Team Meeting 2/14/20 - **1.5 Wks til PDR: Feb 24**

Meeting Agenda

- Review progress
- Deliverables for Monday

Current Tasks **(Critical items)**

Top Level

- Tabulate mdot values for potential chamber pressures - Jeff - DONE 2/10
    - Current top-level parameters (150psi chamber) documented HERE
- Sponsorships
    - 3D systems paper abstract submission - DONE 2/11
    - 3D systems is willing to print stuff for us
    - Want us to do casting, but we can't afford
    - Get updated sponsorship agreement with only 3D printing (and finish machining?)
    - Protolabs wants CAD

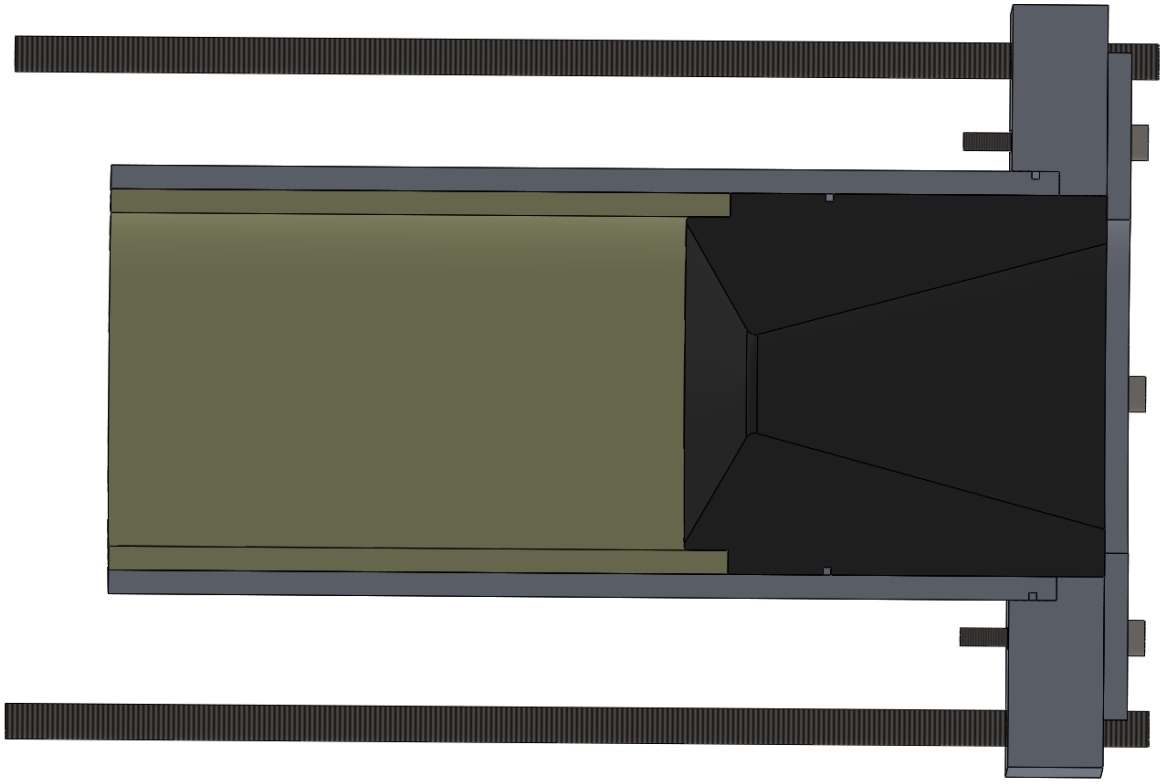
Prop Feed

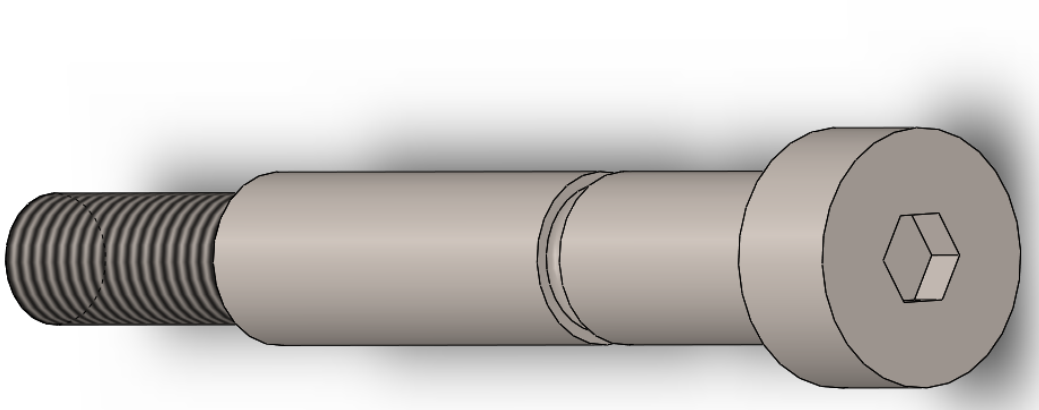
- P&ID
    - Update P&ID with Greg feedback - DONE, REV 06 tentative final
    - Redo interactive P&ID as MATLAB script
        - Cryo Ox stream - Rishav
        - Gas streams - Jeff
- BOM
    - Find actual part numbers for flow controls
        - Fill in relief valve/solenoid valves - Alec
    - Catalog existing hardware in lab & update BOM
        - Found several ball valves, hoses, solenoid valves, check valves, regulators, press transducers - still need to catalog
        - Look for actuators for cryo ball valves - Alec
    - Find high-flow, high-pressure regulator for CH4 stream - DONE
        - Swagelok KPF series Cv=1.0, quoted $1291
        - Tescom 26-2000 series in Cantwell lab **- Cv 0.3**
    - Compile fitting list for each prop stream (see BOM) - Alec - DONE 2/12
    - **Get propellant/fluid quotes - Rishav**
    - **Add insulation to BOM**
- Design/sketch dip tube fitting for scuba tank - DONE
    - Check material compatibility at P, T, flow vel - Jeff

Nozzle/Chamber

- **CAD of nozzle & chamber**
  - Move bolts towards edge of flange to create clearance for nuts/wrench -DONE
  - Define injector plate interface with chamber
  - Drop throat diameter to 1”
    - Area ratio = 2.18
- Nozzle bolt notch design
  - Prelim - **can we test before PDR?**
  - Look into v-groove notch (based on whatever turning tools are in PRL)

- **BOM**





Injector/Igniter

- CAD
    - Injector element design
        - Sizing - Rough pass done (Rishav, Jeff)
        - Need spreadsheet for quicker design updates (Walker)

    - Injector manifolding
        - Design retaining flange & sealing interfaces - Wouter needs for test stand design
    - Igniter design
    - **SEND DESIGN DRAFT TO GREG BEFORE PDR FOR REVIEW**
