system
- System acts in event of cable malfunction
- Two alternative concepts
 - Completely stop
 - Automatically descend



Product Design Specifications:

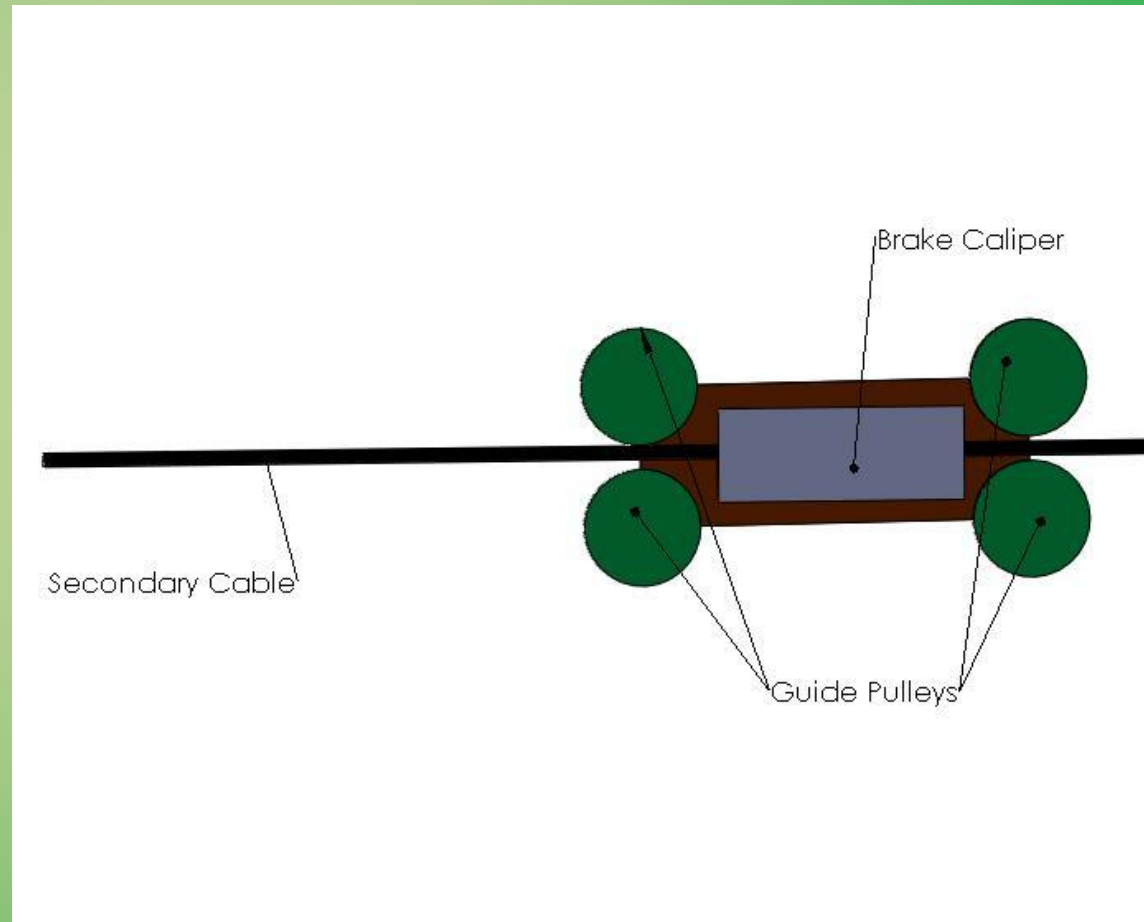
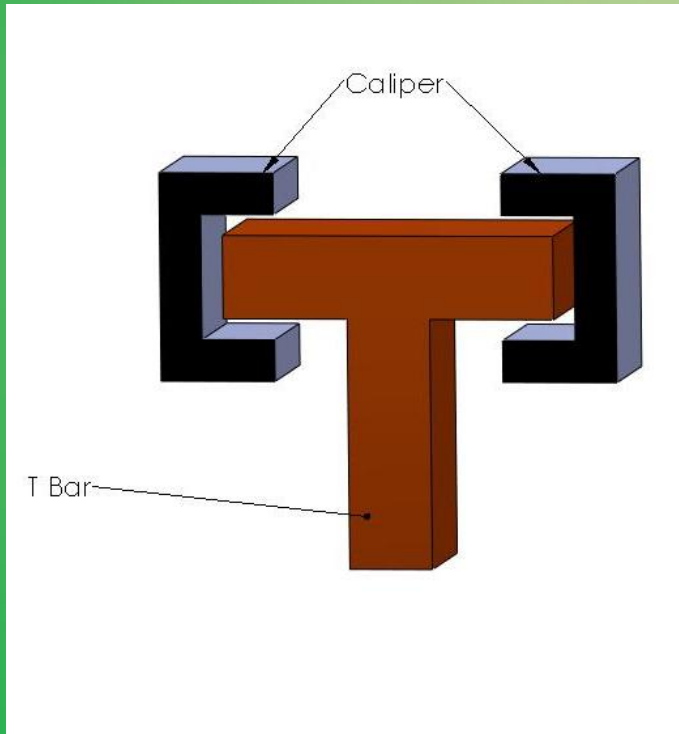
Brake system

- Stop the cart with acceleration not greater than 2 m/s^2
- Should have a manual brake release on the cart
- All components must be mechanical
- Cart must be easily removable
- Documentation including Bill of Materials, Operating and Maintenance instructions
- Safety factor for all components of at least 2

