Guide Shoe Cart Combination

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Goal

Design a device that assists in the insertion and extraction of the cryostat beams into and out of the Ross shaft skip compartment. Optimizing for time, ease of use, and safety.

Constraints

1) Shaft dimensions
2) Safety factor target of 3
3) Ease of mounting and dismounting
4) Efficiency of insertion and extraction of beam
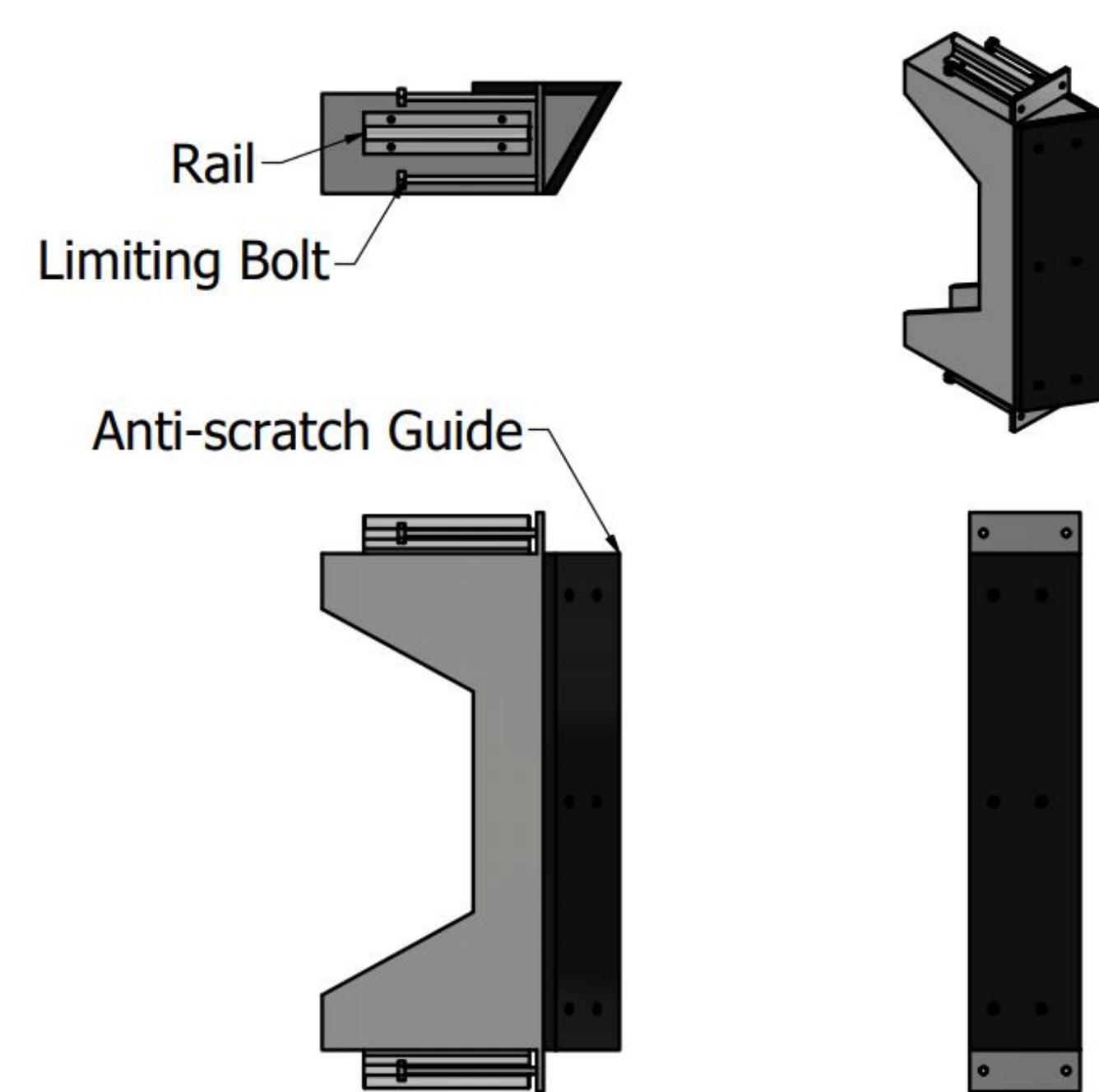
Design Overview
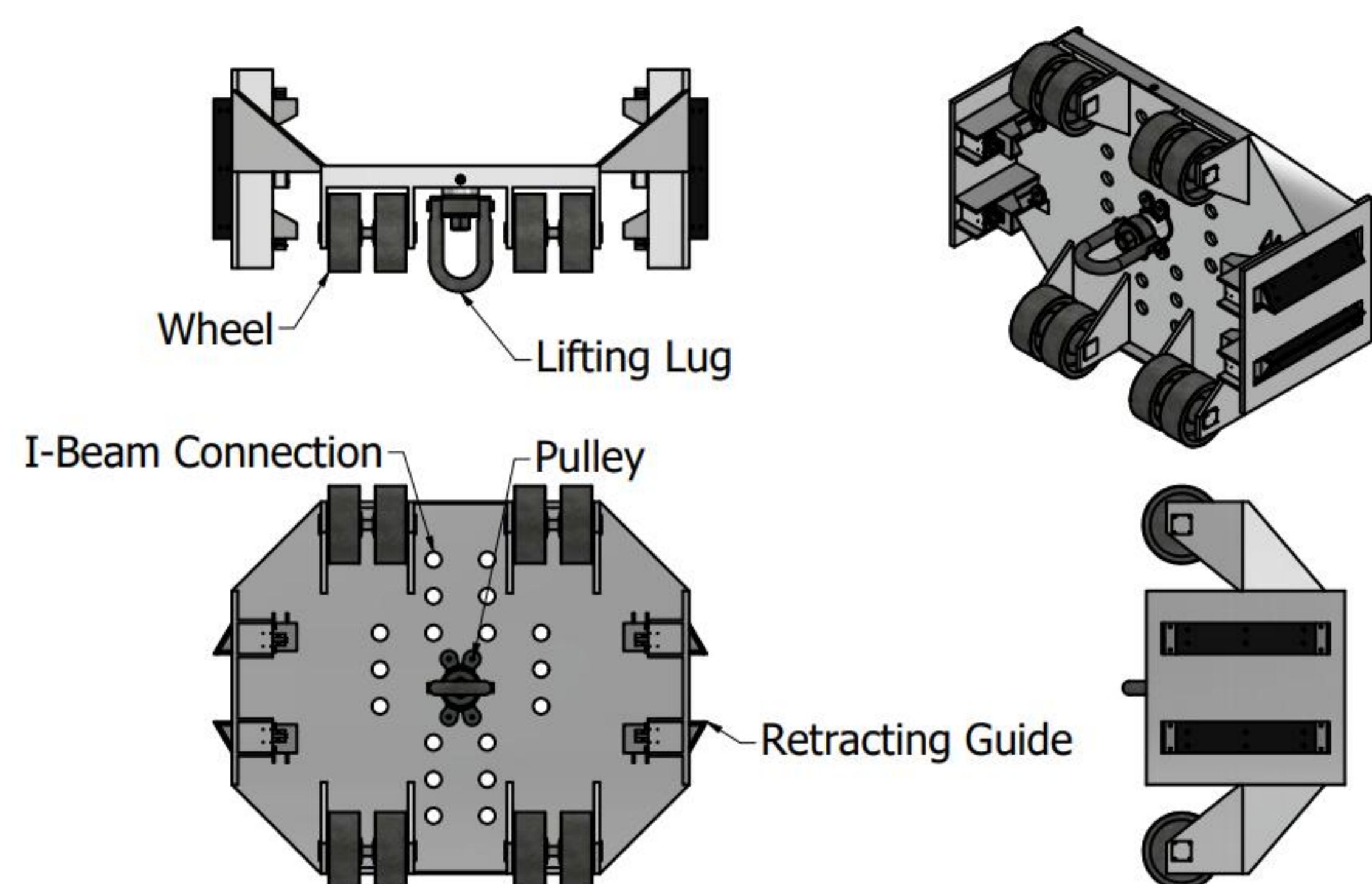
Guide shoe cart combination design overview

