College of Engineering
Department of Mechanical & Industrial Engineering

College of Engineering
School of Electrical Engineering & Computer Science

To Predict ▶ To Design ▶ To Perform

ME, ECE Capstone Design Programs

Team 21 – SAE Aero Design Micro Class

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Pilot: Drew Rousseau

Jack Rettig

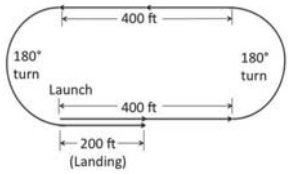
OBJECTIVE STATEMENT

The goal of this project is to design a competition winning RC aircraft under the constraints dictated by the 2018 SAE Aero Design Rules and Regulations. The team is to minimize aircraft weight, maximize payload, and reduce assembly time through utilization of the design process.

BACKGROUND INFORMATION

Competition Details

- Van Nuys, CA
- April 6 – 8, 2018



Competition Imposed Constraints

- Payload: 2" SCH 40 PVC Pipe
- Hand launched
- Electric Motor/Lithium Polymer Battery
- Aircraft, payload, and tools stored in container
- Flight circuit (left)

ENGINEERING SPECIFICATIONS

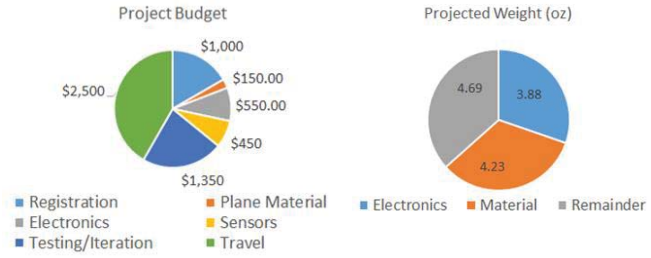
Measurable Specification	Value	Description
Max Total Weight	10 lbs.	Weight of aircraft, payload, container, and assembly tools
Container Dimensions	13.875" x 12.125" x 3.625" t = 0.125"	Dimensions of cardboard carrying container
Container Weight	1.5 lbs.	Weight of empty cardboard carrying case
Payload Dimensions	OD = 2.375", ID = 2"	Outer/Inner diameter of PVC pipe
Payload Specific Gravity	0.68 lbm./ft.	Density of PVC pipe per linear foot
Battery Size	2-cell 325 mAh	Optimized battery size
Assembly Time	1:45 min	Aircraft assembly time
Flight Time	60 s	Maximum allowed time of flight

COMPETITION RESULTS

Category	Score	Place
Overall Score	92.3891	4th
Payload Fraction	0.69	3rd
Flight Score	29.5852	5th
Design Report	31.8640	6th
Technical Presentation	37.9400	9th

ASSEMBLED DESIGN

BUDGET



TESTING

Test	Expected Result	Measured Result
Static Thrust Test	> 140 grams	430 grams
Wing Break Test	1.48 lbs.	7.11 lbs.
Wing Deflection Test	1.7"	1.5"
Battery Life Test	> 30%	58% Remaining
Servo Test	4.16 oz.-in.	10.86 oz./ 60°

SAFETY

- Red arming plug to arm and disarm system safely
- Programmed throttle failsafe to automatically shut system down if signal is lost
- Lithium Polymer battery charging bag to protect from battery fires
- Painted propeller tips
- Warming up and wearing a hard hat during launch

MATERIALS AND MANUFACTURING

Component	Material/Manufacturing
Wing/Tail Ribs	Balsa Wood – laser cut from balsa wood sheets
Wing Joints	Carbon Fiber – rods purchased and cut with bandsaw
Wing Spars	Balsa Dowels – ordered and cut to length with bandsaw
Wing Bracket	Balsa Wood – pieces laser cut individually; glued together; sanded to shape
Central Rods	Carbon Fiber Tubing – premade (ordered); cut to length with bandsaw
Wing Bracket/Rib Reinforcement	Carbon Fiber Tubing – premade (ordered); cut to length with bandsaw
Wing/Tail Skin	Coverite Microlite Film – cut to shape; ironed onto balsa wood ribs

Sponsors: Dr. K. Gonthier, LaSPACE, Mr. Jack Rettig, LSU MIE/EE Dept. **Advisers: Jack Hawkins, Mark Rabalais, Drew Rousseau**