Project Calypso Production Plan

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This production plan details the major deadlines and tasks which must be completed to successfully accomplish the goals of Project Calypso, including the wind tunnel testing of a subscale model and flight testing of a full-scale aircraft for use in maritime search and rescue. Using conservative estimates for time and budget, wind tunnel testing will be completed no later than September 30th and flight testing no later than November 30th. Materials for the test articles can be either sourced directly through ERAU facilities or from domestic suppliers, reducing the risk of supply chain issues. Additionally, these goals will be met while remaining within the designated budget of $1,600.

I. Allocation of Personnel

For the duration of the detail semester, team members have been assigned specific roles to minimize confusion regarding personnel allocation. Table 1 breaks down the roles each team member is expected to fulfill, as well as their formal titles. Each member is solely responsible for a specific task and will manage the delegation of work on their specialty to ensure work is completed to the team's standards.

Table 1: Personnel Roles and Titles

Name	Title	Role
Jacob McMillin	Program Manager	Scheduling, resource management, communication
Ryan Lundell	Chief Engineer	Space negotiations, component integrations, composites
Anthony McLevsky	Production Lead	Build personnel allocation, avionics, electronics
Joshua Carver	Supply Chain Manager	Budgeting, purchasing, CFD, testing
Marcello Montes	Documentation Manager	Reporting, structures, test article production
Tyler Phillips	CAD Specialist	CAD modelling, implementation of design changes
Khaled Alhammadi	Propulsion Specialist	Propulsion testing, power distribution
Caleb Lynch	Missions Specialist	Missions system prototyping, construction

Table 2 summarizes the predicted labor hours for the upcoming semester. The design category contains revisions to existing designs as well as the design of production tools and test articles. This category will be dominant in the early phase of wind tunnel and structural testing, while manufacturing will mostly take place later in the semester.

Table 2: Labor Allocation

Category	Total Labor Hours	Hours per Week
Design	400	26.7
Test	500	33.3
Manufacturing	800	53.3
Reporting	300	20
Total	2000	133.3

II. Communication

Communication regarding testing, progress, production, resource management, and reports will be funneled through the PM to keep a single point of contact. The chief engineer, Ryan Lundell, will oversee the fabrication process, and any sub tasks such as wind tunnel testing, aircraft construction, catapult construction, and any other AXFAB work. Major updates will be communicated between the PM and the chief engineer to ensure clarity in progress and tasks. When communicating drawings and design with the machine shop, the chief engineer will act as a liaison between the production team and the shop workers. This is to ensure that drawings and designs are finalized before being sent to the shop for fabrication, and to allow a single point of contact between both parties. Machine shop and wind tunnel time will be requested by the PM ahead of time, through email or in person appointments. Purchases and material acquisition will be directed and completed by Joshua Carver, with the production lead ensuring correct parts, specifications, and arrival times are met. Documentation proofreading and final checks will be conducted by the documentation manager, Marcello Montes.

III. Material and Resource Allocation

The aircraft will be largely constructed of composites, with the skin of the fuselage and tail made entirely of low-density carbon fiber (< 5 oz/ft^2) and the wing skin constructed of a mix of fiberglass and low-density carbon fiber where additional strength is needed. The internal structure of the aircraft will be made of Nomex honeycomb sandwiched with standard weight carbon fiber fabric. Of these materials, only the low-density carbon fiber fabric will need to be sourced from outside suppliers, as the others are available via the AXFAB composites shop.

Most critical avionics components have been sourced from the capstone inventory, with the motors, ESCs, and props requiring purchasing from outside suppliers. These components have been ordered and should arrive within two weeks.

The molds for the composite structures will be made from wire-cut insulation foam, which is available via the AXFAB Light Machine Shop. The aircraft is not expected to require large machined or welded parts, so shop lead time will not be expected during the construction process.

IV. Production Timeline

The major deliverables and steps to produce the aircraft are detailed in Table 3. Mold production for wings and fuselage are to start on 17 Oct, while the tail mold production will begin on 21 Oct. Component fabrication is staggered so that personnel can be allocated to mold production, composite layups, and assembly simultaneously to make best use of the allotted time. Final assembly will begin on 15 Nov with testing concluding on 28 Nov. Overall, the build process is expected to take a month with testing being completed in about two weeks.

