



MexLog Saddle

Project Sponsor: Mexicana Logistics
 Sam Melin | Jeffrey Webb | Badr Alouhali | Guillermo Ortega
 Advisor: Dr. Daniel Codd



Abstract

Problem: Semi-Trucks produced in Mexico need an efficient way to be moved into the US and Canada. More Semi-Truck Designs have caused MexLog to utilize a Forward Extended Saddle (FES) system. The current Rhino design is:

- Unnecessarily heavy
- Invasive and labor Intensive to hook-up
- Costly to ship back to decking facility

Solution: Design a lightweight saddle mount that utilizes a simple mounting method in order to reduce the invasivity of the system and streamline the overall process.

Customer and Regulatory Requirements

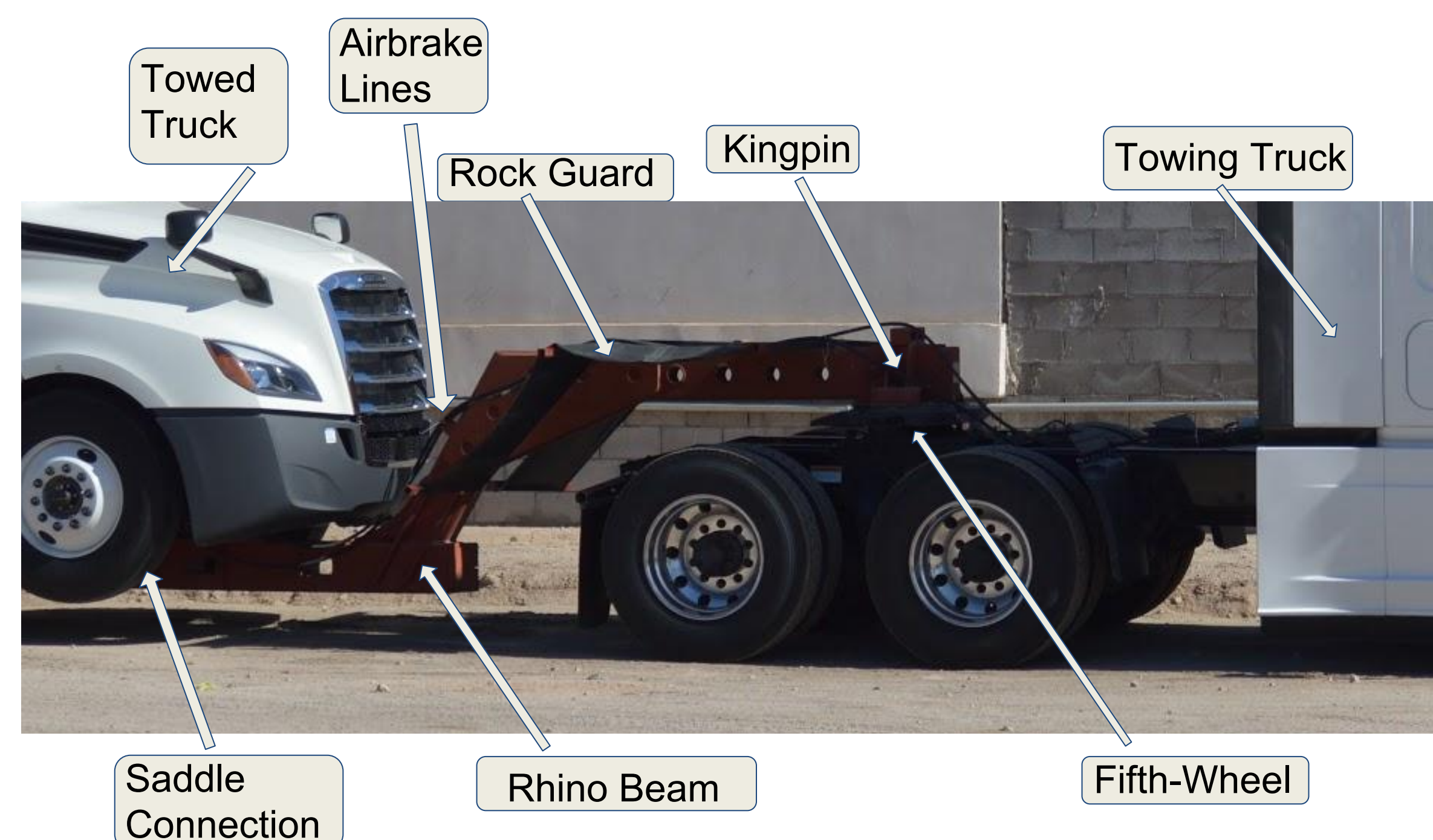
- Transport trucks up to 22,000 Lbs in weight
- Significantly reduce weight of Rhino below 2,200 Lbs.
- Overall Cost below \$4500
- Total height below 13'6" per USDOT 31111
- Overall train length less than 75', per USDOT 31114
- Train Weight below 80,000 Lbs per USDOT 23.127
- Transport 18 or more mounts on a flatbed truck
- Resist corrosion and the elements
- Minimum lifespan 10 years, minimal maintenance
- Total Weight of return shipment 39,600 Lbs

