

AERO PAKISTAN 2027

RULEBOOK

VER. 1.0



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I INTRODUCTION

I1 What is Aero Pakistan?

Aero Pakistan is Pakistan's first student aerial systems engineering challenge, organized by NUVEX (Pvt.) Ltd. Students aged 15 to 19 take a glider from first sketch to final flight—designing, engineering, manufacturing and launching it.

Working in defined Flight Crew roles, students must apply engineering principles, make evidence-based design decisions, manage technical and commercial responsibilities, and demonstrate ownership of their work throughout the competition.

I2 Competition Objective

The objective of Aero Pakistan is to challenge each team to design, manufacture, document and safely fly a compliant unpowered glider capable of completing the prescribed flight mission.

The competition evaluates the complete development process, including engineering reasoning, analysis, design decisions, manufacturing quality, testing, documentation, communication, teamwork and final flight performance.

I3 Competition Format

Aero Pakistan consists of pre-submitted Project Elements, technical and commercial judging sessions, mandatory Pre-Flight Clearance and an official Flight Assessment. Participation in one activity does not automatically confirm eligibility for another.

I4 Scope of the Rulebook

This Rulebook defines the requirements governing eligibility, team participation, student ownership, submissions, judging, scoring, glider airworthiness, inspection, flight operations, safety, penalties and official authority.

I5 Rulebook Authority

This Rulebook, together with official written amendments and clarifications issued by NUVEX, is the governing regulatory document for Aero Pakistan. Authorized Competition Officials may interpret and apply its requirements to protect safety, fairness, technical integrity and orderly competition operations.

I6 Official Communications and Amendments

Official regulations, deadlines, amendments, bulletins and clarifications shall be communicated through the official competition website. The latest officially issued requirement shall take precedence over earlier versions.

I7 Responsibility for Compliance

Each team is responsible for ensuring that its glider, documents, presentations, and competition activities comply with all applicable requirements. Passing an earlier review or inspection does not prevent Competition Officials from identifying non-compliance at a later stage.

D DEFINITIONS AND ABBREVIATIONS

D1 Glossary of Terms

The terms in this section carry specific meanings within Aero Pakistan and shall be used when interpreting this Rulebook, assessment requirements, technical regulations and official decisions.

Term	Definition
Aerodynamic Centre	The point on an aircraft where the aerodynamic forces effectively act, regardless of how the wing is angled into the airflow.
Centre of Gravity (CoG)	The single point at which the entire weight of the glider acts, as if all the mass were concentrated there.
Aerofoil	The cross-sectional shape of a wing when viewed from the side. It is curved on top and flatter on the bottom, which causes air to generate lift as it flows over the surface.
Angle of Attack	The angle between the wing's chord line and the direction of the oncoming airflow.
Lift Coefficient (CL)	A dimensionless number that describes how much lift a wing generates at a given angle of attack and airspeed.
Drag Coefficient (CD)	A dimensionless number that describes how much aerodynamic drag a wing produces at a given angle of attack.
Leading Edge	The forward-most edge of a wing or stabilizer — the part that meets the oncoming airflow first.
Trailing Edge	The rearward-most edge of a wing or stabilizer — where the airflow from the upper and lower surfaces rejoins.
Chord	The straight-line distance from the leading edge to the trailing edge of a wing at any given point along the span.
Span	The total width of the glider measured from one wing tip to the other.
Aspect Ratio	A measure of the geometry of the wing, calculated by dividing the square of the wingspan by the total wing area.
Dihedral Angle	The angle formed when an aircraft's wings are tilted upward from the horizontal.
Standard Launch Hook	The standardized interface installed at the prescribed position on the underside of the fuselage to connect the glider to the official launcher shuttle. Its geometry, dimensions, mounting arrangement and placement are defined by Aero Pakistan.

Payload Bay Cavity	The prescribed cavity manufactured within the fuselage to receive, position and structurally support the Standard Payload Enclosure.
Standard Payload Enclosure	The standardized 3D-printed enclosure installed within the Payload Bay Cavity for receiving and retaining the Official Payload.
Standard Payload Enclosure Cover	The removable cover used to close the Standard Payload Enclosure and retain the Official Payload. It is secured using the prescribed screws and threaded inserts.
Official Payload	The standard 100 g mass supplied by the Organizing Committee and installed inside the Standard Payload Enclosure before the official Flight Assessment.
Longitudinal Reference Plane	An imaginary flat plane running lengthwise through the exact center of the glider from nose to tail, perpendicular to the ground. It is the reference line used for all symmetry checks during Pre-Flight Clearance.
Shuttle	The moving carriage on the official Aero Pakistan motorized launcher that accelerates the glider down the launch rail. The glider is attached to the shuttle via the Standard Launch Hook and releases automatically at the end of the rail.
Spar	A structural beam running through the length of a wing or connecting the tail assembly to the fuselage. It is the primary load-carrying element of the wing, resisting the bending forces generated by lift during flight.
Stabilizer Coupling	A standard ring-shaped component that connects the stabilizers to the tail spar. Teams must design their stabilizer attachment around this coupling.
UIUC Airfoil Coordinates Database	A publicly available library of airfoil profiles maintained by the University of Illinois at Urbana-Champaign. It provides coordinate data used to define an airfoil shape in CAD.
XFOIL	An aerodynamic analysis tool used to calculate the lift, drag and stall behavior of an airfoil at a given Reynolds number. Teams may use it to generate polar data supporting their airfoil selection, as required by the Airworthiness Regulations.
STEP File	A universal 3D CAD file format that can be opened by almost any CAD software, regardless of which program created it. It preserves the full 3D geometry of the model without being tied to one specific software.
Hangar	The team's dedicated operational space at the competition venue on Launch Day. It serves as the team's working and preparation area
Team Patch	A custom emblem that represents the team's identity and program.

D2 Abbreviations

Abbreviation	Meaning
AP	Aero Pakistan
AR	Airworthiness Regulations
BPP	Business Plan Pitch
CoG	Centre of Gravity
EDR	Engineering Design Review
FER	Flight Engineering Report
PFC	Pre-Flight Clearance

A ADMINISTRATIVE REGULATIONS

The Administrative Regulations define the documents, communication channels, eligibility, team participation, Project Elements, submission procedures and operational responsibilities for all registered teams.

Season-specific details, including competition dates, venue arrangements, deadlines, reporting times, judging schedules, Hangar allocations and Launch Day procedures, shall be issued separately in the Competition Handbook.

A1 Official Competition Documents and Communication

This section establishes the documents and communication channels through which Aero Pakistan regulations, instructions and official clarifications shall be issued.

A1.1 Aero Pakistan Website

The Aero Pakistan website shall serve as the official Competition Management System for:

- Competition learning and resources;
- Official updates and announcements;
- Team information;
- Rule Clarifications;
- submission deadlines;
- Project Element submissions

Teams are responsible for regularly monitoring the Aero Pakistan website

A1.2 Rule Clarifications

Questions concerning the interpretation of this Rulebook must be submitted through the official Rule Clarification email address.

Each clarification request should identify the relevant regulation number and clearly explain the point requiring clarification.

A clarification affecting general interpretation, safety or competitive fairness may be published for all registered teams.

A1.3 Design Compliance

The Organizing Committee may clarify the meaning of a regulation but shall not provide pre-event approval of a complete glider design.

Teams remain responsible for independently interpreting and complying with the Airworthiness Regulations.

A lack of objection, response or comment from the Organizing Committee shall not be treated as confirmation that a design is compliant.

Final technical compliance shall be determined during Pre-Flight Clearance.

A1.4 Amendments and Rulebook Revisions

The Organizing Committee may amend or revise this Rulebook where necessary to:

- Clarify the interpretation of a regulation
- Correct an error or omission
- Protect participant safety
- Preserve competitive fairness
- Address material, technical or operational requirements.

Where any amendment is made, a revised version of the Rulebook shall be issued. All changes shall be identified in the revision notice provided at the beginning of the updated version.

The latest officially issued version of the Rulebook shall supersede all previous versions. Any official Rule Clarification or technical bulletin issued between Rulebook revisions shall carry the same authority as this Rulebook until incorporated into a subsequent version.

Informal advice, private messages, verbal discussions, or unofficial communications shall not override any official written regulation, Rule Clarification, technical bulletin, or published Rulebook revision.

A2 Registration, Eligibility and Team Participation

This section defines the eligibility, registration and participation requirements applicable to all competing teams and student members.

A2.1 Registration

Only teams whose registration has been confirmed by the Aero Pakistan Organizing Committee shall be eligible to participate.

Each registered team shall receive an official Team Number. The Team Number must be used on all required submissions, glider identification markings and official competition materials.

A2.2 Participant Eligibility

All competing students must be between 15 and 19 years of age on the date of the competition.

A student must be registered as a competing member of only one Aero Pakistan team during the same competition season.

A2.3 Team Composition

Each team shall consist of a minimum of four and a maximum of six registered members.

Only registered members may:

- Represent the team during official judging sessions;
- Answer questions on behalf of the team;
- Deliver an assessed presentation or pitch;
- Handle the glider during assessed competition activities; and
- Participate in official Hangar activities.

A2.4 Team Captain

Each team must designate one registered member as Team Captain.

The Team Captain shall serve as the primary contact between the team and the Organizing Committee and shall coordinate the team's participation in official competition activities.

A2.5 Flight Crew Roles

Every registered team member is required to hold a defined role and a clearly defined area of responsibility. Roles must be applied consistently across all submitted documents, presentations and judging sessions. Mission Evaluators will direct questions to team members by role during the Engineering Design Review and the Business Plan Pitch.

Teams may define, combine, rename or adapt roles according to their internal structure, provided that all major technical, commercial and operational responsibilities are appropriately assigned.

A2.6 Roster Changes

Changes to the registered team roster may only be made before the roster deadline published through the Aero Pakistan website. Any roster change requested after the stated deadline shall require written approval from the Organizing Committee.

An unregistered or unapproved individual shall not replace or represent a registered team member during an assessed competition activity.

A2.7 Attendance and Readiness

Teams must attend all assigned judging, inspection and competition activities at the times stated in the official schedule.

Teams must report with the required members, files, documents, presentations and physical Project Elements ready for assessment.

A delay caused by missing files, unavailable team members, equipment problems or incomplete preparation shall not extend the team's allocated session time.

A team that fails to attend an assigned activity may receive zero points for the relevant event unless an alternative arrangement is expressly approved by the Competition Officials.

A delay caused by the Organizing Committee or official competition equipment shall not result in a penalty to the affected team.

A2.8 Official Aero Pakistan Logo (5 Point Penalty)

The completed glider shall display the official Aero Pakistan logo measuring 60 mm × 60 mm at any clearly visible location on the glider.

The logo shall not be distorted, recolored, cropped, covered, or otherwise modified.

Failure to comply with this requirement shall result in a 5-point penalty.

A3 Project Elements and Submission Regulations

This section establishes the common submission, formatting and delivery requirements applicable to all Aero Pakistan Project Elements. Content requirements, judging procedures and evaluation criteria specific to each Project Element are stated in the applicable Event Regulations.

A3.1 Mandatory Project Elements

Each registered team must complete the following Project Elements:

Project Element	Submission Stage
Flight Engineering Report	Pre-Submission
Final Glider STEP File	Pre-Submission
Brand Portfolio	Pre-Submission
Business Plan Pitch Video	Pre-Submission
Business Plan Pitch Presentation	Launch Day
Completed Glider	Launch Day

The Organizing Committee may require additional declarations, forms or supporting files where stated in this Rulebook, the Competition Handbook or an official amendment.

The submitted STEP File must represent the final glider configuration intended for Pre-Flight Clearance and the official Flight Assessment.

A3.2 Official Submission Channel

All digital Project Elements must be submitted through the Aero Pakistan website. A Project Element shall only be considered submitted once it has been successfully received through the official platform. The timestamp recorded by the official platform shall determine whether the Project Element was submitted before the applicable deadline. Files submitted through email, WhatsApp, personal cloud-storage links or any other unofficial channel shall not be considered unless specifically requested by the Organizing Committee.

A3.3 Submission Responsibility

Teams are responsible for ensuring that every submitted file is:

- complete, accessible and correctly named
- submitted in the required format
- free from corruption
- not password-protected
- the correct final version intended for judging.

Technical difficulties experienced by a team, including internet failure, device failure, upload delay or file-conversion problems, shall not automatically justify an extension.

Teams are responsible for allowing sufficient time to upload and verify their submissions before the applicable deadline.

A3.4 Submission Finality

Project Elements shall be evaluated in the form in which they were received.

A team shall not replace, amend or supplement a Project Element after the applicable deadline unless expressly permitted by the Organizing Committee.

A file may be replaced without penalty before the submission deadline.

Where a file is replaced after the deadline, the replacement shall be treated as a late submission.

A3.5 External and Additional Material

Teams may provide supplementary information through external websites, QR codes, cloud-storage folders, linked documents, social media accounts, or other online resources.

Where such materials are provided, they shall serve only as supporting information and shall not replace any required content of the official Project Element submission. All external resources must be clearly identified and accessible through links contained within the submission.

Judges may review supplementary materials at their discretion; however, the official Project Element submission shall remain the primary basis for evaluation. Teams are responsible for ensuring that all information required for judging is included within the submitted Project Element or presented during the assigned judging session.

A3.6 Digital and Printed Versions — 5 Point Penalty

Where printed copies are required, the printed copies must match the digitally submitted version.

The digitally submitted version shall remain the official version for judging.

Any additional, revised or altered content appearing only in a printed version shall not be considered.

A material difference between the printed and digitally submitted versions shall result in a five-point deduction from the score of the relevant Project Element.

A3.7 Late Submission — 5 Points per Commenced 24 Hours

A digital Project Element submitted after its prescribed deadline shall receive a five-point deduction from the relevant Project Element score for each commenced 24-hour period that it is late.