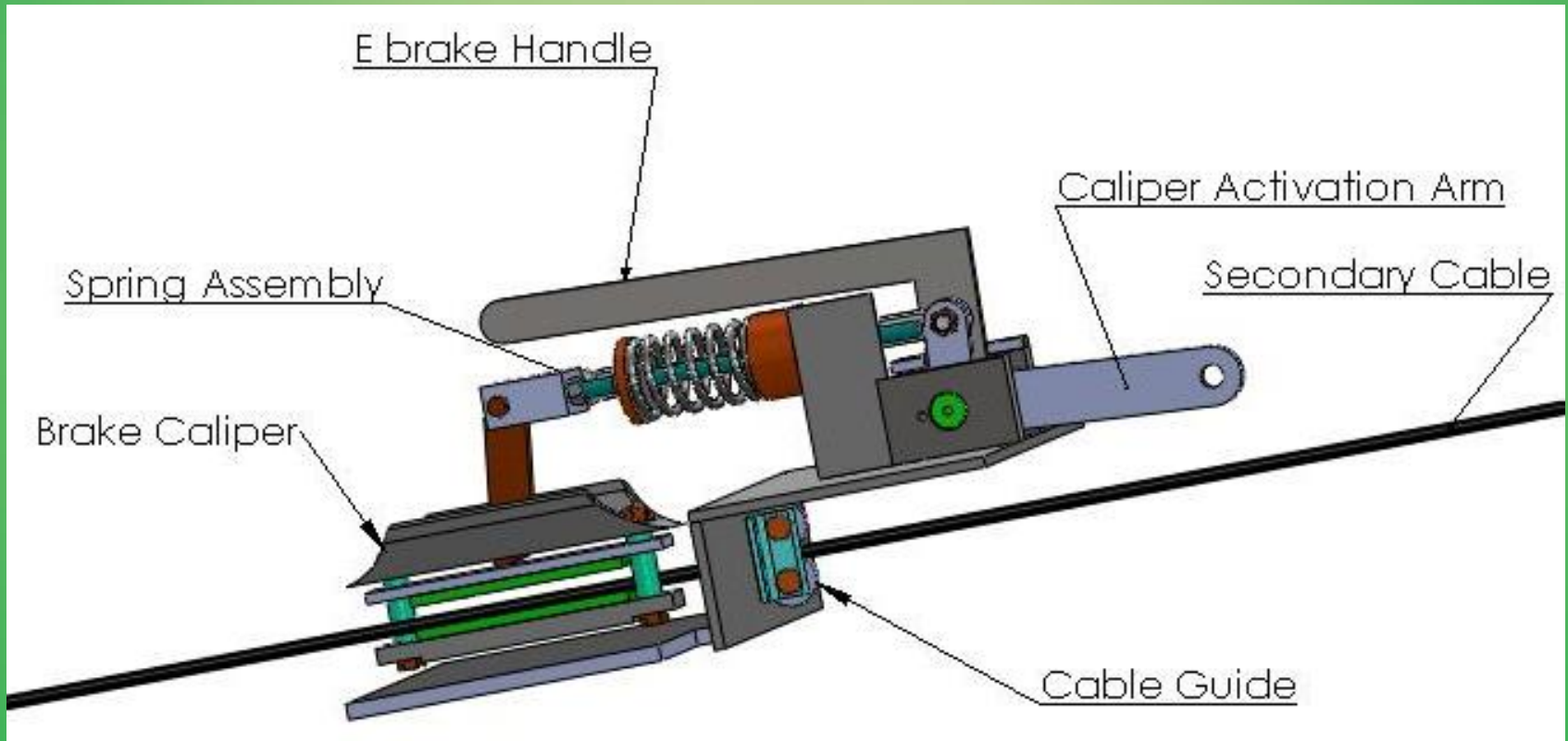
Top Level Design Concepts

Caliper on Cable

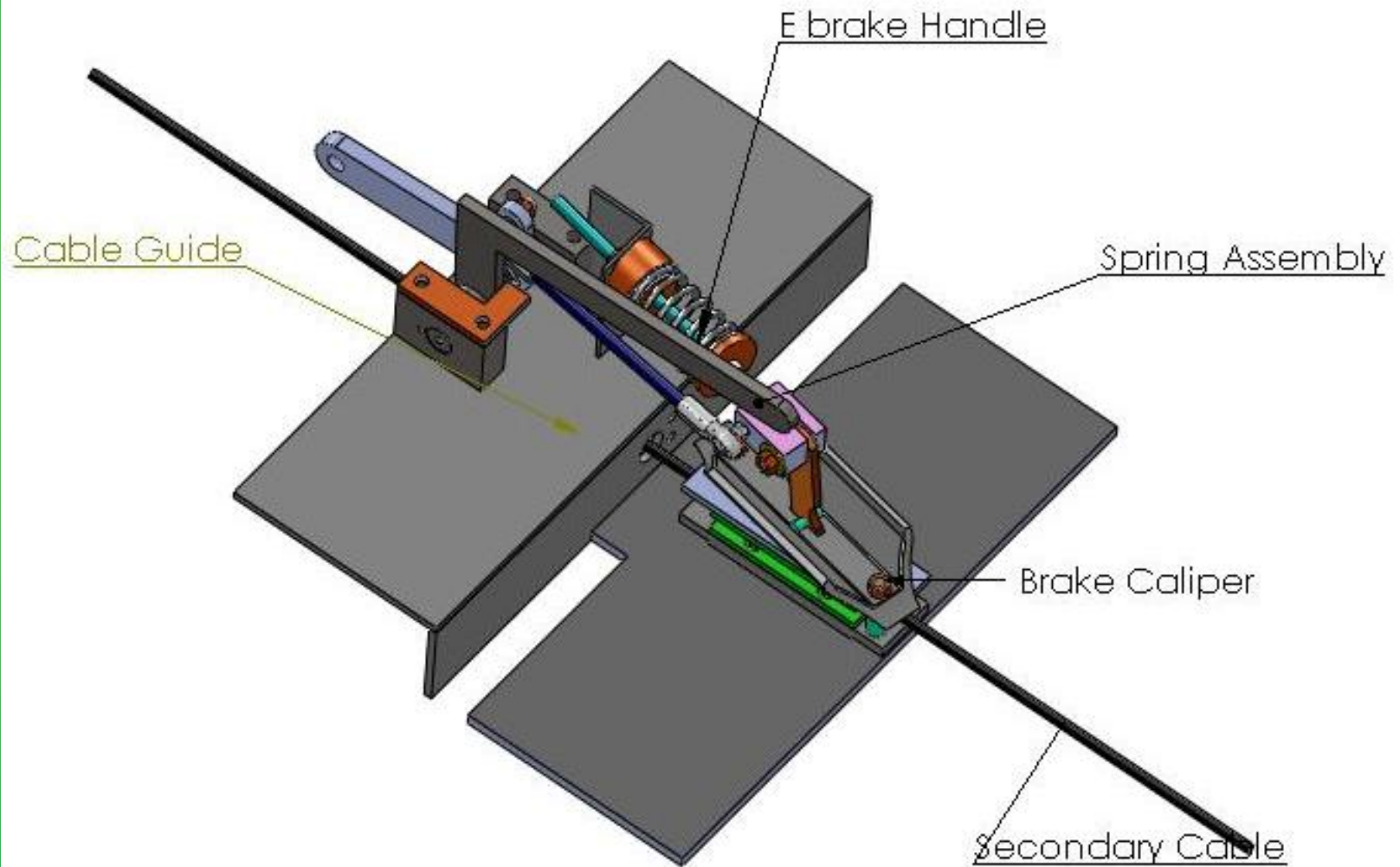
