

Fastener-less Flange

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Background

The Fastener-less Flange project is an undergraduate design project set to redesign the flange. Bolted Flanges are the current go-to method for temporary pipe connections. These flanges rely on bulky, threaded bolts to secure the two pipe ends together. Additionally, the mated ends must be of a certain machined finish and have a gasket inserted between them to achieve a reliable seal. This leads to a large increase in weight and assembly time for any piping systems.

Goals

- Create fastener-less flange
- **But What is a Fastener-less Flange?**
- The intent is to create a fully integrated connection system with respect to the pipe network of the rocket
- No separate pieces required for connection
- It would be simpler than a bolted flange in terms of manufacturing and installation
- Contributes to the greater goal of a fully 3D-printed rocket

Objectives

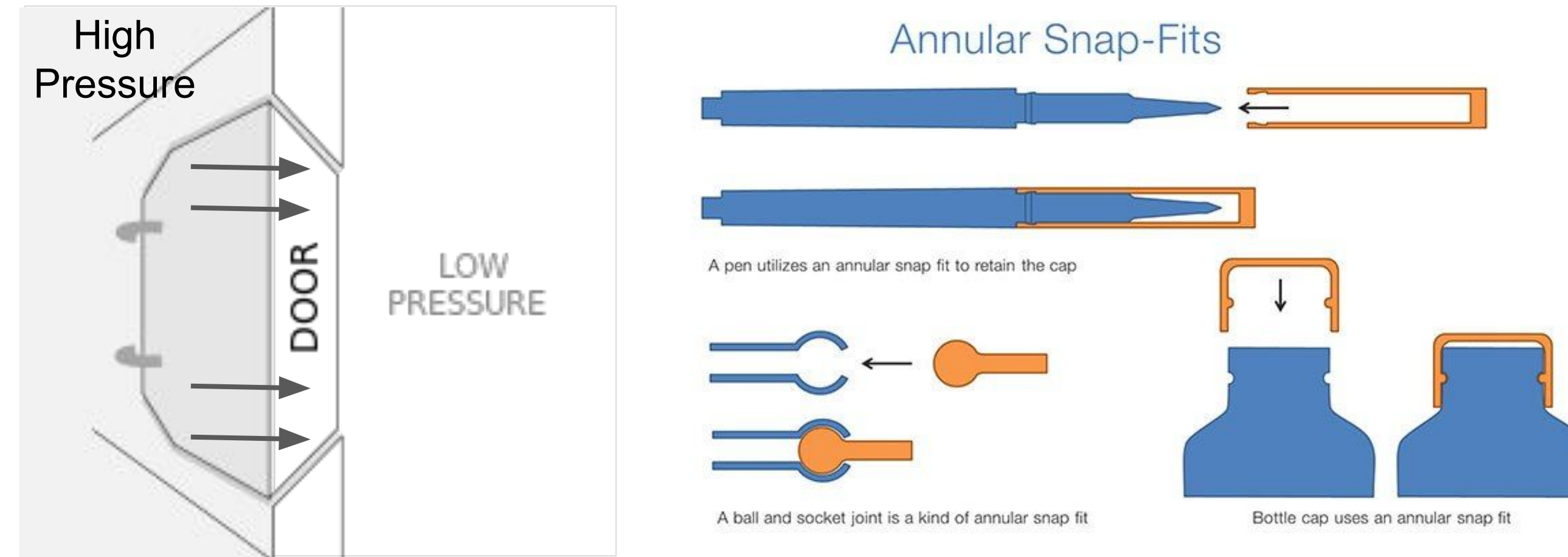
Main Objectives

- Design a fully 3D printable design
- Reduced in weight compared to a traditional flange
- Able to withstand pressures and leak rates according to ASME B16.5 Class 150 standards

