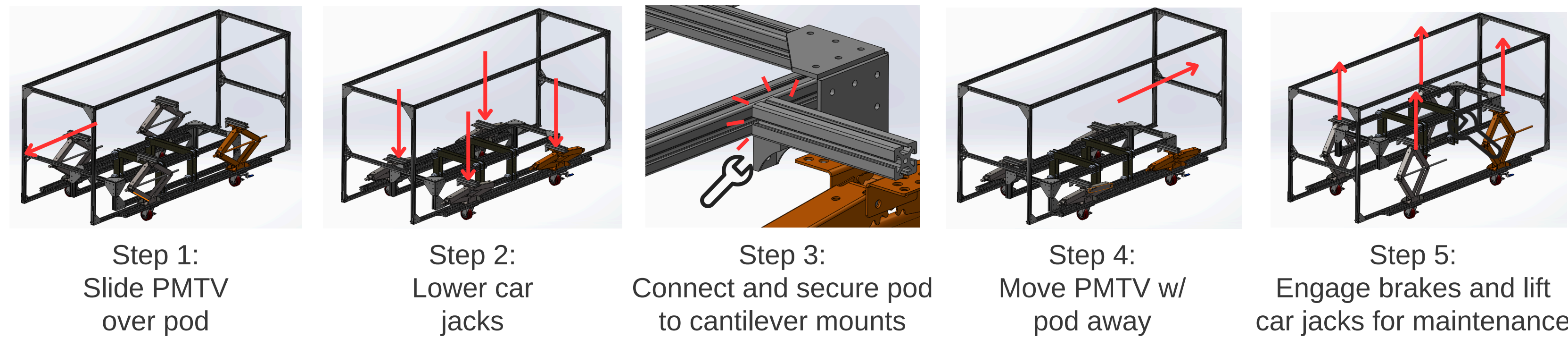




Executive Summary

The Hyperxite 10 team needed a way to transport their hyperloop pod without incorporating an I-beam, while also allowing for easy maintenance of the pod on the go. The previous year's team had the Pod Transport Vehicle (PTV) to fulfill these needs, but the PTV ran into issues regarding its maneuverability and lack of maintenance functionality. This year's Pod Maintenance & Transport Vehicle (PMTV) aims to be easier to handle as well as add a safe maintenance function to the vehicle allowing the team to easily move their hyperloop pod while also allowing ease of access to the pod for maintenance anywhere. After several rigorous tests, the PMTV has proved to be an adequate solution to address the needs of the team.

How to Use



Overview

Structural Frame

- Ensures structural rigidity
- Designed to allow PMTV to slide over pod

Cantilever Mounting

- Attaches the car jacks to the pod
- Rigid connections to ensure safe transport and maintenance of the pod

Car Jacks

- Provides precise height adjustment for pod maintenance
- Supports up to 5,000 lbs per jack for stable lifting