The maximum late-submission penalty for one Project Element shall be 50 points.

A Project Element shall not be accepted after the final submission closure date published through the Aero Pakistan website or the Competition Handbook.

Failure to submit a scored Project Element before final submission closure shall result in zero points for the relevant judging category.

Failure to submit the Final Glider STEP File may prevent the team from completing Pre-Flight Clearance until the required file has been received and verified.

A3.8 Invalid or Inaccessible Files

A file may be treated as not submitted where it is:

- corrupted;
- inaccessible;
- empty or materially incomplete;
- password-protected
- submitted in an unsupported file format;
- unable to be opened using reasonable standard software.

Where a valid replacement is received before the applicable deadline, no penalty shall apply.

Where a valid replacement is received after the applicable deadline, the late-submission penalty stated in A3.12 shall apply.

Where no valid replacement is received before final submission closure, the team shall receive zero points for the relevant Project Element.

A3.9 Missing Printed Copies — 5-Point Penalty

Where two printed copies of a Project Element are required, failure to provide the required copies on Launch Day shall result in a five-point deduction from the score of the relevant Project Element.

Printed copies provided after the official document handover period may be treated as missing.

A3.10 Incorrect File Naming — 3-Point Penalty

A three-point deduction shall apply where a Project Element is not submitted using the required file-naming convention.

Minor differences in capitalization shall not receive a penalty where the Team Number, Team Name and Project Element remain clearly identifiable.

A3.11 Application of Submission Penalties

Submission penalties shall be deducted from the score of the Project Element to which the failure relates.

A single submission failure shall not receive duplicate penalties under overlapping regulations.

Separate submission failures may receive separate penalties.

No Project Element score shall be reduced below zero through the application of submission penalties.

C COMPETITION CODE

The Competition Code establishes the standards governing student ownership, external assistance, originality, artificial intelligence, evidence integrity, conduct, fair competition, penalties and the authority of Competition Officials.

C1 Student Ownership and External Assistance

This section establishes the boundary between permitted guidance and work that must be completed directly by the registered student team.

C1.1 Student-Led Work

All assessed Aero Pakistan work must be developed, completed, understood and defended by the registered student team.

Student ownership applies to:

- glider concepts and engineering decisions;
- CAD models and engineering drawings;
- aerodynamic and structural analysis;
- calculations, simulations and technical conclusions;
- manufacturing files and processes;
- testing and performance data;
- reports and portfolios;
- branding and visual communication;
- business models and financial reasoning;
- presentation slides and scripts
- submitted videos and supporting material.

C1.2 Permitted Guidance

Teachers, parents, mentors, engineers and external professionals may provide:

- teaching and technical instruction;
- general guidance and feedback;
- demonstrations;
- safety supervision;
- access to equipment, software and facilities;
- review of work already produced by the student team.

C1.3 Prohibited External Completion

External individuals must not complete final assessed work on behalf of the team.

This includes, but is not limited to:

- producing the final CAD model;
- completing the final engineering analysis;
- writing reports or portfolio content;
- designing the final branding or portfolio;
- developing the final business model or financial projections;
- preparing presentation scripts;
- answering questions during judging sessions.

C1.4 External Manufacturing and Specialist Services

External manufacturing or specialist services may only be used where permitted by the Airworthiness Regulations.

Any material external assistance must be disclosed in the Project Element to which it relates.

The disclosure must identify:

- the person or organisation providing the assistance;
- the nature of the assistance;
- the work completed externally; and
- the work completed by the student team.

C1.5 Verification of Student Involvement

Mission Evaluators may direct questions to any registered team member to verify their involvement in and understanding of the submitted work.

A team's inability to demonstrate reasonable understanding of its work may result in reduced marks or an integrity review.

The Organizing Committee may request working files, version histories, photographs, calculations, manufacturing records or other supporting evidence where student ownership is uncertain.

C2 Originality, Artificial Intelligence and Evidence Integrity

This section establishes the requirements governing original work, external sources, artificial intelligence assistance and the accurate presentation of technical and commercial evidence.

C2.1 Originality

All submitted and presented work must be original or appropriately acknowledged.

Plagiarism includes presenting another person's or team's work as the team's own, including:

- written content;
- technical explanations;
- calculations or analysis;
- CAD geometry;
- engineering drawings;
- computer code;
- simulation or testing data;
- photographs or illustrations;
- branding and visual identity;
- portfolio layouts;
- business models;
- presentation material.

C2.2 External References

Teams may use published research, technical data, standard equations, aerofoil databases, software outputs, market reports and third-party visual material where relevant, provided that the source is appropriately acknowledged.

Use of an existing template does not remove the requirement for original content, analysis and visual development.

C2.3 Permitted Use of Artificial Intelligence

Artificial intelligence tools may be used without declaration for:

- spelling correction; basic grammar correction;
- basic document formatting; and generation of search terms.

Artificial intelligence tools may be used with declaration for:

- brainstorming and idea exploration;
- content structuring; language refinement beyond basic grammar;
- coding assistance; data- visualization assistance; visual concept development;
- comparison of design alternatives; and
- research support.

C2.4 Limits on Artificial Intelligence

Artificial intelligence must not replace the team's own:

- engineering reasoning and design decisions;
- calculations and validation;
- testing process;
- technical conclusions;
- commercial reasoning; or
- ability to explain and defend its work.

AI-generated information shall not be treated as verified technical or commercial evidence without independent checking by the team. Teams remain fully responsible for the accuracy, originality and technical validity of all AI-assisted work.

C2.5 Prohibited Artificial Intelligence Use

Artificial intelligence must not be used to fabricate:

- references or citations;
- calculations;
- test results;
- simulation outputs;
- market data;
- financial results;
- sponsor engagement;
- manufacturing evidence; or
- photographs or videos of work that did not occur.

Using artificial intelligence to generate an entire report, portfolio, presentation, engineering design or analysis without meaningful student development and understanding may result in zero points or disqualification from the relevant judging category.

C2.6 AI Use Declaration

Where artificial intelligence has materially contributed to a Project Element, the team must disclose:

Requirement	Information to Provide
Tool Used	Name of the artificial intelligence tool
Purpose	What the tool was used for
Project Element	Where the output was used
Student Contribution	Work completed or changed by the team
Verification	How the output was checked

Basic spelling, grammar and formatting assistance does not require declaration.

C2.7 Accuracy of Claims

A design concept must not be represented as manufactured, tested or operational unless evidence supports that claim.

Teams must state relevant inputs, assumptions, limitations and units associated with calculations and simulations.

Predicted performance, simulated performance and measured performance must be clearly distinguished.

C2.8 Verification

The Organizing Committee and Mission Evaluators may request:

- native CAD files;
- version histories;
- calculation sheets;
- simulation files;
- test records;
- original photographs or videos;
- source references;
- market or financial working; and
- AI prompt or usage records where relevant.

An honest technical error, incorrect calculation or unsupported assumption shall normally be addressed through the applicable judging scorecard.

Information shall be treated as misconduct where it has been deliberately fabricated, altered, concealed or misrepresented.

C2.9 Project Integrity Declaration

Each team must submit a Project Integrity Declaration confirming:

- that its assessed work is substantially student-produced;
- that external assistance has been disclosed;
- that artificial intelligence use has been declared where required;
- that no data or evidence has been fabricated; and
- that all third-party material has been appropriately acknowledged.

The declaration must be signed or digitally confirmed by the Team Captain and all registered team members.

C3 Fair Competition, Penalties and Official Authority

This section defines the standards of fair participation, the consequences available for violations and the authority responsible for administering the competition.

C3.1 Spirit of the Competition

Aero Pakistan is founded on fair competition, student ownership, engineering learning, genuine effort and mutual respect.

Teams are expected to compete within both the written regulations and the intended purpose of the competition.

C3.2 Fair Competition

Teams must not:

- interfere with another team's glider, equipment, documents or Hangar;
- tamper with official equipment, measurements, seals or records;
- obstruct another team's participation in an official activity;
- seek to influence judges outside the official judging process;
- obtain or distribute another team's confidential work without permission;
- deliberately conceal a known non-compliance;
- misrepresent compliance with the Rulebook.

C3.3 Competition Conduct

All participants must follow reasonable instructions issued by Competition Officials.

Disrespectful, disruptive, threatening, dishonest or unsafe conduct may result in disciplinary action.

C3.4 Available Consequences

Depending on the nature and severity of a violation, the Organizing Committee may apply:

- an official warning;
- a fixed-point deduction;
- zero points for an affected scoring criterion;
- zero points for an affected Project Element;
- invalidation of a Flight Assessment attempt;
- removal from an official competition activity;
- disqualification from an individual judging category
- disqualification from the competition.

C3.5 Application of Penalties

Where a fixed penalty is stated in the Rulebook, that penalty shall be applied.

Where no fixed penalty is stated, Competition Officials shall determine an appropriate consequence based on:

- the severity of the violation;
- whether the violation was deliberate;
- whether it affected safety or competitive fairness;
- whether an advantage was gained; and
- whether the violation was repeated.

No competition score shall be reduced below zero through the application of penalties.

C3.6 Serious Misconduct

Serious misconduct may include:

- deliberate cheating;
- plagiarism;
- fabricated or altered evidence;
- undisclosed external completion of student work;
- tampering with another team's property;
- tampering with official equipment or records;
- deliberate interference with another team; or
- repeated refusal to follow official instructions.

Serious misconduct may result in immediate disqualification from the affected judging category or from the competition.

C3.7 Official Authority

The Competition Director shall hold overall authority for competition administration and operations.

The Head Judge shall hold authority over judging, scoring and the application of judging regulations.

The Head of Technical Inspection shall hold authority over Pre-Flight Clearance, Airworthiness compliance and flight eligibility.

Competition Officials may take any reasonable action required to protect:

- participant safety;
- competitive fairness;
- regulatory compliance;
- official equipment; and
- orderly competition operations.

J JUDGING AND SCORING

J1 Competition Categories

Aero Pakistan evaluates teams through the following technical, commercial and flight assessment categories.

Category	Description
Pre-Flight Clearance (PFC)	Mandatory technical inspection of the glider against all Airworthiness Regulations. No points are awarded, but failure bars the team from the Flight Assessment.
Engineering Design Review	Live technical judging session assessing the team's glider design, CAD modelling, aerodynamic and structural analysis, manufacturing quality, and depth of engineering understanding.
Flight Engineering Report (FER)	Pre-submitted document judged independently by a dedicated review panel. Evaluates the team's complete engineering design and manufacturing journey.
Business Plan Pitch	Live 8-minute pitch to a panel of industry investors. Teams present as startup founders seeking investment for their glider technology at commercial scale. Top 3 teams advance to the Finals Stage.
Finalist Business Plan Pitch (Top 3 — On-Stage)	A 5-minute on-stage pitch delivered by each of the three Business Plan Pitch finalists before the audience and investor panel. This session determines the final ranking of the top three teams.
Brand Portfolio	Pre-submitted document evaluated on the strength of the team's brand identity, visual communication, marketing strategy, audience engagement, sponsorship approach, project planning, and alignment between the brand and the prototype.
Business Plan Pitch Video	Pre-submitted 60-second video evaluated on the team's ability to clearly and persuasively communicate its business concept, target market, value proposition, commercial potential, and connection to the prototype.
Flight Assessment	The scored flight. The glider is launched from the official motorized launcher and scored on landing precision relative to the designated target.

J2 Point Allocations

Category	Description
Engineering Design Review	200
Flight Engineering Report (Pre-Submission)	150
Business Plan Pitch (Launch Day) + Finalist Pitch (Top 3)	150
Brand Portfolio (Pre-Submission)	100
Business Plan Pitch Video (Pre-Submission)	50
Flight Assessment (Launch Day)	300
TOTAL	950

S ASSESSMENT SECTIONS

Each assessment section defines its purpose, required preparation, assessment procedure, evidence requirements, scoring approach and the authority of Competition Officials.

S1 Pre-Flight Clearance

S1.1 Purpose of Pre-Flight Clearance

S1.1.1 Pre-Flight Clearance is the mandatory technical inspection conducted before a glider is permitted to participate in the Flight Assessment.

S1.1.2 The purpose of Pre-Flight Clearance is to verify that each glider is safe, compliant, structurally suitable, and eligible for launch under the official Flight Assessment conditions.

S1.1.3 A team shall not be permitted to participate in the Flight Assessment unless its glider has successfully received Pre-Flight Clearance.

S1.1.4 Any penalty points issued during Pre-Flight Clearance shall be deducted from the team's Flight Assessment score.

S1.2 Pre-Flight Clearance Inspection

S1.2.1 During Pre-Flight Clearance, Inspection Officials shall inspect each glider for compliance with the Airworthiness Regulations stated in this Rulebook.

S1.2.2 The Pre-Flight Clearance inspection may include, but shall not be limited to, verification of the following:

- Overall dimensions, mass, and physical conformity of the glider.
- Fuselage construction, Payload Bay Cavity dimensions and position, Standard Payload Enclosure installation, and structural integrity.
- Main Wing Assembly, aerofoil profile, spar installation, and attachment security.
- Stabilizer construction, alignment, and attachment security.
- Centre of Gravity marking and other required technical markings.
- Team identification markings, including the Team Patch and Team Number.
- Standard Launch Hook geometry, position, mounting cavity, attachment security, and compatibility with the official shuttle.
- Compliance with all Critical Airworthiness Requirements.
- Consistency between the submitted engineering drawings and the physical glider.

S1.2.3 Inspection Officials may inspect any additional feature, component, construction detail, material, joint, attachment, marking, or modification considered relevant to the safe, compliant, and fair participation of the glider in the Flight Assessment.

S1.2.4 Inspection Officials may request clarification from team members regarding the glider's construction, markings, Payload Bay Cavity, Standard Payload Enclosure, Standard Launch Hook, structural design, or compliance with the Airworthiness Regulations.

