DESIGN/BUILD/FLY

Aircraft Specifications

Max Cruise Speed	88 mph
Empty Weight	7.72 lb
Max Payload Weight	7.04 lb
Wingspan	5 ft
Wing Aspect Ratio	6.93
Horizontal Stabilizer Span	19.2 in
Vertical Stabilizer Span	10.3 in

Project Status

The team has designed three full iterations of the aircraft that have flown in over four flight tests to ensure a successful and competitive aircraft.

The current objective for the project is to conduct a full competition simulation. The fourth iteration of the aircraft utilizes a Kevlar fuselage with balsa reinforcements.

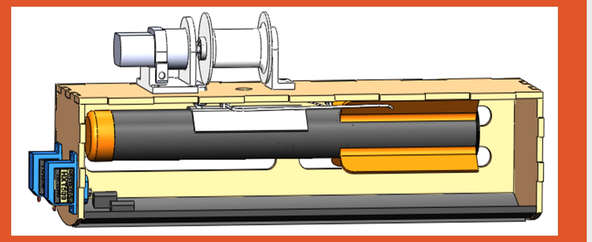

Figure 6: Payload Module Model

Figure 7: Third Prototype at Flight Test Site

Oregon State University

Team Overview:

The 2020-2021 DBF team is comprised of 11 senior capstone members and 4 underclassmen club members. This is the ninth year that OSU has participated in the AIAA DBF Competition.

Mission Requirements:

Mission 1: 3 lap functionality test

Mission 2: Sensor shipping container payload flight

Mission 3: Sensor deployment, retraction, and function endurance flight

Ground Mission: Time to load shipping containers inside aircraft.

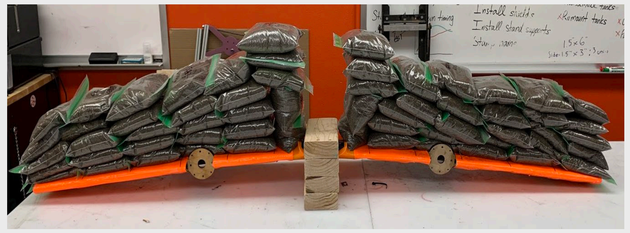

Figure 2: Wing Loading Testing

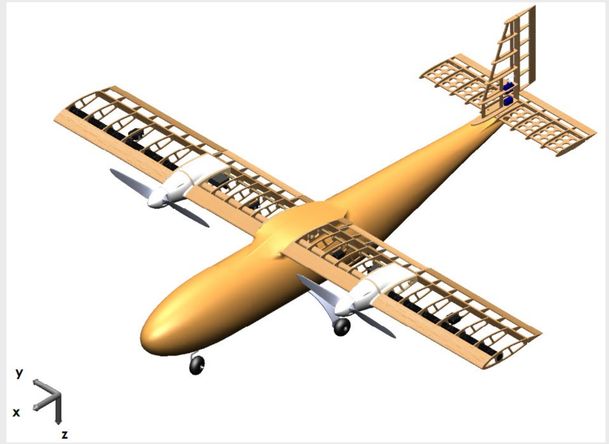

Figure 1: Aircraft Assembly Model

Aerodynamics and Structures:

A standard high wing configuration was chosen for its stability and compatibility with the towed sensor. A balsa/mylar wing is built around two carbon fiber spars that carry aerodynamic loads. The Kevlar fuselage is formed around a balsa skeleton to provide a strong, lightweight structure while maximizing internal storage volume for the payload.

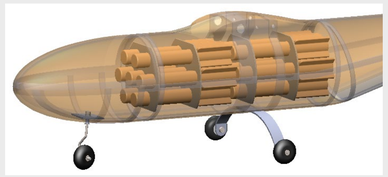

Figure 3: Honeycomb Storage

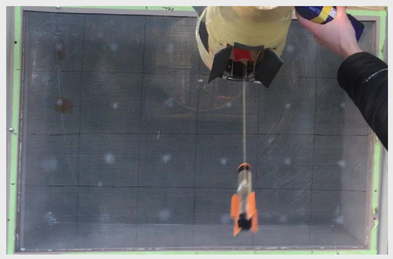

Figure 4: Wind Tunnel Testing

Payload:

The payload module includes bomb bay doors, a winch, and an alignment mechanism. The winch is actuated with a geared DC motor. A one-way bearing is added to the motor shaft to allow freewheel deployment and retraction by the DC motor. A blunt nose and blunt end rocket produces enough drag, preventing forward swing, while also optimizing the sensor length for the score. The electronics onboard the sensor are designed to allow activation of three sequenced LEDs with a single signal wire.

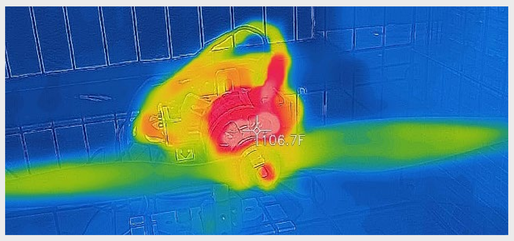

Figure 5: Motor After Thermal Stress Test

Propulsion:

The propulsion package is powered by a 6 cell, 4500 mAh LiPo battery that can supply 99.9 Wh to the aircraft. A two-motor configuration was chosen in order to maximize thrust, with two Turnigy SK3 motors spinning 15x10 in propellers. These propellers allow the package to supply the greatest thrust per amp from the battery.

Project Sponsors

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OSU AIAA

KDE Direct

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TECHNICAL ADVISOR
Dr. Roberto Albertani

PILOT
Dave Patana

COURSE INSTRUCTOR
Dr. Sampath Adusumilli

Mission Patch