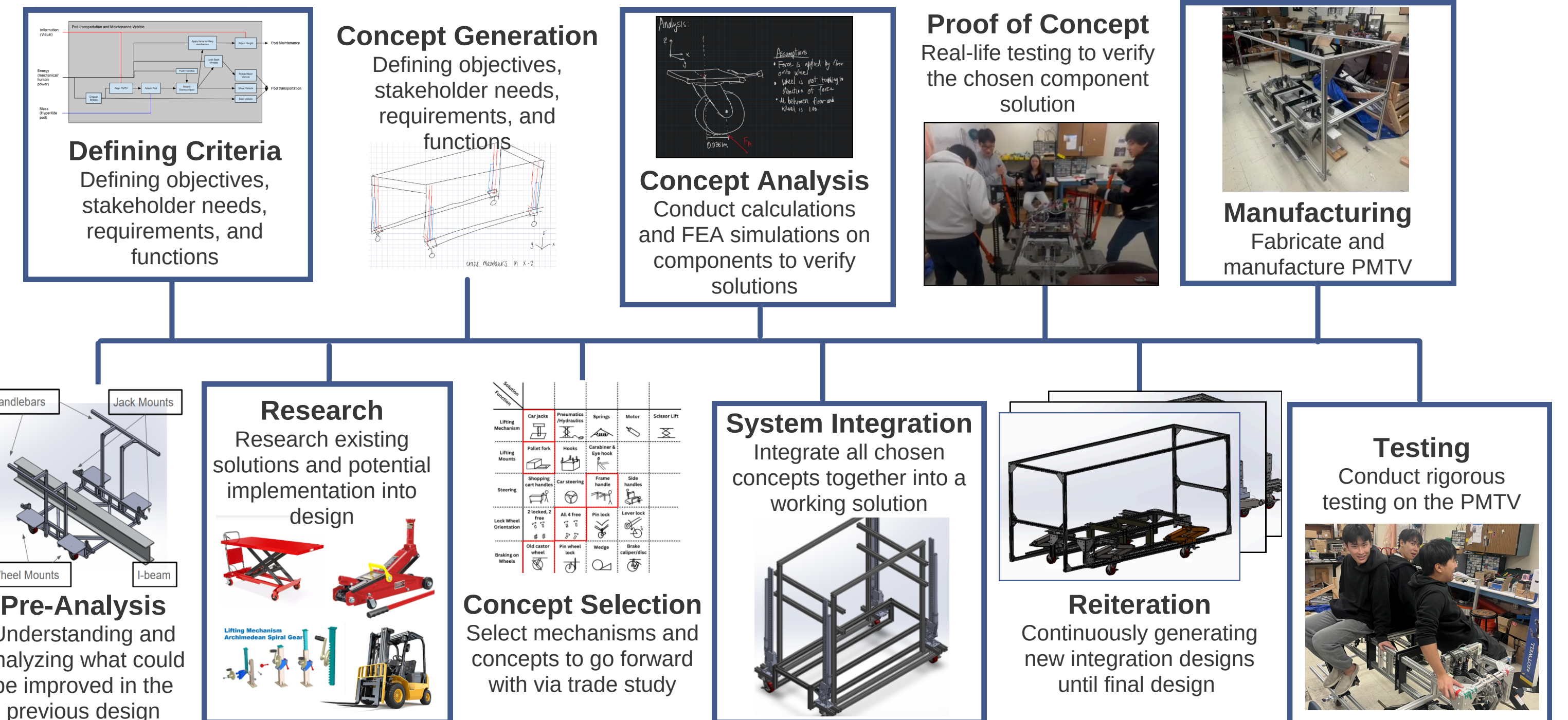
Wheel Swivel Locks

- Retrofitted for easier control over the PMTV's direction
- Allows for "shopping cart like" movement

Castor Wheels w/ Brakes

- Allows for transit of the PMTV with pod
- 500 lbs of braking force per wheel to ensure stability

Design Process



Engineering Analysis

Idea: Simple FEA on the longest extrusion member to validate the structural rigidity

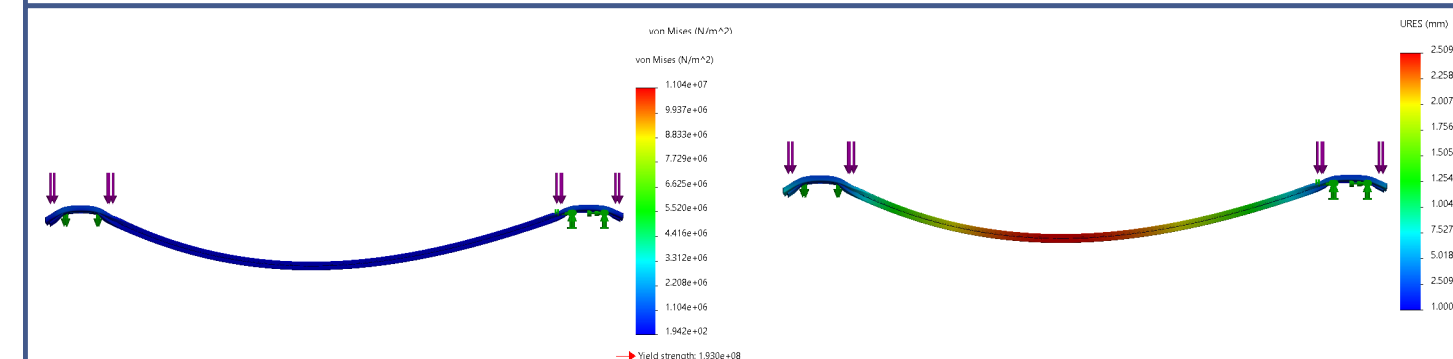
Simulation Setup for the two FEAs:

Load: 400N force applied downward
Boundary Conditions: Simply supported
Material: 6061 Aluminum

Extrusion profile type: 4040

Result: The beam did not yield and it has a FOS of 45 and a maximum deformation of 0.025mm

Conclusion: the extrusion type can be optimized to reduce cost



Extrusion profile type: 3030

Result: The beam did not yield and it has a FOS of 17 and a maximum deformation of 0.025mm

Conclusion: this is the optimal extrusion for the PMTV frame

Future Improvements

- Added structural members to the frame
- Make pod mounting solution simpler for users
- Device or solution to make lifting and lowering jacks easier and quicker
- Added tool mounts to increase the functionality of PMTV
- Allow for mounting of the pod's aero body shell

Impact and Considerations



- Allow the Hyperxite 10 team to transport and service the pod with ease
- Convenient for use in competition during Canadian Hyperloop
- Slow lifting and lowering ensures no injuries from elevating 250 kg of mass

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