

RACE PAKISTAN 2027

RULEBOOK



**RACE
PAKISTAN**

Organized by
NUVEX
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I INTRODUCTION

I1 What is Race Pakistan?

Race Pakistan is Pakistan's own student motorsport engineering competition — built from scratch, right here. Organized by Nuvex (Pvt) Ltd, Race Pakistan gives 14 to 19 year-old students the chance to design, engineer, manufacture and race a CO₂-powered model car.

Throughout the season, teams are required to design and manufacture a CO₂-powered model car using industry-standard CAD software and CNC machining processes. Alongside the technical workload, teams are expected to develop and execute a business strategy, secure external sponsorship, manage a project budget, and present their decisions and outcomes before a panel of industry professionals.

On competition day, every element of this work is subjected to formal evaluation — through technical scrutineering, structured judging sessions, and a live race on the official 20-metre straight-line track. Performance across all phases of the season contributes to a final cumulative score, and it is this score that determines the Race Pakistan Champion.

I2 Race Pakistan Team Roles

Teams are free to define their own internal roles and titles based on their size and structure. However, each team must designate a Team Manager who will serve as the primary point of contact between the team and Race Pakistan management. The Team Manager is responsible for managing timelines, coordinating the team, and ensuring the car is ready on time.

The following roles are suggested to help teams organize their work effectively. Teams are free to adapt, combine, or rename these based on their needs:

- **Technical Manager:** Owns the car's CAD design, aerodynamics and geometry.
- **Manufacturing Manager:** Responsible for CNC machining, surface finishing and assembly.
- **Marketing Manager:** Finds sponsors, builds the brand and manages social media presence.
- **Finance Manager:** Organizes budgets and tracks all expenses and income.
- **Graphic Designer:** Responsible for producing color schemes, sponsorship decals and team marketing materials.

A DEFINITIONS

A1 Key Performance Indicators (KPIs)

The scoring criteria on official judge scorecards describe the level of evidence needed to earn points in each scoring band.

A2 Project Elements

Every document, file, model or presentation submitted or delivered as part of the competition entry.

A3 Engineering Drawing

A dimensioned drawing of the car detailed enough for a third party to manufacture it. Must include dimensions, tolerances, material specifications and virtual cargo identification.

A4 Critical Regulation

A regulation whose violation leads to disqualification from the competition or from specific awards. Clearly flagged throughout the Technical Regulations.

A5 Penalty Points

Points deducted from a team's score for regulation violations. Applied per infringement per car.

A6 Scrutineering

The official technical inspection of race cars. Every car must pass scrutineering before it is allowed to race.

A7 Primary Car and Backup Car

The primary car, designated 'A', is the car entered for scrutineering and racing. The backup car, designated 'B', serves as the reserve. Both cars must be identical in design, construction, and specification in every respect.

A8 Paddock

Each team's dedicated exhibition space at the competition venue. Assessed by judges during Paddock Inspection.

A9 Car Track Time

This is the actual time taken by car to travel the full track length from start to finish. It is measured from the moment the launch pod is activated to when the car crosses the finish line beam.

A10 Total Race Time

Calculated as: $(\text{Sum of all run times} + \text{sum of all penalty times}) \div \text{number of valid runs}$.

A11 MARKAZ (Competition Management System)

The Race Pakistan online platform used for learning, team number allocation, document submissions and official communications.

G GENERAL INFORMATION

G1 Registration

- G1.1** All teams must register via the official RACE PAKISTAN website before the stated deadline.
- G1.2** Only teams with confirmed registration are eligible to compete.
- G1.3** Team numbers serve as official car numbers on both primary and backup cars.
- G1.4** After successful registration teams will be given to MARKAZ

G2 Competing Teams

- G2.1** Minimum 4 and maximum 6 members per team.
- G2.2** All members must be aged between 14 to 19 at the time of competition.
- G2.3** Only registered members may represent the team at any official event activity.

G3 Queries and Clarifications

- G3.1** Questions about the rules must be submitted via the Race Pakistan FAQ portal on the MARKAZ. The Organizing Committee reviews and answers all questions publicly.
- G3.2** Clarifications are also published on the official Race Pakistan website and CMS.
- G3.3** Teams cannot ask officials or judges whether a specific car design is compliant before the event. Compliance is determined directly at scrutineering events on competition day.

G4 Supplementary Regulations and Event Day Handbook

Additional documents containing logistical information and competition day schedules will be issued by the Organizing Committee and distributed via the official Race Pakistan website. All such documents are mandatory on all registered teams

G5 Design Ideas and Innovation

Teams must interpret the Technical Regulations independently. No pre-event rulings on compliance will be issued. Innovation within the rules is actively encouraged.

G6 Team Partnerships

- G6.1** Teams are encouraged to build mentoring relationships with engineers and companies.
- G6.2** All project work must be created by the team members, and any external assistance must be acknowledged in submissions.
- G6.3** Commercially sourced components must be justified in the Engineering and Design Portfolio.

G7 Mandatory Project Elements

Project Element	Submission Deadline	Submission Method
Engineering and Design Portfolio (PDF)	Will be communicated via MARKAZ	Upload via MARKAZ
Business Strategy Portfolio (PDF)	Will be communicated via MARKAZ	Upload via MARKAZ
Final Car STEP File	Will be communicated via MARKAZ	Upload via MARKAZ
Both Race Cars (Primary + Backup)	Competition Day	Delivered in person
Engineering and Design Portfolio (Printed ×2)	Competition Day	Submitted to Engineering and design judges
Business Strategy Portfolio (Printed ×2)	Competition Day	Submitted to Business Strategy judges
Business Strategy Presentation	Competition Day	Submitted online

G8 File Naming Convention (3-Point Penalty)

Each document must be named according to the following naming convention; a 3-point penalty applies per incorrectly named file.

Document	Required File Name
Engineering and Design Portfolio	TeamNumber_TeamName_EngineeringDesignPortfolio.pdf
Business Strategy Portfolio	TeamNumber_TeamName_BusinessStrategyPortfolio.pdf
STEP File	TeamNumber_TeamName_Vehicle.step

G9 Team Names

Teams cannot use “Race Pakistan”, or “Nuvox” within their team’s name, logo or social media handles.

G10 Late Submission

- G10.1** Any project element submitted after the deadline loses 5 points per day from that category's total score, up to 50 points
- G10.2** Late submissions will not be acceptable 10 days before the competition day.
- G10.3** Missing the final deadline entirely results in disqualification from that judging category.

G11 Plagiarism

All submitted work must be original and produced by the student team. Confirmed plagiarism may result in disqualification from a category or the entire competition.

G12 Acceptable Use of AI

- G12.1** AI tools are permitted for research, content ideas, design support and visual polish only.
- G12.2** AI-assisted content must be clearly flagged in the relevant portfolio section or presentation.
- G12.3** Teams must be able to explain all AI-assisted content and demonstrate understanding.
- G12.4** Using AI to generate an entire portfolio or bypass the design process results in disqualification from the category

G13 Spirit of the Competition

Race Pakistan is built on fair competition, mutual respect and genuine effort. Teams exploiting rules, interfering with other teams, or attempting to influence judges through anything other than brilliant project work face consequences at the Head Judge's discretion.

G14 Official Decals and Car Identification

G14.1 Race Pakistan Official Decal [Penalty — 5pts]

- A Race Pakistan logo decal must be wholly adhered to each side of the car body, positioned between the front and rear wheel centerlines and clearly legible in the respective side view.
- The decal must measure 30mm (horizontal) × 15mm (vertical).
- Teams may manufacture their own decals but must use the official Race Pakistan artwork available on the Race Pakistan official website and MARKAZ.
- The decal is available in two versions — black background or white background. Teams must select whichever version provides maximum contrast against their car's color scheme.

G14.2 Primary and Backup Car Identification [Penalty — 3pts]

- The primary car must be identified as "A" and the backup car as "B" via a labelled decal affixed to the outer face of the left wheel when viewed from the front of the car.
- The decal must cover the full outer face of the wheel, sized to match the outer diameter of the wheel as manufactured, and must not extend beyond the wheel's outer circumference.
- The official sticker template is available on the Race Pakistan official website and MARKAZ. Failure to apply this decal results in a 3-point penalty per car.

G14.3 Team Number Identification [Penalty — 3pts]

- The team number must be displayed on both cars via a decal affixed to the outer face of the right wheel when viewed from the front of the car.
- The decal must cover the full outer face of the wheel, sized to match the outer diameter of the wheel as manufactured, and must not extend beyond the wheel's outer circumference.
- The team number must be identical on both primary and backup cars. The official sticker template is available on the Race Pakistan official website and MARKAZ. Failure to apply this decal results in a 3-point penalty per car.

G15 Safety Overview

G15.1 Any car found unsafe during racing must be repaired or replaced immediately.

G15.2 Vapes, cigarettes, alcohol, and intoxicating substances are strictly prohibited. Violations may result in removal and team disqualification.

G16 Code of Conduct

G16.1 Everyone at Race Pakistan must act with integrity, respect and professionalism at all times.

G16.2 Sabotage or tampering with another team's equipment is a serious offence.

G16.3 Consequences range from score deductions to full disqualification and banning from future events.

G17 Code of Conduct Team (CoCT)

A dedicated Code of Conduct Team (CoCT) will be present at all Race Pakistan events. The CoCT operates independently from the judging panel and has full authority to issue disciplinary cards to any competing team for behavioral violations or scheduling failures.

