To Predict ▶ To Design ▶ To Perform

College of Engineering
Department of Mechanical & Industrial Engineering

ME, ECE, IE Capstone Design Programs

Jack Rettig

Team 21 – SAE Aero Design Micro Class

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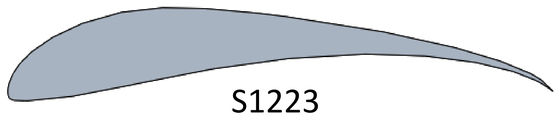
Objective

Design, test, and manufacture a competition-winning Unmanned Aerial Vehicle that minimizes the structural weight, maximizes the total useful payload capacity, and is easily transportable in a compact aircraft container.

Airfoil Selection

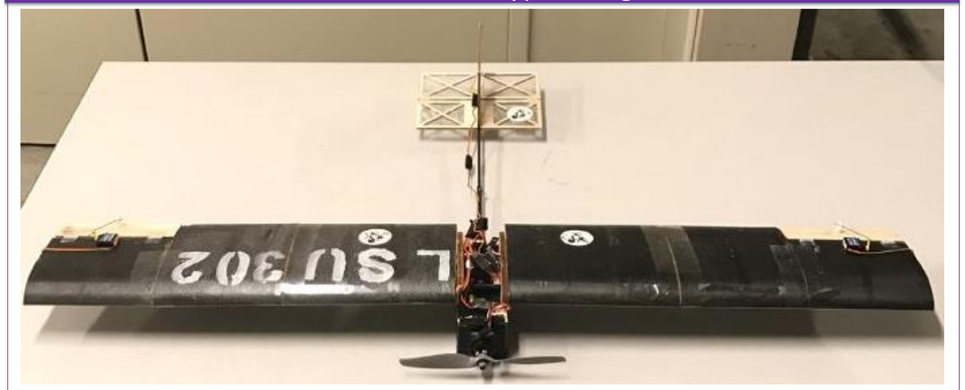


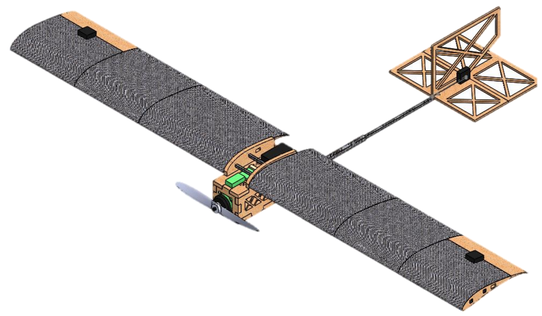
S1223

Engineering Specifications

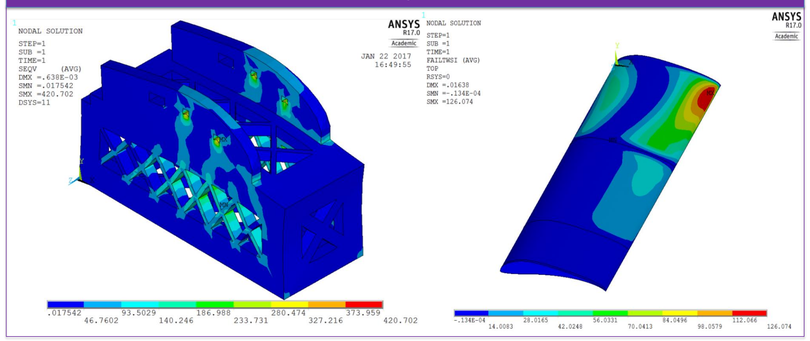
Specification	Theoretical Value	Prototype #1	Prototype #4 (Competition)	Prototype #5 (Redesign)
Wingspan	37.75 in.	38.1 in.	38.1 in.	42.63 in.
Wing Chord Length	5.5 in.	5.5 in.	5.5 in.	5.5 in.
Empty Plane Weight	6.61 oz.	12.56 oz.	10.32 oz.	10.56 oz.
Payload Weight	57.39 oz.	4.93 oz.	35.84 oz.	42.88 oz.
Overall Plane Weight	64 oz.	17.49 oz.	46.16 oz.	53.44
Tube Length	7.2 in.	7.5 in.	7.5 in.	7.5 in.

