

UCI Pressurized Ejection Test: Testing Rig for the UCI Rocket Project

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Introduction

- UCI Rocket Project needs a test apparatus to test their nose cone ejection system
- Should be capable of simulating ejection and measuring relevant data

Existing Solutions

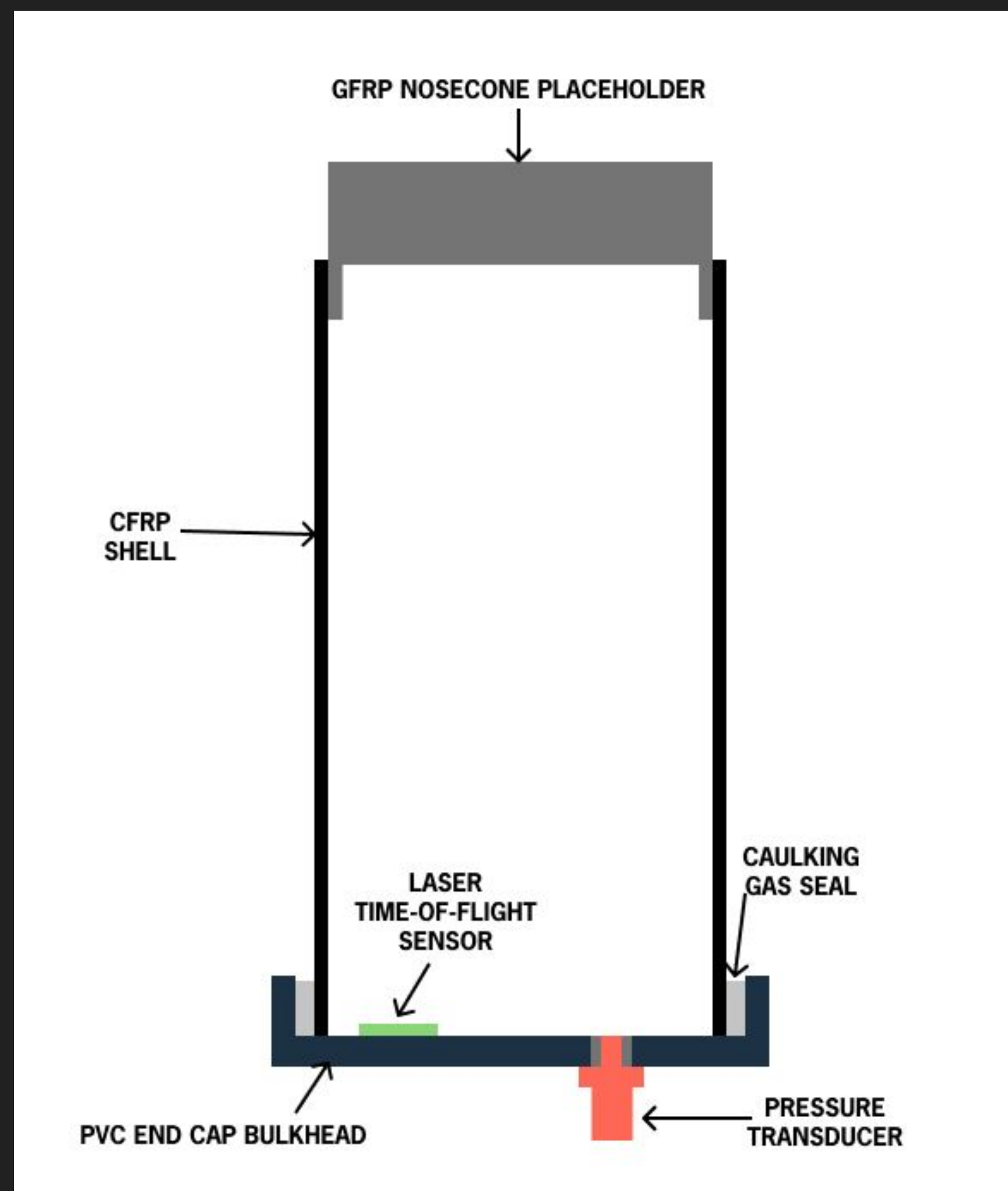
- Many solutions were designed to test the amount of CO₂/black powder needed to eject nose cone