T- Bar & Caliper



Final Design



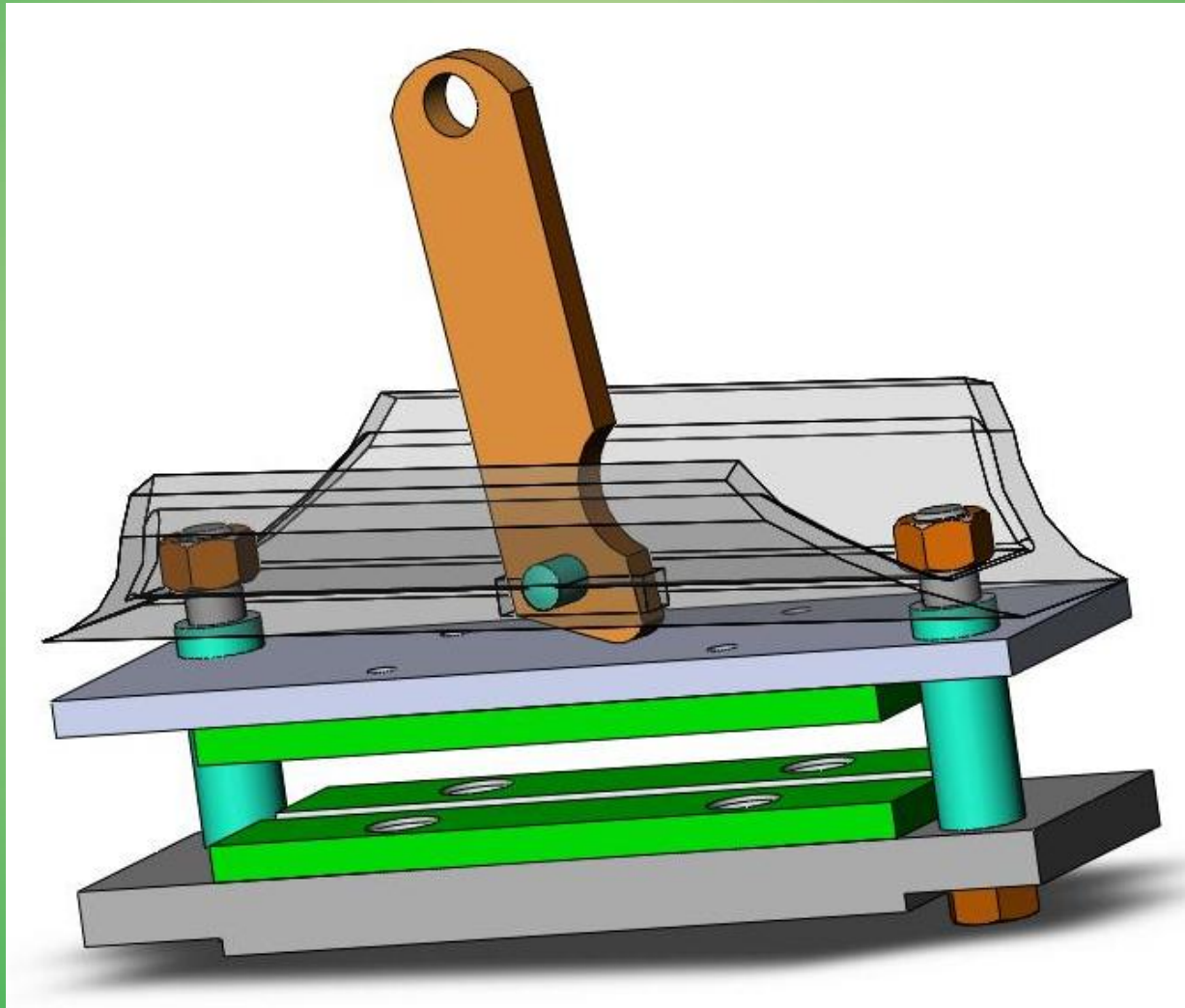
Final Design



Original Caliper