S1.2.5 Inspection Officials may refuse clearance if a glider is considered unsafe, incomplete, structurally unreliable, non-compliant, or unsuitable for official launch.

S1.3 Team Preparation

S1.3.1 Teams are responsible for ensuring that their glider complies with all applicable Airworthiness Regulations before submission for Pre-Flight Clearance.

S1.3.2 Teams must ensure that all required markings, identification labels, payload-system components, Standard Launch Hook, structural components, and technical features are complete and clearly visible before inspection.

S1.3.3 Teams must present the glider in a condition ready for official inspection. A glider that is incomplete, damaged, unstable, or not ready for inspection may be refused clearance or delayed until it is made inspection-ready within the permitted inspection window.

S1.3.4 Teams are responsible for bringing any required supporting material, including engineering drawings, technical documents, or evidence of compliance, where requested by the Inspection Officials.

S1.4 Non-Critical Non-Compliance and Penalties

S1.4.1 Failure to comply with a non-critical Airworthiness Regulation may result in penalty points.

S1.4.2 Any penalty points issued during Pre-Flight Clearance shall be deducted from the team's Flight Assessment score.

S1.4.3 Non-critical non-compliance may include issues that do not prevent safe launch but affect technical compliance, fairness, identification, measurement, or inspection quality.

S1.5 Critical Airworthiness Requirements

S1.5.1 Failure to comply with any Critical Airworthiness Requirement shall result in refusal of Pre-Flight Clearance.

S1.5.2 A glider that fails any Critical Airworthiness Requirement shall not be permitted to participate in the Flight Assessment unless the non-compliance is corrected and the glider is re-inspected within the permitted inspection window.

S1.5.3 If a critical issue cannot be corrected within the permitted inspection window, the team shall not receive Pre-Flight Clearance and shall not be eligible to complete an official Flight Assessment attempt.

S1.6 Official Authority

S1.6.1 The decision of the Inspection Officials regarding Pre-Flight Clearance, penalties, critical non-compliance, re-inspection, and flight eligibility shall be final.

S1.6.2 The Competition Officials reserve the right to prevent any glider from participating in the Flight Assessment if it is considered unsafe, non-compliant, or unsuitable for launch, even if the issue is identified after initial inspection.

S1.6.3 Teams must follow all instructions given by Inspection Officials and Competition Officials during the Pre-Flight Clearance process.

S2 Engineering Design Review

The Engineering Design Review is a mandatory technical review in which each team shall present, explain, and defend the engineering decisions behind its glider.

S2.1 Purpose of the Engineering Design Review

The purpose of the review is to assess the team's technical understanding of the complete flight system, including aerodynamic design, structural design, stability, manufacturing, design development, and expected flight performance.

S2.1.1 The Engineering Design Review shall be conducted as a technical discussion in which Mission Evaluators assess not only the final glider design but also the reasoning, analysis, testing, trade-offs, and decision-making process followed during its development. Teams must clearly justify how their glider has been designed and manufactured to meet the Airworthiness Regulations, competition requirements, and intended flight objectives, and must support their responses to direct engineering questions with relevant evidence, calculations, drawings, analyses, design files, test results, or physical features of the glider, where applicable.

S2.2 Review Scope

During the Engineering Design Review, Mission Evaluators may evaluate, but shall not be limited to, the following areas:

- Aerodynamic design choices, including aerofoil selection, wing geometry, aspect ratio, planform, tail configuration, and supporting analysis.
- Structural design choices, including spar arrangement, load-bearing components, joints, fuselage structure, tail structure, material selection, and construction method.
- Centre of Gravity location, static margin, and overall stability reasoning.
- CAD modelling, assembly design, component fit, and consistency between the digital model and the physical glider.
- Manufacturing approach, including fabrication method, tooling, cutting, machining, 3D printing, assembly process, bonding, finishing, and surface quality.
- Design development process, including design iterations, testing, failures, improvements, trade-off decisions, and final design selection.
- Consistency between the Flight Engineering Report, CAD files, engineering drawings, analysis files, manufacturing files, and physical glider.
- Payload-system integration, including the Payload Bay Cavity, Standard Payload Enclosure, Standard Payload Enclosure Cover and prescribed screws, structural support, accessibility, and effect on balance and stability.
- Launch-system integration, including the Standard Launch Hook, attachment, shuttle compatibility, and expected behavior under official launch conditions.
- The ability of team members to explain and defend engineering decisions under direct technical questioning.

S2.2.2 Mission Evaluators may question any design feature, calculation, analysis method, manufacturing decision, material selection, construction detail, or testing result considered relevant to the engineering quality, safety, or flight performance of the glider.

S2.2.3 Teams should be prepared to explain both successful and unsuccessful design choices. Evidence of iteration, improvement, and problem-solving may be considered positively during evaluation.

S2.2.4 A team may receive reduced marks if it presents a technically strong glider but is unable to explain the engineering reasoning behind its design decisions.

S2.3 Supporting Documentation and Evidence

S2.3.1 Teams shall bring two printed copies of the Flight Engineering Report to the Engineering Design Review.

S2.3.2 Teams shall bring a laptop containing relevant support files, which may include, but shall not be limited to:

- CAD models and assembly files.
- Dimensioned engineering drawings.
- Aerodynamic analysis files or calculations.
- Structural calculations or supporting evidence.
- Centre of Gravity and static margin calculations.
- Manufacturing files, templates, toolpaths, or 3D printing files, where applicable.
- Testing records, photographs, videos, or observations.
- Design iteration evidence and comparisons between earlier and final designs.

S2.3.3 Teams must ensure that all required documents and files are accessible during the review.

S2.3.4 Failure to provide relevant documentation, design files, calculations, drawings, or supporting evidence may affect the team's evaluation.

S2.4 Physical Glider Requirement

S2.4.1 Teams must bring their completed glider to the Engineering Design Review unless otherwise instructed by the Competition Officials.

S2.4.2 The physical glider presented during the review must be consistent with the submitted Flight Engineering Report, CAD model, engineering drawings, and supporting design files.

S2.4.3 Mission Evaluators may inspect the glider to verify design features, dimensions, structural details, payload-system integration, Standard Launch Hook installation, manufacturing quality, and consistency with submitted documentation.

S2.4.4 Any major mismatch between the physical glider and the submitted design documentation may result in reduced marks or further review by the Competition Officials.

S2.5 Attendance Requirements

S2.5.1 A minimum of three Flight Crew members must attend the Engineering Design Review.

S2.5.2 Mission Evaluators may direct questions to any attending team member.

S2.5.3 Teams should ensure that attending members collectively understand the aerodynamic design, structural design, stability approach, manufacturing process, design development, and documentation of the glider.

S2.5.4 A team may receive reduced marks if only one member is able to answer technical questions while other attending members are unable to demonstrate meaningful understanding of the project.

S3 Flight Engineering Report

The Flight Engineering Report is a mandatory pre-submission document that presents the team's technical design, engineering analysis, manufacturing approach, and design development process.

S3.1 Purpose of the Flight Engineering Report

The purpose of the Flight Engineering Report is to allow judges to assess how the team designed, analyzed, manufactured, tested, and refined its glider in accordance with the Airworthiness Regulations and competition requirements.

The Flight Engineering Report must demonstrate the engineering reasoning behind the team's final glider design and development process, including aerodynamic performance, structural integrity, stability, payload integration, manufacturing feasibility, expected flight behavior, design iterations, trade-offs, testing outcomes, improvements, and lessons learned.

S3.2 Report Content Requirements

S3.2.1 The Flight Engineering Report may include, but shall not be limited to, the following technical areas:

- Aerofoil selection, wing geometry, and aerodynamic design justification.
- Aerodynamic analysis of the wing, fuselage, tail, and overall glider configuration.
- Structural justification of the wing, spar arrangement, joints, fuselage, tail structure, and major load-bearing components.
- Centre of Gravity calculation, static margin estimate, and stability reasoning.
- Payload-system integration, including the Payload Bay Cavity dimensions and position, Standard Payload Enclosure installation, Standard Payload Enclosure Cover and prescribed screws, and the effect of the Official Payload on Centre of Gravity and stability.
- Launch-system analysis, including the Standard Launch Hook position, attachment, shuttle compatibility, and expected release behavior under the official launcher conditions.
- Predicted flight path, estimated glide performance, and estimated landing distance.
- Manufacturing process documentation, including fabrication methods, tooling, machining, cutting, 3D printing, assembly, bonding, sanding, finishing, or any other process used.

- Design development process, including iterations, testing, failures, trade-offs, refinements, and improvements made before the final design.
- Dimensioned engineering drawings, including clear identification of the Payload Bay Cavity, Standard Payload Enclosure, Standard Launch Hook, Main Wing Assembly, fuselage, Tail Assembly, spar arrangement, and other major components.
- Professional document quality, including structure, clarity, technical communication, correct use of figures, tables, units, calculations, diagrams, and references.

S3.2.2 Teams are expected to support their engineering decisions with clear reasoning, calculations, diagrams, sketches, test data, simulations, photographs, or other relevant evidence where applicable.

S3.2.3 The report should clearly distinguish between measured data, calculated estimates, simulation results, design assumptions, and team observations.

S3.2.4 Any design assumption used in the report must be reasonable, clearly stated, and relevant to the glider's expected performance or compliance with competition requirements.

S3.3 Engineering Drawings and Technical Evidence

S3.3.1 The Flight Engineering Report must include sufficient technical information for judges to understand the final glider configuration and the reasoning behind its design.

S3.3.2 Dimensioned drawings should be clear, readable, and labelled appropriately. Important dimensions, component locations, Payload Bay Cavity position, Standard Payload Enclosure position, Standard Launch Hook position, structural members, and reference datums should be identifiable.

S3.3.3 Photographs of the manufacturing process, testing process, or completed glider may be included where they support the technical explanation.

S3.3.4 Teams must ensure that all figures, tables, graphs, diagrams, and images are relevant, properly labelled, and explained in the report.

S3.4 Flight Engineering Report Submission Requirements

Requirement	Specification
Submission method	One digital copy submitted through the official Aero Pakistan website
File format	PDF
Submission deadline	Before the stated submission deadline on website
Maximum length	12 pages
Pages excluded from limit	Front cover and back cover
Excess pages	Only the first 12 eligible pages shall be considered for evaluation
Minimum font size	11-point
Required file name	TeamNumber_TeamName_FlightEngineeringReport.pdf
Printed copies	Two copies must be brought on Launch Day
Version consistency	Printed copies must match the digitally submitted version exactly
File responsibility	Teams must ensure the file is complete, accessible, correctly named, and not corrupted
Mismatch consequence	Any mismatch between the digital and printed versions may affect the team's evaluation

S4 Business Plan Pitch

S4.1 Purpose and Scope

The Business Plan Pitch is designed to evaluate each team's ability to develop, justify, and professionally present a hypothetical but commercially credible business model based on its Aero Pakistan prototype.

The proposed business model must present a product, service, or commercial application in which the team's prototype, or a specific system, component, feature, or capability of the prototype, forms an essential part of the value proposition.

S4.1.1 Teams are not required to present an existing registered company, operational business, or already launched product. The Business Plan Pitch may be based on a proposed future business concept, provided that it is commercially reasonable and technically plausible.

S4.1.2 Teams may introduce reasonable commercial assumptions, adaptations, or modifications to the prototype for the purpose of presenting a marketable product, service, or commercial application. Any such assumptions must be clearly stated during the pitch and must remain technically and commercially realistic.

S4.1.3 Judges shall be treated as potential investors or strategic stakeholders for the proposed business model.

S4.1.4 The Business Plan Pitch shall evaluate the commercial logic, market relevance, feasibility, communication quality, financial reasoning, and connection between the prototype and the proposed business model.

S4.1.5 The technical quality, construction standard, and flight performance of the prototype shall be evaluated separately in the relevant technical and flight assessment events. However, teams must still demonstrate how the prototype supports the proposed business model.

S4.2 Pitch Format

S4.2.1 Each team shall deliver its Business Plan Pitch during its assigned judging slot.

S4.2.2 The Business Plan Pitch shall be limited to a maximum of 8 minutes. The time limit shall be strictly observed. Judges may stop any pitch that exceeds the permitted time limit.

S4.2.3 The pitch shall not be interrupted by questions during the presentation time.

S4.2.4 Immediately after the pitch, each team shall complete a 5-minute question-and-answer session with the judges.

S4.2.5 Two or more team members may present the Business Plan Pitch.

S4.2.6 All team members involved in the pitch must be introduced to the judges at the beginning of the session.

S4.2.7 Teams may use presentation slides, visuals, prototypes, printed material, or other supporting material where appropriate

S4.3 Team Requirements

S4.3.1 Teams are responsible for ensuring that their presentation file, supporting materials, and any required equipment are ready before the start of their assigned judging slot.

S4.3.2 Teams must report to the assigned judging area on time and must be prepared to begin immediately when called by the Competition Officials.

S4.3.3 Any delay caused by the team, including missing files, technical issues, unavailable presenters, or incomplete preparation, may reduce the available presentation time or result in penalties.

S4.3.4 Teams that fail to present within their assigned judging slot may receive zero points for the Business Plan Pitch, unless otherwise permitted by the Competition Officials.

S4.3.5 All claims, assumptions, and projections presented during the pitch must be reasonable, relevant, and clearly connected to the team's prototype and proposed business model.

S4.4 Evaluation Scope

S4.4.1 During the Business Plan Pitch, judges may evaluate, but shall not be limited to, the following areas:

- Clarity and strength of the proposed business model.
- Connection between the Aero Pakistan prototype and the proposed value proposition.
- Market need, target customer, and commercial opportunity.
- Revenue model, cost assumptions, and financial reasoning.
- Feasibility of the proposed product, service, or commercial application.
- Branding, positioning, and go-to-market approach.
- Competitive advantage and differentiation from existing alternatives.
- Practicality of the execution plan.
- Quality of presentation, communication, and professionalism.
- The team's ability to respond to investor-style questions.