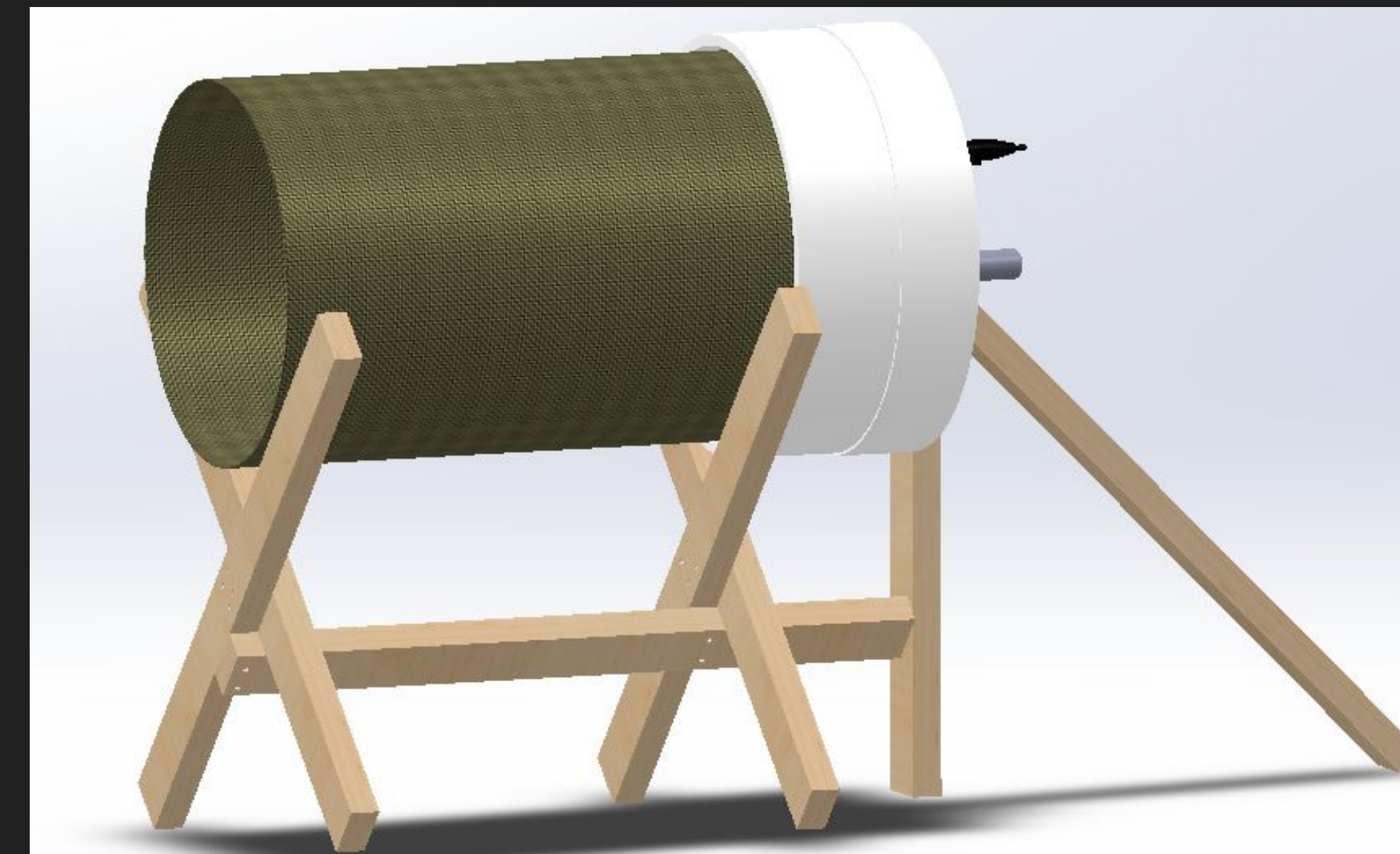
Nose cone ejection test

Design Solution

- 12.75" OD Carbon Fiber Reinforced Polymer tubing (CFRP)
- 14" ID PVC end cap
- Pressure Transducer
- Laser Time of Flight Sensor