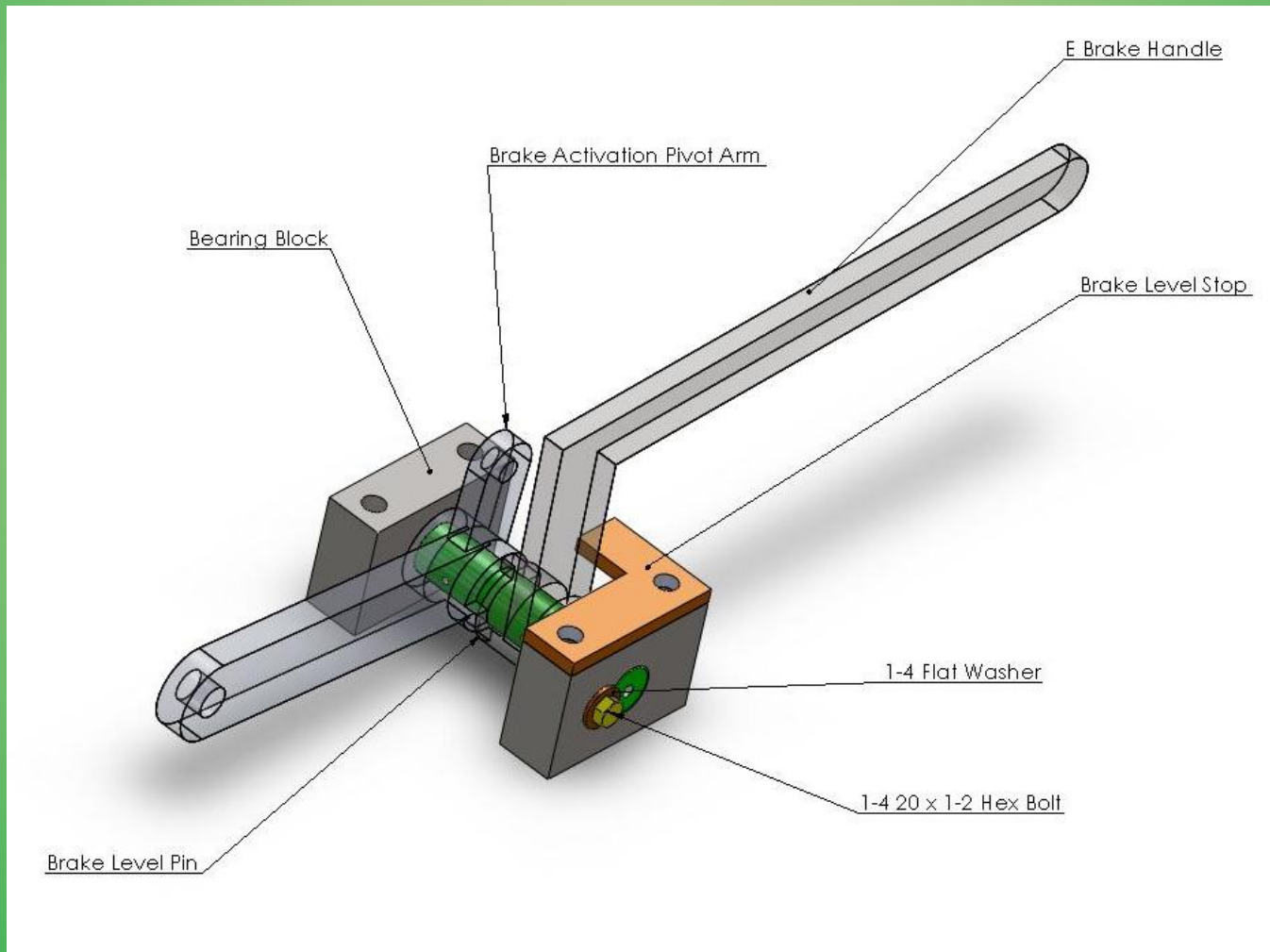
Modified Caliper



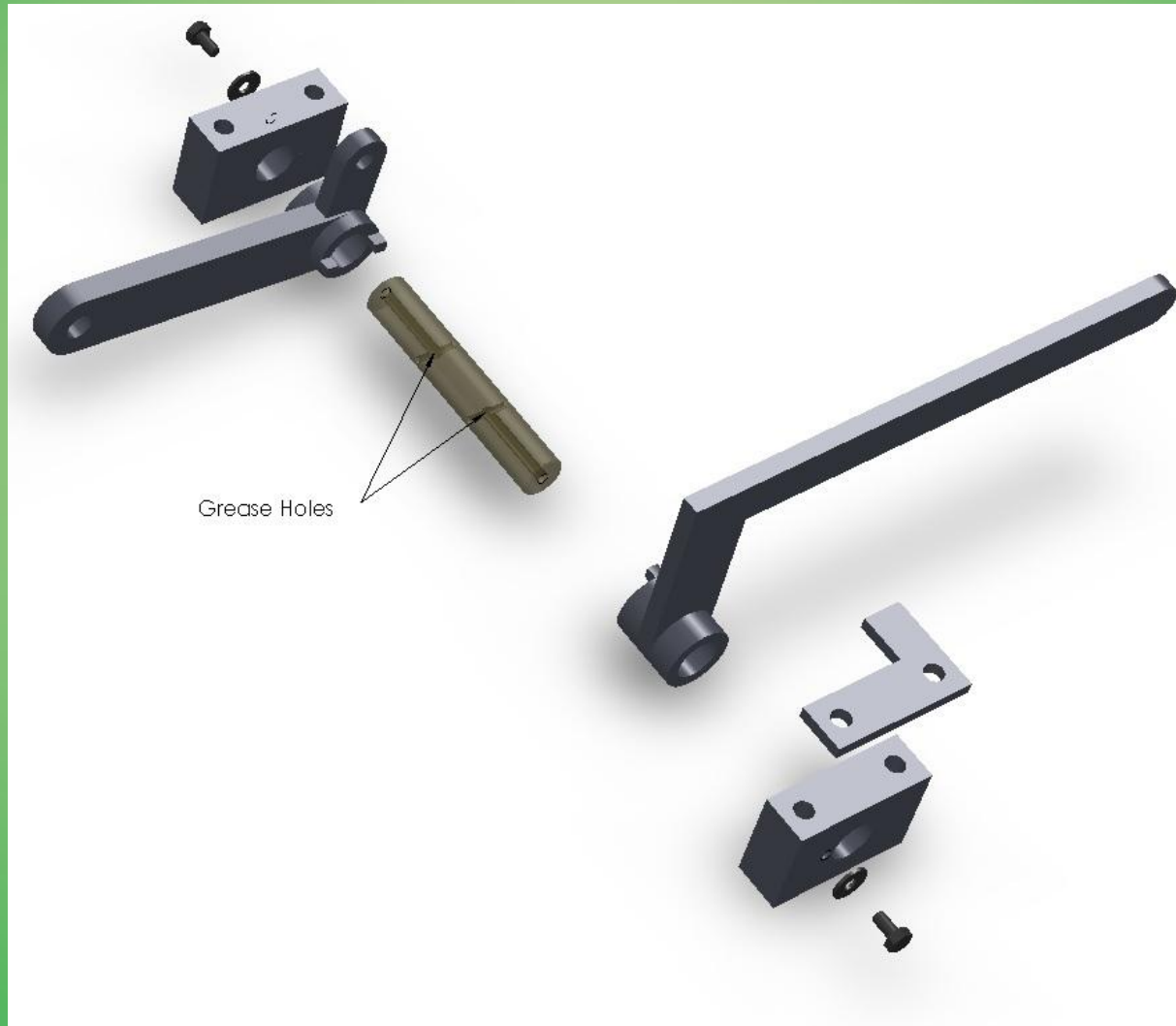
Modified Caliper