S4.4.2 Judges may question any assumption, market claim, financial estimate, business model decision, prototype application, or execution strategy considered relevant to the credibility and commercial strength of the pitch.

S4.4.3 Teams should be prepared to justify how their prototype, or a specific system or component of the prototype, creates value for the intended user, customer, or market.

S4.4.4 A business model that is generic, unrealistic, unsupported, or only loosely connected to the prototype may receive reduced marks.

S4.5 Scoring Structure

S4.5.1 The Business Plan Pitch shall carry a maximum of 150 points.

S4.5.2 All teams shall be eligible to receive a maximum of 140 points through the assigned judging-slot Business Plan Pitch.

S4.5.3 The top three teams ranked highest after the assigned judging-slot Business Plan Pitch shall qualify for the Finalist Business Plan Pitch.

S4.5.4 The Finalist Business Plan Pitch shall be conducted on stage and shall carry a maximum of 10 additional points.

S4.5.5 Teams that do not qualify for the Finalist Business Plan Pitch shall retain their score out of the maximum 140 points available from the assigned judging-slot Business Plan Pitch.

S4.5.6 The final score for each finalist team shall be calculated by adding its assigned judging-slot Business Plan Pitch score and its Finalist Business Plan Pitch score.

S4.5.7 The final ranking and winner of the Business Plan Pitch Event shall be determined after completion of the Finalist Business Plan Pitch and the judges' evaluation process.

S4.6 Finalist Business Plan Pitch

- S4.6.1** The top three teams ranked highest in the assigned judging-slot Business Plan Pitch shall qualify for the Finalist Business Plan Pitch.
- S4.6.2** The purpose of the Finalist Business Plan Pitch is to allow the highest-ranked teams to further demonstrate the commercial strength, technical understanding, execution potential, and overall credibility of their proposed business model.
- S4.6.3** The Finalist Business Plan Pitch must show a clear and logical connection between the team's prototype, engineering specifications, target market, commercial strategy, and implementation plan.
- S4.6.4** Teams should demonstrate how the technical features, systems, components, or capabilities of their prototype support the proposed business model and create value for the intended customer, user, partner, or stakeholder.
- S4.6.5** Teams are expected to present their business case in a structured and professional manner. The presentation may include, but is not limited to, the problem being addressed, proposed solution, market opportunity, customer segment, revenue model, cost considerations, competitive advantage, prototype relevance, and execution strategy.
- S4.6.6** Each finalist team shall be allowed a maximum presentation time of 5 minutes. The time limit shall be strictly observed. Judges may stop any presentation that exceeds the permitted time.
- S4.6.7** Immediately following the presentation, each finalist team shall participate in a question-and-answer session with the judging panel.
- S4.6.8** During the question-and-answer session, judges may ask questions related to the team's business model, engineering decisions, market assumptions, financial reasoning, execution plan, prototype feasibility, commercial viability, and overall strategic direction.
- S4.6.9** Teams must ensure that all claims, assumptions, and projections presented during the Finalist Business Plan Pitch are reasonable, relevant, and clearly connected to their prototype and business proposal.
- S4.6.10** The Finalist Business Plan Pitch shall form the final stage of assessment for the Business Plan Pitch Event.
- S4.6.11** The judges' decision regarding finalist scoring, final ranking, and the winner of the Business Plan Pitch Event shall be final.

S4.7 Submission Requirement

The Business Plan Pitch must be available in the format and through the handover method stated in the Competition Handbook.

Teams must ensure that the correct final version is available and ready before the start of their assigned judging session.

S5 Brand Portfolio

S5.1 Purpose

Each team must submit a Brand Portfolio for evaluation. The Brand Portfolio is intended to demonstrate the team's ability to develop, present, and manage the identity of their team and prototype as a professional brand.

S5.2 Required Content

The Brand Portfolio must provide a clear overview of the team's branding, marketing, communication, sponsorship, and project presentation activities. It should demonstrate how the team has planned and executed its brand identity, promotional strategy, audience engagement, sponsorship approach, and overall brand management.

S5.3 Portfolio Content and Prototype Alignment

S5.3.1 The Brand Portfolio must demonstrate how the team's brand identity, marketing strategy, communication, and commercial positioning relate to the team's prototype or to a specific system, feature, component, or function of the prototype.

S5.3.2 The portfolio may include, but shall not be limited to, the following areas:

- Team name, identity, vision, and brand concept.
- Team patch, visual identity, color palette, typography, and design language.
- Explanation of how the brand identity and visual language reflect the purpose, value, or technical direction of the prototype.
- Team roles, organizational structure, and brand-related responsibilities.
- Marketing strategy, promotional campaigns, target audience, and audience engagement.
- Social media presence, content strategy, and public communication.
- Sponsorship approach, sponsor proposals, partnership development, and commercial positioning.
- Budget planning, resource management, and brand-related costs.
- Project timeline, task allocation, and execution planning.
- Evidence of outreach, media activity, sponsor communication, partnership development, or public engagement.
- Reflection on brand development, challenges, decisions, improvements, and lessons learned during the project.

S5.3.3 Teams must clearly explain how their brand, marketing strategy, and communication approach support the prototype and its intended purpose. A generic, unrelated, or weakly connected brand concept may receive reduced marks or penalties, even where the portfolio is otherwise visually strong.

S5.4 Brand Portfolio Specifications

Requirement	Specification
Digital submission	One digital copy must be submitted through the official submission channel before the deadline specified in the Competition Handbook
File format	PDF
Maximum length	12 pages
Pages excluded from limit	Cover page and table of contents
Excess pages	Only the first 12 eligible pages shall be considered for evaluation; any additional content shall be disregarded
Minimum font size	11-point
Readability	All text, diagrams, charts, tables, and supporting material must be clear, readable, and professionally presented
Required file name	TeamNumber_TeamName_BrandPortfolio.pdf
Printed copies	Two printed copies must be present on the competition day

S6 Business Plan Pitch Video

- S6.1** Each team shall submit a Business Plan Pitch Video as a mandatory pre-submission Project Element.
- S6.2** The video must present a concise and commercially credible overview of the team's business idea, including its value proposition, intended target market, and relationship to the team's Aero Pakistan prototype.
- S6.3** The business concept may be hypothetical but must be realistic, logically developed, and substantially connected to the prototype or to a specific system, feature, component, or function of the prototype.
- S6.4** The video should clearly communicate:
- The problem, need, or market opportunity identified by the team.
 - The product, service, or commercial solution being proposed.
 - The intended customer or target market.
 - The value offered by the proposed solution.
 - The commercial relevance of the team's prototype.
- S6.5** The maximum permitted duration of the video is 60 seconds. Any content presented after the first 60 seconds shall not be considered for evaluation.
- S6.6** Any team members appearing as presenters in the video must be registered Flight Crew members. The information presented in the video must remain consistent with the team's submitted documents and live Business Plan Pitch.

- S6.7** Teams are responsible for ensuring that the submitted video is complete, correctly named, accessible, and not corrupted. A late, incomplete, inaccessible, or corrupted file may be treated as not submitted.

S6.8 Business Plan Pitch Video Specifications

Requirement	Specification
Submission stage	Pre-Submission
Submission status	Mandatory
Maximum duration	60 seconds
Accepted formats	MP4, MOV, or MPG
Submission channel	Official submission channel specified in the Competition Handbook
Required file name	TeamNumber_TeamName_BusinessPlanPitchVideo.mp4
Excess duration	Content after 60 seconds shall not be considered
Submission deadline	As specified in the Competition Handbook
File responsibility	The file must be complete, accessible, correctly named, and not corrupted

S7 Flight Assessment

S7.1 Purpose of the Flight Assessment

- S7.1.1** The Flight Assessment is designed to evaluate the flight performance, stability, control, and landing precision of each team's glider.
- S7.1.2** The primary objective of the Flight Assessment is for the glider to land as close as possible to the designated target point on the measurement field.
- S7.1.3** The Flight Assessment shall test the effectiveness of the team's design, manufacturing quality, weight distribution, aerodynamic performance, and overall flight readiness under standardized launch conditions.

S7.2 Eligibility for Flight Assessment

- S7.2.1** A team shall not be permitted to attempt an official flight unless its glider has passed all required Pre-Flight Clearance checks.
- S7.2.2** Any glider that fails Pre-Flight Clearance, or is deemed unsafe by the Competition Officials, shall not be allowed to participate in the Flight Assessment.
- S7.2.3** Competition Officials may re-inspect any glider before the flight attempt if they believe that the glider has been modified, damaged, or altered after receiving Pre-Flight Clearance.

S7.3 Inspection Mark

A glider that successfully completes Pre-Flight Clearance will receive an official inspection sticker

Teams shall not:

- Remove the clearance mark.
- Alter the clearance mark.
- Transfer the clearance mark to another component or glider.
- Conceal any post-clearance modification.

S7.4 Flight Assessment Format

S7.4.1 Each team shall complete one official flight attempt during the Flight Assessment window.

S7.4.2 Each glider shall be launched using the official Aero Pakistan motorized launcher.

S7.4.3 The launcher shall be set to a fixed launch speed of 7 m/s, a fixed launch angle of 5 degrees, and a fixed launch height of 6.5 meters above ground level, unless otherwise specified by the Competition Officials.

S7.4.4 The designated target point shall be located at a horizontal distance of 20 meters from the launcher, unless otherwise specified by the Competition Officials.

S7.4.5 The flight order shall be determined by the order in which teams receive Pre-Flight Clearance, unless otherwise directed by the Competition Officials.

S7.4.6 Teams must be present and ready when called for their official flight attempt. Failure to report to the launch area when called may result in the team losing its flight attempt or receiving a penalty, at the discretion of the Competition Officials.

S7.5 Launch Procedure

S7.5.1 Only Competition Officials or authorized personnel appointed by the Organizing Committee may operate the official launcher.

S7.5.2 Teams must place their glider on the launcher only when instructed by the Competition Officials.

S7.5.3 Teams must not interfere with the launcher settings, launch mechanism, launch direction, or any official equipment.

S7.5.4 Once the glider has been positioned on the launcher and the launch area has been cleared, the Competition Officials shall initiate the official launch procedure.

S7.6 Landing Error Measurement

- S7.6.1** The Flight Assessment score shall be based on the landing error of the glider relative to the designated target point.
- S7.6.2** Landing error shall be measured as the minimum distance between the designated target point and the official measurement reference point of the glider after the glider comes to rest on the measurement field.
- S7.6.3** The nose of the glider shall be used as the official measurement reference point during the Flight Assessment. All flight-distance and target-error measurements shall be taken from the forward-most point of the glider's nose
- S7.6.4** The measurement shall be taken only after the glider has fully come to rest.
- S7.6.5** If the glider slides, bounces, or rotates after initial contact with the ground, the final resting position shall be used for measurement unless otherwise determined by the Competition Officials.
- S7.6.6** The measurement recorded by the Competition Officials shall be considered the official landing error for scoring purposes.

S7.7 Scoring Method

- S7.7.1** The team with the lowest valid landing error shall receive the maximum available Flight Assessment score.
- S7.7.2** All other valid flights shall be scored proportionally based on their landing error, according to the official Flight Assessment scoring formula.
- S7.7.3** The final scoring formula shall be stated in the Scoring Appendix or official competition scoring sheet.
- S7.7.4** A team whose flight is declared invalid may receive zero marks for the Flight Assessment, unless a re-flight is granted under the conditions stated in this section.
- S7.7.5** In the event that two or more gliders achieve the same official landing error and Flight Assessment score, the glider recording the shorter flight time shall be ranked higher. Flight time shall be measured from release from the official launcher to the glider's first contact with the ground.

S7.8 Valid Flight Definition

- S7.8.1** A flight shall be considered valid if all of the following conditions are satisfied:
- The glider is released cleanly from the official launcher.
 - The glider travels a horizontal distance of at least 3 meters from the launcher.
 - The glider comes to rest within the designated measurement field.
 - The primary structure of the glider remains intact until the glider comes to rest.
 - The flight can be fairly measured by the Competition Officials.

S7.8.2 Minor damage after landing may not automatically make a flight invalid, provided that the glider remains measurable and the damage does not prevent a fair assessment of landing error.

S7.8.3 A flight shall remain valid even if the glider does not reach the designated target point, provided that it satisfies all validity conditions.

S7.9 Invalid Flight Conditions

S7.9.1 A flight may be declared invalid if:

- The glider fails to release correctly from the launcher.
- It travels less than the minimum required horizontal distance of 3 meters.
- It lands outside the designated measurement field.
- The Official Payload leaves the Standard Payload Enclosure, or the Standard Payload Enclosure Cover opens, loosens, or separates.
- The Standard Launch Hook or any primary structural component separates from the glider.
- The glider suffers structural failure before coming to rest.
- The glider changes configuration through a prohibited mechanism.
- Its final position cannot be measured fairly.
- The team interferes with the launch, measurement process, or official equipment.
- The glider differs from the configuration approved during Pre-Flight Clearance or contains an unauthorized component or modification.

S7.9.2 Minor cosmetic damage shall not invalidate a flight if the Official Payload remains inside the Standard Payload Enclosure, the Standard Payload Enclosure Cover and prescribed screws remain secured, all primary structural components remain attached, and the final position can be measured fairly.

S7.9.3 An invalid flight caused by team error, design failure, unsafe construction, interference, or non-compliance may receive zero points.

S7.9.4 Competition Officials shall have final authority to determine flight validity.

S7.10 Re-Flight Conditions

S7.10.1 A re-flight may only be granted if the Competition Officials determine that the original flight was affected by an issue outside the team's control.

