I. Executive Summary

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II. Management Summary

A. Team Organization

Figure 1 depicts the overall organization of our team structure. Advisors include the professor overseeing our club as well as graduate student members of our team. Each of the teams is lead by an individual who answers to the Engineering Lead and Project Manager. The skills required for each position/team are as follows.

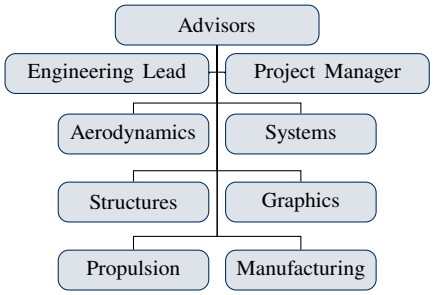

Figure 1 This chart depicts the structure of, and assignment areas within, our team organization.

Engineering Lead As with the team leads, the Engineering Lead primarily requires good decision making and leadership skills, qualities the BYU Aero Club seeks to develop in all of its members. In addition the Engineering Lead has a well rounded understanding of the various systems and both design and testing expertise.

Project Manager The Project Manager has excellent organizational skills and oversees the logistical side of the project: heading up report writing, budgeting tasks, scheduling, etc.

Aerodynamics The Aerodyanmics team members have expertise in aerodynamic analysis and testing, including skills in hand calculations, computational analysis tools, wind tunnel and glide testing.

Structures The Structures team members focus on skills in structural analysis and testing, employing hand calculations, computational tools, and various structural testing methods.

Propulsion The Propulsion team focuses on analyzing and testing the propulsion system effectiveness and efficiency, but also has skills in electronics related to the propulsion system.

Systems The Systems team works very closely with the Engineering Lead, as they oversee all systems interfacing, avionics, etc. There is a sub-group of the Systems team that is assigned to work on the mission specific payload and related components, as well as related testing.

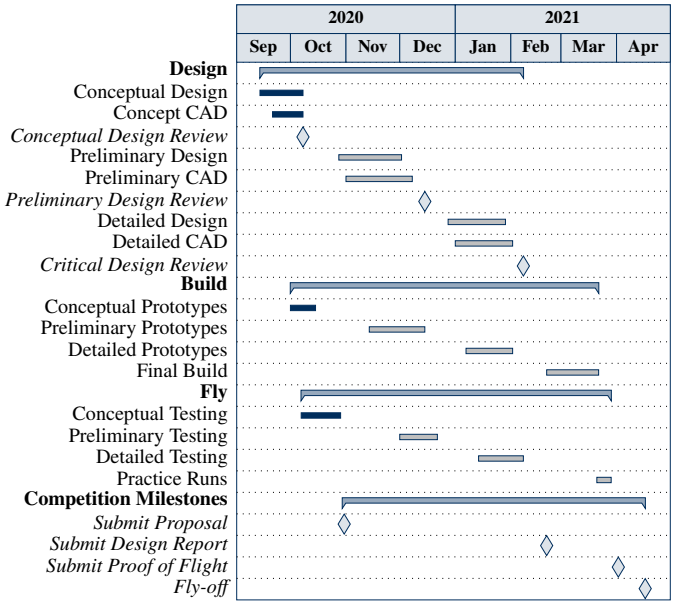

Figure 2 This milestone chart shows our 3-phase plan for the major elements of our design, manufacturing, and testing processes.

Manufacturing The Manufacturing team oversees the manufacturing of all prototypes and testing apparatus.

Graphics The Graphics team has skills in CAD design as well as graphical marketing for the team.

B. Schedule

Figure 2 depicts our planned timeline for the year. Sections IV and V describe the flow of our schedule in more detail. Note that at the time of submitting this proposal, we have completed the conceptual design presented herein and have moved on to our preliminary design phase. Also of note is that we began prototyping early in order to apply a "fail fast, fail often" methodology to quickly fill any gaps in understanding and allow our underclassmen to develop their aircraft design intuition faster than if we waited to prototype after completing all the design phases.

C. Budget

Table 1 contains a breakdown of our budget estimates for the 2020-2021competition year. Note that we have not allocated any funds to aircraft shipping costs as it is more cost effective for us to drive rather than fly to the fly-off location; therefore, we can transport our aircraft ourselves at no additional cost.

