List of Philosophy & General Goals for LOX/Paraffin hybrid project.

Black = unmodified original statement from team member.
Blue = my reformatting of your original statement (not shown) to make it concise.
Red = team member

Please make any changes or corrections to your statements that I may have misinterpreted. I have deliberately left out personal, specific and technical goals because they won't be applicable to our discussion at this point. The coming meeting will be used to give us direction in the project and not so much the specific details on how we are going to build the motor.

Philosophy:

VALUES

- Have everyone be committed to the project and complete the tasks they are assigned in a timely manner or be honest enough to pass it off. (Maggie)
- Be safe (Maggie)
- Keep things simple (Michael)
- Take ownership and be accountable (Brian)
- Make it safe and reliable (Brian)
- High reliability (Michael)
- Cost vs. efficiency. (Brian)
- Simple vs. complex. To the point of sacrificing efficiency (Brian)
- COTS vs. exotics. If it saves time or money and the efficiency penalty is not great (Brian)

INTELLECTUAL PROPERTY

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- Be open source, as long as our shared goals support it, publish a lot and build our reputation (JimW)
- Discuss intellectual property rights. (JimC)
- Discuss open vs. closed, non-profit vs. commercial or some mixture of these (Michael)
- Do everything open-source to build flight-article LOX/Paraffin motor. Then evaluate commercial opportunities (Brian)

PROCEDURE

- Data analysis should involve as much of the team as possible. The consensus of our results dictate where to go next and these decisions are best made as a team. (JimW)
- Vote on project issues (Michael)
- Take incremental design steps (Maggie)

- Move in incremental steps (Michael)
- During design and testing only adjust one variable at a time (Michael)
- Keep R&D and production separate (Michael)
- Define an initial end goal but be flexible enough to take advantage of discoveries along the way and refine that goal as we approach it. (JimW)
- Start with very simple design, try novel ideas on later generations. (Brian)
- Don't introduce feature creep or make unnecessary design changes during the process (Brian)
- Develop on schedule and to completion the product we decide upon in the beginning (Brian)
- We need to be clear about our primary objective and then not get distracted by peripheral concerns. (Evan)

HARD TO QUANTIFY

- Productive attitudes (Maggie)
- To learn from other's mistakes and successes (and of course our own). (Maggie)
- Learn from our history and mistakes (Michael)
- Working to understand the hybrid will help in optimization of the design (Maggie)
- Accept that failures will happen but keep moving ahead. (Michael)
- Do the research and design but remember the importance of actually building hardware (Michael)
- Think of the LOX/Paraffin hybrid as an organism (evolvable) (Michael)

General Goals:

VISION

- Build LOX/Paraffin Hybrid motor for investigating active guidance (Brian)
- Openly develop paraffin technology and publish results (Brian)
- Assist in the completion of a (lab-ready) LOX/Paraffin hybrid motor that performs at least as well as predicted on paper. (JimW)
- Assist in the completion of a (flight-ready) LOX/Paraffin hybrid motor that performs at least as well as predicted on paper and meets the needs of our launch vehicle (e.g. guidance features, thrust profile, etc.) (JimW)

TIME LINE

- Acquire the proficiency to be able to repeat what others have done, first. Afterwards use our success to justify trying things that haven't been tried. (JimW)
- By Black Rock 2005, have a flight article (as close as is feasible) LOX/Paraffin motor ready for static test fire. This motor will be designed to produce a specific amount of thrust (to be determined by the group ASAP). (Maggie)

- Perfect and understand GOX/Paraffin lab-scale motor then move to LOX/Paraffin lab-scale motor to work out issues. Then move up to flight-scale LOX/Paraffin motor and work out issues. Then work towards flight-article LOX/Paraffin hybrid motor. (Maggie)
- Wait until we have a flight-article LOX/Paraffin hybrid before we start investigating active control (Maggie)
- Design a flight-article LOX/Paraffin hybrid, build a non flight-article version of this design for testing on the ground, making appropriate concessions to hardware (i.e. Cost, availability) to get it up an running within one year form now to start the debugging procedure. (Brian)
- Incorporate into the flight-article design and the non flight-article ground test version of motor a method for active guidance (i.e. TVC, gimbaling) (Brian)
- Build a small scale LOX/Paraffin hybrid first, then a full-scale hybrid (Michael)
- Consider future active guidance (Michael)
- Develop a kit or system for hobbyist (Peter)
- Once GOX/Paraffin hybrid performance is proven, seek outside funding for development of LOX/Paraffin hybrid. (Evan)
- Convert lab-scale GOX hybrid to lab-scale LOX hybrid. Work out any performance issues of LOX versus GOX. Reproduce performance of GOX using LOX (Target chamber pressure = 500psi, target thrust = 50 lbf). (Evan)
- Design/build flight-article LOX hybrid after previous steps completed (Evan)

PROCEDURAL

- Formalize roles during testing operations to increase safety and improve the integrity of the data that is collected. (JimW)
- Create a schedule (Maggie)
- Be more involved in finding funding. Regardless of whether that's applying for grants, looking of sponsorship, developing something to sell or just being more aware of opportunities as they present themselves. (JimW)
- Quick turn-around time (Michael)
- Excellent Standard Operating Procedures (Michael)
- Have a designated project manager responsible for calling meetings, assigning tasks, and keeping members on task and accountable for timelines. Also responsible for making decisions when there is conflict. (Maggie)
- Hold regular meetings for brain storming, manufacturing and testing every 2 weeks. (Maggie)
- Cross train team members on manufacturing (Maggie)
- Favor in-house manufacturing to save money and improve skills (Brian)
- Use as many COTS components as possible (JimC)

UPPER LEVEL SPECIFIC GOALS

- Low g-loads (Michael)
- Motor capable of 10% throttling and active guidance (Brian)
- Motor 95% reliable (Brian)
- Motor 15 second burn, 1000-2000 lbf (Brian)

- Reusable, motor good for 50 flights (5% disposables per flight) (Brian)
- <$1000 per motor (count out-sourced labor, even if donated. Don’t count special deals unless they are relatively constant) (Brian)
- <$100 per flight (Brian)
- Flight article LOX/Paraffin targets: 1500lbf, 15s burn time, construction cost <=$1000, consumables cost per flight <=$100 (Evan)
- Revise fuel grain construction (better insulative liner, easier insertion and removal) (Evan)