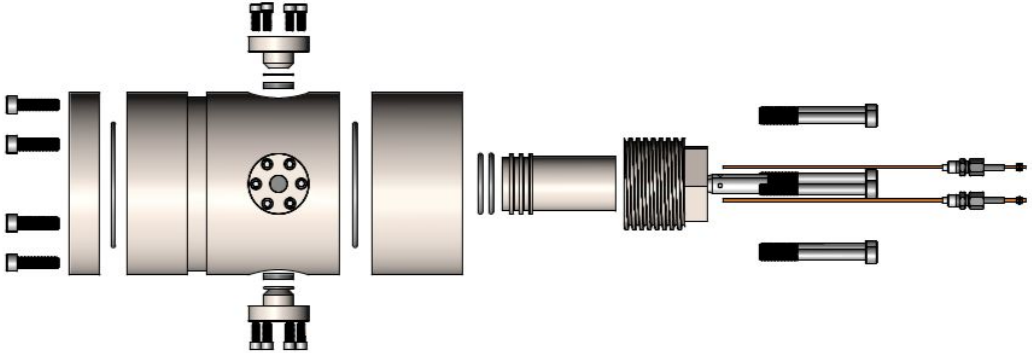


Strand Burner

The University of Alabama
2018 IBEC 30K SRAD
Advisor: Dr. Kenneth Brezinsky, Dr., Patrick Lynch, CRC AIE

Introduction

- Proposed project as a joint project with Dr. Lynch
- Made to satisfy all requirements of a strand burner
- All designs was made to comply with ASME boiler and pressure code
- All drawings were made for outsourced machining
- Hydrostatic testing and redundant safety have been our highest priority
- The goal is experimental repeatability for all tests of the propellant

Purpose

- Used to experimentally verify various kinds of propellant under various pressure conditions as seen in the combustion chamber of a rocket motor.
- Used to tailor propellant ISP without having to risk at full scale tests
- After satisfactory experiments, scaling rocket motors would follow.
- This would be used to test propellants samples provided by Dr. Lynch from NAWCWD
- We intent to use different kinds of igniters for head ignition
- The sapphire windows will allow for different analysis of chemical species, laser ignition, and photography.

Design

- The strand burner is a ~1 liter vessel that has window ports for optical experiments.
- Acme thread allows for quick removal of spent propellant to test different propellant samples quickly
- **Material:** 316L stainless steel
- **Seal material:** Viton
- **Window material:** Sapphire

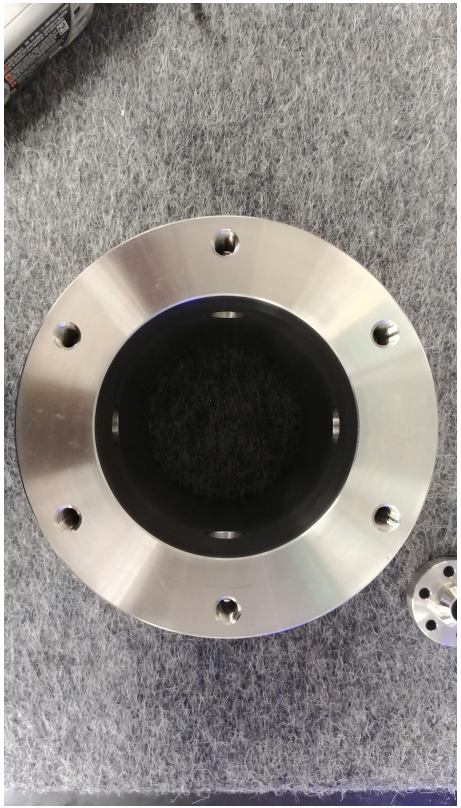
Going forward

- The Strand Burner will be used for developing newer solid propellants by recording burn rate data at different pressure conditions.
- We would be using the strand burner for analysing heat transfer rates from the system to the surrounding and mitigating better combustion chamber design to minimize losses due to thermal heat transfer.
- Using the strand burner test and analysing combustion products formed and determining the chemical kinetic rate of product formation to increase efficiency of the combustion process.
- Using Laser spectroscopy to study the flame temperatures, ignition delays and Chemical mechanisms of the combustion reaction.

Conclusion

- Unfortunately we will not be able to finish this project before the competition due to an internal decision to move our operations.
- We intend to find a new location immediately after competition and begin testing.
- Currently everything has been ordered and is being assembled while we await an appropriate location for testing.

Pictures



Pictures