S7.10.2 A re-flight may be granted in cases including, but not limited to:

- Launcher malfunction.
- Official measurement error.
- Obstruction on the flight path or measurement field.
- Interference by an unauthorized person or object.
- Any other issue determined by the Competition Officials to have prevented a fair flight attempt.

S7.10.3 A re-flight shall not be granted for poor glider performance, design failure, unstable flight, structural weakness, incorrect team preparation, or any other issue considered to be within the team's control.

S7.10.4 The decision to grant or deny a re-flight shall rest solely with the Competition Officials.

S7.11 Post-Flight Inspection

Following the official flight, Competition Officials may inspect the glider to confirm that:

- The Official Payload remained inside the Standard Payload Enclosure.
- The Standard Payload Enclosure Cover remained closed, and all prescribed screws remained installed.
- The Standard Payload Enclosure and Standard Launch Hook remained securely attached in their approved positions.
- All major structural components remained attached.
- No prohibited component was released.
- The glider remained in the approved configuration.
- No unauthorized modification was made after clearance.
- The physical glider remained consistent with the approved design.

S7.12 Safety and Official Authority

S7.12.1 All teams must follow the instructions of the Competition Officials at all times during the Flight Assessment.

S7.12.2 Teams, spectators, and unauthorized personnel must remain outside the designated launch area, flight path, and measurement field unless instructed otherwise by the Competition Officials.

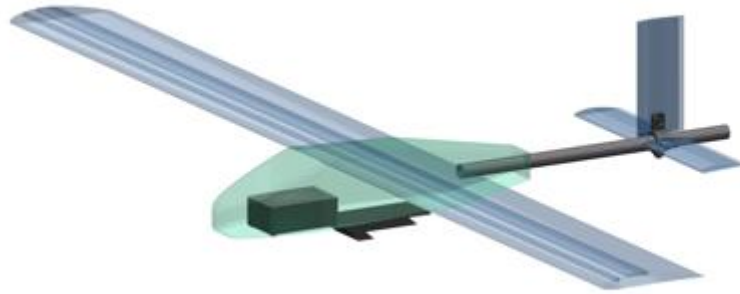
S7.12.3 Competition Officials may stop, delay, cancel, or repeat any flight attempt if they believe there is a safety concern or operational issue.

S7.12.4 The decision of the Competition Officials regarding flight validity, landing measurement, re-flight approval, penalties, and final scoring shall be final.

R AIRWORTHINESS REGULATIONS

The Airworthiness Regulations establish the complete design, material, manufacturing, construction, configuration, inspection, and safety requirements governing every Aero Pakistan glider.

R1 The Aero Pakistan Glider



R1.1 Mission Definition

The Aero Pakistan glider is an unpowered, fixed-wing aircraft designed and manufactured in accordance with these Airworthiness Regulations.

The glider shall be designed to:

- Interface safely with the official Aero Pakistan motorized launcher.
- Carry and retain the official payload throughout launch, flight, and landing.
- Fly in a stable and predictable manner.
- Land as close as possible to the designated target located 20 meters downrange.

R1.2 Airworthiness Standard

The glider shall be:

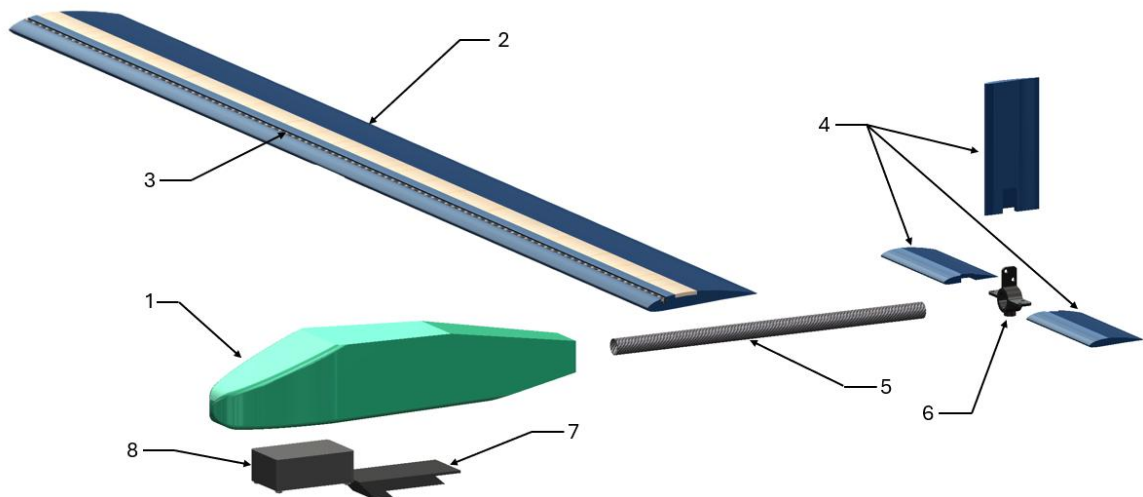
- Aerodynamically stable.
- Structurally sound.
- Manufactured from the permitted materials.
- Free from unsafe, loose, sharp, or unsecured components.
- Consistent with the team's submitted Flight Engineering Report, CAD files, engineering drawings, and manufacturing documentation.
- Compatible with the official launcher and shuttle.
- Capable of carrying the official payload without structural failure, excessive movement, or release.
- The glider must successfully complete Pre-Flight Clearance before being permitted to fly.

R1.3 Permitted Components

The glider may consist only of the following components:

No.	Permitted Component
1	Fuselage, including the Payload Bay Cavity
2	Main Wing Assembly
3	Carbon-fiber wing spar or spars
4	Tail stabilizer or stabilizers
5	Carbon-fiber tail spar
6	Stabilizer coupling
7	Standard Launch Hook
8	Standard Payload Enclosure, including the Enclosure Body, Enclosure Cover, and prescribed screws
9	Surface finishes and livery
10	Team patch, roundel, and identification decals
11	Assembly adhesives used only to join permitted components

No additional, undefined, concealed, or unapproved component may be incorporated into the glider. Decorative parts that perform no structural or aerodynamic function are not permitted unless they are applied as surface finishes or decals.



R1.4 Fully Assembled Glider

The Fully Assembled Glider is the complete flight-ready aircraft in its final competition configuration, excluding the official payload. The Fully Assembled Glider shall include:

- All structural components.
- All permanent adhesives.
- All coatings, films, paint, coverings, and surface finishes.
- All decals and identification markings.
- All permanent fittings.
- The Standard Payload Enclosure Body, Standard Payload Enclosure Cover, and all prescribed screws.

When weighed or inspected, the glider shall be:

- Placed on a flat surface.
- Resting under gravity alone.
- Free from packaging, external supports, transportation fixtures, or temporary attachments.

The total mass of the Fully Assembled Glider, excluding the official payload, shall not be less than 250g.

R1.5 Flight Configuration

The glider presented for Pre-Flight Clearance shall be in the same configuration used for the official flight attempt.

After Pre-Flight Clearance, teams shall not:

- Add or remove components.
- Change the position of any component.
- Alter the Centre of Gravity.
- Adjust the wing or Tail Assembly position.
- Remove, replace, reposition, reshape, repair, or otherwise modify the Standard Launch Hook or its mounting arrangement.
- Remove, replace, reposition, modify, or alter the Standard Payload Enclosure, Enclosure Cover, prescribed screws, or enclosure installation arrangement.
- Apply additional adhesive, tape, paint, film, or covering.

Any authorized modification or repair shall require reinspection and may require the glider to repeat Pre-Flight Clearance.

R2 General Airworthiness, Measurement, and Safety

R2.1 Units

Use following units unless otherwise stated:

Quantity	Unit
Length	Millimeters
Mass	Grams
Angle	Degrees
Speed	Meters per second
Area	Square millimeters
Force	Newtons

R2.2 Measurement Conditions

All dimensions shall be measured on the completed physical glider. Measurements shall include:

- Paint, Surface film, Coatings, Permanent adhesives, Decals, and All permanent fittings.

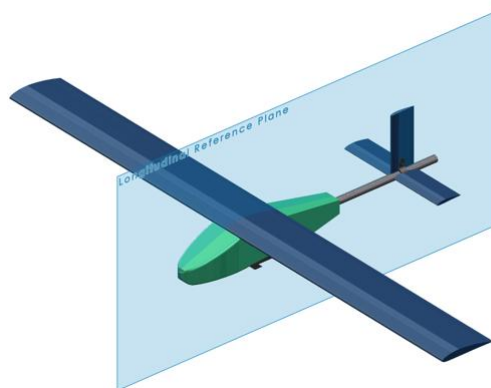
No additional manufacturing tolerance shall be added to a stated minimum or maximum limit. Teams are responsible for designing and manufacturing sufficient dimensional margin to remain compliant. The official measurement recorded by the Competition Officials shall be final.

R2.3 Fuselage Reference Datums

All longitudinal component positions shall be measured from the following reference datums:

Fuselage Nose Datum: The vertical plane passing through the forward-most point of the completed fuselage. This datum shall represent longitudinal position $X=0$.

Longitudinal Reference Plane: The vertical center plane extending through the fuselage from nose to tail.



Fuselage Lower Datum: The reference baseline identified in the official fuselage dimensional drawing. Distances measured rearward from the Fuselage Nose Datum shall be stated as positive longitudinal dimensions.

R2.4 Critical Airworthiness Requirements

A requirement identified as Critical must be satisfied before the glider may receive Pre-Flight Clearance.

- Failure of a Critical Airworthiness Requirement shall result in one or more of the following:
- Failure of Pre-Flight Clearance.
- Requirement to repair or modify the glider.
- Reinspection.
- Exclusion from the official flight attempt where compliance cannot be achieved.

R2.5 Penalty Requirements

A requirement identified as Penalty does not automatically prevent the glider from flying, provided the glider remains safe and otherwise airworthy.

Failure to comply may result in penalty points as specified in this rule book.

Teams shall not obstruct, delay, or interfere with an official inspection.

R2.6 Safety Requirements

The glider shall be safe for Competition Officials, team members, spectators, and competition equipment to handle.

The glider shall not contain:

- Sharp exposed edges.
- Exposed carbon-fiber splinters.
- Unprotected pointed fasteners.
- Uncured adhesive or resin.
- Toxic, corrosive, explosive, or highly flammable material.
- Fragile projections are likely to detach.
- Loose internal components.
- Any component likely to cause injury during handling, launch, flight, or landing.

Competition Officials may require sharp edges or exposed fibers to be covered or repaired before clearance.

R2.7 Identification Markings

The completed glider shall display:

- Team number.
- Team patch or roundel.
- A clearly identifiable and unobstructed access point for the Standard Payload Enclosure Cover and prescribed screws.
- An area suitable for an official inspection sticker or clearance mark.

Markings shall remain legible and securely attached throughout the competition.

R3 Fuselage

R3.1 Fuselage Construction — Critical

The fuselage shall be manufactured exclusively from the official Aero Pakistan fuselage block using three-axis CNC milling.

The fuselage shall:

- Incorporate the prescribed Payload Bay Cavity and provide the required minimum 6 mm of surrounding fuselage material.
- Provide a secure mounting interface for the Main Wing Assembly.
- Provide a secure interface for the wing spar system.
- Incorporate the official tail-spar socket.
- Incorporate and structurally support the Standard Payload Enclosure in the prescribed position and orientation.
- Provide the prescribed mounting surface and supporting structure for the Standard Launch Hook at the position and orientation specified in AR7.
- Hand cutting, hot-wire cutting, molding, casting, additive manufacturing, or replacement of the official block with another fuselage material is prohibited.
- Minor manual finishing may be used only to remove machining residue, improve surface quality, or prepare surfaces for coating or bonding.

R3.2 Fuselage Longitudinal Layout — Critical

The completed fuselage shall comply with the longitudinal arrangement stated in Table R3-1 and shown in the official fuselage dimensional drawing.

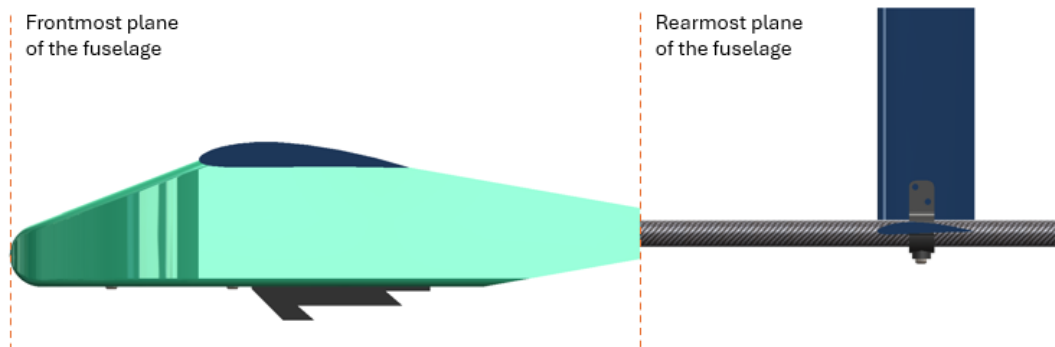
Table R3-1 — Fuselage Longitudinal Layout

Parameter	Requirement	Measurement Basis
Maximum overall fuselage length	280 mm maximum	Measured between the foremost and rearmost points of the completed fuselage
Payload Bay Cavity starting position	25 mm minimum to 65 mm maximum aft	Measured from the Fuselage Nose Datum to the forward face of the Payload Bay Cavity
Payload Bay Cavity length	66 mm	Measured from the forward face to the rear face of the Payload Bay Cavity
Distance between the Payload Bay Cavity and Standard Launch Hook	6 mm minimum	Measured from the rear face of the Payload Bay Cavity to the forward-most point of the Standard Launch Hook
Standard Launch Hook overall length	85 mm	Measured from the forward-most to the rear-most point of the Standard Launch Hook

The Payload Bay Cavity shall be located within the fuselage. The Standard Launch Hook shall be bonded externally to the underside of the fuselage and shall form the lowest prescribed point of the glider.

