

Introduction

The Hyperloop is a high speed, ground based civil transportation concept. Introduced as an open-ended project in 2013 by a team of SpaceX engineers lead by Elon Musk. (Musk E, 2013)⁽¹⁾ Its primary objective: reduce carbon emission from public or private transport. This is achieved through low pressure travelling environments and electromagnetic hovering. Near perfect inertia can be obtained thus consequently dividing energy usage. Currently, concepts evolve around 50% atmospheric pressure across a network that is constantly on a pressurization/depressurization cycle.

Motivations

To allow people to enter and exit the network, having to pressurize and depressurize the entire network is not viable, therefore the use of decompression chambers at each entry/exit point has been proposed as an alternative solution. This would allow for the entire network to be kept at the desired low pressure (vacuum).

Aim

To design a decompression chamber system for a pod to integrate the vacuum tube network of the Hyperloop system.

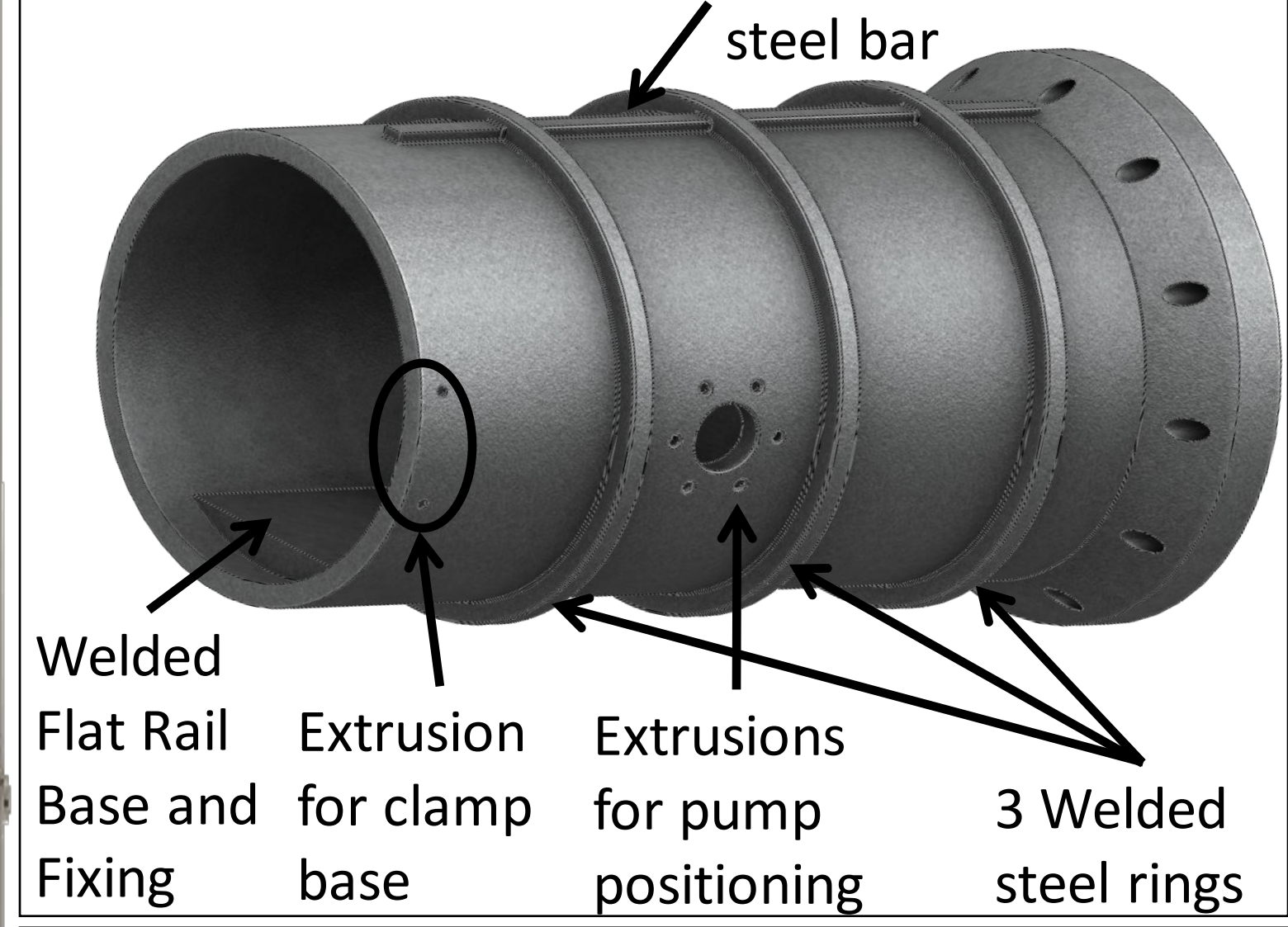
Hyperloop Manchester pod



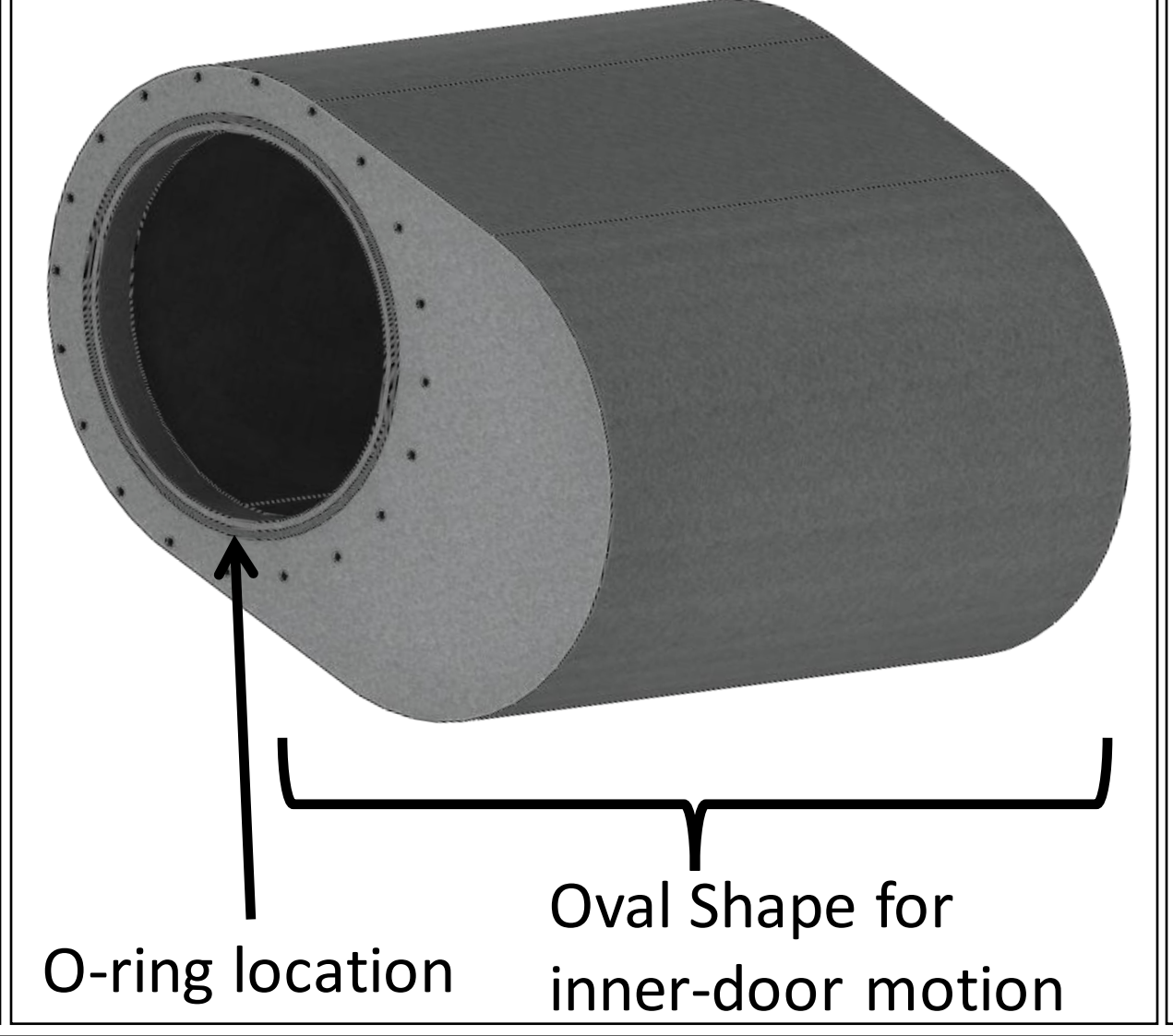
Objectives

- Review and understand existing literature
- Compile design requirements for the decompression chamber
- Generate ideas, conduct calculations, generate designs and embodiments.
- Verify designs using modelling and simulation, customer performance index and tests.

