Team Meeting 1/15/20

Project Topic/Concept

We are probably doing a test stand design, to focus on the engine itself
The front-runner ideas could all be done with **liquid biprop** or hybrid

- Seems like majority of team wants to to biprop
- Biprop is relevant to industry developments, so good experience to have

IDEAS:

- **Non-pyrotechnic restart**
    - Greg feedback: good idea, never attempted in 284
    - **Primary goal with liquid biprop**
    - **If we can't do it, we should still be on the way to a working biprop engine**
- TVC by inert gas injection
    - Greg feedback: good idea, real applications for MAV and others, previously attempted in 284 but unsuccessful
    - **Secondary goal if design is going well, since likely easy to add to working engine**
- ~~Throttling~~
    - Greg feedback: interesting idea, not done in 284 successfully
    - Other team is doing throttling with a hybrid
    - **Probably too much to handle along with liquid biprop**
- ~~Regen cooled hybrid nozzle for oxidizer heating~~
    - Greg feedback: interesting idea, hard to pick appropriate oxidizer since design constraints (pressure drop, temperature) counter advantages of N2O for small engines - would probably have to work with LOX, need research to characterize effect of temperature boost on combustion efficiency, regression rate, etc.
    - **Manufacturability will be massive inhibitor - probably impossible in this timeframe**
- ~~Electric turbopump~~
    - Greg feedback: better used on hybrid since only need to worry about 1 prop stream, hard to pick oxidizer due to N2O vapor pressure (cavitation), probably requires from-scratch pump design for ox environment + high pressures (lots of design work)
    - After reading Purdue paper on turbomachinery dev (Walker), seems like mfg would still be a huge hurdle
    - **We don't think this is a reasonable project in this timeframe**

Notes

- Engineering references posted to GDrive folder - add others when you find/need them
- If we try to use the previous liquid biprop design as baseline, will Greg be OK with it?
    - Probably since there's lots of room for improvement

To-Do:

- ~~Figure out at least 2 weekly meeting times that work for “everyone”~~
- Decide on project topic
    - Liquid Biprop with non-pyro restart capability
    - If this goes well, add TVC capability
- Start researching design for CoDR
    - Everyone research/come up with general concepts, but don’t do CAD or drawings yet
    - Propellant choice
    - Thrust level
    - Total impulse
    - Ignition method ideas
    - Injector concepts
    - Valving/tank systems
        - Esp. if using LOx
    - Goals for project
        - Measurable test items
    - Test stand concepts
    - Post research results to GDrive
- Read SSI liquid biprop paper from last year
    - Similar project may provide insight into decisions and rationale