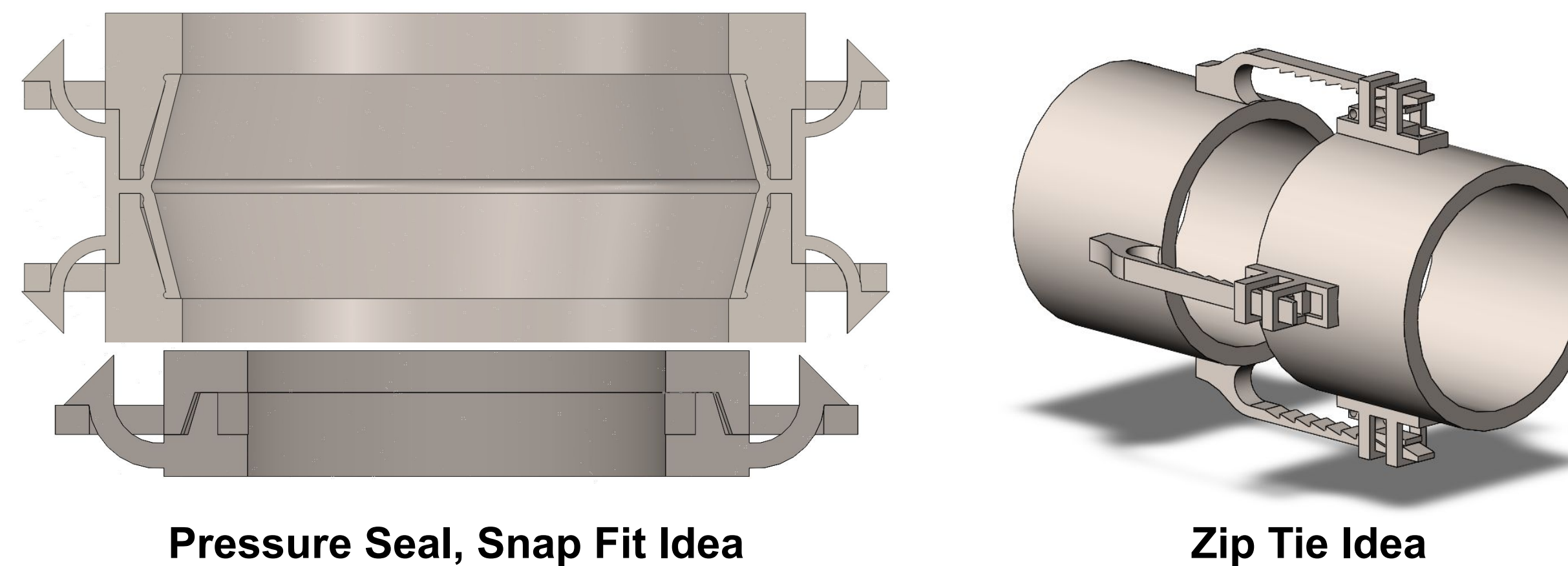
Secondary Objectives

- Have an equally distributed load
- Eliminate extra machining
- Minimize the amount of additional parts needed
- Allow for easy installation and disassembly