- Retracting guides like how a door locks
- Two sets of wheels
- Lifting lug able to control insertion and extraction
- Pulley system that retracts the opposite guides
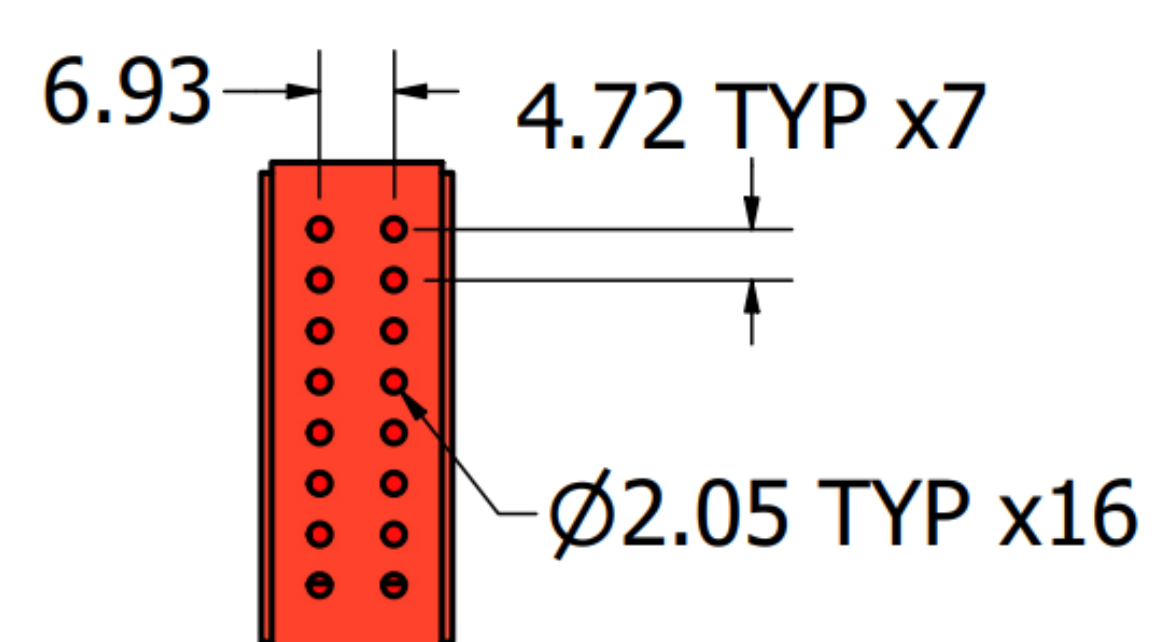- Primarily designed around commercially available parts