Specifications Per Saddle

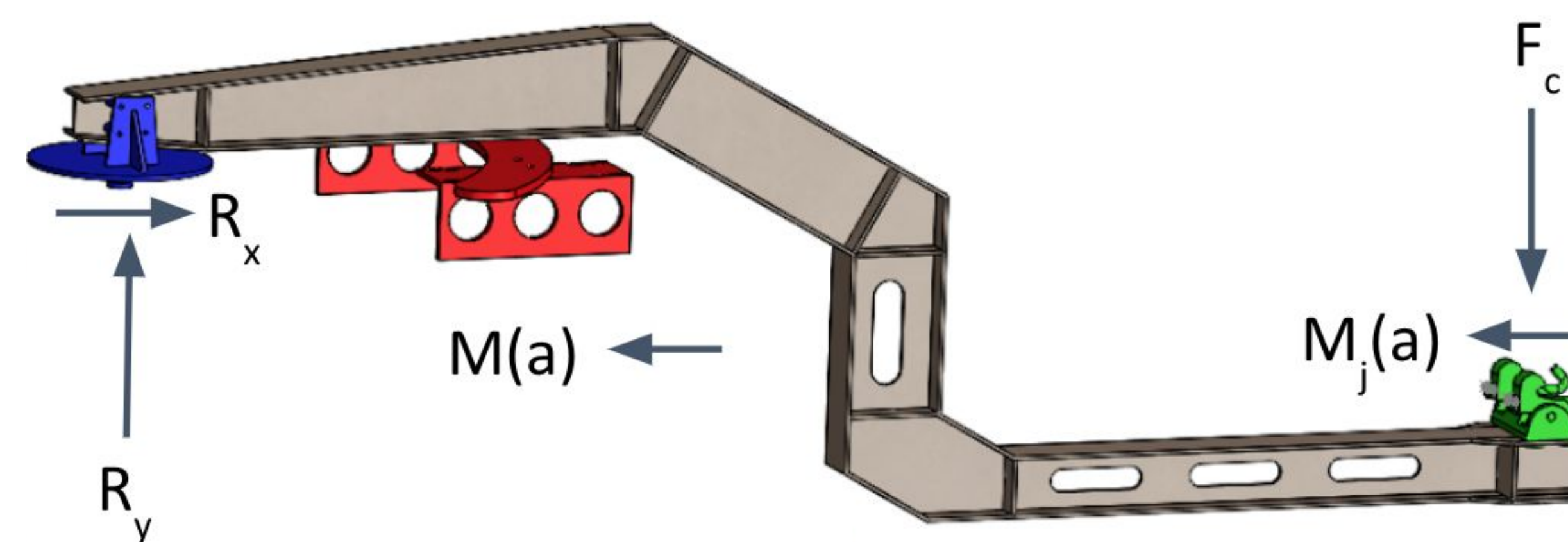
- 14.6' long, 650 lb, A36 Carbon Steel
- Attaches to front crossmember of a truck
- Easily "racked" for return shipping
- Little to no additional invasivity into the trucks during decking
- Manufacturable by welding and water-jet cutting

A one-half scale model is to be constructed for mechanical and manufacturability testing. Steel beam will have welded construction for ease of manufacturability.

