

### AIAA Design/Build/Fly Competition 2020-2021 Aircraft Design Report

### Brigham Young University Aeronautics Club 2021 AIAA Design Build Fly Competition Design Report

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### I. Executive Summary

Table 1 Summary of major system perfomance factors.

| Metric |                     |
|--------|---------------------|
|        | Performance (units) |
|        | Performance (units) |

### **II. Management Summary**



Figure 2 This milestone chart reveals our original plan for major elements of our design process compared to the actual timing of these events.

### III. Conceptual Design

### A. Mission Requirements

Aerodynamic Requirements

Structural Requirements

**Propulsion Requirements** 

Specialty Requirements

### **B. Scoring Sensitivity Analysis**

### C. Concept Weighting and Selection Process

Table 2 Figures of Merit

| Factor | Relative Importance (1-5) |
|--------|---------------------------|
|        |                           |
|        |                           |
|        |                           |
|        |                           |
|        |                           |



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Table 3 Weighted decision (Pugh) matrix.

| Factor | Weight | Option 1 | Option 2 | Option 3 |
|--------|--------|----------|----------|----------|
|        |        |          |          |          |
|        |        |          |          |          |
|        |        |          |          |          |
|        |        |          |          |          |
| Totals |        |          |          |          |

### Figure Placeholder

Figure 3 Here we show a sampling of the design concepts we rejected along the way as we honed in on our final design concept (see figure 4).

# Figure Placeholder

Figure 4 Our final conceptual design incorporates the highest scoring options in the decision matrices described above.

- IV. Preliminary Design
- A. Methodology
- **B. Trade Studies**
- C. Estimated Aircraft Performance

Uncertainty Analysis

Lift and Drag

Stability

Mission Performance

- V. Detail Design
- A. Sizing
- **B. Structures**



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### C. System Selection, Integration, and Architecture

### D. Weights and Balance

Table 4 Weight and Balance table including empty aircraft and each possible configuration.

| Configuration | Weight (grams) | CG Location (mm) |
|---------------|----------------|------------------|
| Empty         |                |                  |
| Config 1      |                |                  |
| Config 2      |                |                  |

### **E. Flight Performance Parameters**

### F. Mission Performance

### G. Drawing Package

The following are drawings including a 3-View drawing with dimensions of all configurations, a structural arrangement drawing, a systems layout/location drawing, and payload accommodation drawings.



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### VI. Manufacturing Plan

Table 5 Figures of Merit

| Factor | Relative Importance (1-5) |
|--------|---------------------------|
|        |                           |
|        |                           |
|        |                           |
|        |                           |
|        |                           |

Table 6 Weighted decision (Pugh) matrix for manufacturing plan.

| Factor | Weight | Option 1 | Option 2 | Option 3 |
|--------|--------|----------|----------|----------|
|        |        |          |          |          |
|        |        |          |          |          |
|        |        |          |          |          |
|        |        |          |          |          |
| Totals |        |          |          |          |

# Figure Placeholder

Figure 5 This milestone chart reveals our original plan for major elements of our manufacturing process compared to the actual timing of these events.

### VII. Testing Plan

A. Completed Testing

Ground Testing

Flight Testing

- **B. Planned Testing**
- C. Test and Flight Checklists

**VIII. Performance Results**