Assembled Prototype Design

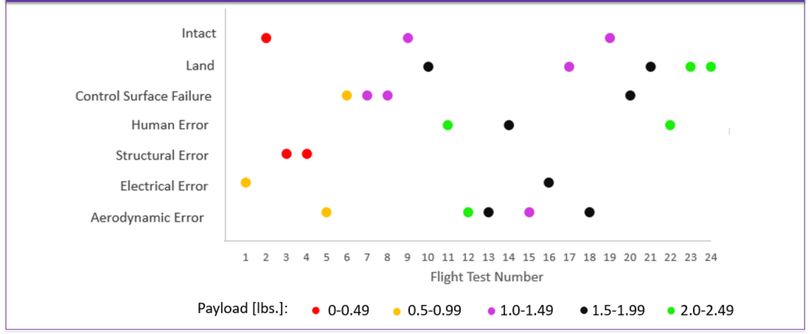




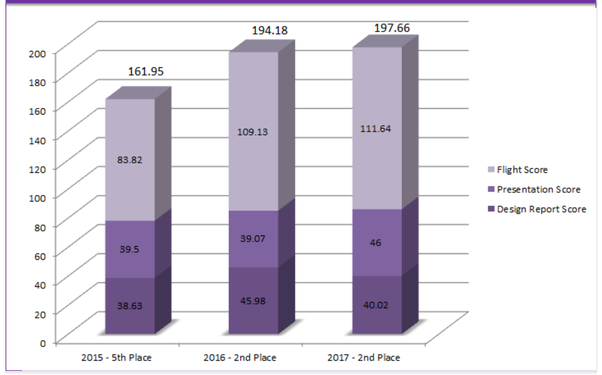
Analysis



Flight Testing



LSU Competition Scoring History



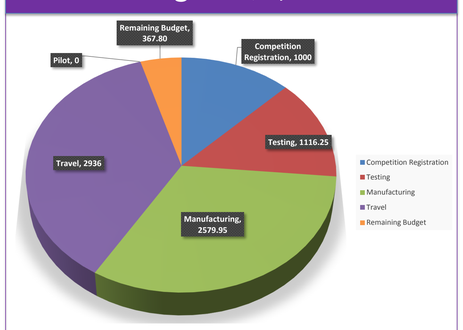
Manufacturing

Component	Method
Wings	Carbon fiber fabric, airfoil manufactured in house; Carbon steel mold outsourced EDM cutter
Ribs	Balsa Wood, Outsourced Laser Cutter
Fuselage	Balsa Wood, Outsourced Laser Cutter; Carbon fiber protective cover, in house
Tail	Balsa Wood, Outsourced Laser Cutter
Boom	Carbon fiber rod, premade item

Competition Results

Category	Score	Place
Overall Score	197.65	2nd of 24
Design Report	40.01	5th of 24
Oral Presentation	46.00	3rd of 24
Flight Sore	111.64	2nd of 24
Best Payload Fraction	76.87%	3rd of 24
Total Payload Lifted	9.9040 lbs	3rd of 24

Budget - $8,000



Concept Generation Sep 4 – Sep 18

Material Selection Sep 18 – Oct 27

Analysis Oct 1 – Dec 1

Manufacturing Dec 1 – Mar 10

Testing Dec 1 – Mar 10

Competition Submissions Jan 27

Competition Mar 10 – Mar 12

Design Revisions Jan 27 – Apr 15

Sponsors: LaSPACE, LSU MIE Department, Jack Rettig

Advisors: Jack Hawkins and Sean King