System Overview

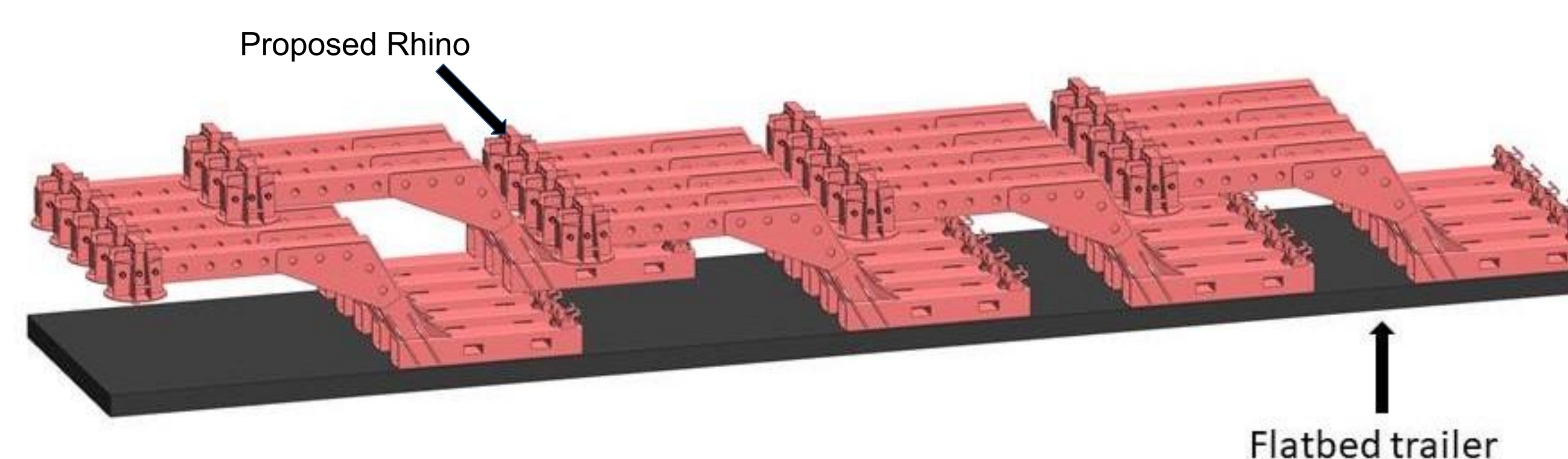


Scaled Test Forces

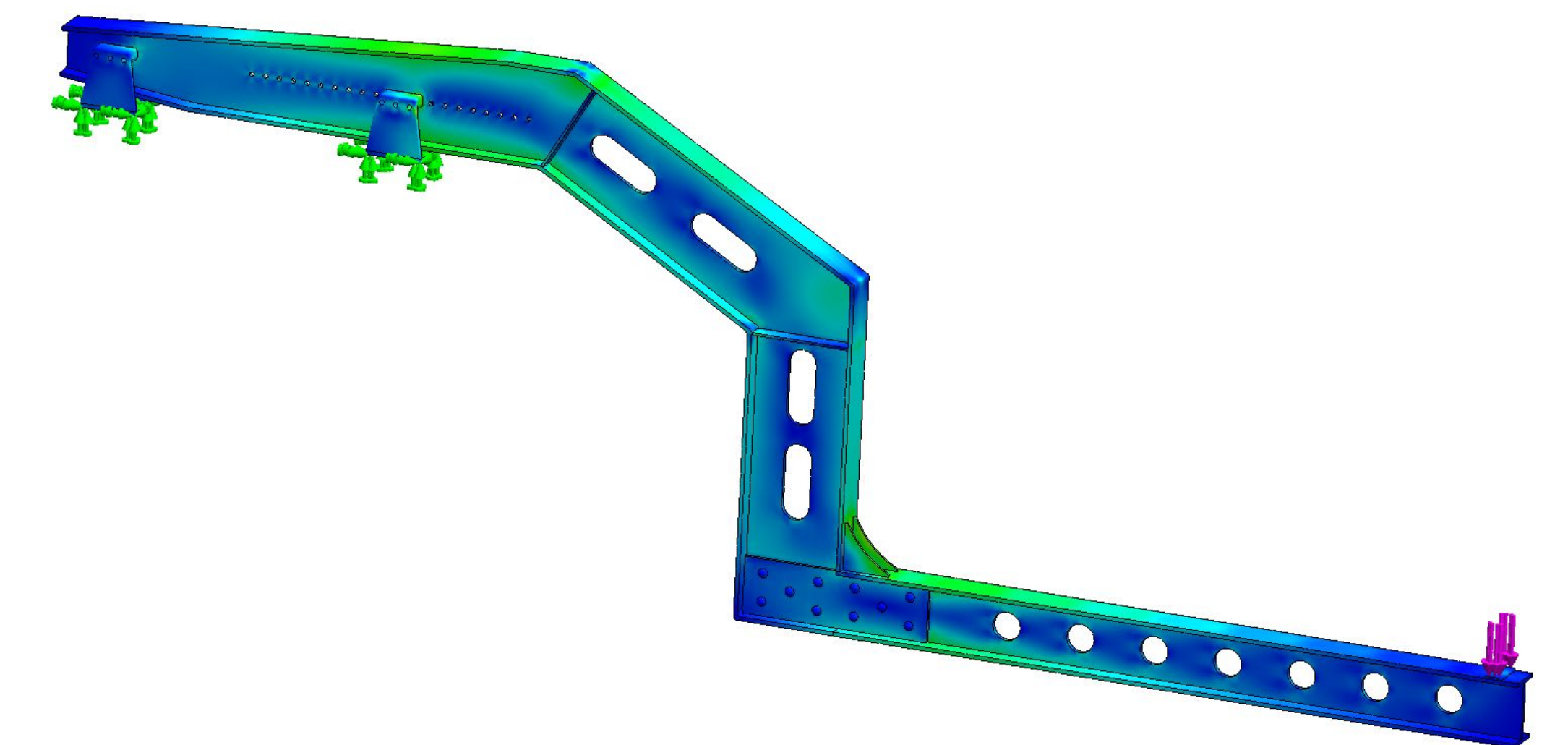


Vertical Load Case 1G			
	I (in ⁴)	Moment (lbf*ft)	Applied Force (lbf)
Full Size	21.27	56,000	11,650
Scale Model	2.707	10,500	1,450

Proposed Saddle Return Shipment Setup



Current Rhino FEA Results



Stress Analysis:

- Maximum load 18,000 Lbs
- Max von Mises stress 560 MPa
- Beam angles are areas of high stress concentration
- Beam has low stress in total cross section

Max displacement: 8.45 mm. at loaded end, 0.3% strain

From the FEA, areas of interest for testing include:

- Welded flange to web joints
- Kingpin connection pins
- Angles of beam

Testing and Results

With our designed weight of **850 Lbs**, the total cost to ship each Rhino drops. Total shipping cost reduction of **70%**

Each additional 100 Lbs saved reduces shipping cost by **5%**

To test our scale design, we will load the model into a 10,000 lb load cell with strain gauges applied in areas of high strain to determine the viability of the models we have created.

Acknowledgements

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