- BOM

Test

- Test plan drafts
    - Subsystem tests
    - Full system test ops
    - What hardware is needed?
    - What data are needed?
- CAD
    - Test stand prelim design : DONE
    - Define where the test stand attaches to the rocket
- BOM: DONE

Avionics

- **Avionics diagram**
    - Set power requirements for flow controls & instrumentation
        - Solenoid valves 24V DC
        - PT 5V DC
- Look into networking for data transfer & control signaling between arduino & computer over ethernet
- BOM

Notes

- **PDR is finished design deadline, esp. for all parts required for igniter test**
- PDR Notes (From class on Weds 2/12)
    - Feb 24th
    - Show spreadsheets used, but don't have to go through everything
    - Show & state that design is final
    - Show key components
    - Need full CAD models & ideally drawings
        - Show all **sealing** & mechanical interfaces
    - Talk through P&ID
        - Explain key decisions
    - Send cross-section of MCC before PDR to get Greg review & pointers
    - Show plumbing and valves, should all be selected but don't have to discuss all
        - Show critical parts on main slides, keep others for backup

    - Talk about limiting factors & problems
        - Specific to sections
        - For P&ID talk about parts costly and hard to find
    - Injector will be main object of concern for our team
        - More detail on this
- Machining
    - Always mention student status when asking for quotes
    - Always meet machinist and talk through drawing
        - Always mark critical & non-critical dimensions
        - What features are important about part?
        - Human element (incentivize good outcome)
        - Give quick line of contact to get info during machining if needed
    - Try AC Mfg. before A-1 Jay's for quotes (smaller shop, cheaper)
- Propellant System Modeling
    - Identify all pressure-affecting features
        - Friction
        - Changes in area
    - Identify inlet & outlet pressures
    - Remember gravity head in LOx tank model
    - Use equations in Greg's prop system slides to convert Cv to useful coefficient
    - Add diagram/other accounting for pressure edge cases due to blowdown
    - Model Cavitating venturi as simple dP when doing pressure ladder
    - Keep Ox velocity below ~30 m/s
    - Fox & McDonald *Intro to Fluid Mechanics*, Wiley 8th ed 2011