Drawing of testing assembly

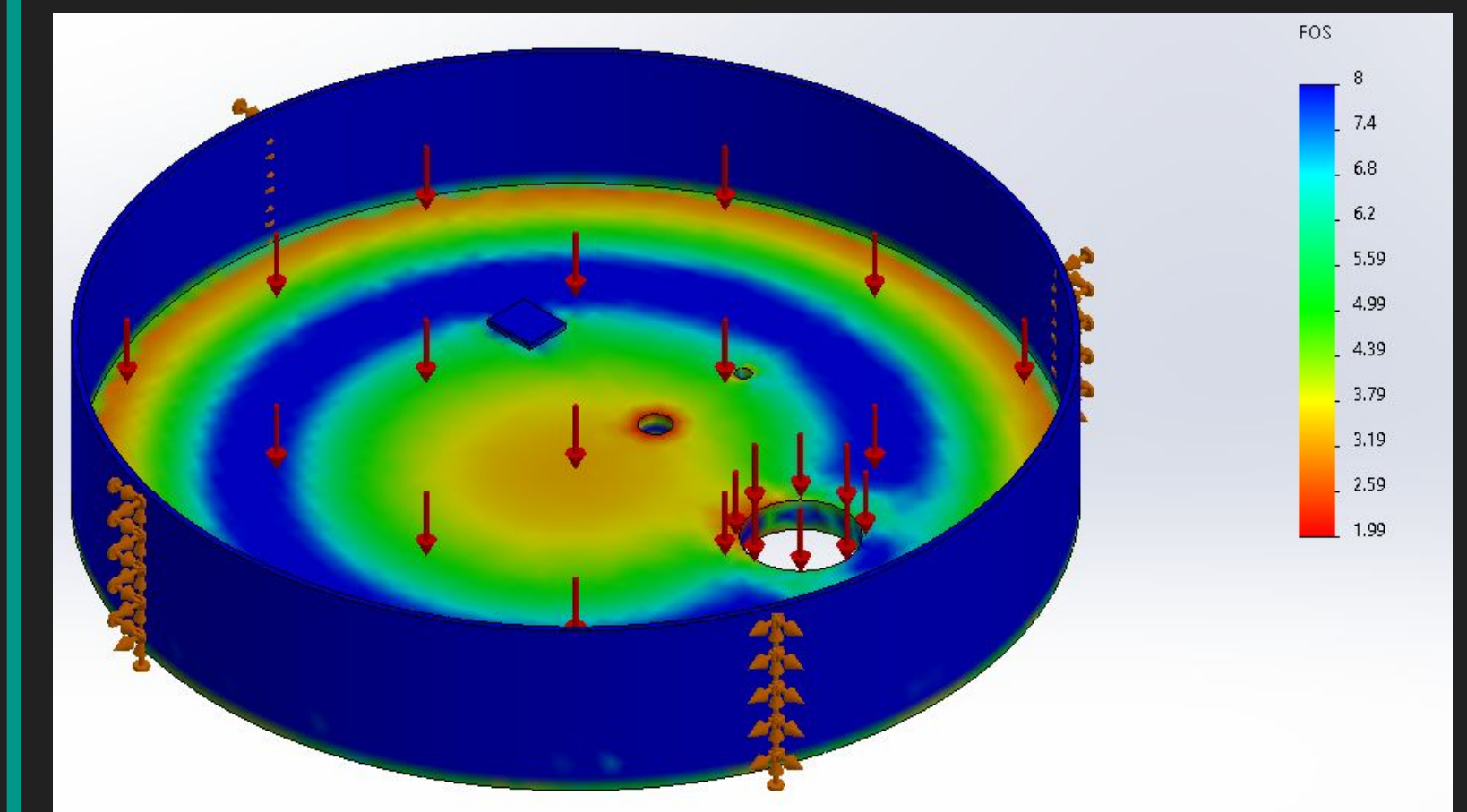


CAD assembly of full testing apparatus and support

- Main testing rig is made of the PVC end cap and the CFRP tubing, sealed and held together by removable caulk
- CFRP tubing is the same as actual UCI Rocket Project configuration
- Sensors and ejection system mounted through the end cap
- All supported by light wooden structure
- Testing rig set up horizontal so the nose cone will not shoot upwards and potentially hit something

Bulkhead Stress Analysis

- Stress tested at estimated max PSI of 20 PSI
- Minimum factor of safety is 2



Pressure analysis on PVC end cap

Conclusions

- As the UCI Rocket Project has been discussing many changes to the rocket, this design is tentative
- Largely, the basic design idea has been made and any changes of the design would be dimensional

Future Improvements

- Research more into a better seal/interface between the PVC end cap and the CFRP tubing

Acknowledgements:

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