

In-Space Cryogenic Propellant Storage

Team 512: Anna Gilliard, Liam McConnell, Samantha Myers, Brandon Young

OBJECTIVE

The objective of this project is to design a storage tank for cryogenic propellant that increases storage time, reduces fuel loss, and reduces heat transfer.

KEY GOALS

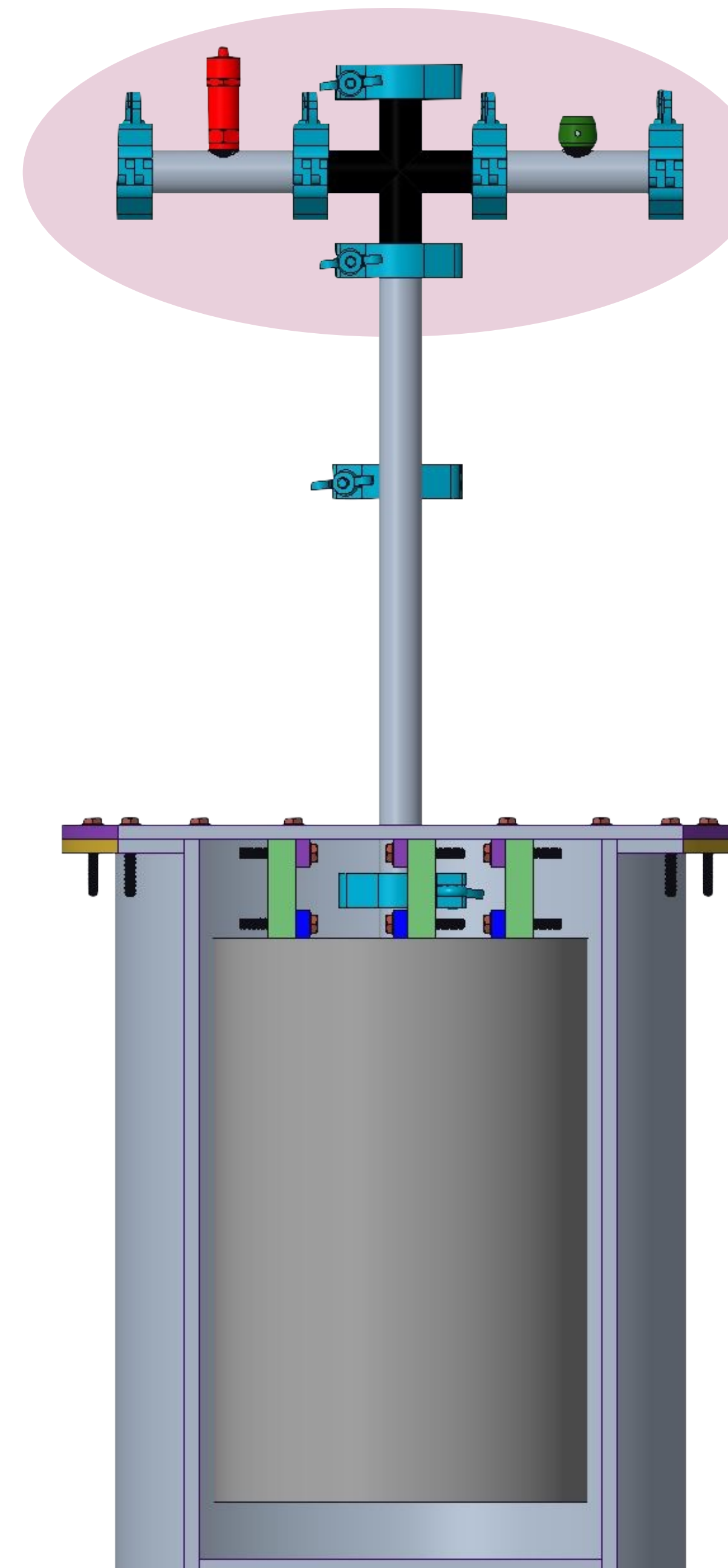
- ★ Maintain temperature
- ★ Maintain pressure
- ★ Reduce fuel loss
- ★ Reduce heat transfer
- ★ Develop prototype

