



# MexLog Saddle

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## 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

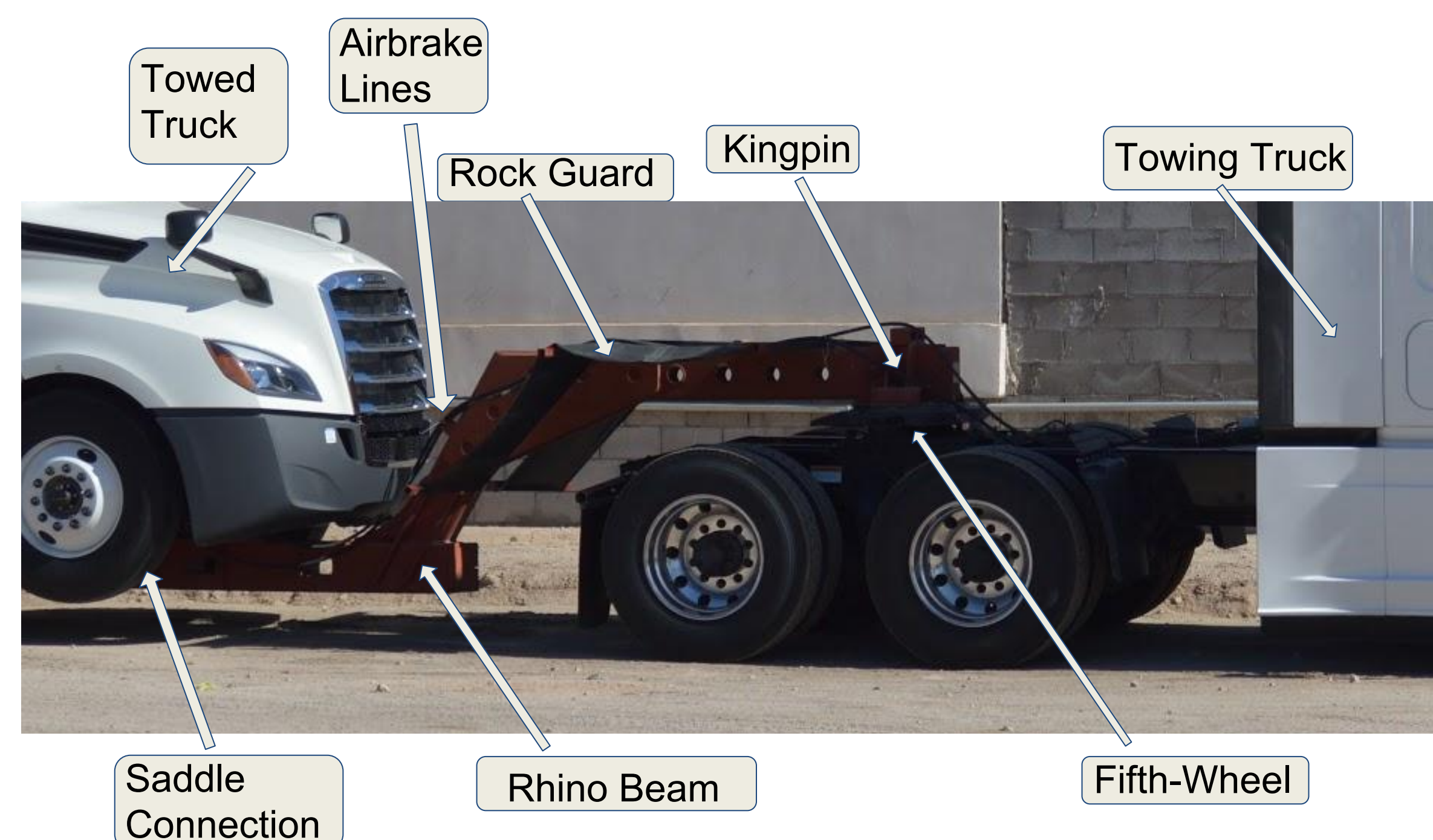
- Transport trucks up to 22,000 Lbs in weight
- Significantly reduce weight of Rhino below 2,200 Lbs.
- Overall Cost below \$4500
- Total height below 13'6" per USDOT 31111
- Overall train length less than 75', per USDOT 31114
- Train Weight below 80,000 Lbs per USDOT 23.127
- Transport 18 or more mounts 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