To obtain funding for our team this year, we will be [NEED TO TALK ABOUT HOW YOU'RE GETTING FUNDS: CLUB, PREVIOUS YEARS WINNINGS, WEIDMANN CENTER, ETC.] Nam dui ligula, fringilla a, euismod sodales, sollicitudin vel, wisi. Morbi auctor lorem non justo. Nam lacus libero, pretium at, lobortis vitae, ultricies et, tellus. Donec aliquet, tortor sed accumsan bibendum, erat ligula aliquet magna, vitae ornare odio metus a mi. Morbi ac orci et nisl hendrerit mollis. Suspendisse ut massa. Cras nec ante. Pellentesque a nulla. Cum sociis natoque penatibus et magnis dis parturient montes, nascetur ridiculus mus. Aliquam tincidunt urna. Nulla ullamcorper vestibulum turpis. Pellentesque cursus luctus mauris.

Table 1 Project Budget Breakdown

Category	Items	Cost ($)
Propulsion	Brushless Motors (Qty?) | Propellers (Qty?) | ESCs (Qty?)	
Power	(how many cells?) Lipo Batteries (Qty?)	
Structures	Balsa Wood (Qty?) | Monokote (Qty?) | ABS Filament (Qty?) | Foam (Qty?)	
Composites	Carbon Fiber Spars (Qty?) | Fiber Glass (Qty?) | Epoxy (Qty?)	
Electronics	Servos (Qty?) | Receiver (Qty?)	
Travel	Vehicle Rental | Gas (Qty?)	
Food & Lodging	Airbnb (Qty?) | Meals (Qty?)	
Total Cost		

III. Conceptual Design Approach

A. Mission Requirements Decomposition

We have organized our sub-system requirements into aerodynamics, structure, propulsion, and specialty requirements explained below.

Aerodynamics Requirements

Structural Requirements

Propulsion Requirements

Specialty Requirements Lorem ipsum dolor sit amet, consectetuer adipiscing elit. Ut purus elit, vestibulum ut, placerat ac, adipiscing vitae, felis. Curabitur dictum gravida mauris. Nam arcu libero, nonummy eget, consectetuer id, vulputate a, magna. Donec vehicula augue eu neque. Pellentesque habitant morbi tristique senectus et netus et malesuada fames ac turpis egestas. Mauris ut leo. Cras viverra metus rhoncus sem. Nulla et lectus vestibulum urna fringilla ultrices. Phasellus eu tellus sit amet tortor gravida placerat. Integer sapien est, iaculis in, pretium quis, viverra ac, nunc. Praesent eget sem vel leo ultrices bibendum. Aenean faucibus. Morbi dolor nulla, malesuada eu, pulvinar at, mollis ac, nulla.