Retracting Guide

- Linear rail reduces forces required
- Anti-scratch guides
- Spring loaded position in locked state
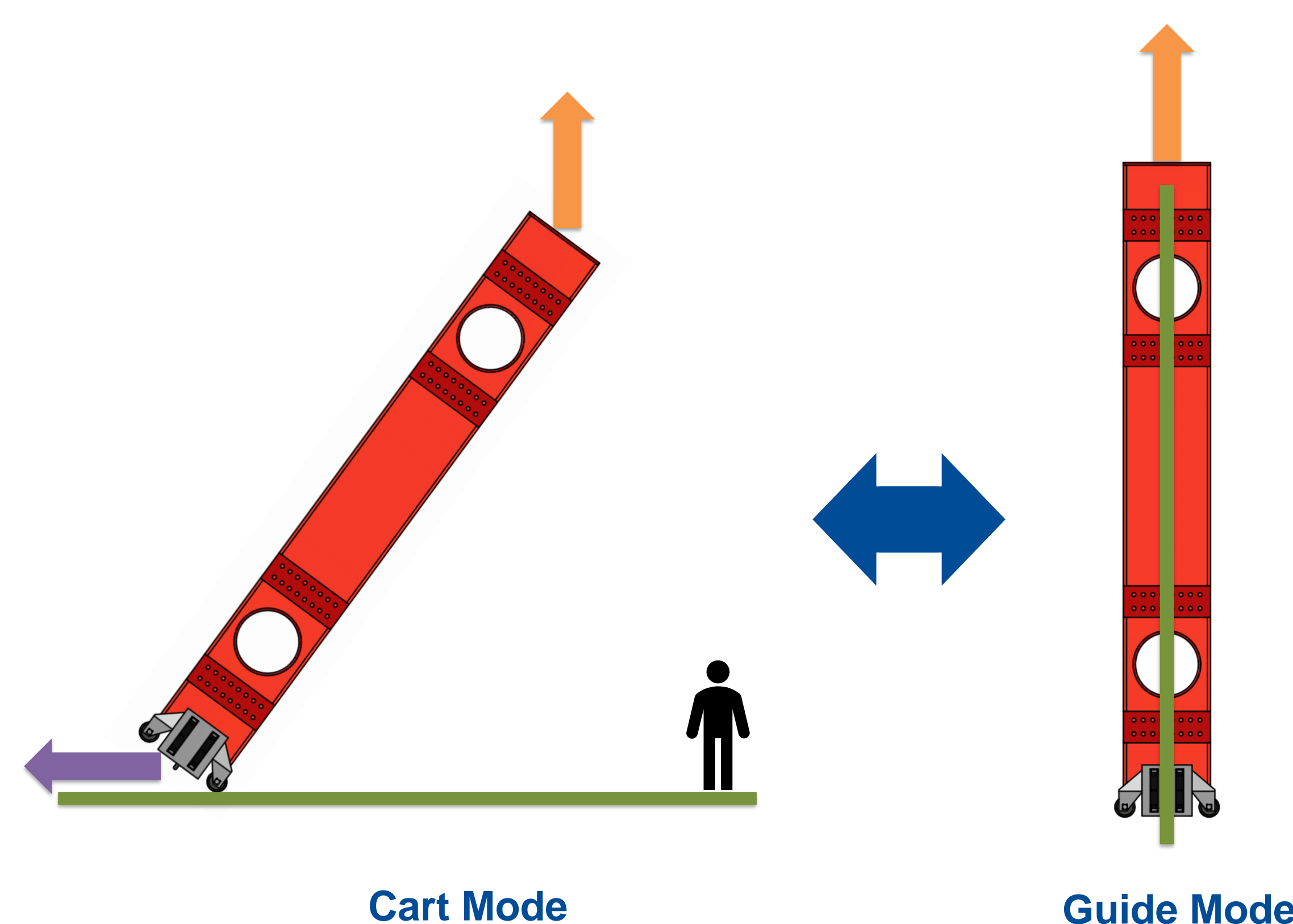