No separate minimum overall fuselage length, width, or height shall apply. The minimum practical fuselage dimensions shall be determined through compliance with the prescribed component positions, cavities, mounting interfaces, supporting-material requirements, and structural provisions.

The fuselage may taper outside the prescribed Payload Bay Cavity, Standard Launch Hook, Main Wing Assembly interface, and tail-spar interface regions, provided that all applicable Airworthiness Regulations remain satisfied.



R3.3 Surface Finish Quality — Penalty

The external fuselage surface shall be consistently and professionally finished.

The fuselage shall be free from:

- Significant machining marks.
- Deep scratches or unintended cavities.
- Loose material.
- Uneven or excessively dripped paint.
- Peeling or damaged wrapping.
- Exposed adhesive residue.
- Surface defects that may affect airflow, handling, or safety.

Paint, coating, or wrapping material may be used, provided it is securely applied and does not cause dimensional non-compliance.

R3.4 Fuselage Material Integrity — Critical

The primary fuselage structure shall consist solely of the official Aero Pakistan fuselage-block material.

Foreign structural materials, hidden reinforcements, undeclared inserts, or concealed masses shall not be embedded within the fuselage.

The following permitted items are excluded from this restriction:

- Wing spars passing through their designed mounting interface.
- Tail spar installed in the official socket.
- Standard Launch Hook installed in accordance with AR7.
- Standard Payload Enclosure, including its Body, Cover, and prescribed screws.
- Assembly adhesive.
- External surface finishes.

R3.5 Fuselage Structural Integrity — Critical

The fuselage shall remain intact during handling, launch, flight, and landing.

The fuselage shall not contain:

- Major cracks and loose sections.
- Structural cavities not shown in the submitted design.
- Walls that are visibly crushed or excessively thin.
- Failed bonded joints.
- Damage, cracking, separation, crushing, or excessive material removal around the wing interface, tail-spar interface, Payload Bay Cavity, or Standard Launch Hook mounting interface.

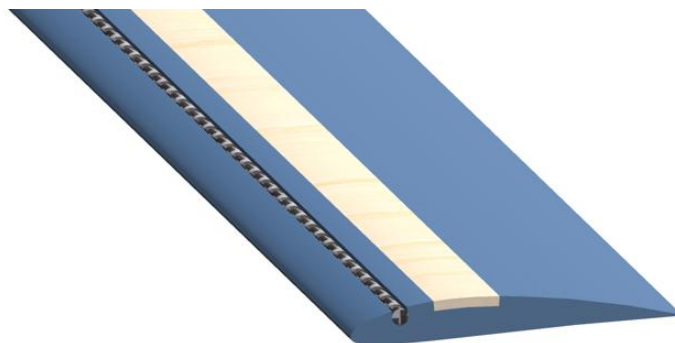
Competition Officials may reject a fuselage where damage or material removal creates a foreseeable structural risk.

R4 Main Wing Assembly

The Main Wing Assembly is the primary lift-generating structure of the glider.

It may consist of:

- One continuous wing; or
- Separate left and right wing panels permanently or securely joined through the fuselage and spar system.



R4.1 Wing Manufacturing Method — Critical

The Main Wing Assembly shall be manufactured from the official Aero Pakistan wing material, identified as pink foam.

The permitted manufacturing methods are:

- Hot-wire cutting.
- CNC milling.
- The wing may consist of one or more sections permanently bonded together.

The following do not violate the wing-material requirement:

- Carbon-fiber wing spars.
- Permitted surface coverings.
- Assembly adhesives.

R4.2 Aerofoil Profile — Critical

Each primary lift-generating wing section shall use an aerofoil profile selected from the UIUC Airfoil Coordinates Database.

The selected aerofoil shall be:

- Identified by its recognized designation.
- Analyzed using XFOIL polar analysis or an equivalent method.
- Justified through aerodynamic reasoning.
- Documented in the Flight Engineering Report.

The maximum completed aerofoil thickness, including all surface coverings and coatings, shall not exceed 20 mm.

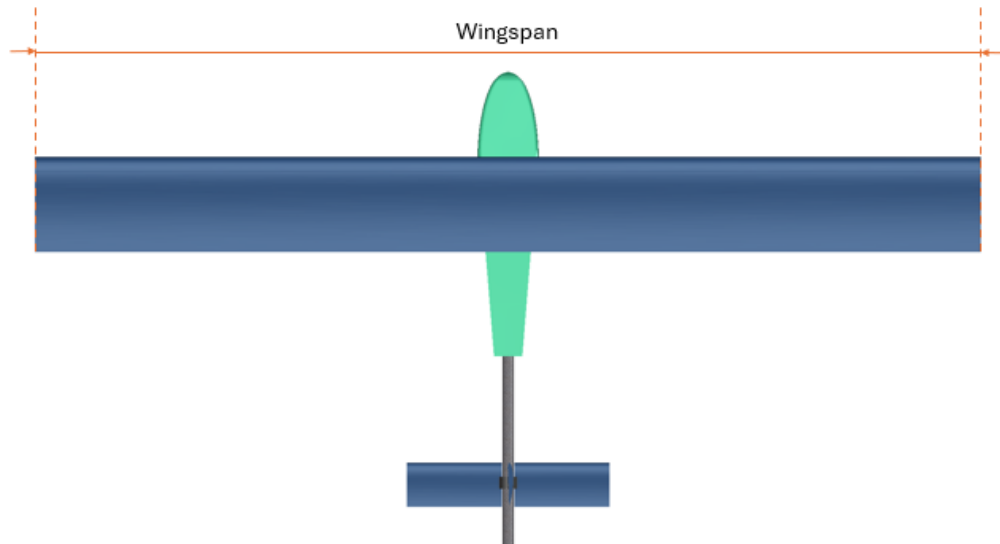
Teams shall not intentionally distort, flatten, enlarge, or modify the selected aerofoil beyond reasonable manufacturing tolerance without documenting the modified geometry and analysis.



R4.3 Wingspan — Critical

The total wingspan shall be measured between the outermost lateral points of the completed Main Wing Assembly.

Dimension	Requirement
Minimum total wingspan	600 mm
Maximum total wingspan	1,000 mm



R4.4 Aspect Ratio — Critical

The Main Wing Assembly shall have a minimum aspect ratio of 5.

Aspect ratio shall be calculated as:

$$\text{Aspect Ratio} = \frac{\text{Total Wingspan}^2}{\text{Projected Wing Planform Area}}$$

The calculation shall use the completed wing geometry.

The team shall include the aspect-ratio calculation and supporting dimensions in the Flight Engineering Report.

R4.5 Wing Surface Covering — Penalty

The complete external surface of the Main Wing Assembly shall be covered using paint or film

The covering shall be:

- Smooth.
- Uniform.
- Securely attached.
- Free from major wrinkles, tears, bubbles, or peeling.
- Applied without materially changing the intended aerofoil geometry.

R4.6 Wing Symmetry — Penalty

The left and right sides of the Main Wing Assembly shall be mirror-symmetric about the longitudinal centerline plane.

The following shall be identical on both sides:

- Planform geometry.
- Planform area.
- Sweep angle.
- Dihedral or anhedral angle.
- Twist distribution.
- Aerofoil profile.

An intentionally asymmetric wing is prohibited. Minor manufacturing variation may be accepted only where it does not materially affect safety, stability, or flight performance.

R4.7 Wing Attachment — Critical

The Main Wing Assembly shall be securely attached to the fuselage through the wing spar system.

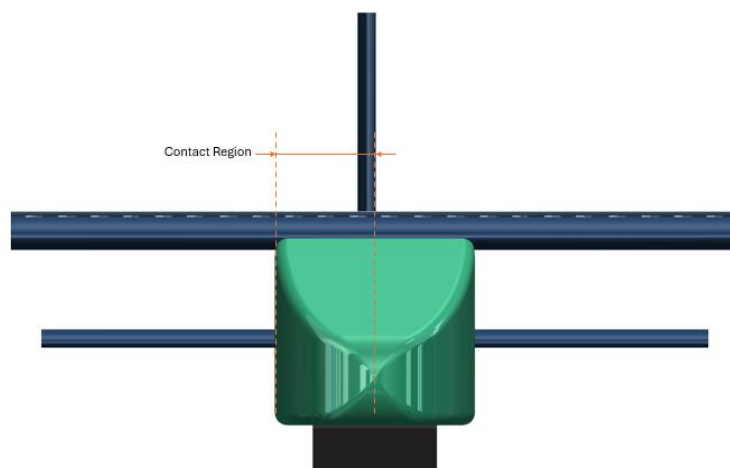
Each wing side shall maintain a minimum contact width of 20 mm with the fuselage.

The required contact may be achieved by:

- Mounting the wing on the fuselage surface.
- Installing the wing within a machined fuselage cavity.
- Using another secure arrangement that complies with these regulations.

During inspection, the wing attachment shall not demonstrate:

- Looseness.
- Unintended rotation.
- Vertical play.
- Separation between bonded sections.
- Cracking.
- Movement under a gentle manual load.



R4.8 Wing Rigidity — Critical

Each wing shall remain sufficiently rigid during launch and flight.

For the official rigidity test:

- The glider shall be supported at the fuselage or wing root.
- The unloaded wing-tip position shall be recorded.
- A mass of 250 g shall be suspended from the wing tip.
- The resulting vertical displacement shall be measured.
- The vertical deflection of each wing tip shall not exceed 20 mm.
- The left and right wings will be tested separately.

The wing shall fail the test if any of the following occurs:

- Deflection exceeds the permitted limit.
- Cracking.
- Permanent deformation.
- Spar movement.
- Bond failure.
- Separation from the fuselage.

R4.9 Wing Identification in Engineering Drawings — Penalty

The engineering drawings included in the Flight Engineering Report shall identify:

- Total wingspan.
- Root chord.
- Tip chord.
- Sweep angle.
- Dihedral or anhedral angle.
- Twist angle or washout.
- Aerofoil designation.
- Maximum aerofoil thickness.
- Wing spar position.
- Wing spar dimensions.
- Wing-to-fuselage attachment.

R4.10 Allowable Wing Zone — Critical

The complete Main Wing Assembly shall remain inside the allowable wing zone.

Front View

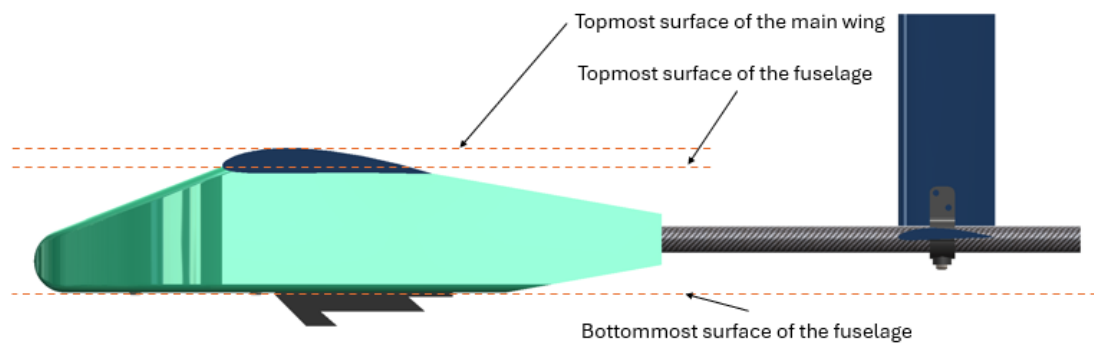
The Main Wing Assembly shall:

- Extend no lower than the lowest external surface of the fuselage.
- Extend no more than 25 mm above the highest external surface of the fuselage.

Top View

The complete Main Wing Assembly shall remain between the foremost and rearmost points of the fuselage.

No part of the wing, may extend forward of the foremost fuselage point or rearward of the rearmost fuselage point when viewed from above.



R4.11 Wing Spar — Critical

Each wing shall incorporate at least one continuous carbon-fibre spar extending from the wing root to the primary wing tip.

The spar shall:

- have any cross-sectional shape;
- where hollow, have a minimum internal cross-sectional dimension of 3 mm;
- be securely bonded within or to the wing;
- extend continuously throughout the primary wing panel without terminating within it; and
- remain secure against movement, rotation, loosening, or separation during inspection and structural testing.

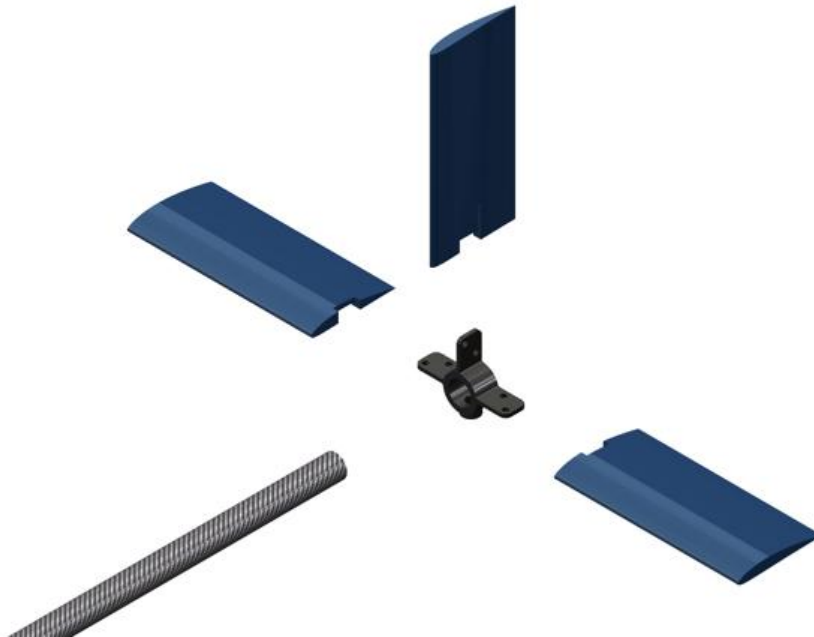
Where separate left and right wing panels are used, the spar system shall provide a continuous structural load path across the complete Main Wing Assembly.