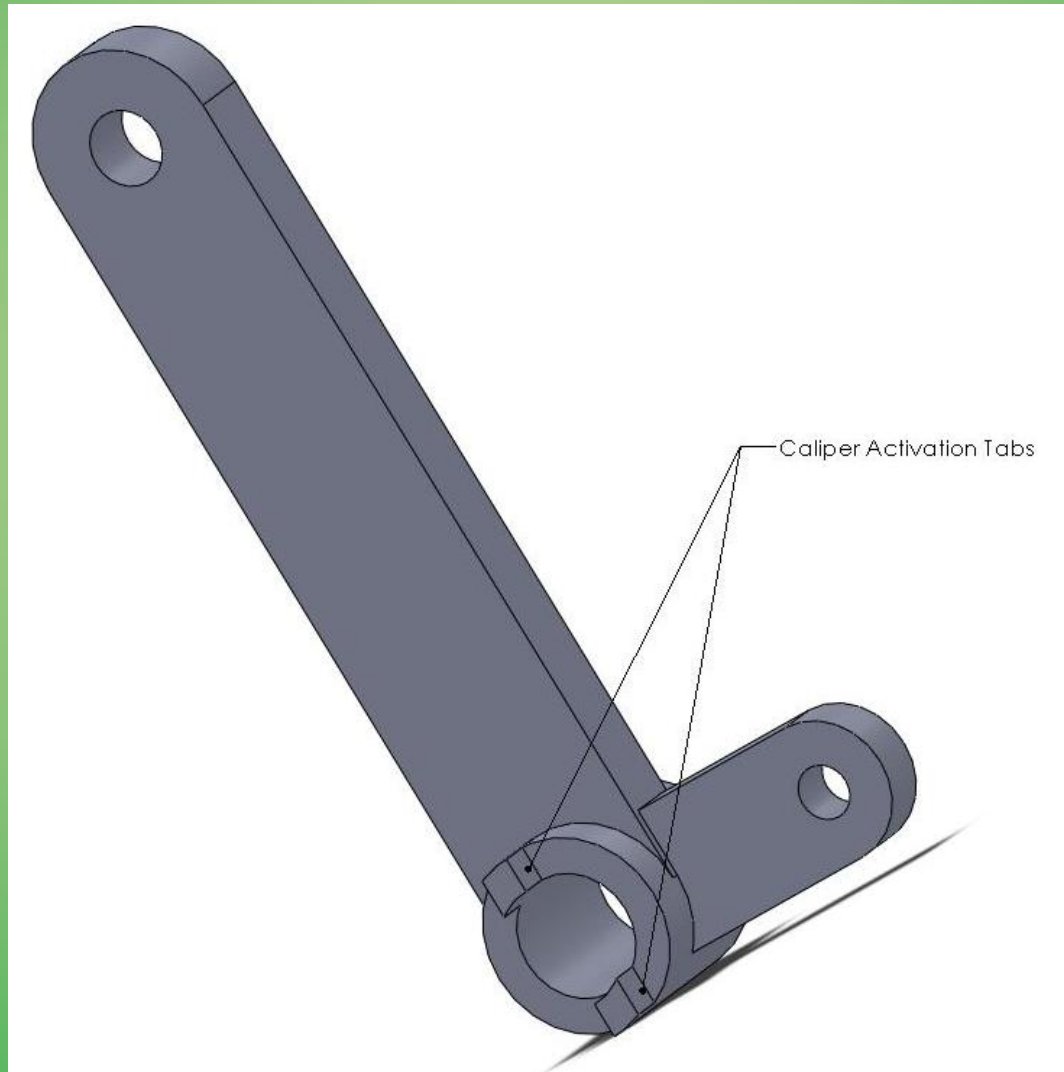
Caliper Release Assembly



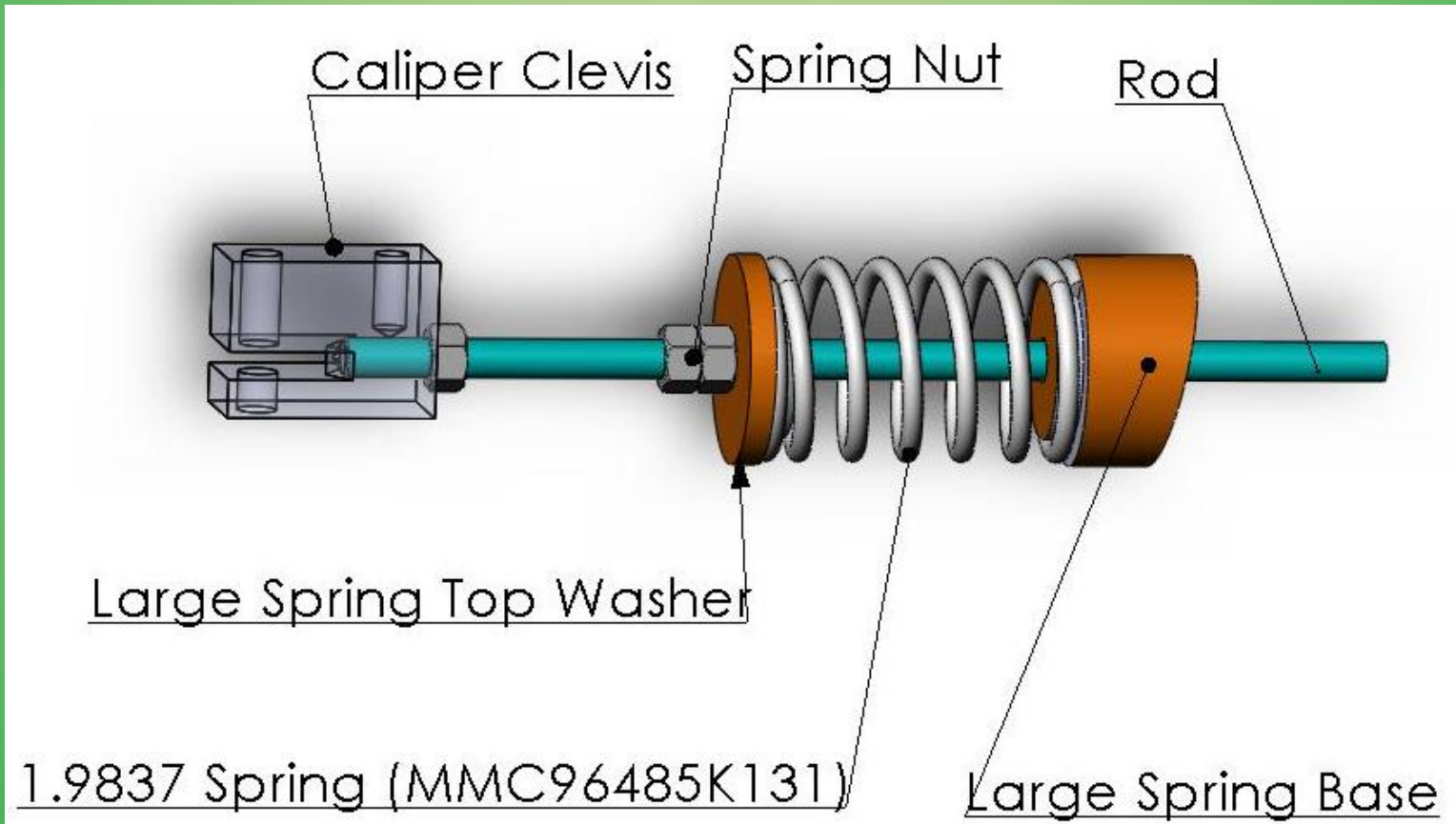
Caliper Release Assembly