Retracting guide design overview

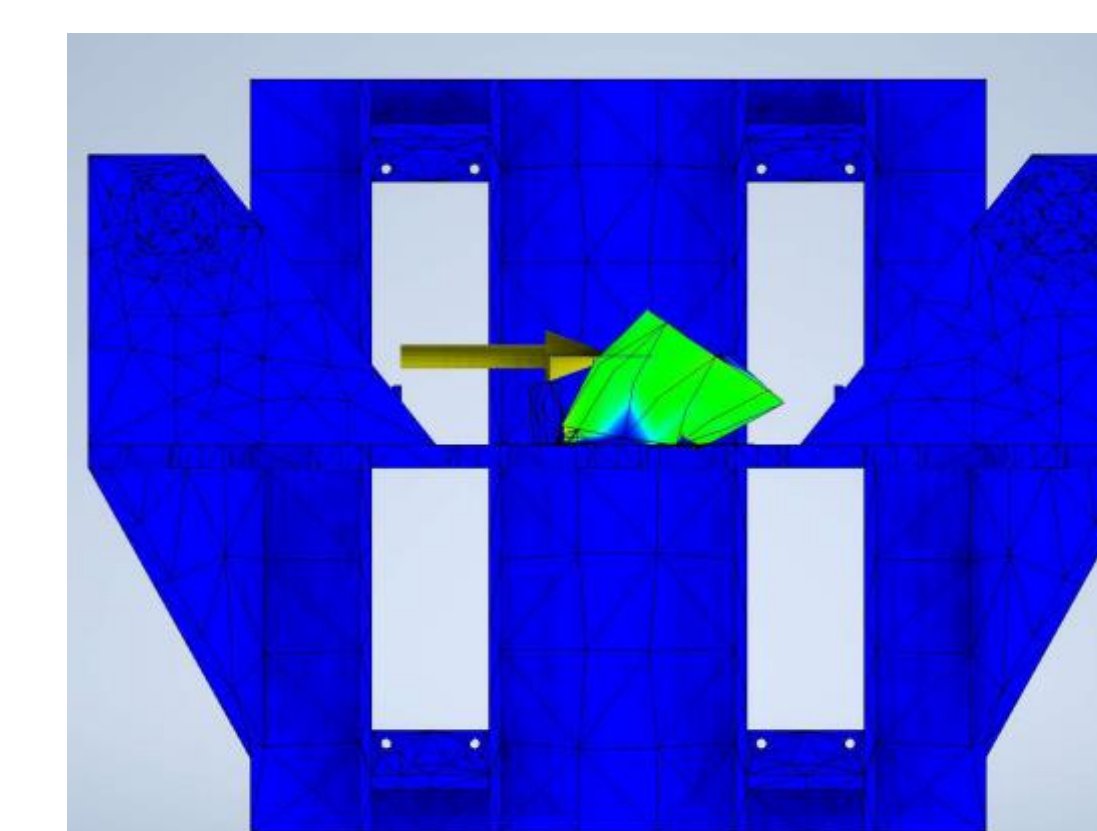## Connecting to I-Beams

I-Beam connection

The method of the assembly of the cryostat will be utilized to firmly attach the beam to the guide shoe

