**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**
- 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

**Connecting to I-Beams**
The method of the assembly of the cryostat will be utilized to firmly attach the beam to the guide shoe

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

**Side loading of lifting lug bolting mechanism FEA**
- 12.72 safety factor with two point loads of 4500lbf
- Minimal Deflection at expected loading

**Wheel bracket FEA**
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

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