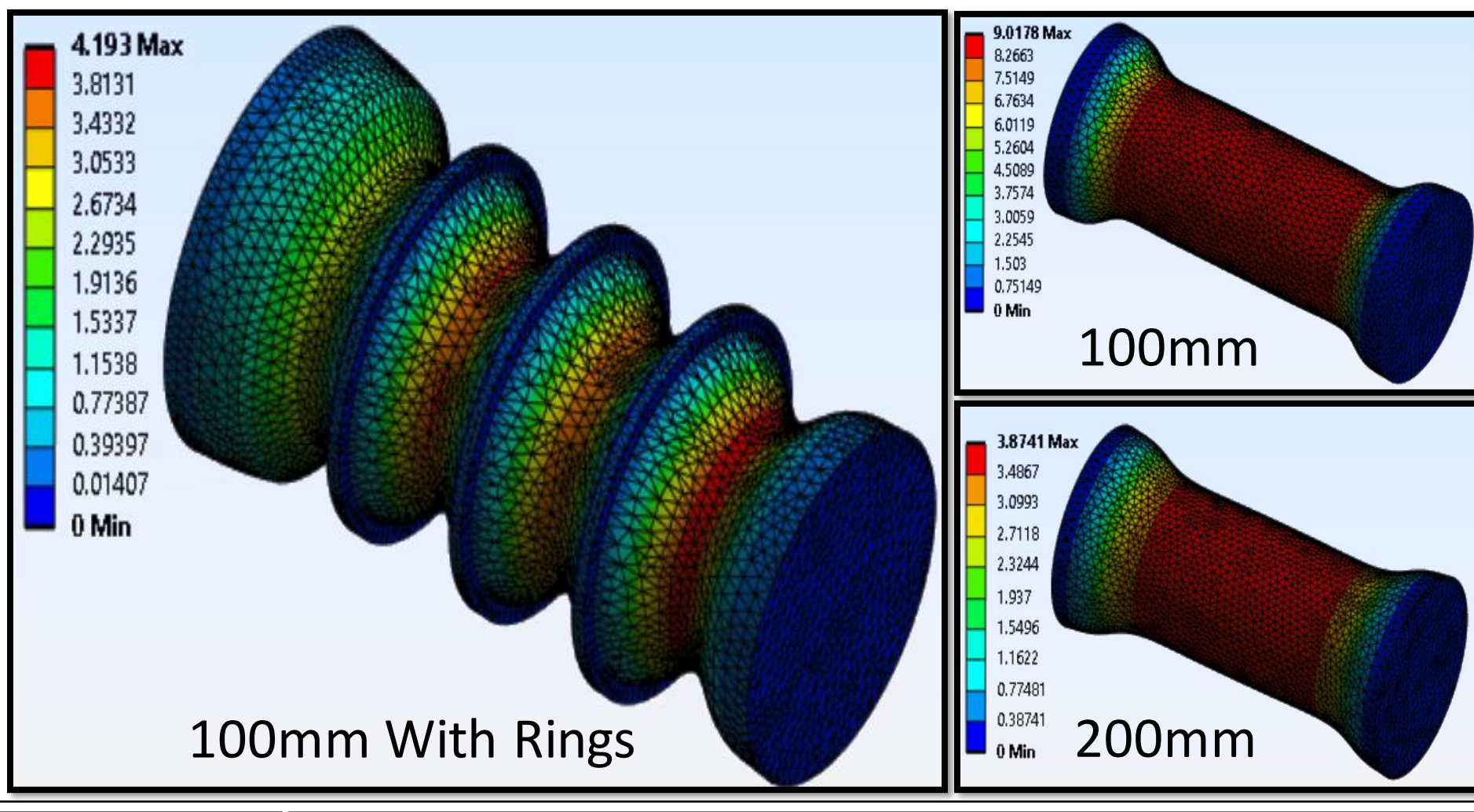
Main hull assembly



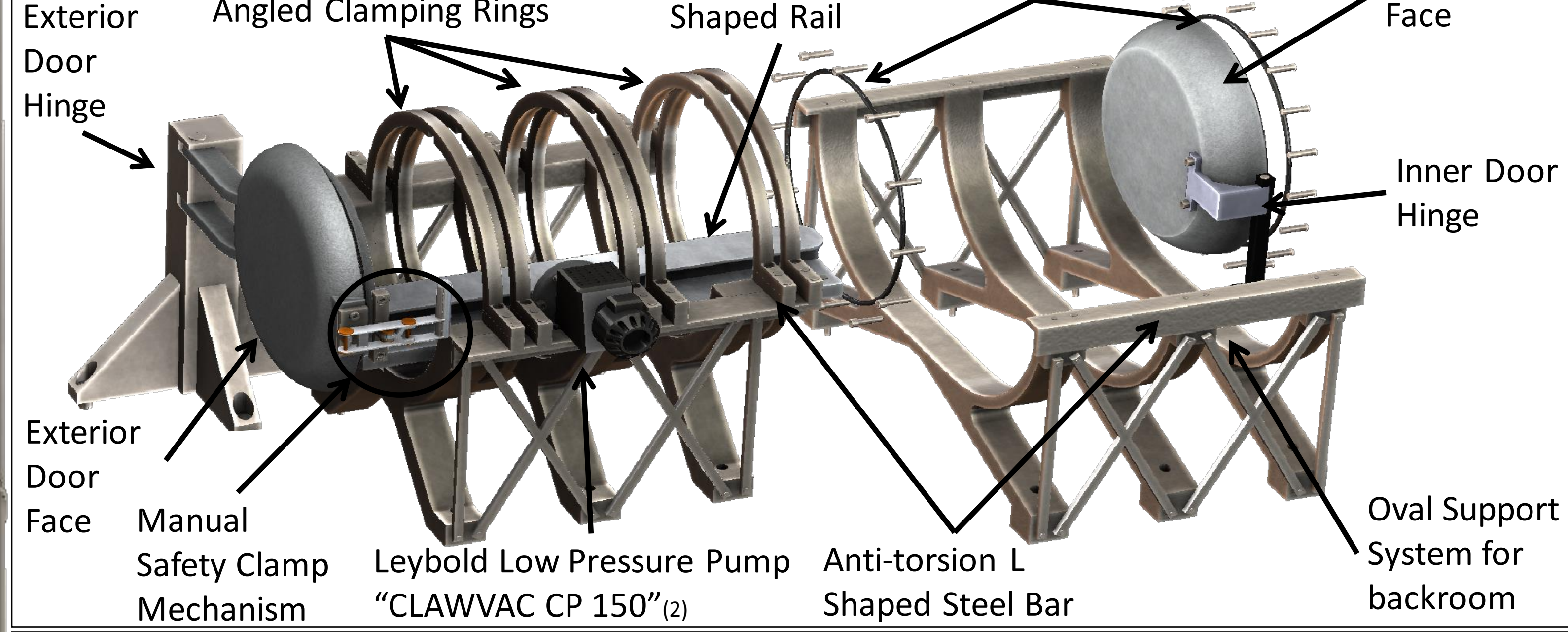
Hull backroom



