Utah State University

Design Build Fly 2016-2017

Competition Requirements

- Folding Design
  - Entire design must fold and stow in a tube.
- Four Missions
  - Ground Test – The whole system, in stowed condition, must survive a drop onto concrete.
  - Demonstration Flight – Short flight to verify capabilities.
  - Speed Mission – Complete 3 laps with a payload of 3 pucks as fast as possible.
  - Endurance Mission – Fly as many laps as possible in 5 minutes with 3 or more pucks.

Wing Configuration

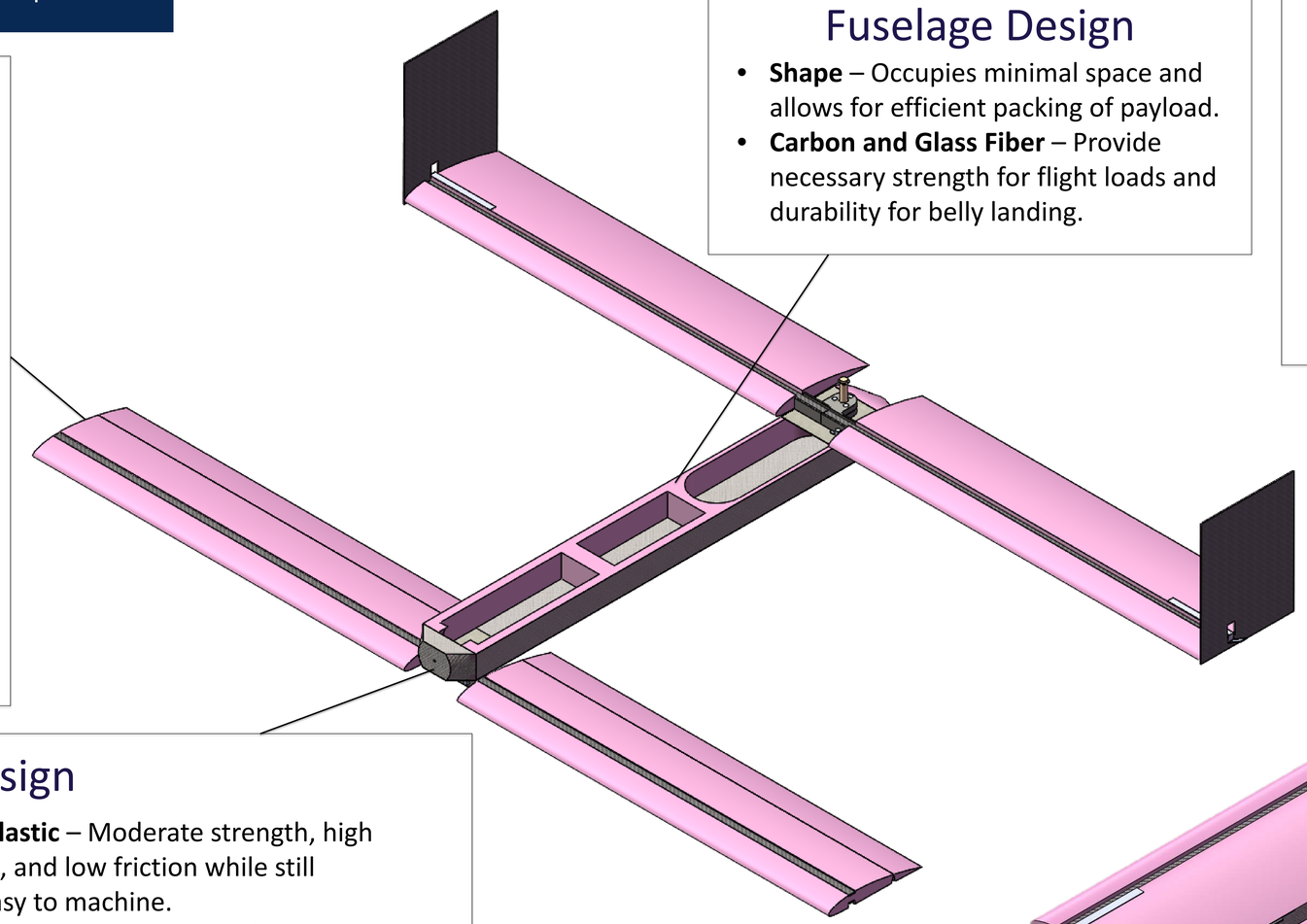
- **Tandem Wings** – Allow for more wing area to be folded into a smaller tube and for the center of gravity to be placed closer to the middle of the fuselage.
- **Outboard Vertical Stabilizers** – Provide necessary roll and yaw stability and can easily be stowed out of the way.
- **Vertical Offset of Wings** – Reduces down wash on rear wing and increases stability.

Team Structure

- **Aero Team** – Analysis of competition scoring, aircraft performance, aerodynamic design, and flight testing.
- **Structures Team** – Structural and mechanical design of aircraft system and components and manufacturing of test and competition planes.
- **Propulsion and Tube Team** – Motor, battery, and propeller sizing and selection; electronics; structural design and manufacturing of tube.

Wing Design

- **NACA6409 Airfoil** – High camber, low-Reynolds number airfoil for high lift at low speeds.
- **Carbon Fiber Spars** – Strong and light-weight in order to carry large vertical loads.
- **Foam Core** – Light weight and allows for easy manufacturing of wing shape.
- **Fiber Glass Wrapping** – Provides additional strength and greatly increases the durability of wings against impacts encountered during landing.

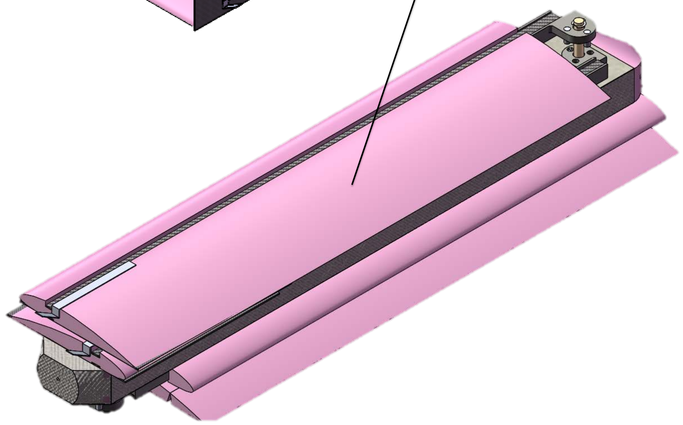


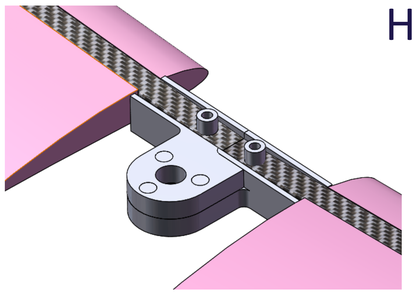
Fuselage Design

- **Shape** – Occupies minimal space and allows for efficient packing of payload.
- **Carbon and Glass Fiber** – Provide necessary strength for flight loads and durability for belly landing.

Folding Design

- **Form Factor** – Compact folding allows for efficient use of tube volume and keeps components secure during ground test.





Hinge Design

- **Delrin Plastic** – Moderate strength, high stiffness, and low friction while still being easy to machine.
- **Self Locking** – Competition rules require hinges to self lock after wings are unfolded.