Team Meeting 2/3/20 - **~2½ Weeks Until PDR (~Feb 21)**

Meeting Agenda

- Made GitHub Organization for more formal code storage
    - https://github.com/Stanford-AA284-2020
    - Send GitHub usernames to Jeff
    - Use for matlab/simulink/other code or version-sensitive files
- Subsystem RE updates
    - Progress
    - Needs
- Top-Level Priorities
- Deliverables for Friday

Top-Level Priorities

Get complete design down, at preliminary detail level - spend next week refining design

- Document rationale for all major/moderate decisions for PDR

P&ID

Understanding pressure, temp, mass flow influences throughout system is critical

- Refine
    - Are we using different pressurant & purge gases?
    - Plumbing sizing
    - Run tank(s)
    - Valve control types (pneu, servo, manual)
    - Redundant shutoff? (E-stop)
- Convert to interactive Simulink/Spreadsheet model
    - Ideally ability to use temp/press inputs to know state during test
- Tank models (P, T, rho)
    - CH4
    - O2
    - N2
    - He
- Flow Control Device models (dP)
    - Main ox/fuel valves
    - Pressurant valves
    - Purge valves
    - Check valves
    - Orifices
- Fittings & pipes

    - Sharp angle pressure drop
    - Area changes/choke points
    - Friction
    - Heat transfer?
- Station table
    - All-in-one state reference for system

CAD

Need to start component design to stay on track

- Component volume/shape
- Fasteners
    - Material
    - Head & shank type
    - Count
- O-ring gland sizing
- Material selection
    - Metals
    - Seals (elastomers)

Bill Of Materials (BOM)

Need cost estimates & quantities

- Raw stock
- Machining/Welding/printing service fees
- Fasteners
    - Bolts/screws
    - Nuts
    - Washers
- Seals
- Valves
- Valve actuators
- Spark plug & coil
- Avionics
    - Control CPU
    - Interface boards
    - E-stop
    - Wiring
- Tubing
- Tube fittings
- Transducers
    - Pressure
    - Temp
- Fluids
    - CH4

    - O2
    - N2
    - He

FMEA

Everyone needs to make additions, and read it

Deliverables for Friday/Monday

Prop Feed

- Coherent Interactive P&ID
    - Not necessarily all design values, but at least structure in place
    - Find appropriate actual part numbers & flow parameters for all flow control parts
- BOM
    - Add all currently quoted parts
    - Get propellant/fluid quotes
    - Conservative fitting estimate
    - Should match P&ID
- Run tank decisions
    - Are we using a run tank for CH4?
    - What are we using for LO2?

Nozzle/Chamber

- CAD of nozzle & chamber
    - Component models
    - Subassemblies
- Nozzle bolt notch design
    - Prelim - can we test before PDR?
- BOM

Injector/Igniter

- P&ID requirements
    - Pressure
    - Mdot
    - Full igniter subsystem
- 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?
    - What design features are needed?
- CAD
    - Test stand prelim design
    - **Define where the test stand attaches to the rocket**
- BOM

Avionics

- Avionics diagram
    - from/with P&ID
    - Interactive?
    - Work on feed system - control type factors into valve selection
- BOM

Notes

- Tom wants to start buying avionics to enable testing, coding, etc.
    - ~$100
    - Raspberry Pi is ~$35
    - Is Raspberry Pi best architecture for this?
    - Use Raspberry Pi to store data, Arduino for control?
- Walker finished igniter design calcs
    - Alec started CAD
- Walker & Alec found micron-dimensioned orifices, useful for mass flow regulation
- Push deadlines forward to enable igniter test over break
    - **PDR is finished design deadline for all parts required for igniter test**
- Which is safer, fuel-rich or fuel-lean?
- How much can we expect N2 to diffuse into our liquid oxygen?
- Add gaseous oxygen feed for igniter - makes test easier
- Add plenum for CH4 stream before orifice?
    - Minimize turbulence effects on orifice flow rate
    - Can we find existing tank hardware to use as manifold/plenum for multiple methane cylinders?