

Regular Class: Competition Scoring

Technical Design Report (TDR): xx/50 pts

- The TDR must include the following: A selection of the overall vehicle configuration, wing planform design including airfoil selection, drag analysis including three-dimensional drag effects, aircraft stability and control, power plant performance including both static and dynamic thrust, and performance prediction.
- 2D Drawings must be submitted with the center of gravity and center of lift marked in the format of the standard aeronautical 3-view orthographic projection, following the ANSI-Y14.5M standard.
- A Payload Prediction Curve must be included to represent an engineering estimate of the aircraft's lift performance at variable altitude densities while carrying the calculated Predicted Payload, "P".

Flight Demonstration Readiness Review (FDRR): xx/50 pts

- Teams are to present at competition on the mission overview, preflight predictions (payload), mission hardware & software pedigree and readiness, competition first time events & mission risks, outstanding major milestones prior to competition, team roles and responsibilities, and post flight risk planning.

Final Flight Score (FFS): Scoring variable based on the FFS equation below.

- A flight attempt is scored if the plane takes off within 100 feet and lands within the 400-foot landing zone.
- PPB is scored if two people unload the payload from the aircraft within one minute after the flight attempt.
- After each successful flight, payload must be increased for the next attempt by adding an empty bottle or replacing one with a filled bottle (see Airframe and Payload requirements for details).

Scoring Equation:

$$FFS = \text{Final Flight Score} = (FS_1 + FS_2 + FS_3)/3 + PPB$$

Where:

$$FS = \text{Flight Score} = 4(EB) + 15(FB)$$

$$PPB = \text{Payload Prediction Bonus} = \text{MAX}(10 - (FS - PS)^2, 0)$$

EB = Count of EMPTY BOTTLES (#)

FB = Count of FILLED BOTTLES (#)

PS = Predicted Maximum Flight Score (#)

Regular Class: Key Design Requirements

Airframe and Payload:

- Takeoff weight may not exceed 55 pounds when fully loaded with the payload ($W_{Payload}$).
- Fixed-wing configuration only. Wingspan = [72", 120"]; min chord length = 4"; max fuselage length = 120".
- Payload consists of standard 2-liter cylindrical plastic bottles, carried internally in enclosed cargo bays.
 - o Empty bottles weigh between 1.0–4.0 lbs.
 - o Filled bottles weigh ≥4.0 lbs.
- Payload design shall not contribute to the structural integrity of the airframe.
- Cargo must not shift in flight and must remain fully enclosed during the mission.
- There must be no chord steps or discontinuities, and the wingtip chord length must be at least 4".
- The aircraft cannot be solely reliant on aerodynamic control surfaces for steering during taxiing.
- Fiber reinforced plastics are prohibited except when using commercially available props or landing gear.

Electronics and Propulsion Systems:

- The aircraft shall be propelled by a single electric motor, driving the prop(s) at the motor RPM.
- Propeller limits: Must use 2 propellers (12" diameter) or 4 propellers (9" diameter).
- Must be powered by a commercially available one 4-cell (14.8 V) LiPo pack, maximum 2200 mAh capacity.
- The aircraft shall employ a 2.4 GHz radio control system with a functional fail-safe system.
- Receiver must use a separate battery or BEC, and the system must function with the arming plug removed.