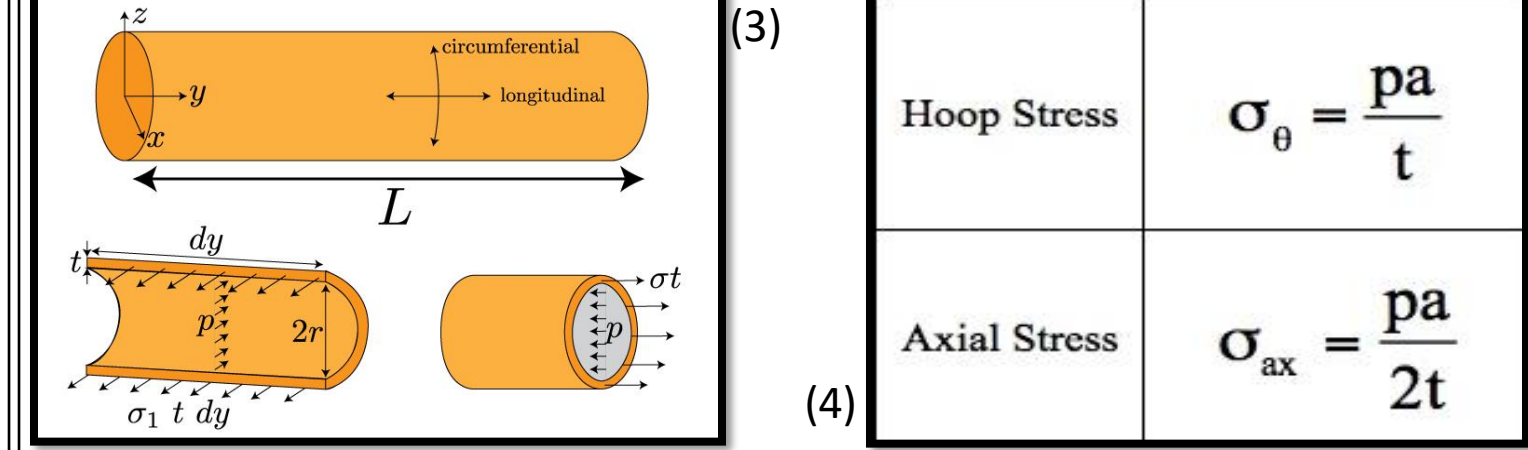
Simulations of the static deformation (in µm) of the main hull for various thicknesses