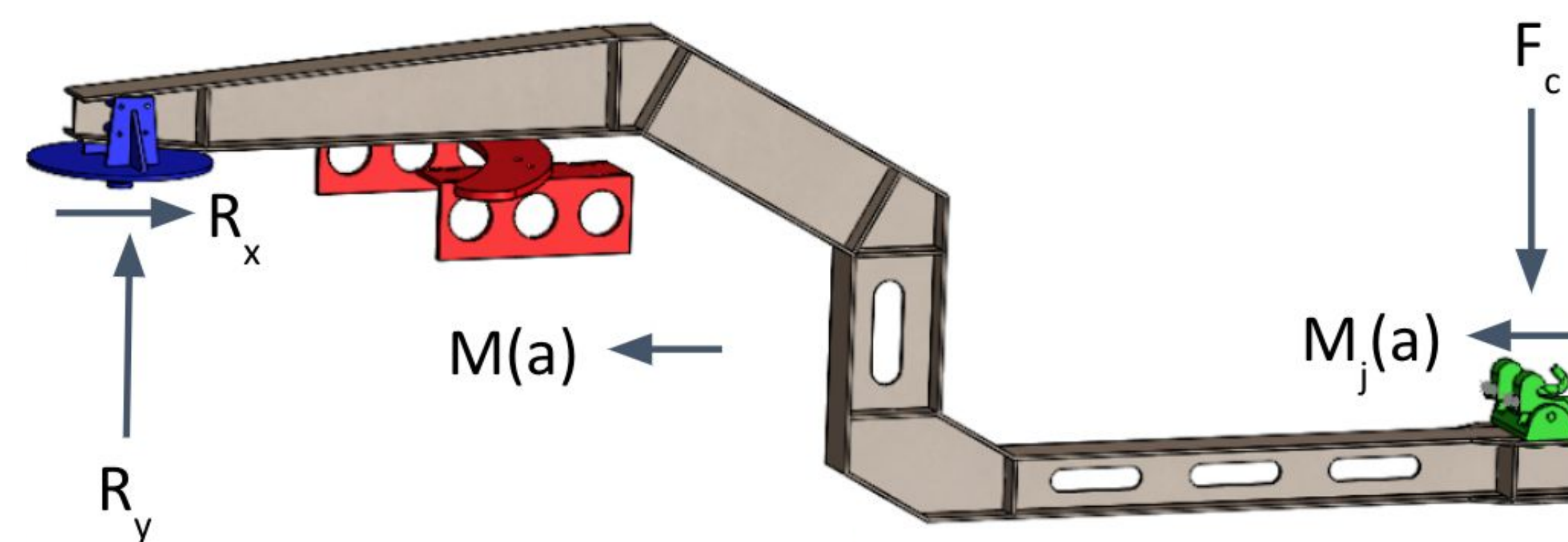
- 14.6' long, 650 lb, A36 Carbon Steel
- Attaches to front crossmember of a truck
- Easily "racked" for return shipping
- Little to no additional invasivity into the trucks during decking
- Manufacturable by welding and water-jet cutting

