

Design Report on SkyRush 2024

Team Name: EnergyGo

Team Id:- 13147

Date: 16/10/2024

Event: SkyRush 2024

1. Executive Summary

This design report provides the overall design, engineering, and flights designed for the RC aircraft that will be built for SkyRush 2024. Our approach to the design is to include high-flight stability, high maneuverability, and payload management with respect to the other safety and performance guidelines by the competition.

2. Design Overview

Our RC plane has a wingspan of precisely 1 m, with a central fuselage optimized for aerodynamic efficiency and is fitted with a payload bay structurally integrated to carry water. In terms of aircraft design, the primary objective of the aircraft will be to fulfill the needs of the competition-the mission of which would focus on stable flight, safety of payload, and navigation through waypoints.

2.1 Materials Used

We have achieved the structure with as little weight material without losing its structural strength. The important materials used include;

Balsa wood: Fuselage-to obtain a good strength-to-weight ratio

Carbon fiber: The added reinforcement for durability on the wing spars.

Depron foam: This is used for wing surfaces, and it achieves light weight together with a better rigid structure.

Epoxy and araldite: These are used to bond parts together securely.

2.2 Design Features

Wingspan: A wingspan of 1 meter ensures achieving maximum lift while being within the boundaries for a competition.

Fuselage: The streamlined section offers lesser drag and maximum speed during flight.

Payload Bay: A centrally mounted, safety payload bay for the aircraft ensures stability in carrying water. The payload will not move when the aircraft is in flight.

Landing Gear: Three-fixed wheels were used for augmenting stability at take-off and landing times.

Propeller: A composite design for the propeller was selected since it had light strength.

3. Flight Characteristics

Our design focuses much on steady flight, which provides maneuverability to navigate the waypoints established in the mission path.

3.1 Takeoff and Landing

The aircraft is fixed-landing gear, which is facilitated to take off as well land on flat surface without much jerking. The grav center that ensured is also balanced without a high risk of nose-diving or tail-dragging in landing.

3.2 Maneuverability

We designed an optimized wing shape and size to provide good, stable, and controlled turns and easy flow over the predetermined path. The tail design, including the vertical stabilizer as well as the horizontal fins, helps in stability in terms of yaw and pitch adjustments.

4. Payload Management

An enclosed container holds the payload securely fastened in the payload bay, which is centrally located in the aircraft so that imbalance is held at a minimum. Shifting of payload is eliminated during flight because of the design of the bay, and the aircraft can be operated stably with and without the payload.

5. Power System

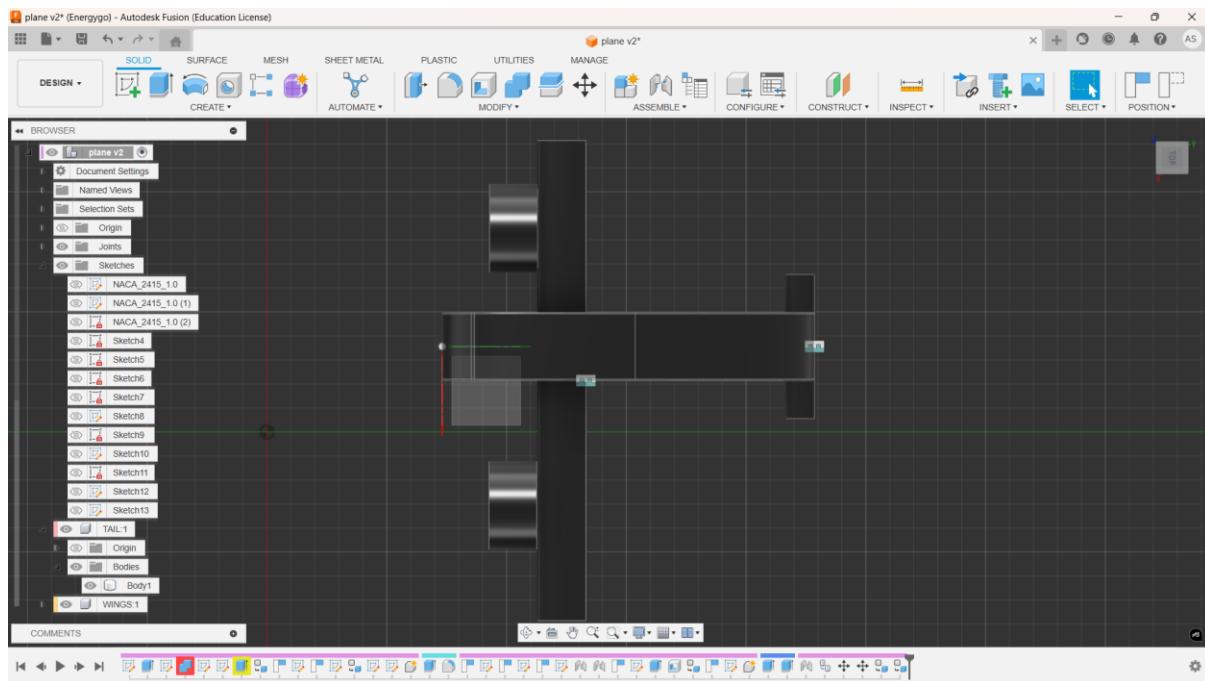
The motor uses a lightweight Li-Po battery that could have great power output while having relatively minimal weight in comparison to other types of batteries. The transmitter will also have a safety switch, which will be installed to cut off power to the motor to maintain compliance with safety requirements of the competition.