Concept Inspiration

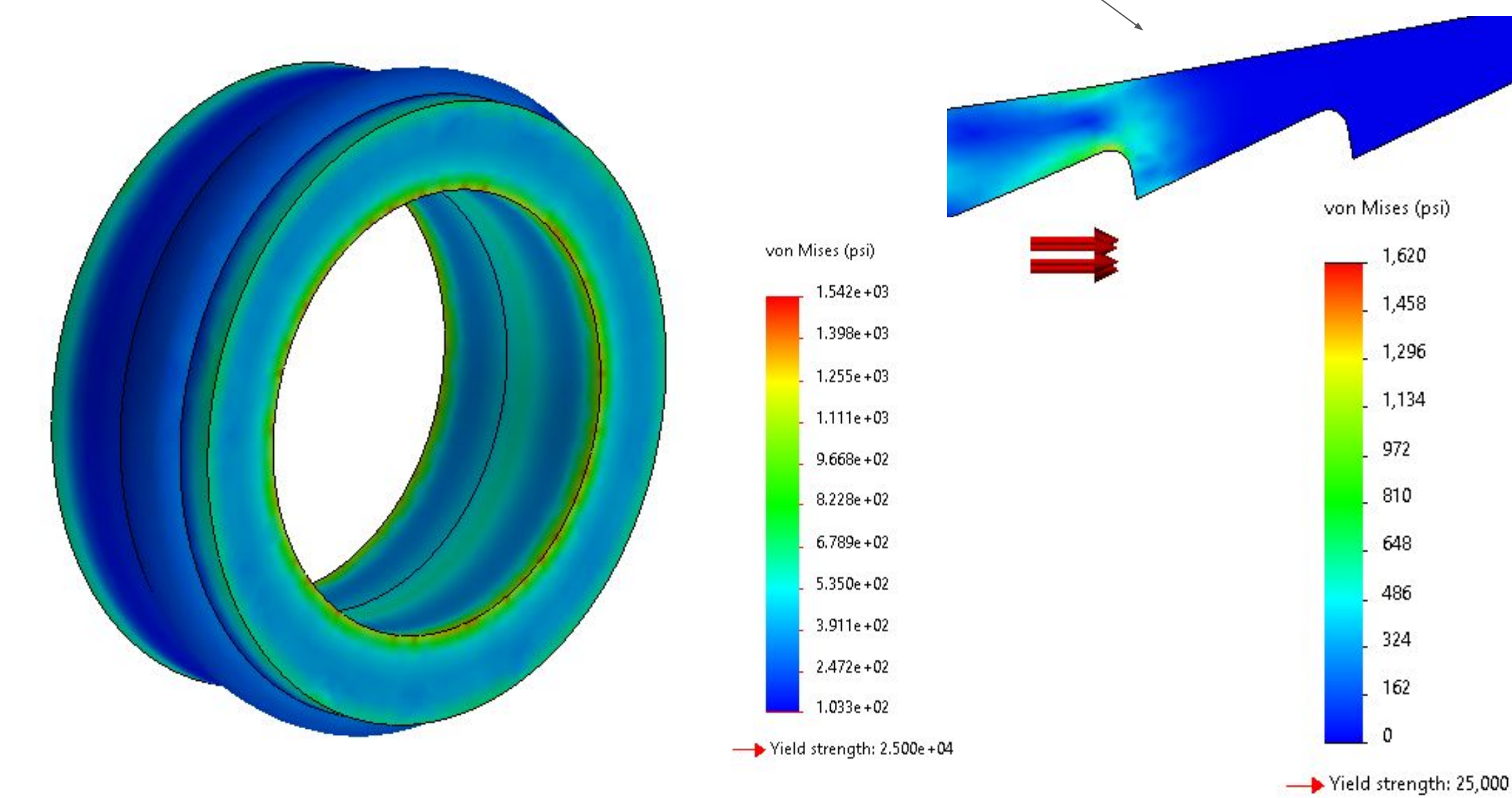
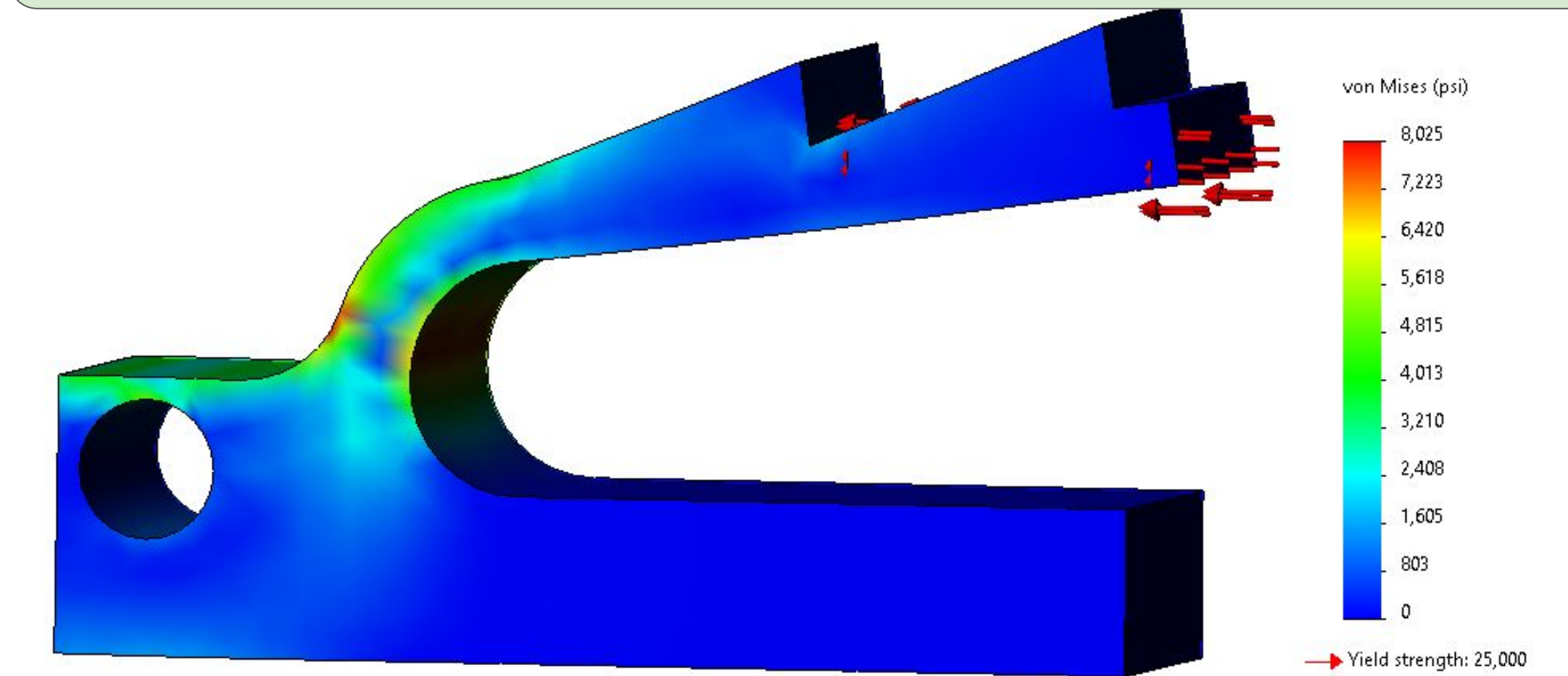


Preliminary Design



- Snap Fit reduces part count and creates pre-loading
- Pressure Seal utilizes internal pressure to its advantage
- Reciprocating Zip Tie Mechanism for Tightening
- Standard Flange Face and Gasket Sealing Method

Analysis



Project Timeline Fall 2021