TARGETS

- ★ Maintain structural integrity for two weeks
- ★ Maintain pressure of 30 psi
- ★ Maintain temperature of 70 K (-189 °C)

PROTOTYPE DIMENSIONS (in)

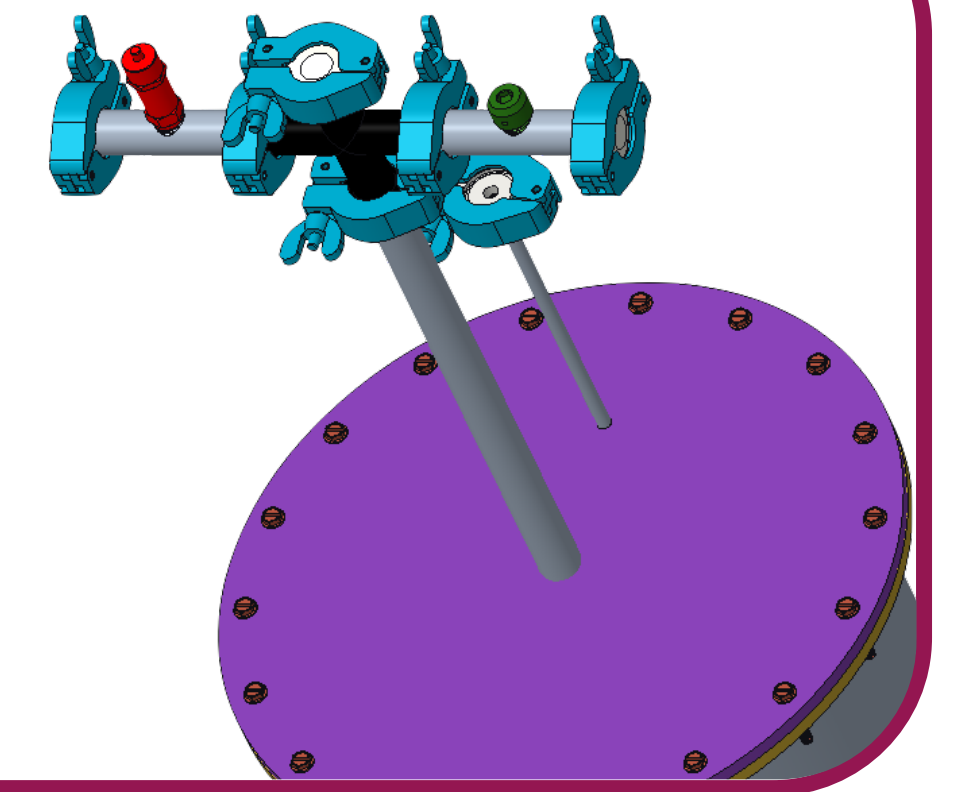
Outer Tank	Inner Tank
★ Diameter: 10.125	★ Diameter: 6.625
★ Thickness: 0.375	★ Thickness: 0.4375
★ Height: 13	★ Height: 10



SECTIONED VIEW

TOP LID VIEW

- Clamps
- Cross Valve
- Pressure Relief Valve
- Top Flange
- Vent



PROTOTYPE

- ★ Liquid Nitrogen
- ★ Flat endcaps
- ★ Active vacuum
- ★ 304 Stainless Steel
- ★ 1.24-gal volume

LARGE-SCALE

- ★ Liquid Hydrogen
- ★ Spherical endcaps
- ★ Sealed vacuum
- ★ Aluminum 2219
- ★ 530,668-gal volume

SHARED SPECIFICATIONS

- ★ Reflective outer layer
- ★ Multi-layer insulation
- ★ G10-CR supports

TESTING PROCEDURE

1. Open top end cap
2. Fill tank through top port on cross valve
3. Close fill port
4. Record mass every 4 hours