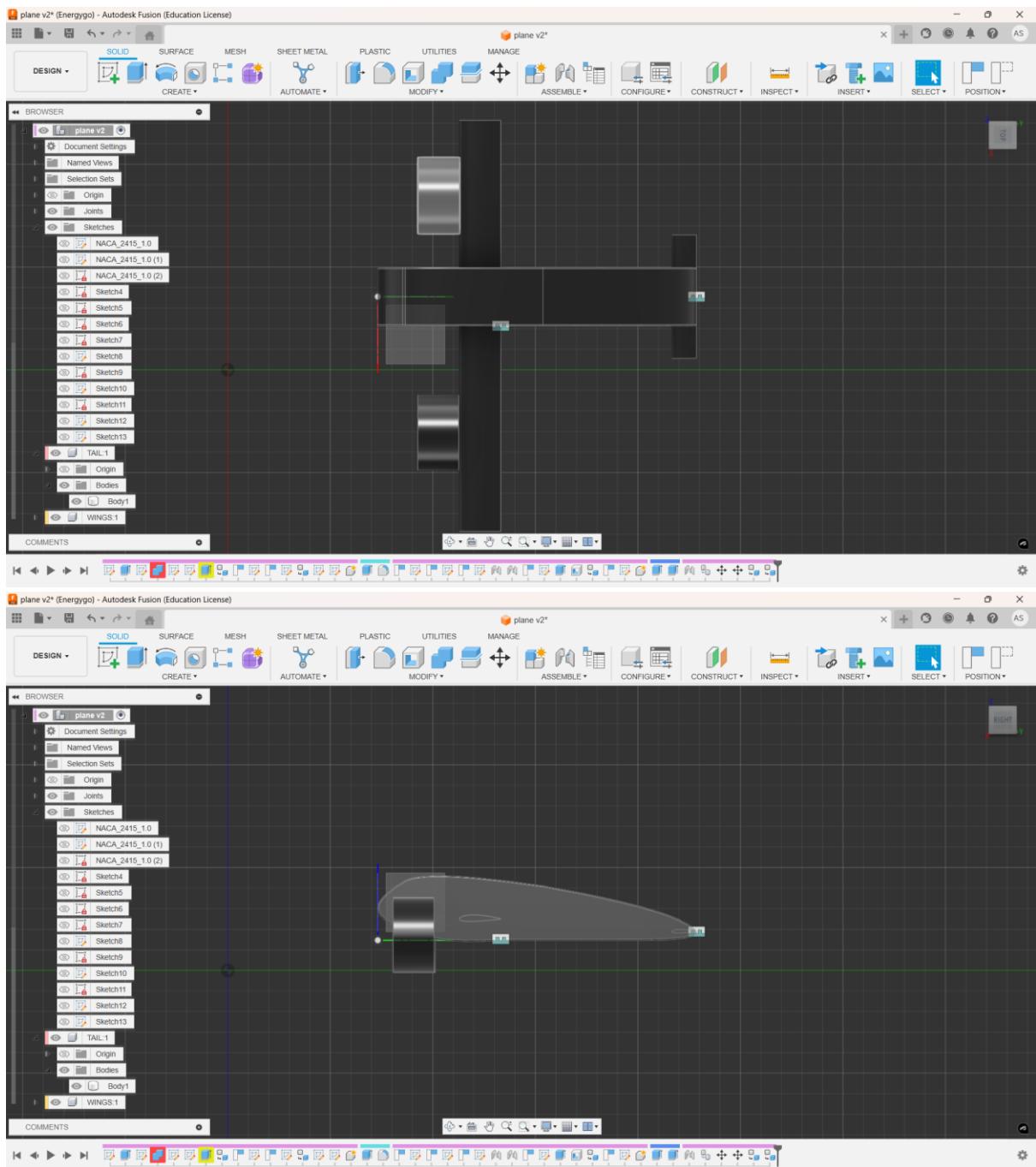
6. Safety Considerations

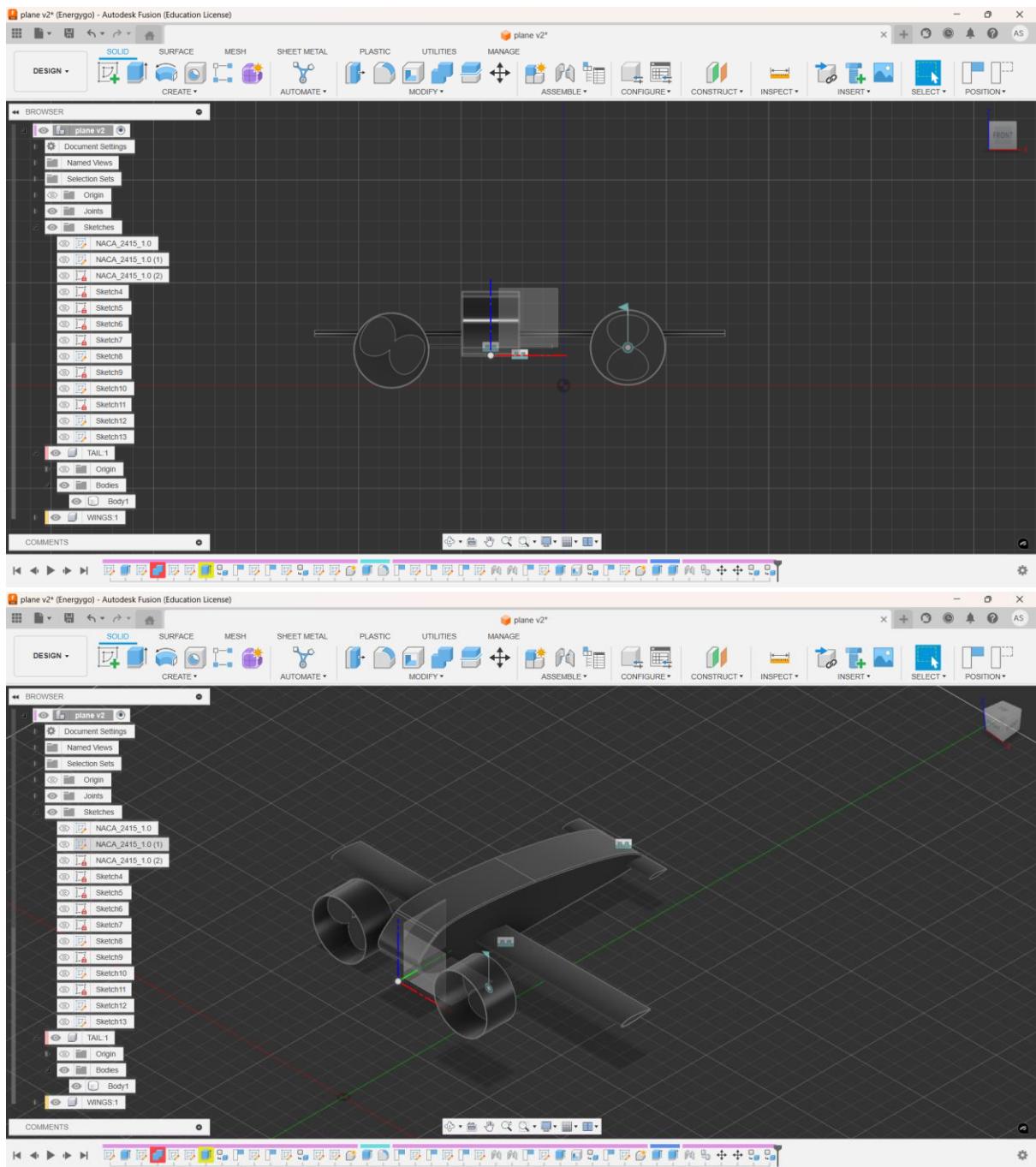
The aircraft has been created with an emphasis on the maximization of safety. Some of these include:

Safety inspection readiness: All structural elements and attachment have been found to undergo detailed tests to ensure that the plane complied with competition safety standards.

Controlled motor shutoff: An emergency cut-off switch operates the motor power by a tr







ansmitter switch.

Safe flight zone compliance: The control system of the plane has been set up so that the aircraft will safely operate within the specifically determined flight zones.