G18 Yellow Card

A Yellow Card is issued for first-instance misconduct or minor scheduling violations, including but not limited to:

- Missing an assigned time slot for any judging session or racing run
- Disrespectful conduct toward judges, officials, or other teams or failure to follow event instructions issued by Race Pakistan officials
- A Yellow Card results in a 10-point deduction from the team's total score. Two Yellow Cards issued to the same team in a single event automatically trigger a Red Card.

G19 Red Card

A Red Card is issued for serious misconduct or upon accumulation of two Yellow Cards. Consequences are at the CoCT's discretion and may include:

- Disqualification from the specific event or judging category in which the violation occurred
- Full disqualification from the competition
- Red Card decisions are reported to the Head Judge and are final.

C COMPETITION AND JUDGING FORMAT

C1 Competition Program

The official schedule of all judging sessions and competition day activities, will be published by the Organizing Committee prior to the event.

C2 Judging Categories

- C2.1 Scrutineering Judging:** The official technical inspection of every race car against all Technical Regulations prior to racing. No points are awarded, but violations carry direct consequences on racing eligibility and scoring.
- C2.2 Engineering and Design Judging:** A live technical review where judges assess your car design, CAD and CAM work, build quality, and your team's depth of engineering understanding.
- C2.3 Engineering and Design Portfolio Judging:** A pre-submitted document judged independently, capturing your complete design and manufacturing journey from concept to final car.
- C2.4 Business Strategy Presentation:** A structured 8-minute live presentation where your team presents and defends its strategy, decisions, and execution to a panel of judges.
- C2.5 Business Strategy Portfolio:** A pre-submitted document evaluating how effectively your team planned, managed, and executed the business side of your Race Pakistan season.
- C2.6 Paddock Inspection:** A scheduled on-day evaluation of your team's paddock space, assessing organisation, team identity, and overall competition readiness.
- C2.7 Racing:**
The on-track performance category where your car's speed, consistency, and reliability are measured across three official runs on the 20-metre track.

C3 Judging Scorecards

- C3.1** Official scorecards for every judging category are published before the competition. Teams are expected to download and use them to guide their work throughout the season.
- C3.2** Judges score only what is presented during the session. Anything submitted, shown, or explained outside of the official judging window will not be considered.
- C3.3** Any queries regarding scores must be submitted via email within 24 hours of the official results being announced.

C4 Overall Champion Determination

- C4.1** The Race Pakistan Champion title is awarded to the team achieving the highest combined score across all six judging categories.
- C4.2** In the event of a tied combined score, the team with the higher Racing score shall be declared as the winner.
- C4.3** All decisions made by the scoring Committee are final and binding on all competing teams.

C5 Point Allocations

Judging Category	Points	Weightage (%)
Engineering and Design Presentation	200	21%
Engineering and Design Portfolio	100	11%
Business Strategy Presentation	200	21%
Business Strategy Portfolio	100	11%
Paddock Inspection	50	5%
Racing	300	31%
TOTAL	950	100%

S SCORING AND JUDGING

S1 Scrutineering

S1.1 Technical Inspection Overview

Each team's car (primary and backup) will undergo full technical scrutineering to confirm compliance with the Race Pakistan Technical Regulations, and any penalties issued will impact the team's overall race points.

- Dimensions — verified using calibrated gauges and vernier calipers
- Weight — using officially calibrated digital scales accurate to $\pm 0.1\text{g}$
- Safety systems — particularly tether line guides
- Critical regulation compliance
- Virtual cargo identification and dimensional compliance
- Overall build quality and assembly
- Engineering drawings and renderings reviewed against the physical car

S1.2 Team Preparation

All cars must be fully compliant with every Technical Regulation prior to submission for scrutineering. Teams are strongly advised to verify all Critical Regulations before handover. Any violations identified during scrutineering are solely the responsibility of the competing team.

S1.3 Attendance

A maximum of two team members must remain available throughout scrutineering to respond to any questions raised by the scrutineering panel. No other individuals are permitted within the inspection area during this time.

S1.4 How Penalties Work

S1.4.1 Penalties are applied per infringement per car.

S1.4.2 Violations of any Critical Regulation directly affect eligibility for major awards and may result in disqualification from racing.

S1.4.3 Standard violations result in point deductions from the team's Racing score.

S1.5 Post-Race Scrutineering

- S1.5.1** Cars are subject to technical inspection following any race run. Any violation identified during post-race scrutineering will void the affected run and may result in additional penalties.
- S1.5.2** Removing or tampering with any official seals or markings placed on a car by Race Pakistan officials constitutes a breach of regulations.

S1.6 Car Submission Between Competition Days

- S1.6.1** Race Pakistan runs across two days. Any team whose car has cleared scrutineering on Day 1 but has not yet completed their racing runs must submit both cars to Race Pakistan officials before leaving the venue at the end of Day 1. Cars may not be taken off-site overnight under any circumstances.
- S1.6.2** Teams will have their cars returned to them at the start of Day 2 to complete their remaining race runs.
- S1.6.3** Failure to submit cleared cars at the end of Day 1 incurs a 50-point penalty deducted from the team's total score, and scrutineering will need to be done again.

S2 Engineering and Design Presentation

S2.1 What Gets Judged?

Engineering judges assess the team's car design, CAD and CAM work, build quality, and depth of engineering understanding. The session combines a portfolio review with a live Technical Questions and Answers, during which judges will examine the printed Engineering and Design Portfolio, review CAD and CAM models, and inspect the physical car.

- Quality of CAD modelling, assembly and rendering
- CAM toolpath simulation evidence and understanding of the CNC process
- Use of CFD, simulation or other analysis tools
- Design development process and iteration
- Physical build quality, finish and assembly
- Ability of team members to explain engineering decisions under questioning

S2.2 Team Preparation

Teams must bring two printed copies of their Engineering and Design Portfolio and a laptop containing all CAD models, CAM simulations, and design files. Judges will ask direct technical questions

S2.3 Judging Process

- S2.3.1** Judges review the Engineering and Design Portfolio in a closed session prior to the interview.
- S2.3.2** The session is conducted as a structured technical discussion, during which judges will examine the team's CAD and CAM work, engineering design decisions, and manufacturing process in detail.
- S2.3.3** Build quality is assessed independently but contributes to the overall Engineering and Design Presentation score.

S2.4 Portfolio Requirements

- Format: Printed A4, two copies
- Maximum 10 pages excluding covers — only the first 10 pages will be read
- Printed copy must match the MARKAZ-submitted PDF
- Must include CAD/CAM evidence, engineering drawings, renderings and virtual cargo identification.

S2.5 Judging Provisions

All sessions will run strictly according to schedule, and teams arriving late may forfeit their slot.

S3 Engineering and Design Portfolio

S3.1 What Gets Judged?

The Engineering and Design Portfolio is judged separately from the on-day event by a dedicated review panel evaluating the MARKAZ-submitted document. It serves as the complete written record of the team's design and manufacturing journey throughout the season.

- Design concepts and how they developed over time
- 3D modelling techniques and CAD tools used
- CAM processes, toolpath simulations and CNC documentation
- CFD, FEA or other engineering analysis
- Testing methodologies and evaluation
- Professional presentation and document quality

S3.2 Submission Requirements

- One digital PDF submitted via MARKAZ before the stated deadline
- Maximum 10 pages excluding covers
- File name: TeamNumber_TeamName_EngineeringDesignPortfolio.pdf
- Two printed copies brought to competition day and submitted at registration desk.
- Submissions that do not comply with the above requirements will not be considered for judging.

S4 Business Strategy Presentation

S4.1 What Gets Judged?

The Business Strategy Presentation evaluates the team's ability to present, justify, and defend their strategy, decisions, and execution before a panel of industry judges.

- Clarity and structure of the presentation
- Quality of communication and delivery
- Team coordination and participation
- Understanding of decisions and ability to justify them
- Effective use of the portfolio as supporting evidence
- Performance under questioning

S4.2 Team Preparation

- Deliver a structured 8-minute presentation
- All team members must actively participate
- Presentation must align with submitted portfolios
- Prepare for direct questioning during Q&A
- Bring and test all supporting materials in advance

S4.3 Judging Provisions

All sessions will run strictly according to schedule, and teams arriving late may forfeit their presentation slot.

S5 Business Strategy Portfolio

S5.1 What Gets Judged?

The Business Strategy Portfolio evaluates the team's ability to plan, manage, and execute the business side of their Race Pakistan season. Judges assess how effectively the team has structured its operations, made and justified decisions, managed resources, and translated strategy into execution. Emphasis is placed on clarity of thinking, alignment between planning and outcomes, consistency of team identity, and the quality and organization of documentation.

S5.2 Submission Requirements

- One digital PDF submitted before the stated deadline
- Maximum 10 pages excluding covers
- File name: TeamNumber_TeamName_BusinessStrategyPortfolio.pdf
- Two printed copies brought to competition day and handed in at registration
- Submissions that do not comply with the above requirements will not be considered for judging.

S6 Paddock Inspection

S6.1 What is the Paddock Inspection?

The Paddock Inspection is a dedicated judging activity in which a panel evaluates each team's paddock space during competition day. The paddock represents the team's working environment and reflects their level of organization, identity, preparation, and overall competition readiness.