R5 Tail Assembly

The Tail Assembly shall include:

- One tail spar.
- At least two stabilizing surfaces.
- One stabilizer coupling.

The Tail Assembly shall provide both longitudinal and directional stability.



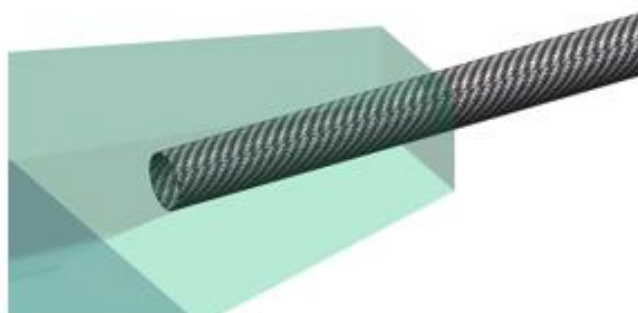
R5.1 Tail Spar — Critical

The glider shall incorporate a circular carbon-fiber tail tube connecting the stabilizers to the fuselage.

The tail spar shall:

- Connect the fuselage to the stabilizer coupling.
- Pass through the stabilizer coupling.
- Extend beyond the coupling.
- Remain straight, rigid, and securely installed.

The total tail-spar length shall include the portion inserted into the fuselage.



R5.2 Tail Spar Dimensions — Critical

Dimension	Requirement
Minimum total length	200 mm
Maximum total length	250 mm
Outer diameter	12 mm
Inner diameter	10 mm

Flattened, slotted, cut, crushed, or locally reduced tail-spar sections are prohibited

R5.3 Tail Spar Attachment — Critical

The tail spar shall be inserted into the socket in the official fuselage block and permanently secured using adhesive.

The installation shall satisfy the following requirements:

- Minimum insertion depth into the fuselage: 60 mm.
- Minimum fuselage wall thickness around the socket: 6 mm on all sides.
- Minimum extension beyond the stabilizer coupling: 10 mm.
- No rotation within the fuselage socket.
- No visible looseness or longitudinal movement.
- No cracking around the socket.
- No excessive adhesive obstructing the coupling.

R5.4 Stabilizers — Critical

The glider shall incorporate at least two stabilizers positioned towards the rear of the aircraft.

The stabilizers may use a conventional, V-tail, T-tail, cruciform, or another fixed configuration, provided the arrangement:

- Provides longitudinal stability.
- Provides directional stability.
- Remains fixed throughout the official flight.
- Connects to the tail spar through the stabilizer coupling.
- Is documented and justified in the Flight Engineering Report.

All stabilizers shall remain rigid and shall not deform, rotate, detach, or break during launch, flight, or landing.

R5.5 Stabilizer Material — Penalty

All stabilizers shall be 3D printed using:

- ABS filament; or PLA filament.

All stabilizers installed on one glider shall be printed from the same material.

Mixed materials, foam stabilizers, wooden stabilizers, composite stabilizers, or non-printed stabilizers are prohibited.

R5.6 Stabilizer Dimensions — Penalty

The stabilizer dimensions shall comply with the following ratios based on the team's actual Main Wing Assembly:

Stabilizer Parameter	Permitted Range
Stabilizer span	30%–40% of actual total wingspan
Stabilizer maximum chord	30%–40% of actual maximum wing chord
Stabilizer maximum thickness	30%–40% of actual maximum wing thickness

Each stabilizer shall use an aerofoil profile selected from the UIUC Airfoil Coordinates Database.

The stabilizer geometry, aerofoil, configuration, and stability reasoning shall be documented in the Flight Engineering Report.

R5.7 Stabilizer Coupling — Critical

The stabilizer coupling shall connect the tail spar to the stabilizers.

The standard coupling base shall comply with the following specifications:

Feature	Requirement
Coupling width	20 mm
Internal diameter	12 mm
External diameter	17 mm
Threaded insert	M3
Minimum mounting-point thickness	2 mm

Teams shall design their stabilizer mounting points around the standard coupling base.

The coupling shall:

- Fit securely around the tail spar.
- Be rigidly fixed.
- Prevent stabilizer rotation.
- Prevent longitudinal movement.
- Remain intact during launch, flight, and landing.
- Show no cracking, looseness, or separation during inspection.



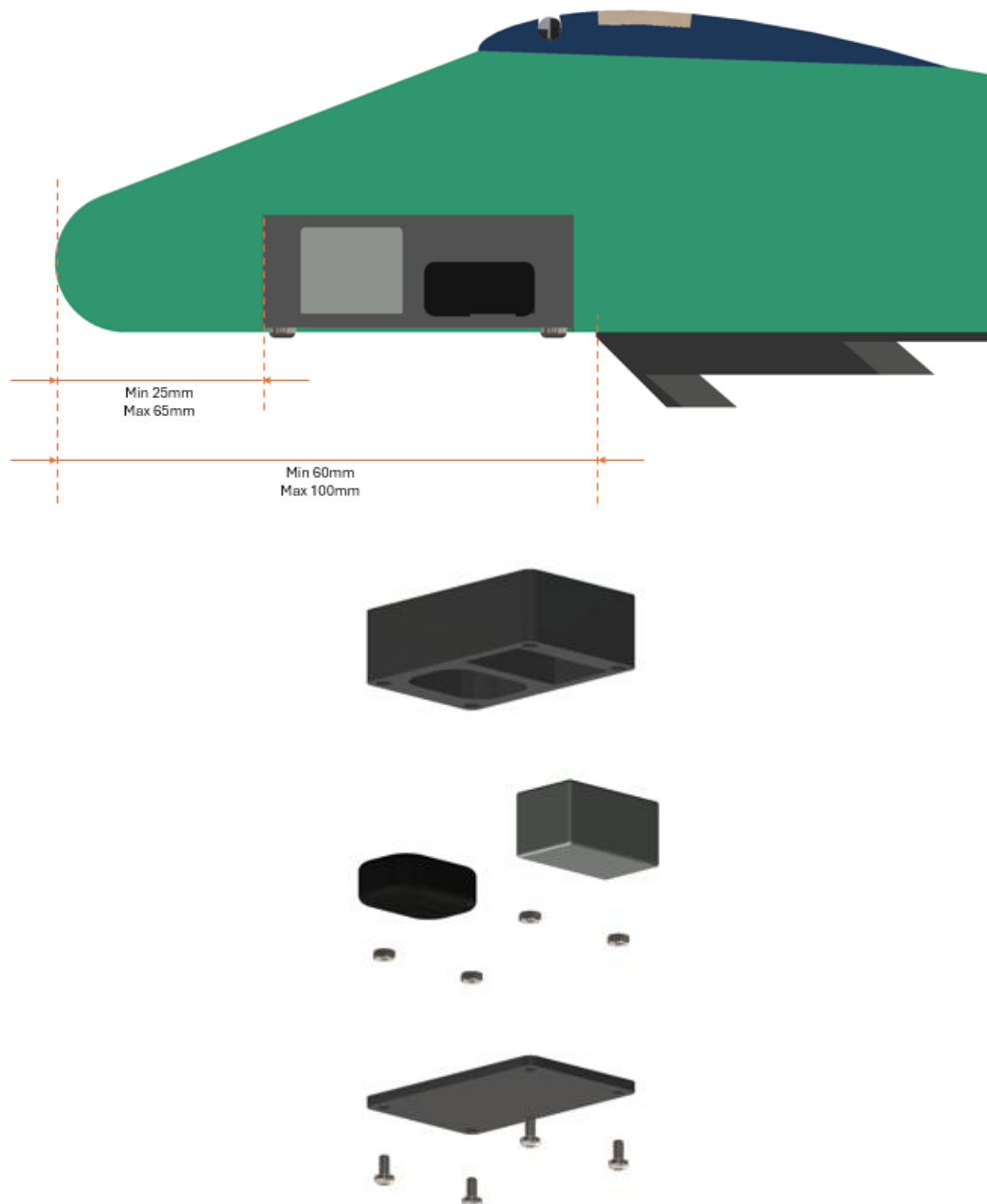
R6 Standard Payload Enclosure and Payload Bay Cavity

The glider shall incorporate a prescribed Payload Bay Cavity within the fuselage for the installation of the Standard Payload Enclosure.

The Standard Payload Enclosure shall receive and retain the Official Payload throughout launch, flight, and landing.

The complete payload arrangement shall consist of:

- the Payload Bay Cavity manufactured within the fuselage;
- the Standard Payload Enclosure Body;
- the Standard Payload Enclosure Cover;
- the prescribed M3 heat-set threaded inserts;
- the prescribed cover screws
- the Official Payload.



R6.1 Definitions

R6.1.1 Payload Bay Cavity

The Payload Bay Cavity is the prescribed cavity manufactured by the team within the fuselage to receive, position, and structurally support the Standard Payload Enclosure.



R6.1.2 Standard Payload Enclosure

The Standard Payload Enclosure is the standardized 3D-printed container installed within the Payload Bay Cavity for receiving and retaining the Official Payload.

The Standard Payload Enclosure shall consist of:

- the Standard Payload Enclosure Body;
- the removable Standard Payload Enclosure Cover; and
- the prescribed cover screws.

R6.1.3 Official Payload

The Official Payload is the standard mass of 100 g supplied by the Organizing Committee and installed inside the Standard Payload Enclosure before the official Flight Assessment.

R6.2 Standard Payload Enclosure — Critical

R6.2.1 Official Design Files

Aero Pakistan shall provide the official design files for the Standard Payload Enclosure.

The supplied design files shall define the approved geometry of:

- the Standard Payload Enclosure Body;
- the Standard Payload Enclosure Cover;
- the screw holes and fastening arrangement; and
- any internal features required to locate and retain the Official Payload.

R6.2.2 Team Manufacture

Each team shall manufacture its own Standard Payload Enclosure using the official design files provided by Aero Pakistan.

The Standard Payload Enclosure shall be 3D printed using material specified in Table R6-1.

Teams shall not:

- scale the supplied design;
- alter any prescribed dimension;
- modify the geometry;
- remove a prescribed feature;
- add an unauthorized internal or external feature;
- alter the cover arrangement;
- change the prescribed screw positions; or
- replace the prescribed fastening arrangement.

Table R6-1 — Standard Payload Enclosure Requirements

Parameter	Symbol	Requirement	Classification
Overall enclosure length	L_E	66 mm	Critical
Overall enclosure width	W_E	43 mm	Critical
Enclosure body height	H_B	25 mm	Critical
Overall assembled height, including cover	H_E	28 mm	Critical
Number of cover screws	—	4	Critical
Cover screw specification	—	M3 × 10 mm	Critical

R6.2.3 Dimensional Authority

The dimensions stated in Table R6-1 and the official Standard Payload Enclosure design files shall be consistent.

Where a dimensional or inspection question arises, the numerical dimensions stated in this Rulebook shall take precedence.

A Standard Payload Enclosure outside the prescribed dimensional tolerances shall be considered non-compliant.

R6.2.4 Competition Configuration

The Standard Payload Enclosure Body, Standard Payload Enclosure Cover, and all prescribed screws shall form part of the Fully Assembled Glider.

They shall be installed during:

- weighing;
- Pre-Flight Clearance;
- the Engineering Design Review; and
- the official Flight Assessment.

The Official Payload shall not be included when determining the mass of the Fully Assembled Glider

R6.3 Payload Bay Cavity — Critical

R6.3.1 Cavity Requirement

Each team shall manufacture a Payload Bay Cavity within the fuselage.

The cavity shall:

- be located entirely within the fuselage;
- receive the Standard Payload Enclosure completely;
- maintain the prescribed position and orientation of the enclosure;
- provide adequate structural support around and below the enclosure;
- allow the enclosure to be installed without damage to the fuselage;
- allow the cover and all prescribed screws to remain accessible; and
- comply with the dimensions stated in Table R6-2.
- The cavity dimensions shall provide sufficient manufacturing clearance for the Standard Payload Enclosure without permitting excessive movement or rotation.

Table R6-2 — Payload Bay Cavity Requirements

Parameter	Symbol	Requirement	Classification
Cavity length	L_C	66 mm	Critical
Cavity width	W_C	43 mm	Critical
Cavity depth	H_C	28 mm	Critical
Minimum surrounding fuselage material thickness	t_F	6 mm minimum	Critical

R6.3.2 Minimum Surrounding Material — Critical

The Payload Bay Cavity shall maintain a minimum uninterrupted thickness of 6 mm of permitted fuselage material on its front, rear, left, right, and lower sides.

The upper opening required for installation and access to the Standard Payload Enclosure shall be excluded from this requirement.

Adhesive, filler, paint, tape, covering, the Standard Payload Enclosure, or any separately attached component shall not count towards the required thickness.

A thickness below 6 mm at any applicable location shall result in refusal of Pre-Flight Clearance.

Adhesive accumulation, manufacturing debris, internal surface irregularities, or other obstructions shall not prevent the enclosure from being correctly installed.

R6.4 Payload Bay Position — Critical

The forward face of the Payload Bay Cavity shall be positioned at the distance specified in Table R3-1 and shown in the official fuselage dimensional drawing.

The Payload Bay Cavity and Standard Payload Enclosure shall:

- be centered on the Longitudinal Reference Plane;
- remain parallel to the fuselage longitudinal axis;
- be positioned vertically in accordance with the official fuselage dimensional drawing;
- remain accessible from the upper surface of the fuselage for installation and removal of the Official Payload.

