Aircraft Design Proposal

Laws of Motion – National Aeromodelling Competition 2025–26

1. Our Aircraft Design

Our aircraft is a payload-optimized fixed-wing radio-controlled aircraft designed specifically for the **Laws of Motion – National Aeromodelling Competition 2025–26**. It follows a **transport-aircraft-inspired configuration**, similar to an Airbus-style airliner, adapted for propeller-driven RC operation.

The aircraft features a **high-mounted dihedral wing** with **wing-mounted tractor propellers**, providing efficient thrust distribution, enhanced lateral stability, and predictable low-speed handling under payload load. A high-wing layout further improves stability during climb and cruise.

The design prioritizes a high payload-to-empty-weight ratio, with a centrally located payload bay near the center of gravity and a **simple single-channel servo-operated payload release system**, ensuring reliable, repeatable performance while remaining fully compliant with competition constraints.

Aircraft Design Highlights

- Transport-aircraft-inspired layout, visually similar to an Airbus-style airliner
- Fixed-wing, propeller-driven RC aircraft optimized for low-speed, high-lift flight
- High-mounted wings with positive dihedral for improved lateral stability
- Wing-mounted tractor propellers for efficient thrust distribution
- High-wing configuration providing inherent stability under payload load
- Streamlined cylindrical fuselage for efficient payload accommodation
- Centrally located payload bay near the aircraft center of gravity
- Simple, single-channel servo-operated payload release mechanism

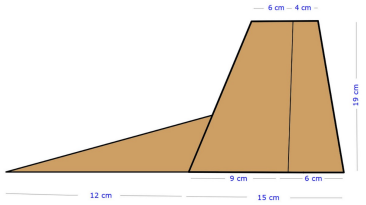

Figure 1: Overall aircraft configuration

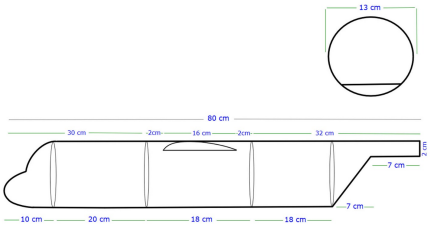

Figure 2: Wing and propulsion layout

2. Why This Design Was Chosen

The design was finalized after detailed evaluation of the competition scoring formula, aircraft limitations, and payload characteristics—specifically golf balls weighing 45 g with

a diameter of 43 mm.

- High-wing aircraft provide better roll and pitch stability under payload load
- Low-speed flight capability is essential for lifting heavier payloads
- Payload placement near the center of gravity minimizes trim changes
- Simple mechanical systems reduce failure risk
- Full compliance with competition rules and electronic restrictions

3. Benefits of This Design

- Low stall speed for safe payload operations
- Predictable and stable handling
- Minimal center-of-gravity shift during payload release
- High structural efficiency with low overall weight
- Ease of repair and fast turnaround
- Fully compliant with KTJ Laws of Motion regulations

4. Expected Lifting Capacity

- Expected payload capacity: 15–20 golf balls
- Total payload weight: 425 g to 500 g
- Minimum flight time with payload: > 180 seconds
- Empty aircraft weight: below 1.2 kg

5. Materials Used

- Kraft foam board for wing and fuselage structure
- Carbon fiber spars for wing reinforcement
- Lightweight plywood / composite plates
- Hot glue and epoxy adhesives

6. Hardware Components Used

- Brushless DC motor
- 3S Li-Po battery
- 2.4 GHz RC receiver
- Standard RC servos
- Propeller with diameter ≤ 13 inches

7. Payload Dropping System Explanation

- Payloads stored internally in a central bay

- Single servo actuates the door mechanism
- All payloads released simultaneously
- Payloads drop as independent objects

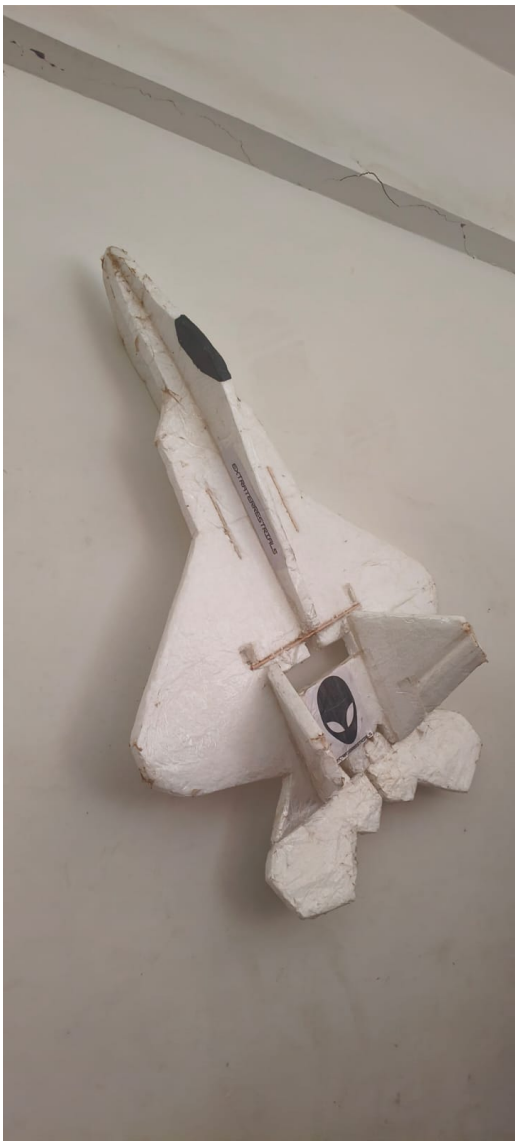

Figure 3: Payload dropping mechanism and internal bay layout