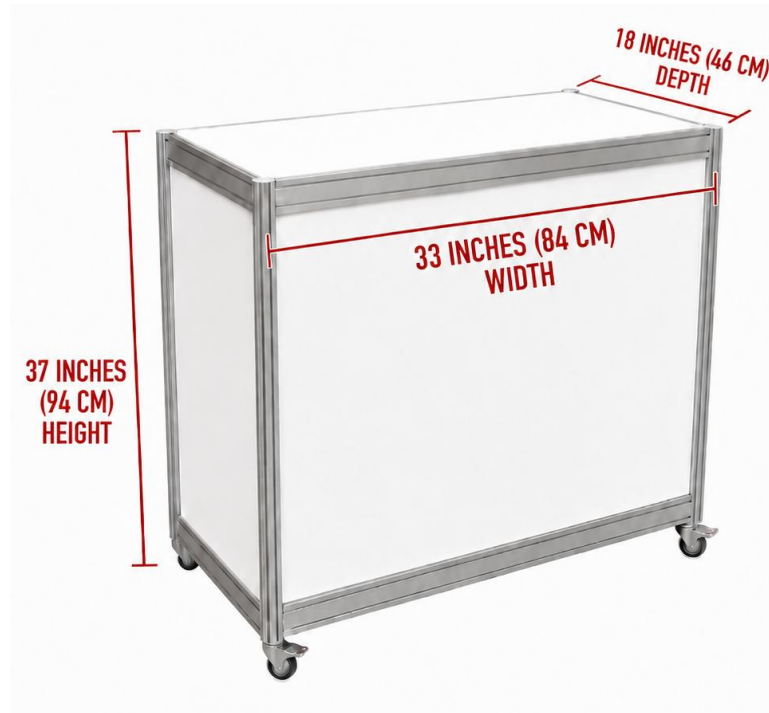
S6.2 What Gets Judged?

S6.2.1 Teams are evaluated on the quality and effectiveness of their paddock setup, including organization, clarity of team identity, visibility of work, team presence, and overall professionalism.

S6.2.2 The paddock must function as a structured team space where cars, portfolios, and relevant materials are clearly presented, and team members are prepared to represent their work when engaged.

S6.3 Paddock Size

Teams will be provided with paddock size and setup specifications prior to the competition and are expected to comply.



S6.4 Team Preparation

Teams are entirely responsible for setting up their own Paddock. Advisors are not permitted to assist during the event under any circumstances. Teams are expected to plan their layout in advance and bring all display materials as part of their competition day preparation.

S6.5 Judging Process

The panel visits every team's Paddock during a scheduled window. Teams must be present during this window. Judges may ask questions about setup and branding decisions.

S6.6 Team Presence During Inspection (5 points penalty)

- All registered team members must be physically present in the paddock for the full duration of the Paddock Inspection window, with a minimum of 2 members required at all times. — judges assess team presence as part of the overall evaluation.
- Members who are absent during inspection cannot be substituted or represented by other team members or the advisor.
- If fewer than 2 members are present, a 5-point deduction applies for absent member to the Paddock Inspection score.

S7 Racing

S7.1 How Scoring Works

The Racing score is determined by the team's Total Race Time — an average calculated across all valid runs with any applicable penalty times included. The fastest team is awarded the maximum 300 points, with all remaining teams scored proportionally relative to the fastest time.

S7.2 Race Format

- Teams found non-compliant with Critical Regulations during scrutineering are ineligible for the racing event.
- Each team completes three official racing runs.
- All three runs are conducted in the same lane, assigned by race officials.
- One 12g CO₂ cartridge is used per run, installed immediately before and removed immediately after each run.
- All runs take place on the official 20-metre elevated straight-line track equipped with a tether line safety system.

S7.3 Team Preparation

- Teams must familiarize themselves with the manual launch procedure. A designated team member must operate the launch pod for every run.
- No team member or official may touch the car once it has been staged at the start line.
- A car that is damaged beyond repair during racing must be replaced by the backup car. If the backup car is unavailable, all remaining runs are forfeited.

S7.4 Scoring Formula

- Fastest average team time earns 300 points.
- Remaining scores are interpolated using a base-time formula defined below:

$$\text{Racing Performance Score} = 50 + (300-50) \times \frac{T_{\max} - T_{\text{team}}}{T_{\max} - T_{\min}}$$

Where:

- $T_{\text{team}} = \frac{\text{Sum of all run times} + \text{sum of all penalty times}}{\text{No. of valid runs}}$
- $T_{\min}$ = Average race time of fastest team
- $T_{\max} = 2.1 \times T_{\min}$
- Any team with $T_{\text{team}} \geq T_{\max}$ receives 50 points.
- In case of a tie, the team with the single fastest run will be ranked higher.
- DNF and False Start runs excluded from the divisor but 0.2s penalty included in sum.
- Final race score will be calculated after subtracting any scrutineering penalty points.

S7.5 Did Not Finish (DNF)

- A run is classified as a Did Not Finish if the car fails to reach the finish line or loses a major component before crossing it.
- Each DNF incurs a 0.2-second penalty added to the team's total penalty time sum.
- A DNF run does not count as a valid run.

S7.6 False Starts

- A false start is recorded when a team launches their car before the start light sequence is complete.
- Each false start incurs a 0.2-second penalty added to the team's total penalty time sum.
- A false start run does not count as a valid run.

S7.7 Track and Timing System

- All racing takes place on the official 20-metre elevated racetrack with tether line system, supplied by Race Pakistan.
- Race times are recorded using an electronic timing system accurate to the millisecond.
- Identical 12g CO₂ cartridges are supplied by Race Pakistan for all teams. Each cartridge is weighed before use and must fall within a tolerance of $\pm 0.5\text{g}$.

S8 Judges

S8.1 Judging Panel Structure

The judging panel is composed of domain-specific teams covering engineering, business strategy, scrutineering, paddock, and racing. Each panel is led by a Lead Judge with relevant industry expertise.

S8.2 Head Judge

An independent Head Judge, appointed by the Organizing Committee, oversees all judging activity, resolves disputes, validates final scores, and signs off all results. The Head Judge's decision is final.

S9 Awards

S9.1 Awards Ceremony

S9.1.1 All awards are presented at the official Race Pakistan awards ceremony, held at the conclusion of competition Day 2.

S9.1.2 The awards are subject to change. Additional awards may be added, and award names may be amended at the discretion of the Organizing Committee

S9.2 Participation Recognition

Every team that competes at Race Pakistan will receive an official Race Pakistan participation certificate in recognition of their effort and contribution to the competition.

S9.3 Overall Awards

Award	Criteria
Race Pakistan Champion	- Highest combined score across all 6 judging categories. - Critical regulation compliance required.
1st Runner Up	Second highest combined score across all 6 judging categories.
2nd Runner Up	Third highest combined score across all 6 judging categories.

S9.4 Technical Awards

Award	Criteria
Engineering and Design Award	Highest score in the Engineering and Design Presentation.
Engineering and Design Portfolio Award	Highest score in the Engineering and Design Portfolio.
Overall Engineering Excellence Award	- Highest combined score across the Engineering and Design Portfolio, Engineering and Design Presentation, Racing, and scrutineering. - Critical regulation compliance required.
Innovation Award	- Awarded to the team demonstrating the most genuinely innovative engineering solution. - Teams must include a dedicated page in their Engineering and Design Portfolio clearly describing their innovation for consideration.
Scrutineering Award	- Least scrutineering penalty points. - In the event of a tie, the award is given to the team that completed scrutineering first.
Race Event Winner	- Lowest Total Race Time across all official runs. - Critical regulation compliance required
Fastest Car Award	- Winner of the head-to-head final between the two teams with the fastest individual valid run times. - Critical regulation compliance required.

S9.5 Business Strategy & Paddock Inspection Awards

Award	Criteria
Business Strategy Excellence Award	Highest combined score in the Business Strategy Presentation, Business Strategy Portfolio and Paddock inspection
Best Business Strategy Presentation Award	Highest score in the Business Strategy Presentation
Best Business Strategy Portfolio Award	Highest score in the Business Strategy Portfolio
Best Paddock Award	Highest score in the Paddock Inspection.
Best Media & Outreach Award	Awarded to the team that builds the most compelling and consistent external brand throughout the season, evaluated on content quality, communication strategy, and audience engagement across all channels
Best Team Identity Award	Awarded to the team whose identity, story, and values are most coherently and consistently reflected across every element of their competition entry — from portfolios, presentations to paddock presence

T TECHNICAL REGULATIONS

T1 Introduction to Technical Regulations

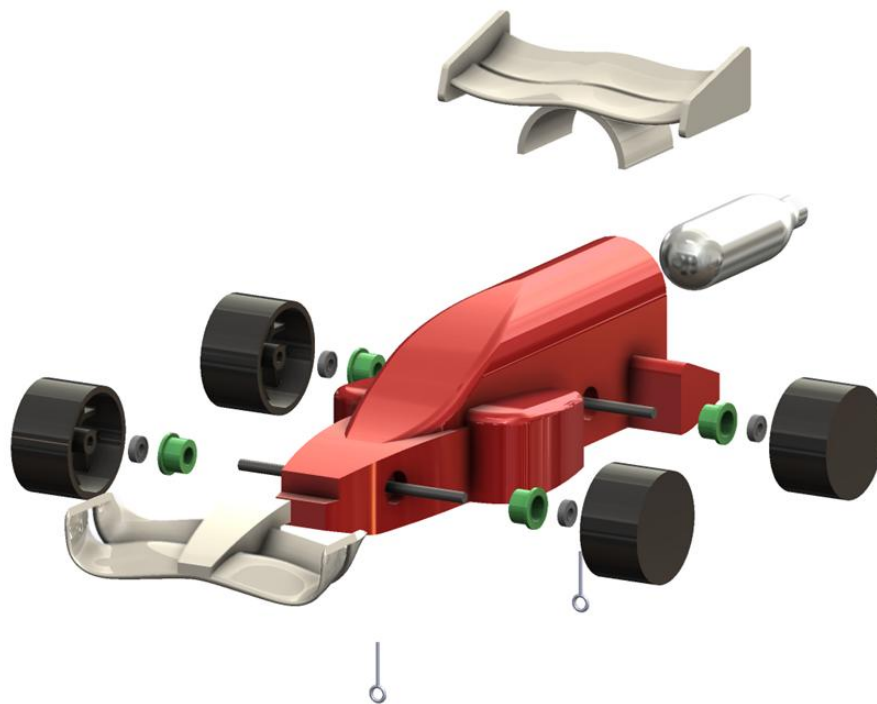
The Technical Regulations define every requirement governing the design, manufacture, and construction of your Race Pakistan car — covering dimensions, materials, and components in full.

