Meeting #4

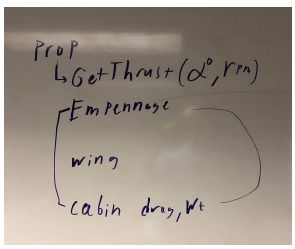
Date: 9/20/19
Time: 9:00-X:00 AM
Location: EGR 108

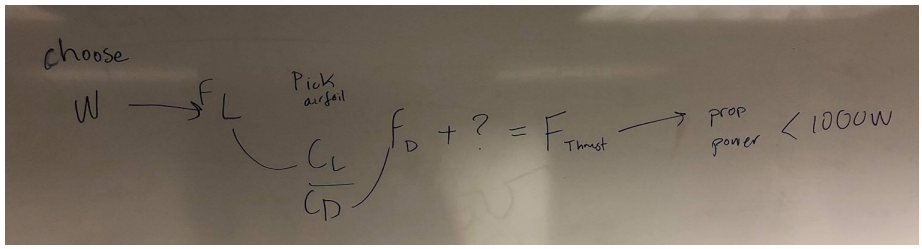
Agenda:

- Prep for call with Ben Foster
- Call Ben Foster
- Discuss Ben's ideas
- Talk about design
- Figure out getting loan from NAU

Meeting Notes:

- Getting $1100 for comp. Fees: Email Oman
    - Ask her if we can get money for personal SAE membership
- We need to figure out where to start
    - Ask Ben and Tester
    - Alex says start with airfoil+prop and everything will follow
- Design
    - Main Restriction: Power
        - Start with Prop
    - Airfoil Selection
        - CL/CD chart (Gliding Ratio)
        - Taper Ratio < .5
        - Chris' friend has a selection tool
        - Look at past SAE Aero airfoil selection
        - Need Re estimate to look at gliding ratios
            - Relative air speed (wind) and desired aircraft speed
    - Design relationships
        - Everything related, but we can't get values for prop/thrust without intensive testing
        - Do prop first or last?





- Call with Ben
    - NAU Grad
    - Worked on Aero with Shafer in 2006

    - Has been working on aero, materials science, etc.
    - Get onto prototyping and testing, don't get hung up on calcs and analysis
    - Prop: run a bunch of tests and develop some experimental curves
        - Thrust at low rpm
        - Large diam, large pitch
        - Static thrust to dynamic thrust (research available)
    - Talk to the hobbyists
    - Categorize and delegate
        - Drive train
        - Aerodynamics
        - Structures
    - Preflight checklist
        - Check batteries and radio, etc.
    - S12-23, wash out, tapered
    - Have second airplane, spare parts
    - Center of grav, mass balance, layout, structure, airfoils ("heavy lift airfoil") *aspect ratio*

Tester Meeting Notes:

- CNC for a lot of parts at once
- Stability will be major factor "Bluff body"
- Don't let preconceptions stop creativity
- Gearing/pulleys = too much complexity, weight (could do analysis)
- Think about CONTROL SURFACES/turning with huge soccer ball
- Landing Gear is hugely significant, gonna be really long
- Nail down "specs" (numbers)
- Look at other teams and see the landing distances
    - How can we slow it down (drag will actually help)
- Try and find the best scoring
    - Weight vs. complexity
    - Figure out scoring "cost" of adding soccer balls
- Get thrust from prop
- DON'T design own prop
- Get model props from toystore to do thrust studies
    - Hook up to weight scale
    - Find which one works best for given power
- Buy MULTIPLE props
    - Want max diameter, will rub off in testing, keep replacing for runs
- Be realistic about saving weight
    - Reliability > shaving off a few ounces
    - Put together ERs that include reliability (#successes/total runs)
- Pitfalls of previous teams

    - Landing gear
    - If plane breaks at landing, not scored as successful flight
    - Do support analysis for landing weight
    - Drag something upon landing to slow down
    - Wind
    - Problem with taildragger
        - High angle of attack, great for takeoff, get fucked once airborne
        - Steerable front wheel for tricycle
    - Must be steerable on takeoff, must slow down on landing
- Modular-ise major components to swap out parts upon light crash
    - Wings especially
- Biplane?
    - More lift, with same span
    - Too much drag
- Analyze wing forces
    - Distributed pressure
    - Point loads for fuselage weight
    - Weight into fuselage into wing spars
- “What breaks the plane is the landing”
- Control Surfaces
    - Calculate everything for drag
    - Must be sufficient to turn the large drag fuselage
    - Don’t make them too small
- “Design it so that you can get it there”
    - We don’t wanna take the big baja trailer
    - We WANT to take the Civil trailer (by the dumpster out back)
    - Tester can get the department to pay for a van
- Get underclassmen to help
    - John wants them to get integrated into SAE before their capstones
- Get prop away from cowling
- Don’t make wing too deep
- Registration
    - Don’t need cash up front
    - Register with SAE personally early
- Use battery and motor from old plane
    - Put the actual parts back in the locker
    - Use old parts for the “Mule” testing plane
- Rib and spar with monocoat
    - Weight
    - Strong
- Don’t use foam for the real thing, but use it for testing because it’s fast and cheap
- Try and get a testing plane by December
- Flagstaff Flyers

    - Know how to make good connections
    - They do NOT do good calculations
    - They will complain about parking

Action Items:

- **Talk to Shafer**
    - **Flight simulator?**
- **Talk to Tester today**
- **Break into design groups**
    - **Aero:**
    - **Structure:**
- **Put aero PDFs in drive**
- **Talk to Flagstaff Flyers**
- **Look into foam**
- **Jacob will be point of contact with Tester**
- **Request foam people contact, paper from the cedar plane guy who knows how to make straight wings from Tester**

Next Meeting: 88/88/88, 5:30 @EGR