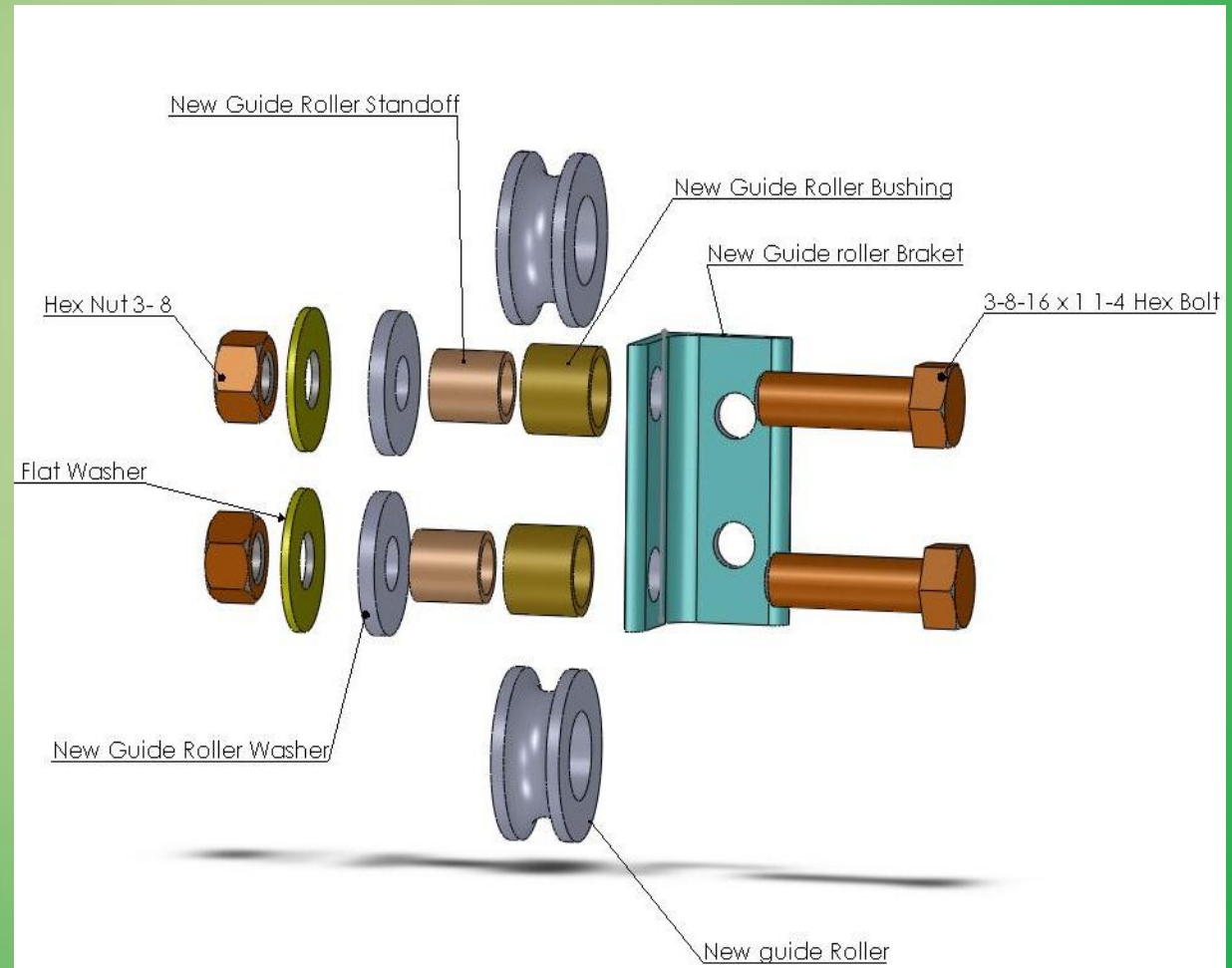
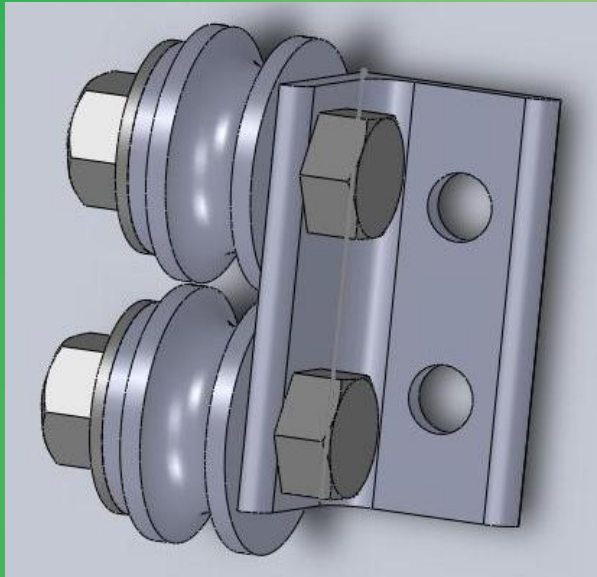
Caliper Activation Arm