Critical Regulation is a rule that must be strictly followed. Any team found in violation will be disqualified from the race and/or major award categories.

T2 Race Pakistan Car

T2.1 Definition

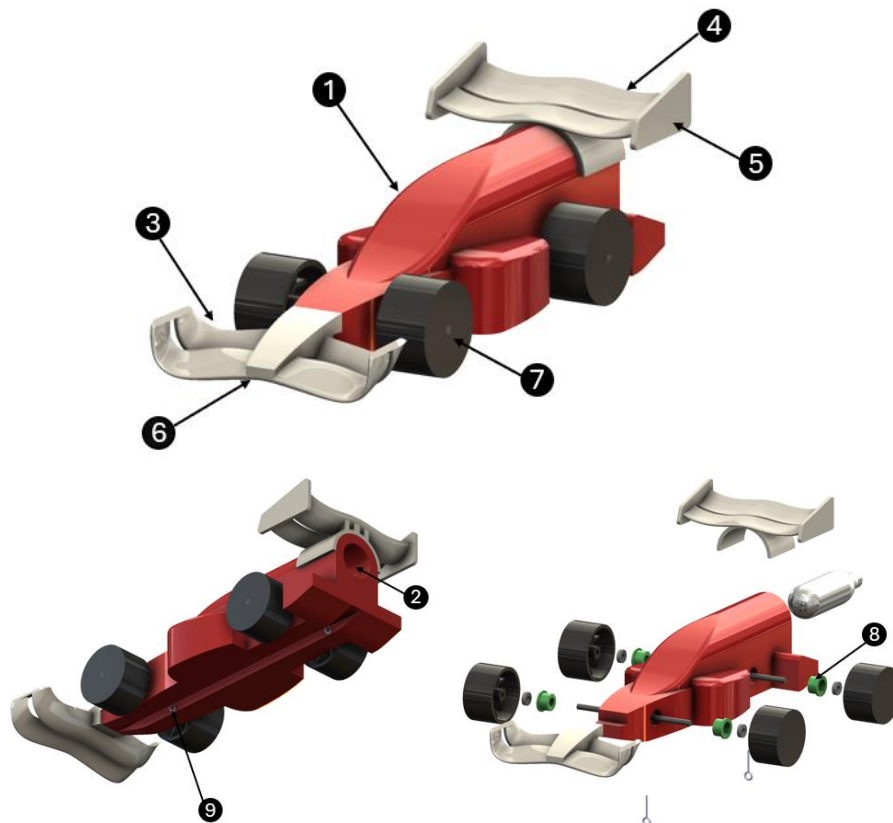
A Race Pakistan car is a model racing car designed and manufactured in full compliance with these Technical Regulations, built specifically to compete on the official 20-metre straight-line track and powered solely by a single 12g CO₂ cartridge.



T2.2 Permitted Components

Your car must consist only of the following components.

1. Body
2. CO₂ cylinder chamber
3. Front wing
4. Rear wing
5. Wing support structures
6. Nose cone
7. Wheels
8. Wheel support system (axle, bearings and axle bushes)
9. Tether line guides
10. Surface finish and decals
11. Assembly adhesives (no dimensional impact)



T2.3 Fully Assembled Car

The fully assembled car is defined as the complete race-ready vehicle without a CO₂ cartridge installed, placed on a flat surface and resting under gravity alone, free of any external attachments or supports.

T2.4 Body

The body is the continuous solid section of Race Pakistan model block material positioned entirely behind the front axle centerline. It must fully enclose both the virtual cargo space and the CO₂ cylinder chamber.

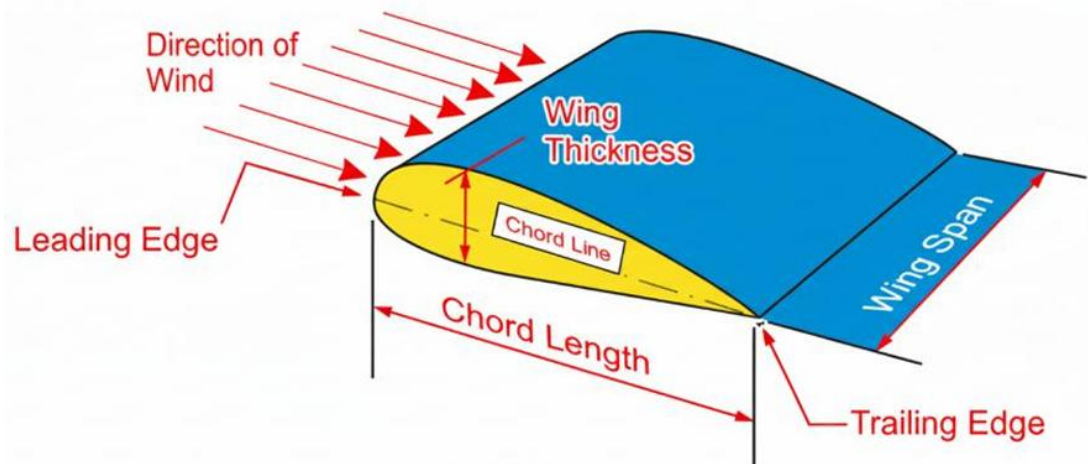
T2.5 CO₂ Cylinder Chamber

The CO₂ cylinder chamber is a hollow cylindrical space within the car body, enclosed on its sides and one end by model block material only. It houses the 12g CO₂ cartridge during racing.



T2.6 Wing

A wing is an aerodynamic element designed to allow airflow around all of its surfaces. It must have a clearly defined leading and trailing edge, and is characterized by its span, chord, and thickness.



T2.7 Wing Support Structure

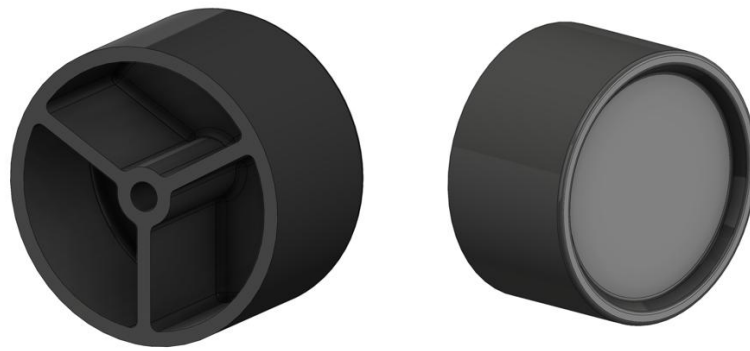
A wing support structure is any component separate from the wing, body, or nose cone that connects a wing to another part of the car. Its sole purpose is structural linkage.

T2.8 Nose Cone

The nose cone is the portion of the car forward of the front axle centerline, excluding wheels, wheel support systems, wings, and wing support structures.

T2.9 Wheel

A wheel is a cylindrical component that contacts the track surface along its outermost circumference. All wheels must rotate freely.



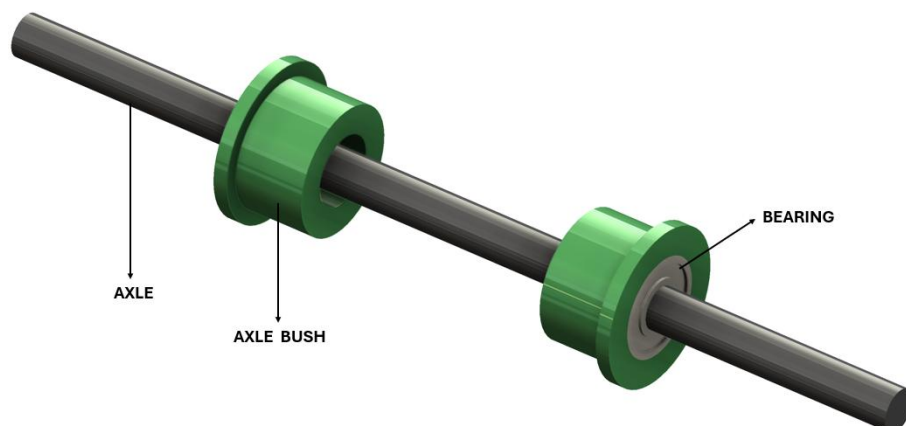
T2.10 Wheel Support System

Components attaching wheels to the rest of the car. Must include:

- Axle — the official Race Pakistan axle supplied in the starter kit (diameter 3 mm). No substitutions allowed

Bearings — mandatory for all cars. Must be fitted to each wheel. These will be supplied by Race Pakistan; however teams are free to use their own.

- Axle Bushes — mandatory for all cars. Must be fitted to locate the axle within the car body.



T2.11 Tether Line Slot

A rectangular void pre-machined into the underside of the official model block. Runs centrally along the car's underside. Must remain clearly visible and unaltered.

T2.12 Tether Line Guide

A mandatory safety feature that encloses the tether line and secures the car during racing. Must form a complete loop around the tether line. Supplied by the Race Pakistan Organizing Committee, no substitution allowed



T2.13 Surface Finish and Decals

Surface finish refers to any uniform coating on external surfaces. A decal is any material adhered flat to a surface with 100% contact area. Both are included in all dimensional measurements. Teams may manufacture their own decals but must use the official Race Pakistan artwork available on the Race Pakistan official website and MARKAZ.