Table 3: Production Timeline and Major Deliverables

Category	Task	Start	End
Wings	Mold Production	10/17/23	10/20/23
	Rib Layup	10/21/23	10/23/23
	Rib Production	10/24/23	10/26/23
	Skin Layup	10/25/23	10/27/23
	Control Surface Production	11/1/23	11/4/23
	Electronics/Hinge Installation	11/5/23	11/7/23
	Final Assembly	11/8/23	11/10/23
Fuselage	Mold Production	10/17/23	10/24/23
	Frame Layup	10/24/23	10/26/23
	Frame Production	10/27/23	10/29/23
	Skin Layup	10/28/23	10/30/23
	Avionics Bay Layout	10/31/23	11/2/23
	Final Assembly	11/3/23	11/7/23
Tail	Mold Production	10/21/23	10/24/23
	Rib Layup	10/27/23	10/29/23
	Rib Production	10/30/23	10/31/23
	Skin Layup	11/1/23	11/3/23
	Control Surface Production	11/4/23	11/7/23
	Electronics/Hinge Installation	11/8/23	11/10/23
	Final Assembly	11/8/23	11/14/23
Avionics/Systems	Payload Systems Production	10/17/23	10/30/23
	PDS Assembly and Installation	10/17/23	10/31/23
	Electronics Layout	10/17/23	10/31/23
	Wiring	11/1/23	11/7/23
	Receiver/Pixhawk Programming	11/5/23	11/7/23
Assembly	Mount Wings	11/15/23	11/17/23
	Mount Vertical/Horizontal Tail	11/15/23	11/17/23
	Mount Props/Motors	11/15/23	11/17/23
	Load Test	11/8/23	11/14/23
	Taxi Test	11/18/23	11/21/23
	Flight Testing	11/20/23	11/28/23

V. Design Validation and Wind Tunnel Testing

Table 4 summarizes the tasks for wind tunnel testing and finalizing the test report. These steps must be taken prior to production of the aircraft. A cut-off date for the final CAD model of the wings will be completed by 08 September, so that printing can begin. Dates for beginning and completing consecutive tasks are expected to be done immediately, but buffer times are included in the dates allocated for each task. The wind tunnel test report is expected to be complete by 03 October, to allow enough time for aircraft production.

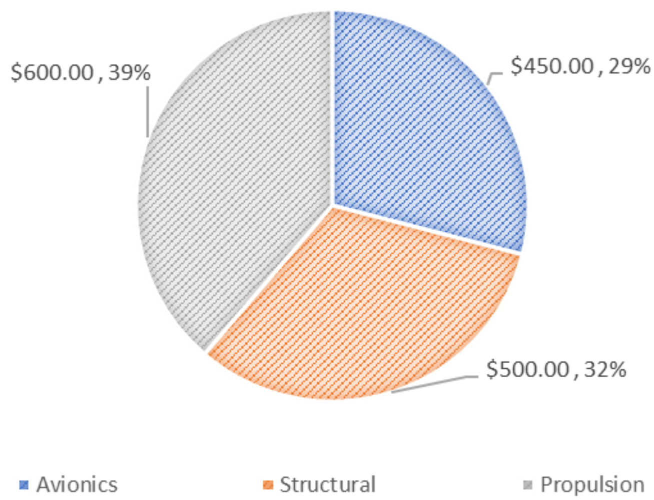
Table 4: Wind Tunnel Test Timeline and Deliverables

Category	Task	Start	End
Wind Tunnel Test Plan	Finalize Aero Design	8/28/23	8/31/23
	CAD Model for Mechanized Wing	9/1/23	9/6/23
	CAD Model for Half Scale	9/1/23	9/6/23
	Submit Models for Printing	9/6/23	9/8/23
	Manufacture Mounts/Frame	9/8/23	9/11/23
	Write Plan	9/4/23	9/14/23
Test Readiness Review	Static Testing of Test Articles	9/12/23	9/14/23
	TRR Report	9/4/23	9/14/23
Wind Tunnel Testing	Assemble Test Articles	9/12/23	9/14/23
	Test	9/14/23	9/27/23
	Analyze Data	9/24/23	9/30/23
Wind Tunnel Test Report	Prepare Report	9/27/23	10/3/23
	Implement Design Changes	9/27/23	10/3/23

VI. Budget

Figure 1 summarizes estimated program expenditure by considering the cost of items necessary for the production aircraft and applying conservative margins (FS = 1.15, round up to nearest $50) to budgetary estimates. Procurement items were grouped into the three largest categories which expenses have been directed at.

Figure 1: Estimated Budget Expenditures



From the data in Figure 1, it is estimated that Project Calypso will be under-budget by completion of the program. With the majority of avionics and propulsion items already procured, most of the remaining budget items are structural—such as carbon fiber, additional aluminum or steel tubing and struts, or additional ABS / PLA filament. The most expensive procurement items are the propulsion motors for the prototype and production aircraft—each motor costs $119.99 per unit. However, these items have already been procured and are factored into the current budgetary estimate, with $881.14 remaining for all further structural and avionics procurement items. If at any point these remaining finances prove insufficient, Project Calypso intends to apply for a budgetary extension, which the advising Professor can allocate on a per-need basis for an additional $200 to cover remaining development expenses. It is not predicted at this time that such funds will be necessary, but conservative margins have been applied to the current expenditure estimates in the event additional redundant items are required.