AIAA Design-Build-Fly 2018-2019

**Competition Description**

Every year, the American Institute of Aeronautics and Astronautics (AIAA) releases a request for proposals (RFP) for the Design-Build-Fly (DBF) competition. The competition requires students to design, build, and fly a small unmanned aerial system to complete a ground mission and three flight missions. Over 100 teams from around the world have the opportunity to compete in Tucson, Arizona where all the missions are completed over the course of four days.

**Who We Are**

The ERAUDB DBF team was revamped in 2013 and is a newer team to the competition. The 2018-2019 team consists of about 25 undergraduate students of all experience levels. The team is very competitive having placed in the top ten teams the last two years. The goal of the team is to develop members into successful engineers both at and away from work, and hopefully place within the top five teams this year!

**2018-2019 Deliverables**

The DBF competition called for the design of a naval bomber capable of being launched from an aircraft carrier. The main design deliverables are as follows:

- Minimum four foot wing span
- Fit within a 3 foot by 2 foot box
- Unfold and lock wings remotely
- Include a rotating radome
- Carry at least four attack stores
- Take off from a ten foot ramp
- Include a tail hook to launch from

**2018-2019 Flight and Ground Missions**

**Ground Mission:**
Assembly crew must remotely deploy wings and install the radome. Then uninstall the radome and install four attack stores. Finally demonstrate all flight controls and propulsion systems are working, and release the four attack stores individually.

**Mission 1: Delivery Mission**
Must take off from the ramp and complete three laps within five minutes with no payload

**Mission 2: Reconnaissance Mission**
Must include the radome, take off from the ramp, and complete three laps in five minutes.

**Mission 3: Attack Mission**
Must take off from the ramp and drop a single attack store each lap to score a point for the lap. The aircraft performs as many scoring laps as possible in ten minutes.

**Mission Scoring**

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GM = \frac{\text{Min_time}}{\text{N_time}}
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Mission 1 = 1 Point if Successful

Mission 2 = \(1 + \frac{\text{Min_time}}{N_{time}}\)

Mission 3 = 2 + Number of Scoring Laps

**Design Choices**

The aircraft for the competition was designed by a team in the Aircraft Preliminary Design course. The aircraft was designed to be easily manufacturable and large enough to be able to carry many attack stores. The main design decisions of the aircraft are as follows:

- Carry 10 attack stores
- Fold the wings with a Grumman style wing fold
- Twin boom configuration for stability
- Two motors to provide enough thrust

**2018-2019 Progress**

- Completed safety training with new members
- Determined requirements from the RFP
- Created a design matrix to maximize score
- Built four iterations of the aircraft
- Documented all design decisions in a design review
- Conducted multiple flight tests to ensure all systems were successful
- Optimized the number of attack stores that could be successfully dropped
- Attended competition April 11-14 in Tucson, Arizona