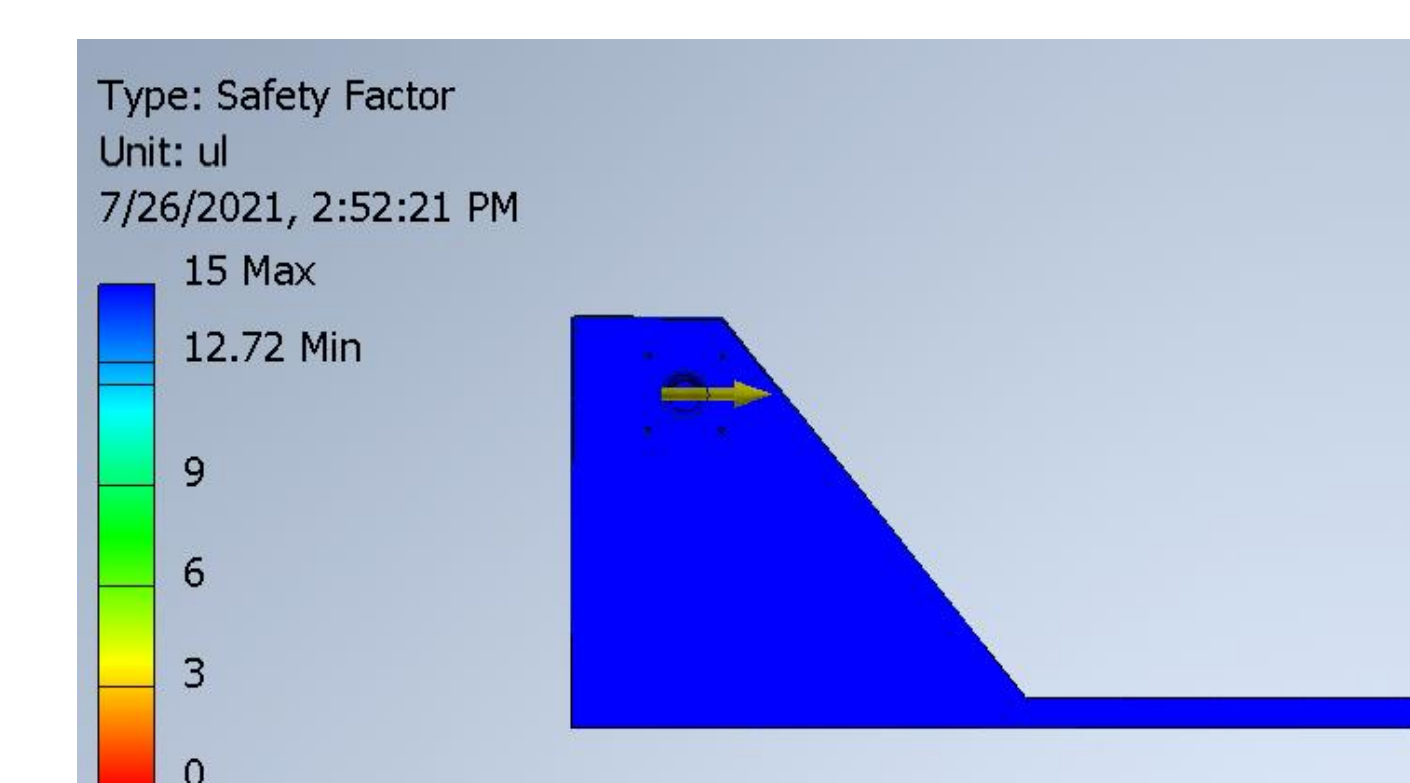## Cart Guide Shoe In Use

Cart Mode   Guide Mode

Guide shoe cart combination attached to beam insertion shaft

Finite Element Analysis

Side loading of lifting lug bolting mechanism FEA

- Minimum of 2.93 safety factor at a max expected of 20,000lbf
- Minimal deflection at expected loading

Wheel bracket FEA

- 12.72 safety factor with two point loads of 4500lbf
- Minimal Deflection at expected loading

Assumptions
- Strictly side loaded within the shaft holders
- Fixed locations where the I-Beam connects to the base plate

Next Steps

- Define parameters of operation
- Evaluate practicality given the current facility
- Submit requests for information to designing firms
- Build the cart

Acknowledgements

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