T2.14 Hand Finishing

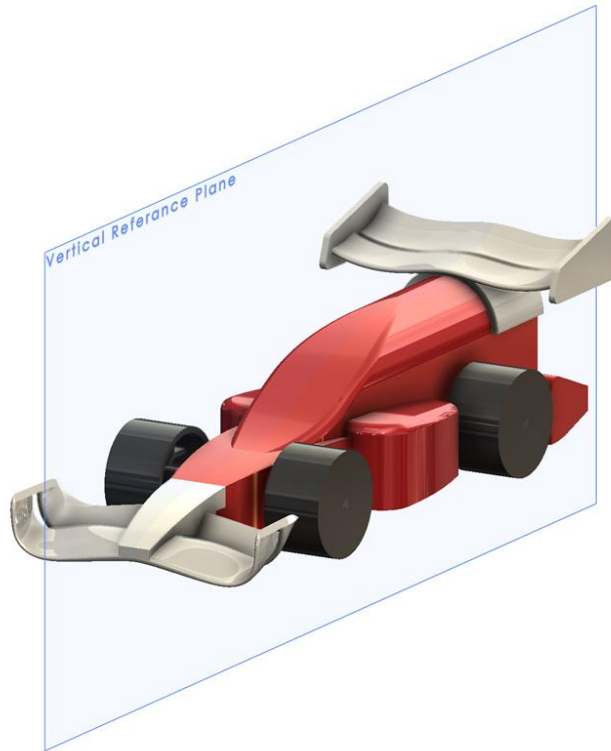
Hand finishing refers to the manual smoothing of CNC-machined surfaces using abrasive paper. It is permitted solely for the removal of machining marks and must not alter the car's geometry or dimensions beyond regulation limits.

T2.15 Race Pakistan Model Block

The official Race Pakistan model block is a single, uniform piece of medium-density polyurethane foam processed to predefined dimensions, provided by the Race Pakistan. It is the only permitted material for the car body. No substitutions are allowed.

T2.16 Vertical Reference Plane

An imaginary plane running along the lengthwise axis of the CO₂ cylinder chamber, perpendicular to the track surface. Used to establish symmetry and orientation for dimensional checks.



T3 Design Integrity & Ownership

T3.1 Student-Led Design & Manufacture

All aspects of car design, engineering, and manufacturing must be completed entirely by the participating team. Any externally sourced components must be identified and justified within the Engineering and Design Portfolio.

T3.2 Understanding Your Car

Every team member attending the Engineering and Design Presentation must be able to clearly explain the decisions behind the car's design and construction. Inability to do so will be treated by judges as evidence of insufficient involvement in the design process and may result in score deductions or disqualification from the category.

T4 Critical Regulations and Award Eligibility

T4.1 Awards Affected by Critical Regulation Violations

Non-compliance with any Critical Regulation carries severe consequences for a team's overall standing in the competition. Every Critical Regulation must be thoroughly verified before submitting the car for scrutineering. Any car found non-compliant with a Critical Regulation during scrutineering or post-race inspection will render the team ineligible for the following awards:

- Race Pakistan Champion
- Fastest Car Award
- Overall Engineering Excellence Award

T4.2 Disqualification from Racing

Any team found to be in violation of a Critical Regulation shall not be permitted to participate in the main race event.

T4.3 Where Critical Regulations Are Listed

Every Critical Regulation is clearly identified and labelled throughout this document for ease of reference.

T4.4 Both Cars Must Comply

Both the primary and backup car must be in full compliance with all Critical Regulations. Compliance of both cars is verified during official scrutineering.

T5 Design Ideas and Regulation Compliance

T5.1 No Pre-Event Rulings

Teams are required to independently interpret the Technical Regulations when designing their cars. No pre-event rulings will be issued regarding the compliance of any specific design.

T5.2 Compliance is Judged at the Event

The final interpretation and judgment of all car designs occur exclusively during official scrutineering. Teams proceeding with designs of uncertain compliance do so entirely at their own risk.

T6 Measurements and Tolerances

T6.1 Dimensional Tolerance

All dimensional measurements carry a tolerance of $\pm 0.5\text{mm}$ unless stated otherwise.

T6.2 Weight Tolerance

All weight measurements carry a tolerance of $\pm 0.5\text{g}$ unless stated otherwise.

T6.3 How Dimensions Are Measured

All car component dimensions are inclusive of surface finishes and decals. Initial compliance is checked using pre-manufactured gauges, with final verification conducted using vernier calipers. Scrutineers' measurements are final.

T6.4 Weighing Equipment

All weight checks are conducted using officially calibrated digital scales accurate to $\pm 0.1\text{g}$, provided by the Race Pakistan Organizing Committee.

T7 Fully Assembled Car

T7.1 Design, Manufacture and Construction

All Race Pakistan cars must be designed and engineered using CAD and CAM software. The car body must be manufactured by material removal using a CNC router only. The primary and backup cars must be identical in design and construction in every way. Using a different manufacturing method for the body, or submitting non-identical primary and backup cars, is a Critical Regulation violation.

T7.2 No Reuse of Previous Season Bodies [Critical Regulation]

The car body for Race Pakistan 2027 must be a completely new design. Submitting a previous season's car body is a Critical Regulation violation. Judges will verify in the Engineering and Design Portfolio by checking design documentation.

T7.3 Finishing [Penalty – 2 pts each]

The entire car body must display a consistent, high-quality surface finish free from: significant machining marks surface irregularities or defects, uneven or dripped coating application, visible adhesive residue.

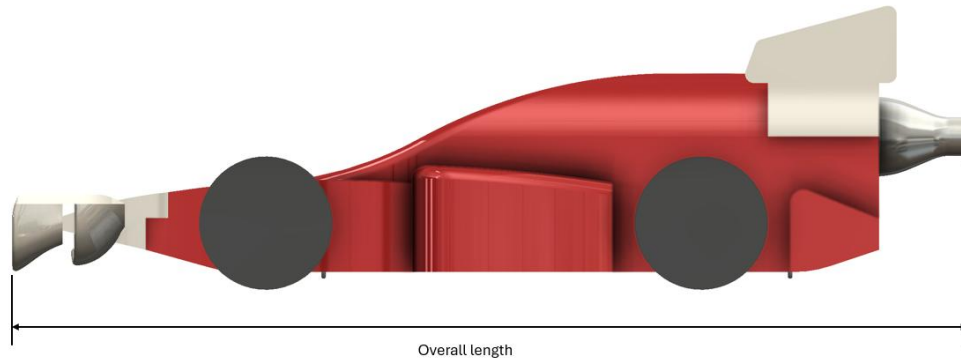
T7.4 Undefined Features [Critical Regulation]

The car assembly may only include the components listed in Section T2.2. Any additional or unlisted features are strictly prohibited.

T7.5 Overall Length [Critical Regulation]

Overall length is measured parallel to the track surface and vertical reference plane, between the front and rear extremities of the fully assembled car.

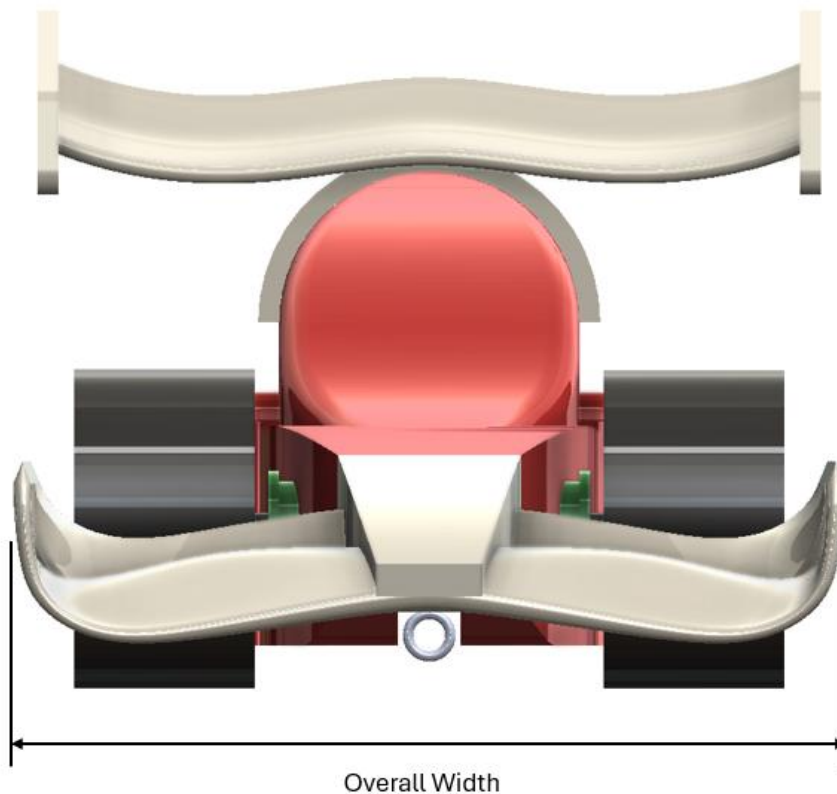
Minimum: 170 mm / **Maximum:** 210 mm



T7.6 Overall Width [Critical Regulation]

Overall width is measured perpendicular to the vertical reference plane across the widest point of the fully assembled car, inclusive of wheels and surface finishes.

Maximum: 85 mm



T7.7 Total Weight [Penalty – 10pts]

Weight is measured without the CO₂ cartridge installed. The car must meet the minimum weight requirement.