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

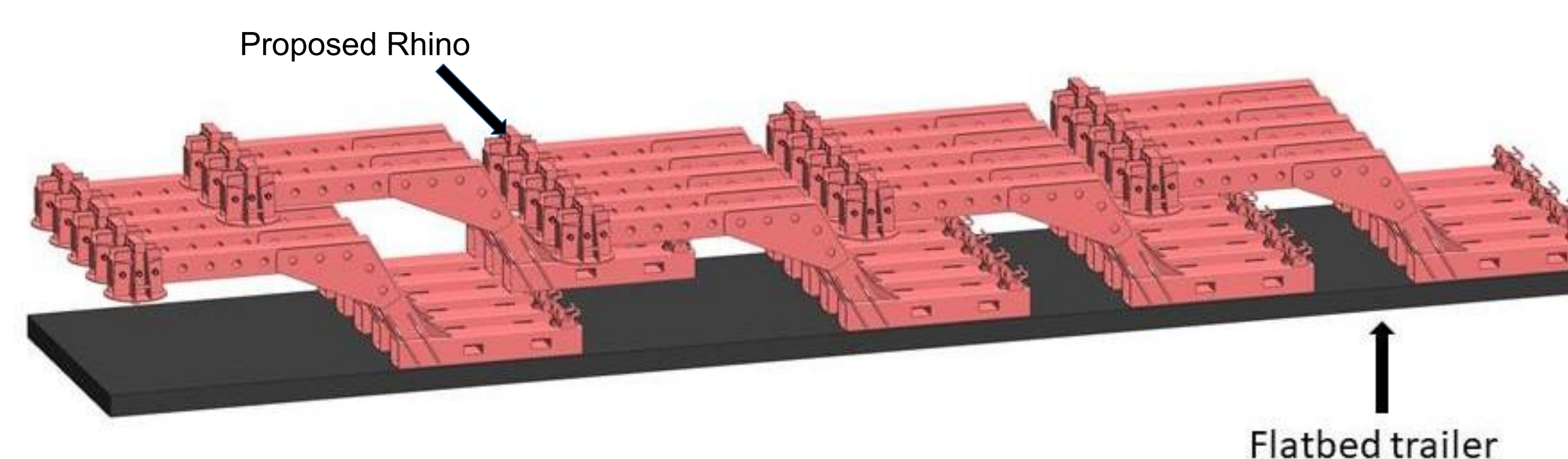


## Scaled Test Forces

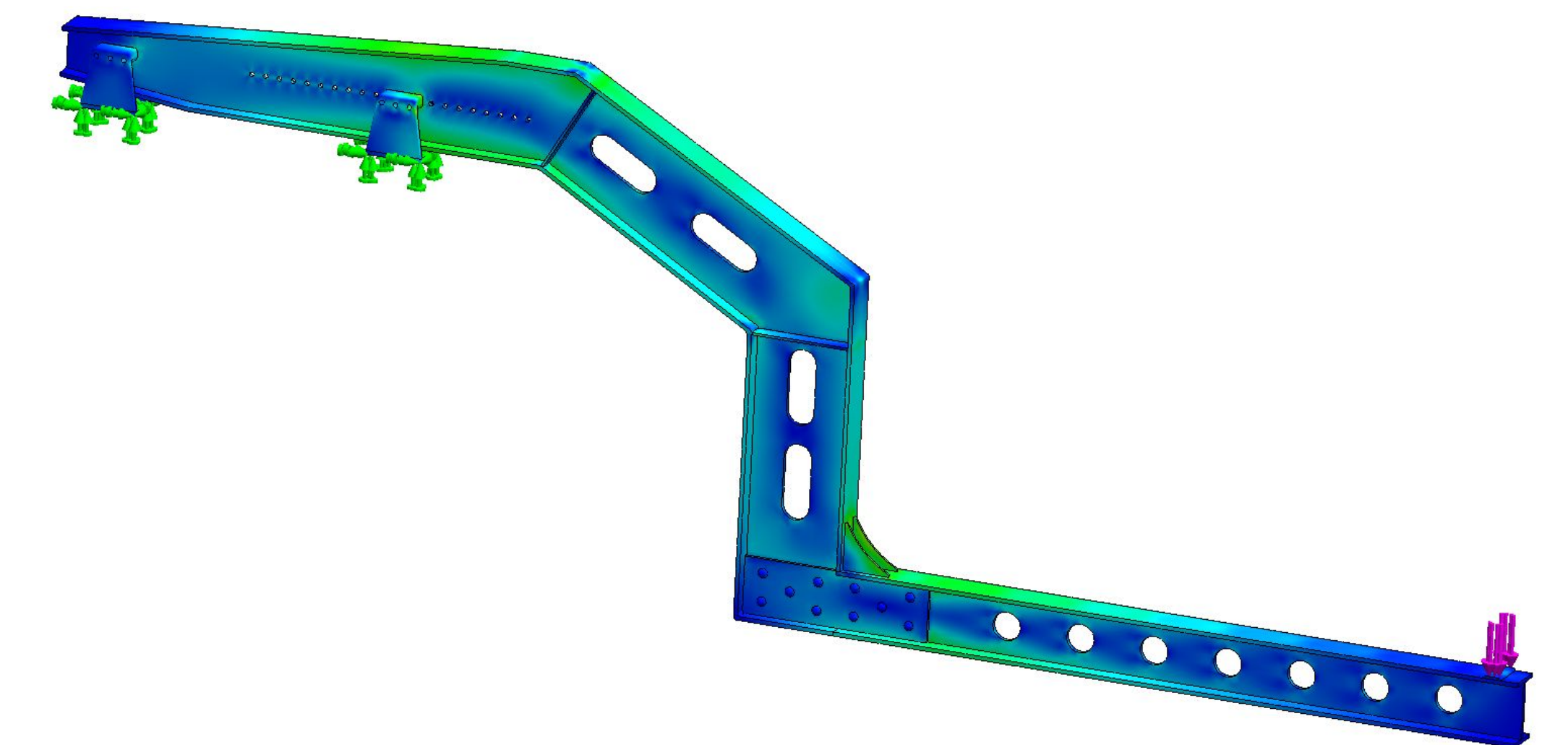


Vertical Load Case 1G			
	I (in <sup>4</sup> )	Moment (lbf*ft)	Applied Force (lbf)
Full Size	21.27	56,000	11,650
Scale Model	2.707	10,500	1,450

## 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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