Spring Assembly



Cable Guide



Final Design



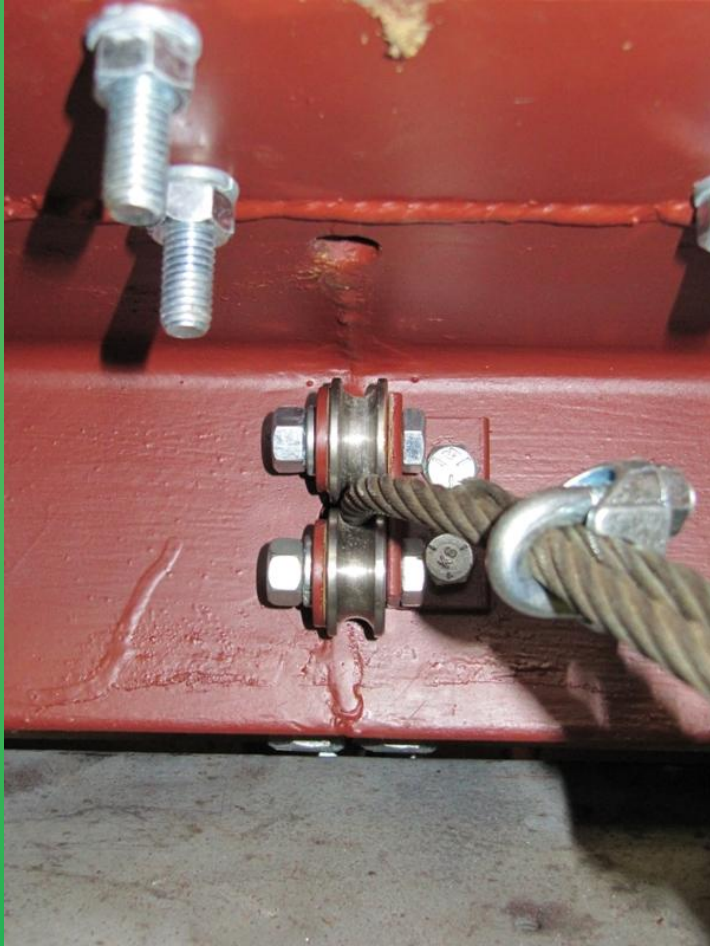
Final Product Evaluation

- 33 requirements specified in PDS
- Most are simple yes/no
- 6 requirements have been determined to be highly important to the success of the project
- All PDS requirements have been met