Minimum: 50 grams

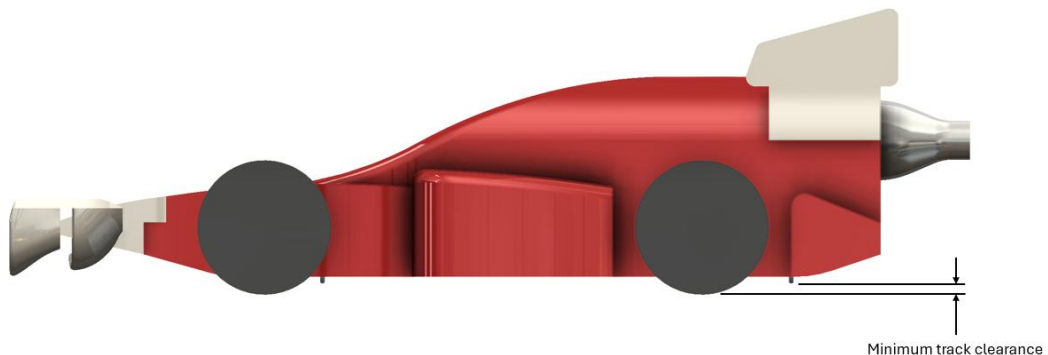
Underweight Car Correction: Cars found underweight will have 3g of screws added for every 1g below the minimum weight, plus a 10-point penalty.

Example: a car weighing 47g is 3g underweight — 9g of screws will be added plus a 10-point penalty. Weight is added by technical officials at their discretion. Added weight must not provide any aerodynamic advantage.

T7.8 Track Clearance [Critical Regulation]

Track clearance is measured vertically from the lowest point of the car, excluding wheels, to the track surface. No part of the body, wings, or any other component may contact the track surface under static or dynamic conditions.

Minimum Clearance: 2 mm



T7.9 Status During Racing [Penalty – 8pts]

No component other than the CO₂ cartridge may be added, removed, or replaced during scheduled racing. The full assembly must remain unchanged throughout all race runs.

T8 Body

T8.1 Body Construction [Critical Regulation]

The car body must be a single, uninterrupted piece of CNC-machined Race Pakistan model block material, positioned entirely behind the front axle centerline. It must fully enclose both the virtual cargo space and the CO₂ cylinder chamber.

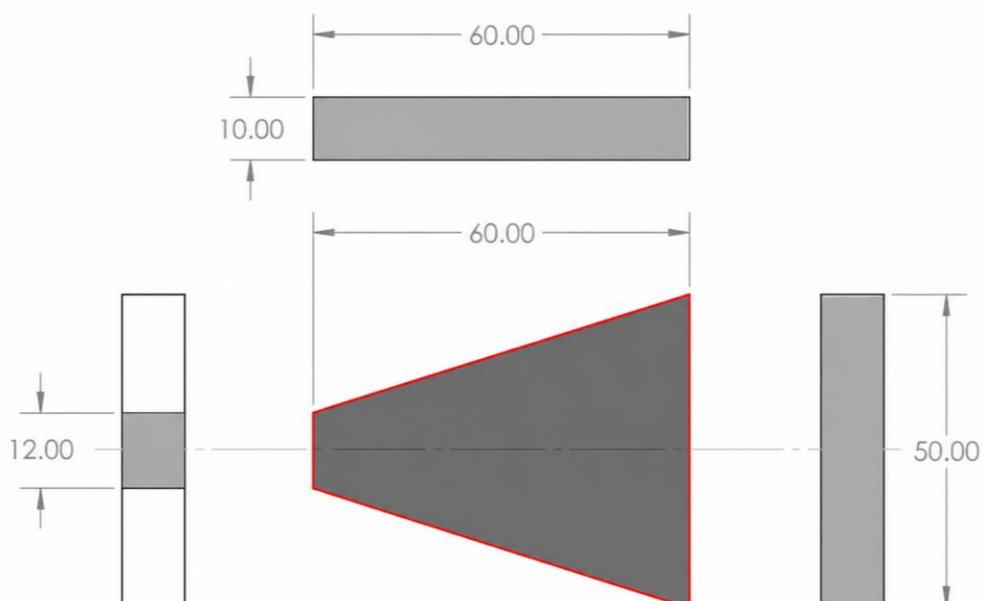
T8.2 No Implants [Penalty – 8pts]

No implants or foreign materials may be embedded within the car body. The body must be composed solely of approved model block material, with the exception of surface finishes and decals applied to external surfaces and adhesives that have no dimensional impact.

T8.3 Virtual Cargo [Critical Regulation]

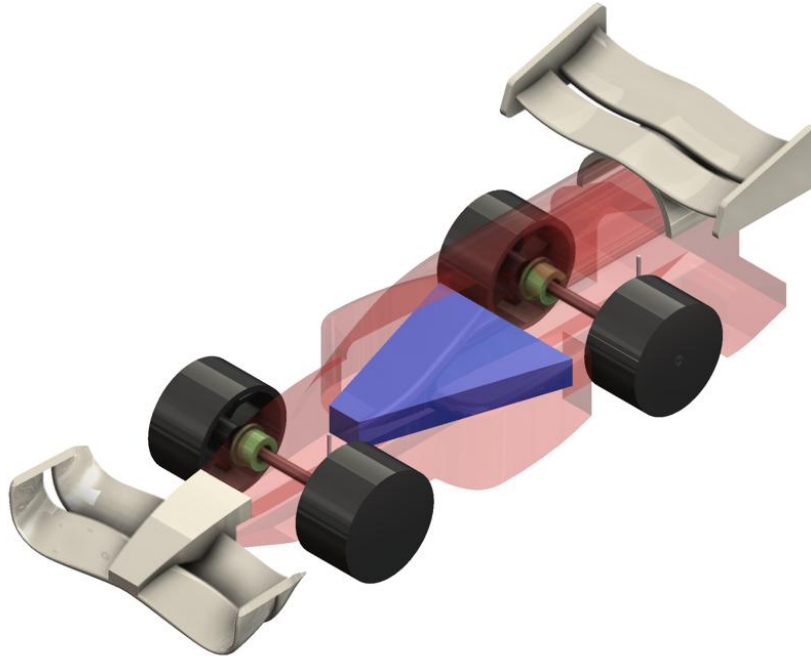
Virtual cargo is a theoretical payload space that must be incorporated into every car design as a solid, unused volume within the car body.

- Must be fully enclosed within the car body.
- Must be positioned entirely between the front and rear wheel centerlines.
- The top surface must be aligned symmetrically and perpendicular at 90° to the vertical reference plane.
- May share common surfaces with the body.
- Minimum Height = 50 mm
- Minimum Length = 60 mm
- Minimum Wall Thickness (sides + rear) = 10 mm
- Minimum Front Wall Thickness = 12 mm



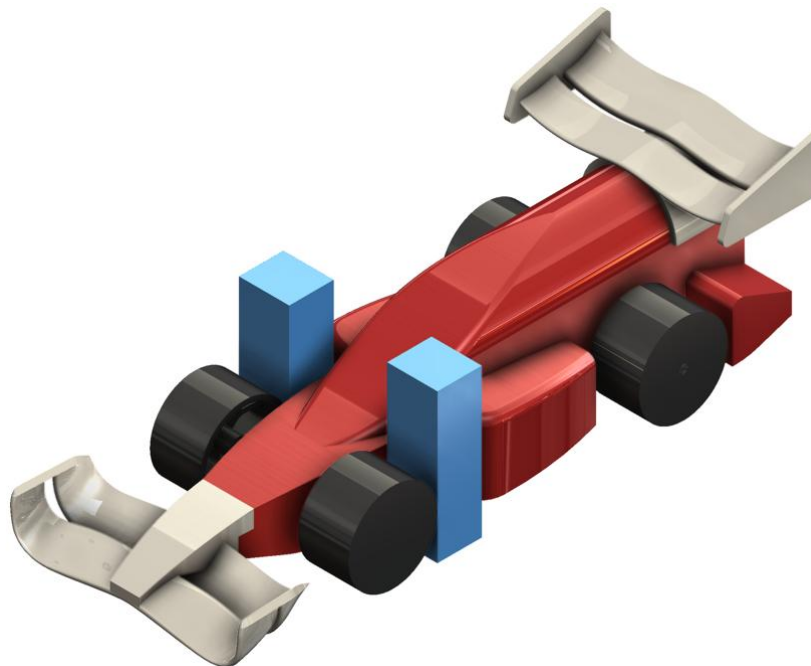
T8.4 Virtual Cargo Identification [Penalty – 6pts]

The position and dimensional compliance of the virtual cargo must be clearly identified and dimensioned in the engineering drawings submitted as part of the Engineering and Design Portfolio.



T8.5 Exclusion Zones [Critical Regulation]

When viewed from above, the car body must not occupy any volume extending 15mm rearward from the outer edge of each front wheel's track contact area.