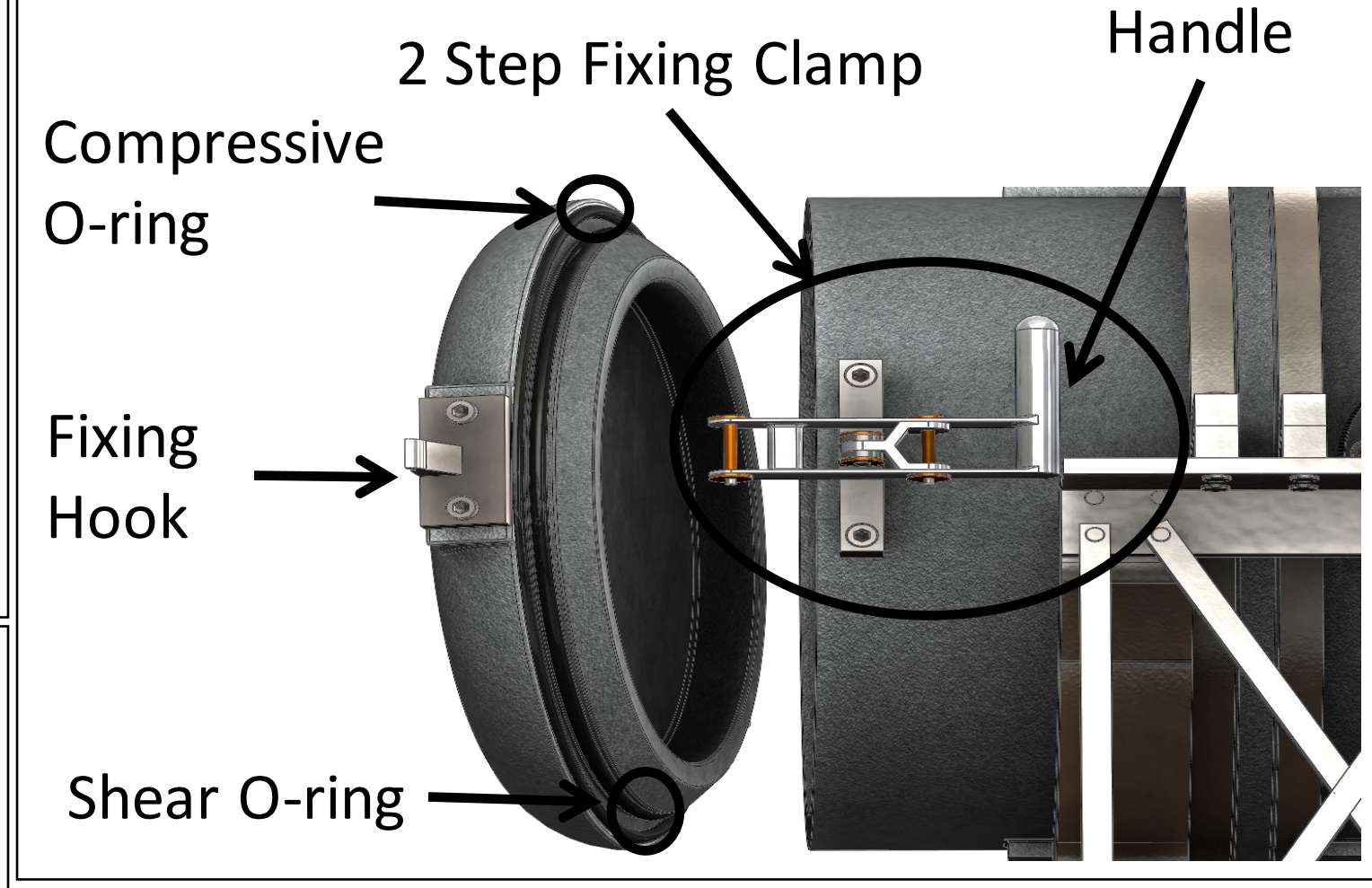
Structural support system



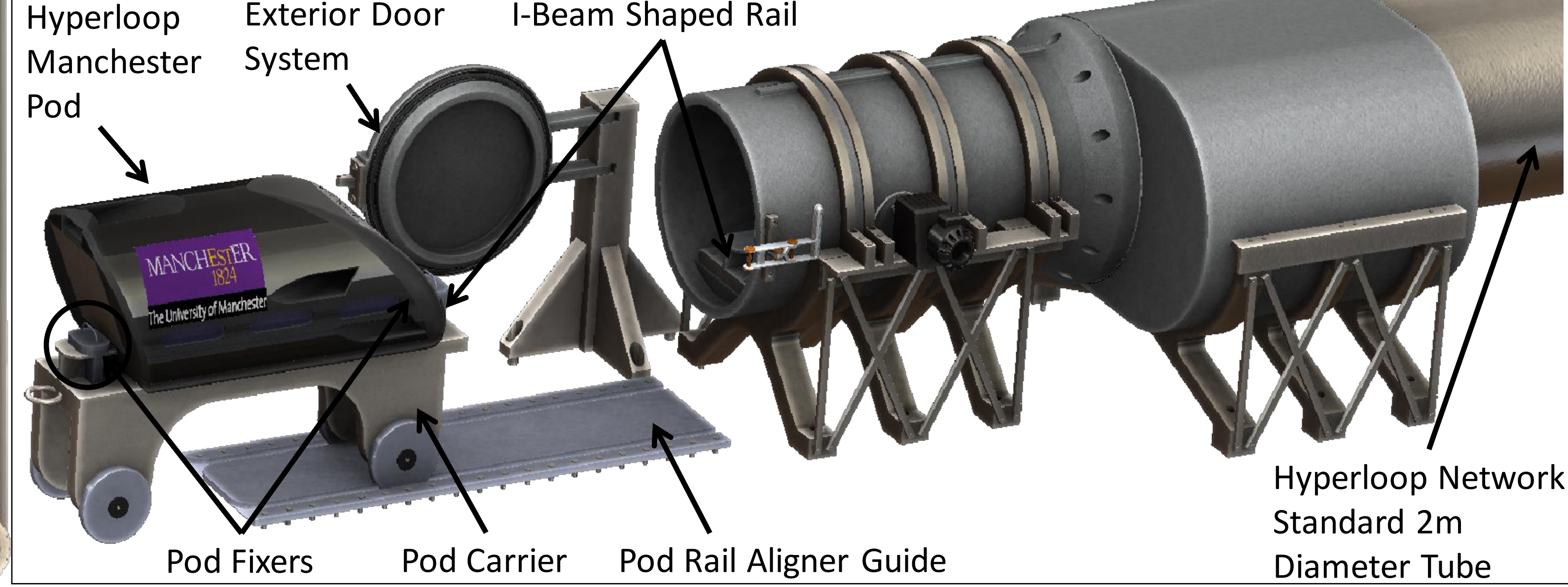
Theory



Door manual (safety) mechanism



Overall design



Future work

- Mechanical design of door motion system, door safety systems, pump holder case.
- Selection of electronic components for automated door system and pressure sensing.
- Manufacturing recommendations

References

(1) Musk, E. (2013). *Hyperloop Alpha*. [online] Tesla.
 (2) GmbH, L. (n.d.). *CLAWVAC CP 150*, Leybold
 (3) Boston Uni. (n.d.). *Mechanics of Materials: Combined Loading* | Boston University.
 (4) ANSYS Innovation Courses. (n.d.). *Pre-Analysis & Start-Up*