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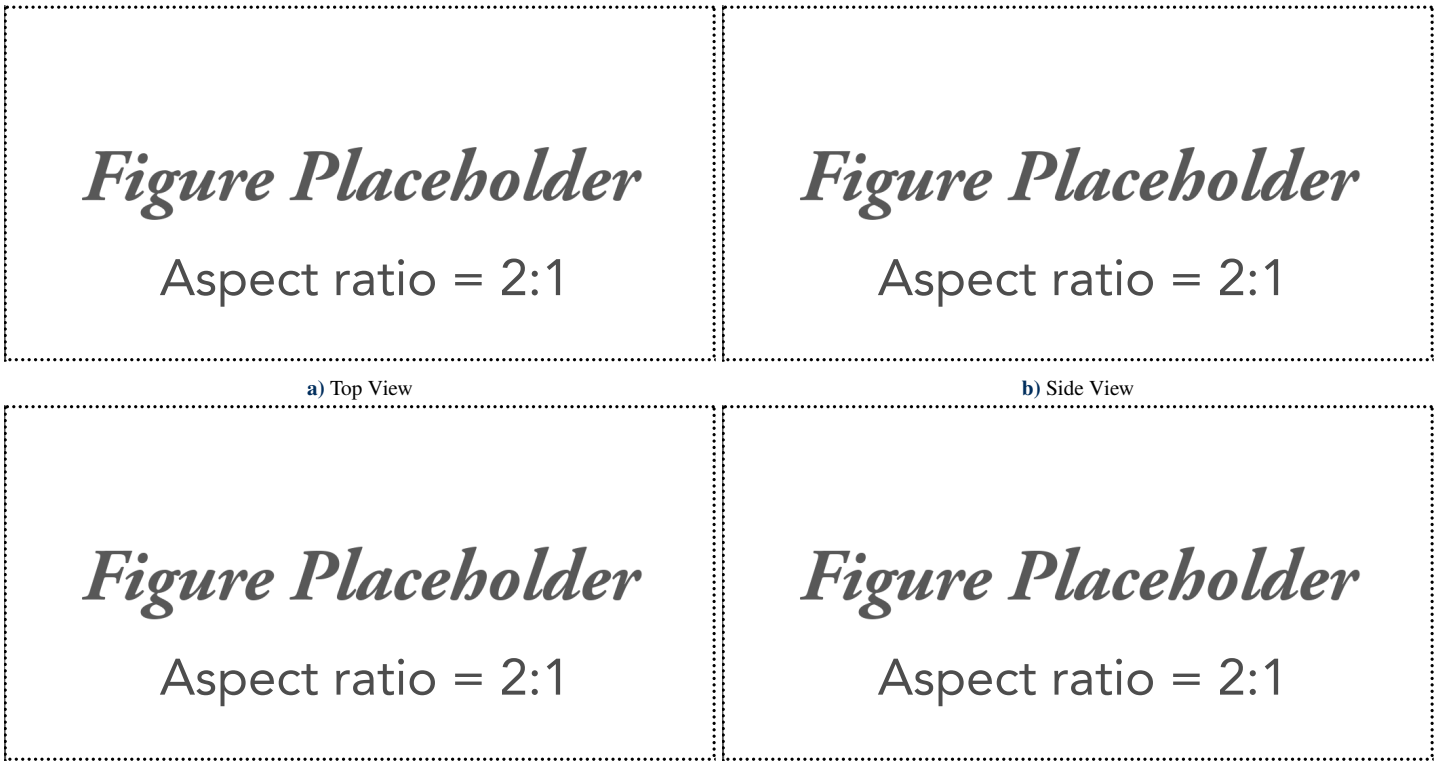
B. Preliminary Design



a) Top View **b)** Side View

c) Front View **d)** Rendered View

Figure 3 Current drawings and rendering of our conceptual aircraft design.

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C. Sensitivity Studies

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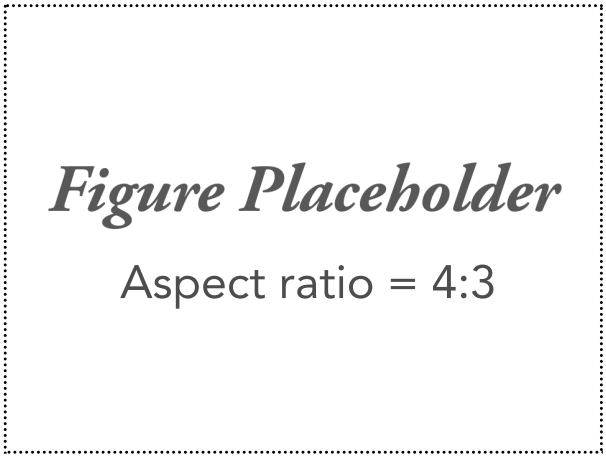

Figure 4

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IV. Manufacturing Plan

A. Manufacturing Flow

Our manufacturing flow follows the outline found in figure 2 which includes three design-build-fly phases. Figure 5 shows this flow with more clarity. Note that for all phases, CAD will commence roughly a week after design starts, prototyping a week after that.

Phase 1 We began with a conceptual design along with conceptual CAD, from which we have built concept prototypes to be used in testing as described below. [ADD A DETAIL ABOUT MATERIALS AND/OR PROCESSES.]

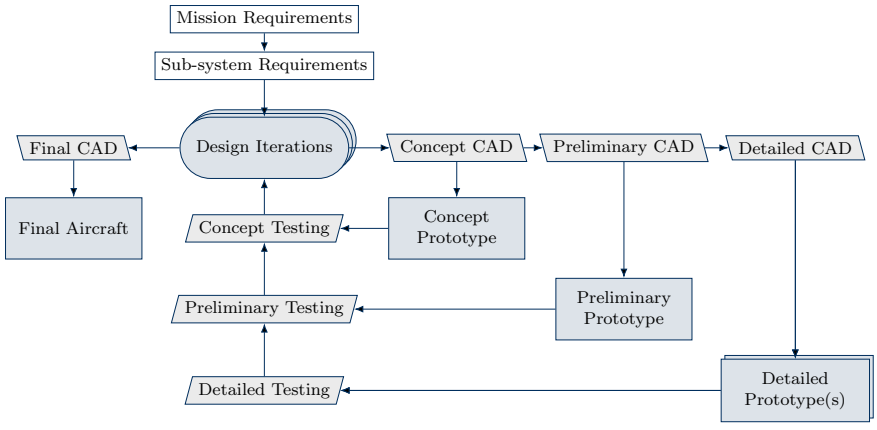

Figure 5 We show here a flowchart of our proposed manufacturing plan.