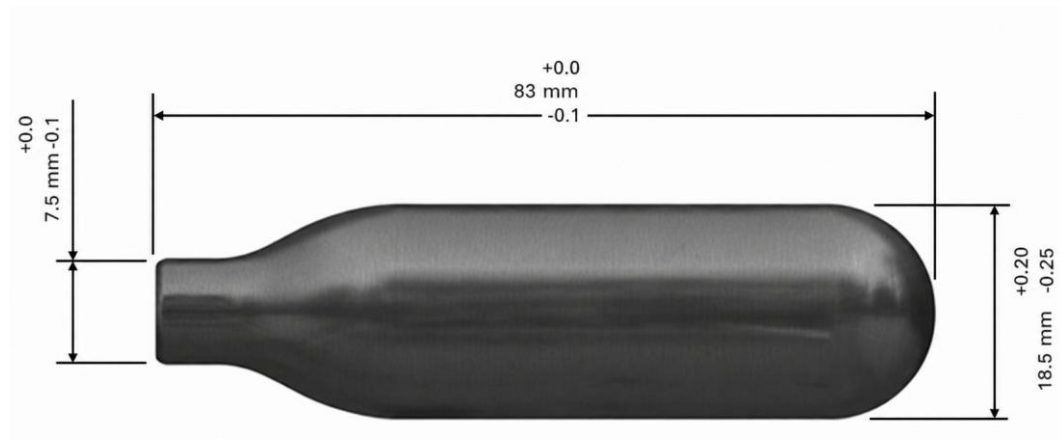
T9 CO₂ Cylinder Chamber

The CO₂ cylinder chamber houses the 12g cartridge that powers the car during racing. It must be correctly sized and positioned to ensure the cartridge fits securely, fires reliably, and can be safely removed following each run.

T9.1 Chamber Diameter [Penalty – 5pts]

The internal diameter must be large enough to fit a standard 12g CO₂ cartridge.

Minimum Internal Diameter: 18.5 mm



T9.2 Distance from Track Surface [Penalty – 5pts]

The distance from the lowest point of the CO₂ cylinder chamber opening to the track surface, measured vertically when the car is at rest in its normal racing position.

Minimum: 22 mm / **Maximum:** 30 mm

T9.3 Chamber Depth [Penalty – 4pts]

Chamber depth is measured parallel to the vertical reference plane, from the opening of the chamber to its closed end.

Minimum: 50 mm / **Maximum:** 60 mm

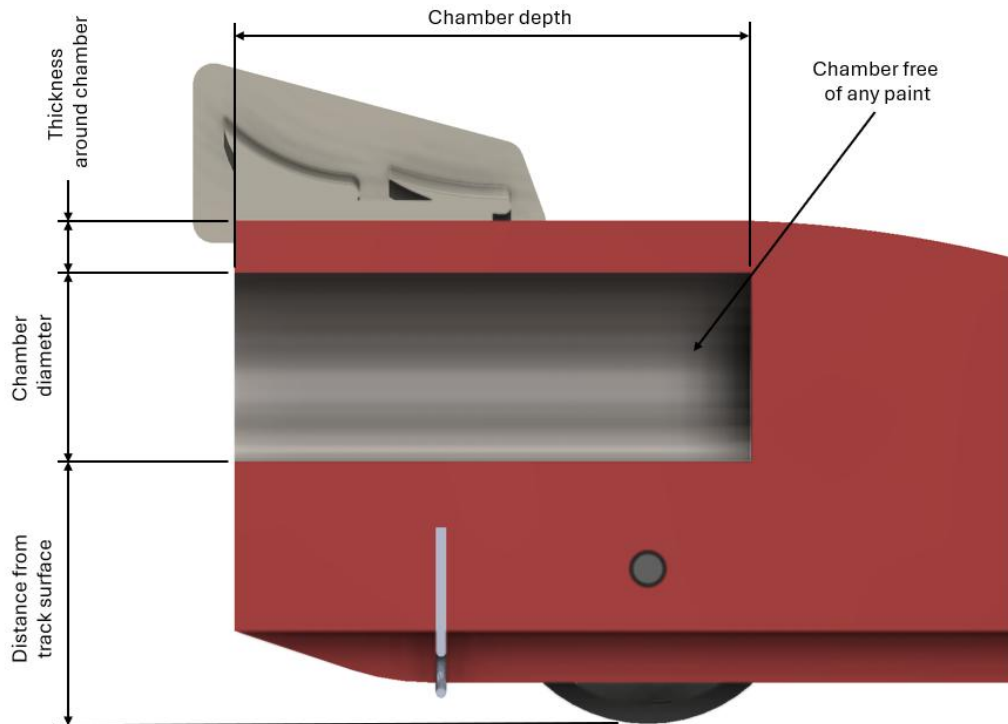
T9.4 Chamber Surround Thickness [Penalty – 8pts]

The CO₂ cylinder chamber must be enclosed entirely by model block material. Surround thickness is measured along any radius from the center of the chamber.

Minimum Thickness: 4 mm

T9.5 Chamber Internal Finish [Penalty – 5pts]

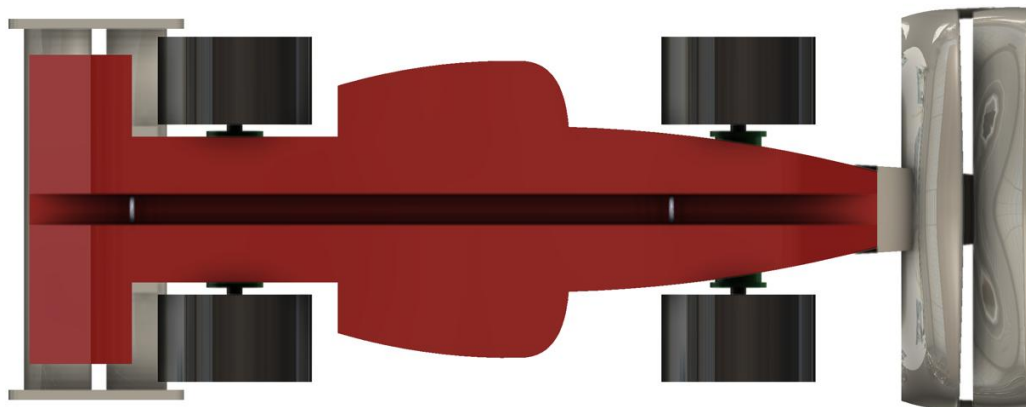
The internal surface of the CO₂ cylinder chamber must be completely free of paint, decals, and any other surface finishes. This is required to ensure the cartridge fits correctly and gas flow remains unrestricted during race.



T10 Tether Line Slot

T10.1 Location

The tether line slot is pre-machined into the official Race Pakistan model block. It runs centrally along the underside of the car. Its length and position are fixed by the model block and must remain clearly visible and unaltered throughout manufacturing.



T11 Tether Line Guides

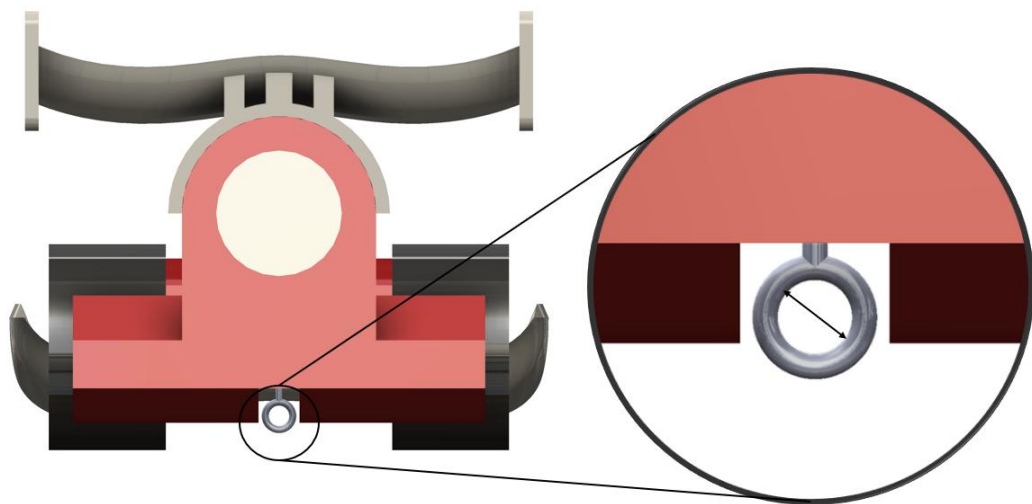
Tether line guides are the safety mechanism that keeps your car on track during racing. They must be robust, correctly sized and properly positioned.

T11.1 Location [Critical Regulation]

Every car must have two (2) securely fixed tether line guides — one toward the front and one toward the rear. The track's tether line must pass through both guides during racing without obstruction.

T11.2 Internal Diameter [Penalty – 4pts]

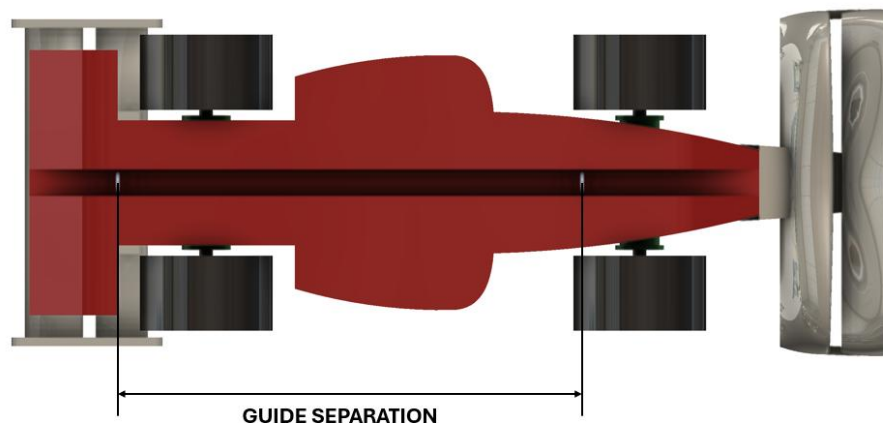
The internal hole of each tether line guide through which the tether line passes.



T11.3 Guide Separation [Penalty – 5pts]

The shortest distance between the inside edges of the front and rear tether line guides, measured parallel to the track surface and vertical reference plane.