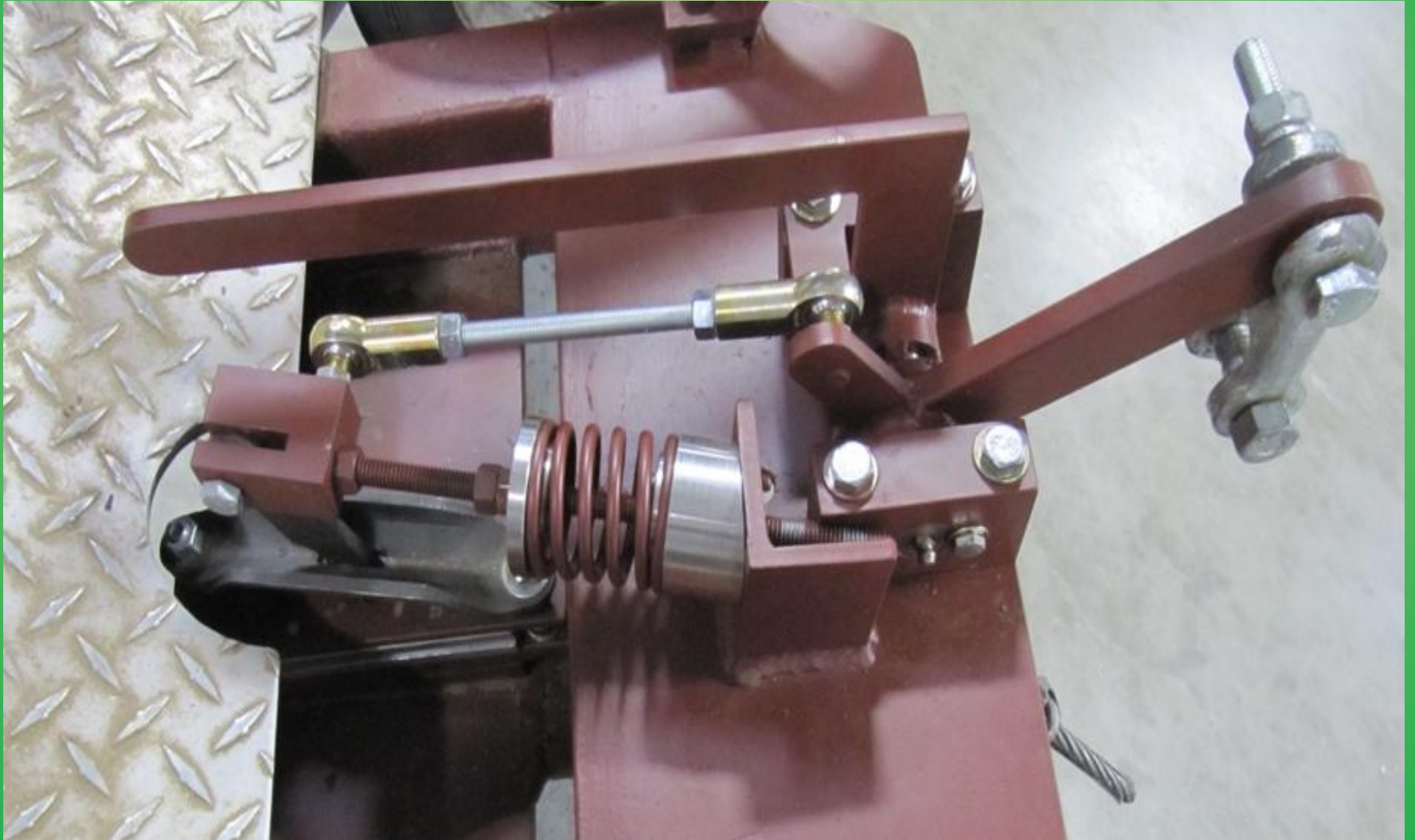
Manual Release Provision



Capture Cart to Rails



Completely Mechanical

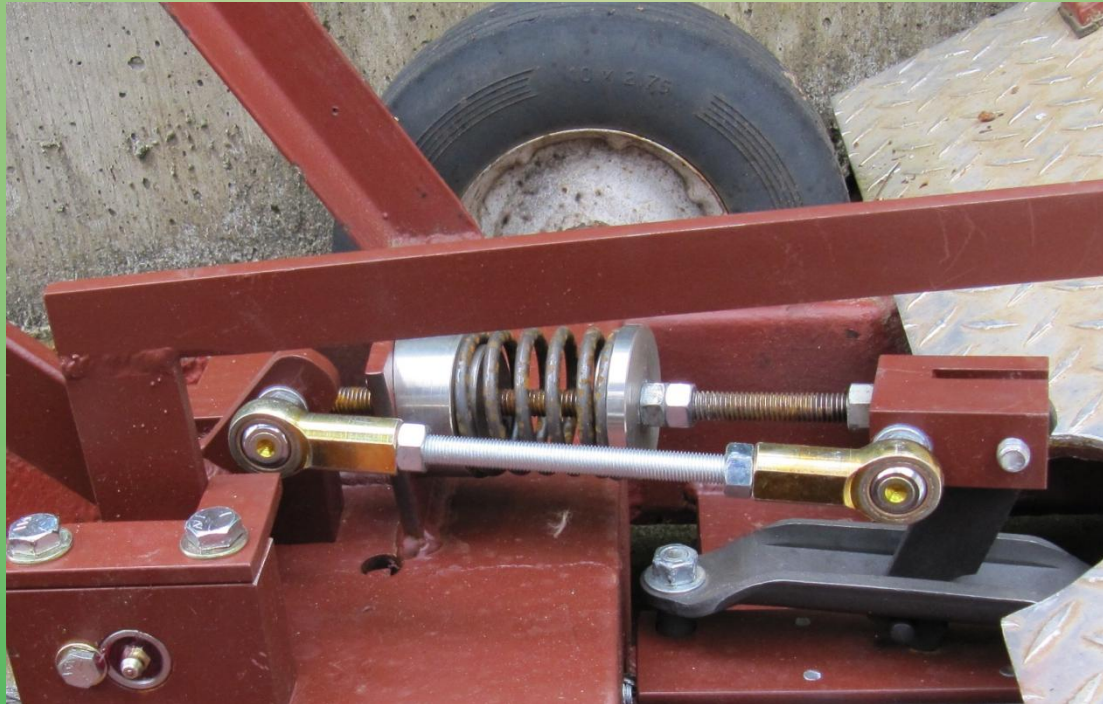


Three Major PDS Requirements

- Brake system will bring cart and up to 600 pounds of passengers & cargo to stop if pull cable or winch fails
- Stopping acceleration must not be greater than startup acceleration
- All components must be designed and built to have a safety factor of at least 2

Things We Learned

- Ineffective communication within the team lead to problems with production and installation of the final product



Conclusion

- The design, production, and installation of the emergency brake system is complete
- Testing has shown the system works exactly as it was designed to.
- All PDS requirements have been fulfilled
- The project sponsor has approved the final product

Questions?