Teams shall not relocate, rotate, enlarge, or otherwise alter the prescribed position or orientation of the Payload Bay Cavity or Standard Payload Enclosure.

R6.5 Standard Payload Enclosure Installation — Critical

The Standard Payload Enclosure shall be permanently bonded within the Payload Bay Cavity using the prescribed adhesive.

The enclosure shall be installed in the prescribed position and orientation, remain securely attached throughout launch, flight, and landing, and remain accessible for payload installation, inspection, and removal.

The adhesive shall not obstruct the Enclosure Cover or screws. Adhesive shall not count towards the minimum required 6 mm surrounding fuselage-material thickness.

Any movement, looseness, separation, or incorrect positioning of the Standard Payload Enclosure shall result in refusal of Pre-Flight Clearance.

R6.6 Standard Payload Enclosure Cover and Fasteners — Critical

The Standard Payload Enclosure shall be closed using the official Standard Payload Enclosure Cover.

The Cover shall be secured using four M3 × 6 mm countersunk machine screws engaging with M3 brass heat-set threaded inserts installed in the Standard Payload Enclosure Body.

The Cover shall fully close the enclosure, remain correctly seated, and retain the Official Payload throughout launch, flight, and landing. All four screws shall be correctly installed and securely tightened before the official flight.

Tape, adhesive, clips, magnets, friction fit, or another unauthorized method shall not replace the prescribed Cover and screws.

A missing, loose, damaged, substituted, or incorrectly installed Cover, screw, or threaded insert shall result in refusal of Pre-Flight Clearance.

Parameter	Requirement	Classification
Number of cover screws	4	Critical
Cover screw specification	M3 × 6 mm countersunk machine screw	Critical
Threaded insert specification	M3 brass heat-set threaded insert	Critical

R6.7 Official Payload

R6.7.1 Payload Specification

The Official Payload shall have a mass of 100 g.

The dimensions, material, and form of the Official Payload shall be stated in the official payload specification or verified using an official payload sample or gauge.

R6.7.2 Official Installation

The Official Payload shall:

- be supplied by the Organizing Committee;
- be installed by, or under the direct supervision of, Competition Officials;
- be installed before the team's official flight attempt;
- remain inside the Standard Payload Enclosure throughout launch, flight, and landing;
- be removed by, or under the supervision of, Competition Officials after the flight; and
- remain under official control during the Flight Assessment.

R6.7.3 Team Restrictions

Teams shall not:

- substitute another payload;
- install their own payload for an official flight attempt;
- modify or damage the Official Payload;
- attach adhesive, tape or another material to the Official Payload;
- use the Official Payload as a structural connector; or
- alter the payload after it has been officially installed.

R6.8 Documentation Requirements

The team's submitted CAD model, engineering drawings, and Flight Engineering Report shall clearly identify:

- the Payload Bay Cavity;
- the Standard Payload Enclosure;
- the enclosure dimensions;
- the cavity dimensions;
- the cavity position relative to the prescribed fuselage datums;
- the minimum surrounding fuselage-material thickness;
- the enclosure installation method;
- the Standard Payload Enclosure Cover;
- the cover screw specification and position;
- the threaded insert specification and position;
- the position of the Official Payload; and
- the effect of the installed Official Payload on the Centre of Gravity and static margin.

Dimensioned sectional views shall be included to demonstrate compliance with the minimum 6 mm surrounding fuselage-material requirement.

R6.9 Inspection and Official Authority

Inspection Officials may verify compliance through:

- direct physical measurement;
- dimensional gauges;
- the official Standard Payload Enclosure;
- an official payload sample or gauge;
- submitted CAD geometry;
- engineering drawings;
- sectional views;
- visual inspection; or
- any other reasonable verification method.

Passing an earlier document review shall not constitute confirmation that the physical cavity or enclosure is compliant.

Final compliance shall be determined during Pre-Flight Clearance.

Non-compliance relating to the enclosure geometry, cavity dimensions or position, minimum 6 mm surrounding fuselage-material thickness, enclosure installation, Cover, screws, threaded inserts, or payload retention shall constitute failure of a Critical Airworthiness Requirement.

The glider shall not receive Pre-Flight Clearance unless the non-compliance is corrected and the glider successfully completes re-inspection within the permitted inspection window.

R7 Official Shuttle and Standard Launch Hook**R7.1 Official Launcher**

The glider shall be launched using the official Aero Pakistan motorized launcher.

Parameter	Official Setting
Launch speed	7 m/s
Launch angle	5° above horizontal
Launch height	6.5 m above ground level

Teams shall design and manufacture their glider to withstand the acceleration and loads produced by the official launcher.

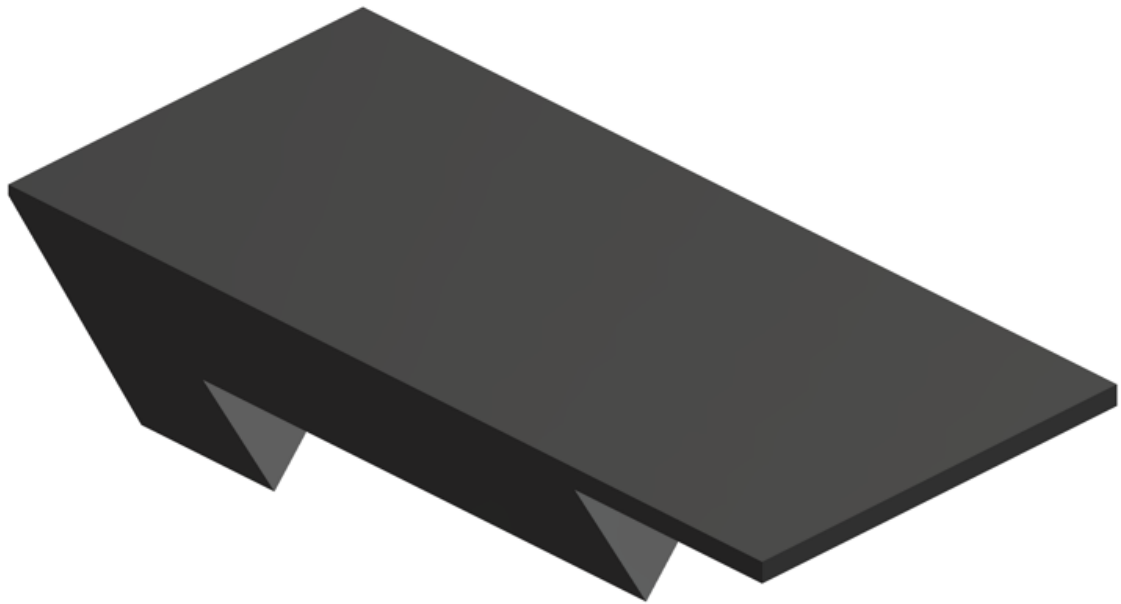
No team-provided launching device, supplementary launching mechanism, or modification to the official launcher or shuttle shall be permitted.

R7.2 Standard Launch Hook — Critical

R7.2.1 Definition

The Standard Launch Hook is the standardized interface installed on the underside of the fuselage to connect the glider to the official launcher shuttle during the launch-acceleration phase.

The Standard Launch Hook shall remain securely engaged with the shuttle during acceleration and shall be released cleanly at the end of the launch rail.



R7.2.2 Official Design Files

Aero Pakistan shall provide the official design file for the Standard Launch Hook.

Each team shall manufacture its Standard Launch Hook using the supplied design file and the prescribed 3D-printing material.

Teams shall not:

- scale the supplied design;
- alter any prescribed dimension;
- modify the hook geometry;
- enlarge or reduce the shuttle-engagement feature;
- reinforce the hook using unauthorized material;
- add an unauthorized mounting feature;
- remove a prescribed feature; or
- manufacture a substitute hook using a different design.

Removal of support material, burrs, strings, or minor printing artefacts is permitted, provided that the prescribed geometry and dimensions are not materially altered.

R7.3 Standard Launch Hook Dimensions — Critical

The Standard Launch Hook shall comply with the official CAD file and the dimensions stated in Table R7-1.

Table R7-1 — Standard Launch Hook Requirements

Parameter	Symbol	Requirement	Classification
Mounting-base length	L_B	85 mm	Critical
Mounting-base width	W_B	40 mm	Critical
Mounting-base thickness	t_B	6 mm	Critical

The official CAD file shall define all curves, radii, chamfers, engagement surfaces, and other geometric features not separately stated in Table R7-1.

Teams shall not scale, reshape, enlarge, reduce, reinforce, or otherwise modify the Standard Launch Hook.

A Standard Launch Hook that does not comply with the prescribed dimensions, material, or manufacturing requirements shall result in refusal of Pre-Flight Clearance.

This component shall be bonded to the fuselage using epoxy resin only.

R7.4 Prescribed Launch Hook Position — Critical

The forward-most point of the Standard Launch Hook shall be positioned at the distance specified in Table R3-1 and shown in the official fuselage and launcher-interface drawings.

The Standard Launch Hook shall:

- be bonded externally to the underside of the fuselage;
- be centered on the Longitudinal Reference Plane;
- remain parallel to the fuselage longitudinal axis;
- face the prescribed shuttle-engagement direction;
- remain fully seated against the prescribed fuselage mounting surface without a spacer or uncontrolled gap;
- and form the lowest prescribed point of the glider.

Teams shall not relocate, rotate, reverse, offset, or otherwise alter the prescribed position or orientation of the Standard Launch Hook.

Any incorrect position, orientation, alignment, or seating shall result in refusal of Pre-Flight Clearance.

R7.5 Standard Launch Hook Attachment — Critical

The Standard Launch Hook shall be permanently bonded directly to the prescribed external mounting surface on the underside of the fuselage using epoxy resin.

The hook mounting base shall remain fully seated against the fuselage surface without an uncontrolled gap, spacer, movement, or rotation.

Before bonding, the mounting surface shall be structurally sound and free from loose material, paint, film, tape, decals, dust, grease, or other contamination.

The Standard Launch Hook shall remain securely attached throughout handling, launch, flight, and landing.

Adhesive shall not compensate for an incorrectly positioned hook, unsuitable mounting surface, or incomplete seating of the mounting base.

Any incorrect positioning, incomplete seating, looseness, movement, rotation, separation, or insecure adhesive bond shall result in refusal of Pre-Flight Clearance.

R7.6 Launcher and Shuttle Compatibility — Critical

The Standard Launch Hook and completed glider shall interface with the official launcher shuttle without:

- forcing the hook into position;
- bending or compressing the fuselage;
- bending or deforming the Standard Launch Hook;
- modifying the official shuttle;
- adding temporary spacers;
- applying temporary tape or fixtures;
- holding the glider in position by hand during launch; or
- obstructing the intended release movement.

The interface shall permit:

- secure engagement during acceleration;
- correct longitudinal alignment;
- stable support on the shuttle;
- unrestricted movement of the shuttle;
- clean release at the end of the launch rail; and
- removal of the glider without damage.

A glider that cannot safely and correctly interface with the official launcher shuttle shall not receive Pre-Flight Clearance.

R7.8 Documentation Requirements

The team's submitted CAD model, engineering drawings, and Flight Engineering Report shall clearly identify:

- the Standard Launch Hook;
- the official hook geometry;
- the hook dimensions;
- the hook reference point;
- the position of the hook relative to the Fuselage Nose Datum;
- alignment with the Longitudinal Reference Plane;
- the vertical mounting position;
- the mounting-surface geometry;
- the surrounding fuselage-material thickness;
- the prescribed adhesive; and
- the hook and shuttle interface.

Dimensioned side, bottom, and sectional views shall be included where necessary to demonstrate compliance.

R8 Centre of Gravity and Stability**R8.1 Centre of Gravity Limits — Critical**

The longitudinal Centre of Gravity of the flight-ready glider, with the Official Payload correctly installed inside the Standard Payload Enclosure and the Enclosure Cover secured using all prescribed screws, shall be located between 25% and 40% of the reference wing chord, measured rearwards from the leading edge.

Centre of Gravity Parameter	Requirement
Forward limit	25% of reference wing chord
Aft limit	40% of reference wing chord
Lateral position	Longitudinal centerline plane
Vertical position	Unrestricted within the glider

The Centre of Gravity shall not move outside the permitted range when the Payload Retention System is closed and the glider is handled normally.

R8.2 Centre of Gravity Identification

The required Centre of Gravity position shall be:

- Clearly marked on the external surface of the glider.
- Identified in the CAD model.
- Dimensioned in the engineering drawings.
- Supported by calculations.
- Verified with the official payload installed.

The physical Centre of Gravity mark shall correspond to the submitted calculations.

R8.3 Centre of Gravity Calculations

Teams shall calculate and document the Centre of Gravity:

- Without the official payload.
- With the official payload installed.
- With all permanent components
- The calculation shall identify:
 - Component masses.
 - Component locations.
 - Payload location.
 - Reference datum.
- Final Centre of Gravity position.

R8.4 Static Stability — Critical

The glider shall demonstrate positive longitudinal static stability in its official flight configuration.

Teams shall calculate and document:

- Aerodynamic Centre or neutral point estimate; Centre of Gravity position; Static margin;
- Tail-volume or equivalent stability reasoning;
- Effect of the official payload

A Centre of Gravity within the dimensional range does not automatically demonstrate stability.

Competition Officials may reject a glider where the submitted analysis, physical configuration, or observed balance indicates an unsafe or predictably unstable aircraft.

R8.5 Lateral Balance

The glider shall not contain an intentional left-right mass imbalance.

When supported along the longitudinal centerline, the glider shall not display excessive rolling tendency caused by:

- Unequal wing construction; Unequal surface finish;
- Incorrect component installation; Unequal stabilizer geometry.