Team Meeting 2/7/20 - **~2 Weeks Until PDR (~Feb 21)**

Meeting Agenda

- Review progress
- BOM Cost discussion
- Review FMEA
- Deliverables for Monday

BOM Cost

- Current partial BOM contains ~$4000 for feed system components
    - Does not include tube fittings for PT/TT install or line splits
        - Swagelok or NPT fittings for high pressure are $50-$100 each
    - Does not include pressure relief valves
        - Very few available with high enough set pressure for O2 run tank
        - Quoted from Rego relief valves at 500 psi and 600 psi
            - $60 each
    - Does not include O2 run tank
        - Current option is $400 scuba tank
            - $200 tank
            - $10 for cap
            - $50 for dip stick
            - $100 for machining?
            - $40 for seals
    - Does not include orifices/venturis
        - Venturi will probably need to be 3D printed
        - Design is 60% complete (Throat is calc'd research on angles is being done)
    - Does not include valve actuators
        - $700 quote for cryo actuated ball
        - Actuators in lab
    - Does not include nozzle/chamber, igniter/injector, test stand, or propellants
- What can we do to reduce cost?
    - Search Cantwell lab for existing hardware
        - Quick look earlier today found ~$8000 of hardware
            - 4x actuated ball valves, 3x Victor SR4J regulators, high-pressure hoses, cryo transfer hoses, pneumatic valves, solenoid valves
        - What does the other team need? What else can we find?
        - Need to catalog found hardware and compare with BOM
    - Switch from needle valves back to orifices on igniter streams?
        - Can easily swap orifices between tests

        - Lenox Laser orifices $44 each
    - Switch from ball valves to solenoid valves on igniter streams?
        - Is solenoid valve Cv high enough?
    - Drop to 1x ball valve on each stream?
        - How do we E-stop?
        - Save $532 for Cryo ox valve, $172 for room temp CH4 valve
        - Could also save on finding pressure reliefs for inter-valve volume
    - Drop to 1x methane cylinder?
        - Will pressure drop too fast? Probably
        - Can do this with a regulator in the main line (High enough Cv if inline)
            - Need to find one (Rego has them I think)
    - Switch to GO2 for main Ox?
        - $1100 for 2x cryo ball valves vs. $350 for 2x room-temp ball valves
        - Would need multiple Ox tanks or reduce chamber pressure/throat dia.
        - But its less fun (Alec)

Deliverables for Monday - New items

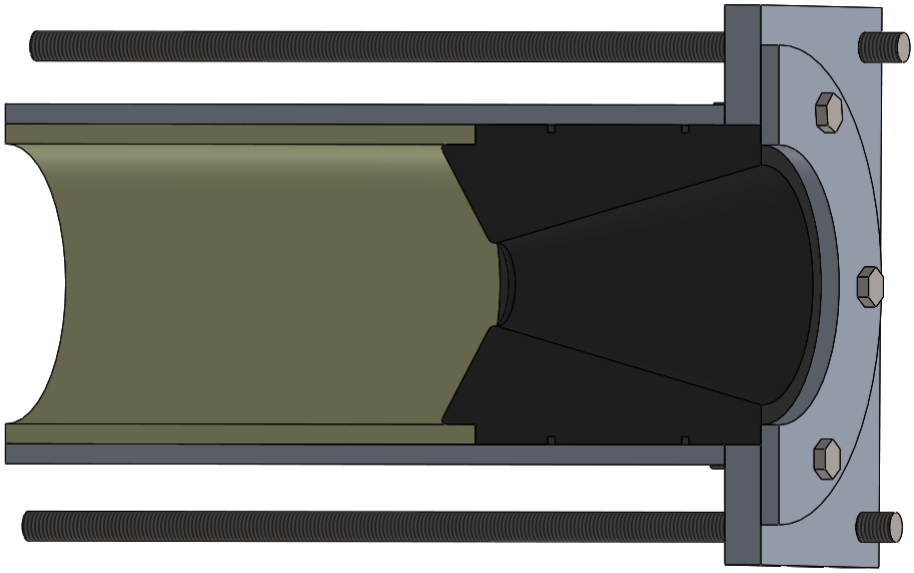
Prop Feed

- Coherent Interactive P&ID
    - Structure in place **- DONE, but non-functional**
    - Find actual part numbers for flow controls **- Partially done, need reliefs, orifices, actuated ball valves**
    - Update P&ID with Greg feedback
        - Sent feeback to channel
        - Need a vent on the main Ox line
        - Make P&ID version with igniter as separate CH4 feed
    - Redo interactive P&ID as MATLAB script
        - Find Cv formulas with less assumptions
- BOM
    - Add all currently quoted parts **- DONE**
    - Get propellant/fluid quotes
    - Catalog existing hardware in lab & update BOM
    - Find high-flow, high-pressure regulator for CH4 stream
        - Rego Inline (I think)
        - Swagelok KHF or KPF (requesting quotes)
    - Compile fitting list for each prop stream (see BOM)
- Run tank decisions
    - Are we using a run tank for CH4? **- NO**
    - What are we using for LO2? **- Scuba?**
    - Design/sketch dip tube fitting for scuba tank (discuss w/Greg)
        - Done, discussed
            - Will put CAD on grabcad tonight (Alec)

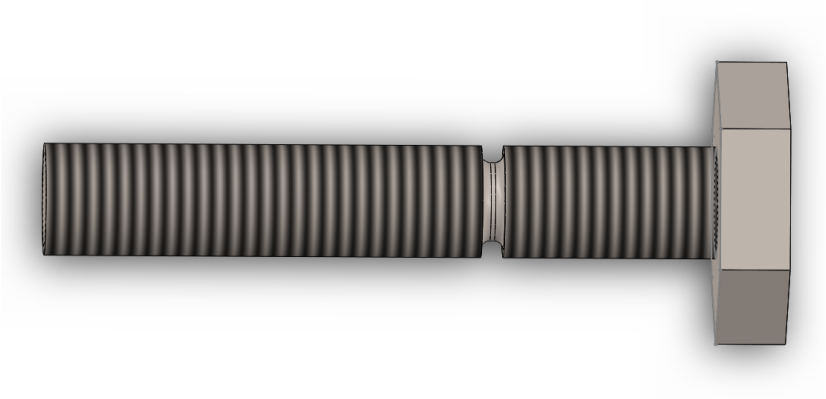
- Send Greg the tank specs to overview (Al6061 is a worry)

Nozzle/Chamber

- CAD of nozzle & chamber **- DONE (mostly)**
  - Component models
  - Subassemblies



- Nozzle bolt notch design **- DONE**
  - ***From Alec (I would notch the bolt at the very top) And use a shoulder bolt instead of a full thread bolt) Just my opinion**
    - Why?



  - Prelim - can we test before PDR?
    - I have access we just need to schedule (Alec)

    - Look into v-groove notch (based on whatever turning tools are in PRL)

- BOM - **Not done**

Injector/Igniter

- P&ID requirements
    - Pressure
    - Mdot
    - Full igniter subsystem
    - Look into recourse after failed test - what knobs to turn?
- CAD
    - Injector element design
    - Injector manifolding first pass
    - Igniter design
- BOM
    - Talk to potential sponsors
    - Get quotes on rough designs for 3D print/AM parts in case of no sponsorship

Test

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

Avionics

- Avionics diagram
- BOM

Notes

- **PDR is finished design deadline, esp. for all parts required for igniter test**
- 3D systems is willing to print stuff for us if we write a paper and list them as co-author.
    - Follow-up: talk with Cantwell to confirm we're allowed to do this (Walker)