Phase 2 We are currently beginning our preliminary design and CAD from which we will build preliminary prototypes for testing. [ADD A DETAIL ABOUT MATERIALS AND/OR PROCESSES.]

Phase 3 Around the new year, we will start on our detailed design and CAD, which will lead to our final testing prototypes. After polishing the design and CAD after final testing, we will manufacture our final competition aircraft. [ADD A DETAIL ABOUT MATERIALS AND/OR PROCESSES.]

B. Critical Processes

[YOU NEED TO DISCUSS THE CRITICAL PROCESSES AND TECHNOLOGY BASED ON HOW YOU'VE DECIDED TO MANUFACTURE THINGS THIS YEAR. FOAM CUTTING? 3D PRINTING? LASER CUTTING? ETC.] Nulla malesuada porttitor diam. Donec felis erat, congue non, volutpat at, tincidunt tristique, libero. Vivamus viverra fermentum felis. Donec nonummy pellentesque ante. Phasellus adipiscing semper elit. Proin fermentum massa ac quam. Sed diam turpis, molestie vitae, placerat a, molestie nec, leo. Maecenas lacinia. Nam ipsum ligula, eleifend at, accumsan nec, suscipit a, ipsum. Morbi blandit ligula feugiat magna. Nunc eleifend consequat lorem. Sed lacinia nulla vitae enim. Pellentesque tincidunt purus vel magna. Integer non enim. Praesent euismod nunc eu purus. Donec bibendum quam in tellus. Nullam cursus pulvinar lectus. Donec et mi. Nam vulputate metus eu enim. Vestibulum pellentesque felis eu massa.

V. Testing Plan

As mentioned in section IV.A and shown in figure 2, each of our design and build iterations culminate in testing. Testing is divided into two categories as follows: [NEED TO FLESH OUT DETAILS BELOW BASED ON THE SPECIFICS OF THE COMPETITION AND YOUR CONCEPTUAL DESIGN.]

A. Component/Ground Test Plan

For all phases, ground testing will start roughly a week after prototyping has commenced.

Phase 1 We began by testing a quick series of concept prototypes for our [PAYLOAD, WING FOLDING MECHANISM, LAUNCH STATION, OR WHATEVER THEY ARE THIS YEAR] in order to quickly narrow down our brainstorming to the most viable solutions.

Phase 2 In our preliminary testing phase, we will be looking at functioning prototypes of [PAYLOAD, WING FOLDING MECHANISM, LAUNCH STATION, OR WHATEVER THEY ARE THIS YEAR] in order to nail down the major details of the design. This will prepare us for integration in the next phase. In this phase, we will also be begin performing preliminary wind tunnel testing to validate our propulsion system. In addition, we will perform preliminary structural testing of our anticipated wing and other critical structures.

Phase 3 Finally, we will integrate all the components and do dry runs of the ground mission, as well as final wind tunnel and structural testing to validate our detailed computational analyses.

B. Flight Test Plan

In all phases, flight tests will typically take place at the end of the phase, in the week following the termination of the prototyping.

Phase 1 Flight testing began with our concept prototype: a hand-launched, unpowered, uncontrolled glider. Our primary goals for the concept test were to validate our static stability and general structural calculations, as well as illuminate any gotchas we may have missed in our initial design phase.

Phase 2 Our preliminary flight test prototype will be a powered, controlled aircraft, though without the full competition functionality. Our goal for the preliminary test is to validate our preliminary designs before moving on to detailed design aspects and full system integration, as well as note any unexpected behavior in the aircraft dynamic responses.

Phase 3 Our detailed design prototype will be complete enough that if desired, we could compete without building another iteration. Our goal for the final testing phase will be to fly the complete mission sequence, allowing for any final fine-tuning of the design before building our competition aircraft.