Minimum: 100 mm / **Maximum:** 190 mm



T11.4 Tether Line Guide Safety [Penalty – 8pts]

The holes within both tether line guides must form fully enclosed loops to prevent the tether line from slipping out during racing. Guides must be strong and rigid enough to maintain their shape and internal diameter throughout all race conditions. Guide construction will be closely examined in relation to safety — refer to T10 for further context.

The following tether line guide test will be conducted during scrutineering: a 150g weight will be suspended from each tether line guide to verify the guides are securely fixed to the car and safe to race.



T12 Wheels

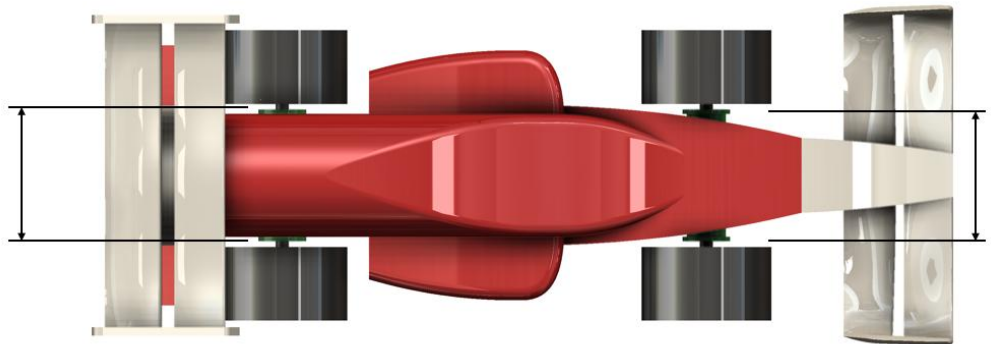
T12.1 Number and Location [Critical Regulation]

The car must have exactly four cylindrical wheels — two at the front sharing a common front axle centerline, and two at the rear sharing a common rear axle centerline. All four wheels must be clearly visible and functional.

T12.2 Distance Between Opposing Wheels [Penalty – 5pts]

The shortest distance between the inner faces of the two opposing wheels that are furthest apart on the car, measured parallel to the track surface.

Minimum: 30 mm



T12.3 Wheel Configuration [Critical Regulation]

Teams must choose one of the following two-wheel configurations. All four wheels must be the same type. Mixing configurations is not permitted.

T12.3.1 Standard Wheel Kit

Teams may use the official Race Pakistan standard wheels provided in the starter kit. These pre-manufactured wheels are fully compliant with all dimensional and material regulations and must not be modified in any way.

T12.3.2 Custom 3D-Printed Wheels [Critical Regulation]

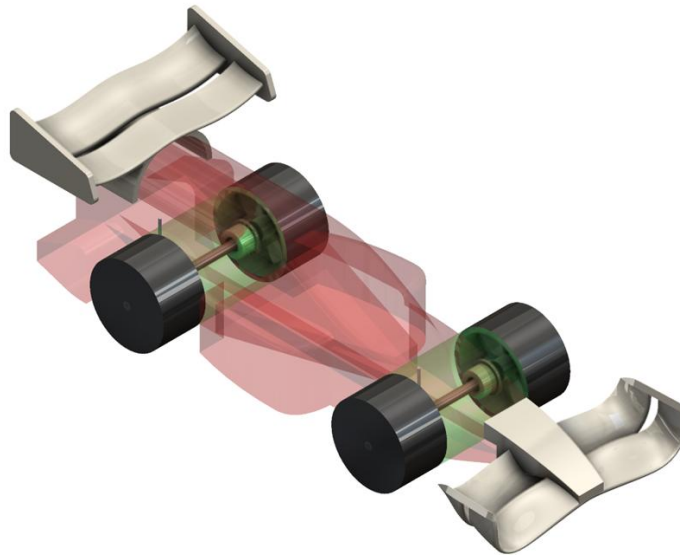
Teams may design and manufacture their own wheels. Teams that do this earn 10 bonus points.

- **Permitted Materials:** ABS plastic or PLA only
- **Outer Diameter:** 26mm – 34mm (± 0.1 mm tolerance)
- **Width:** 15mm – 19mm (± 0.1 mm tolerance), it will be measured along the outer most and inner most face of the wheel
- **Other Requirements:** Must be rigid, circular and rotate freely

T12.3.3 Axle and Wheel Support System

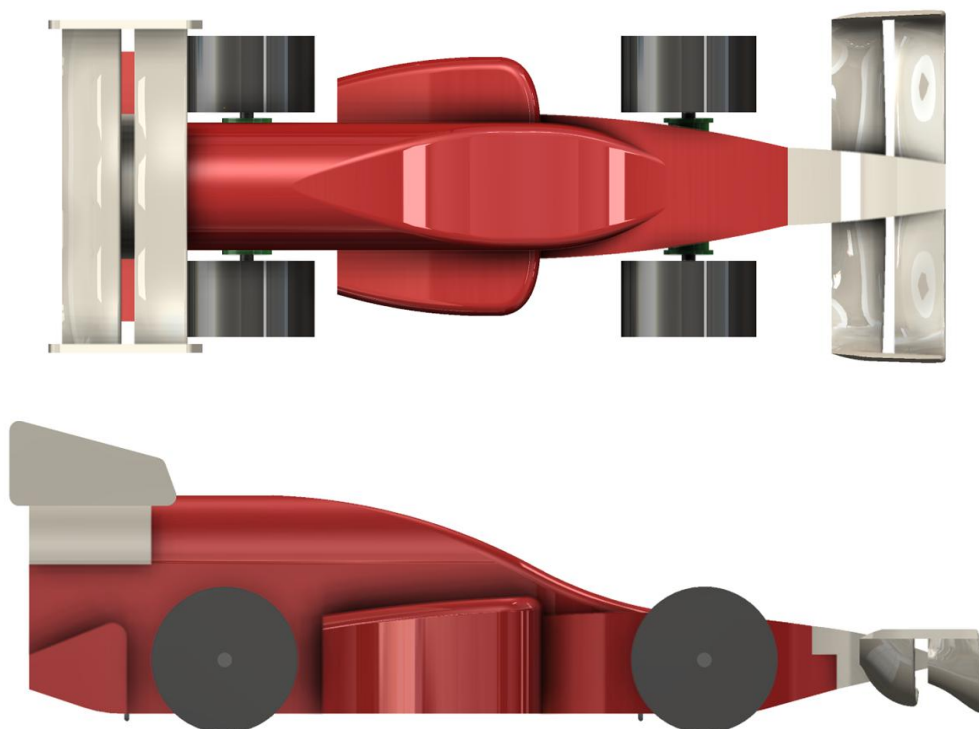
All teams must use the official Race Pakistan axle supplied in the starter kit. Bearings and axle bushes are mandatory components of the wheel support system. See Section T2.10 for full definition.

Axle Diameter: 3 mm / **Axle Length:** 60 mm



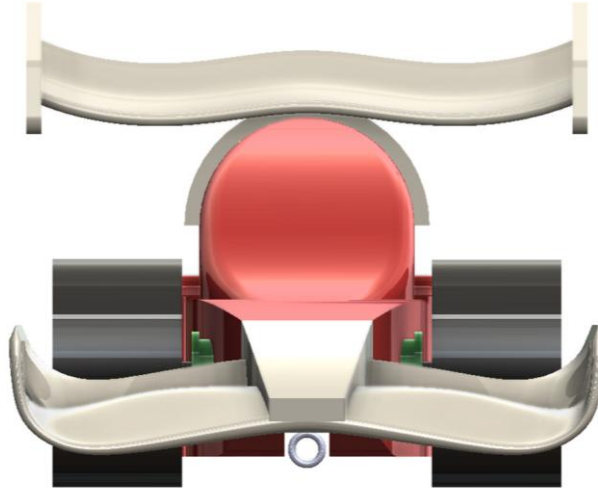
T12.4 Top and Side Visibility [Penalty – 6pts]

All four wheels must be fully visible when the car is viewed from top view. No part of the body or any other component may obscure the wheels in top view.



T12.5 Front View Visibility [Penalty – 5pts each]

When viewed from the front, the car's front wheels must remain visible above a height of 18mm from the track surface.

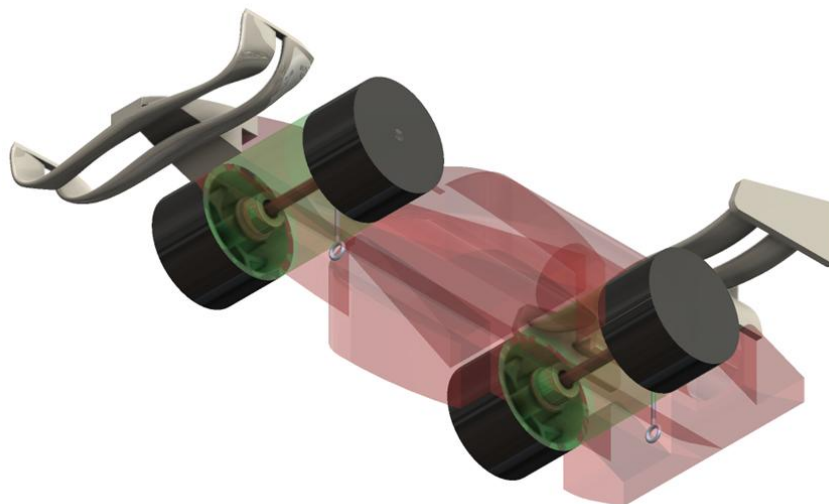


T12.6 Racetrack Contact [Penalty – 4pts]

All four wheels must simultaneously contact the racing surface across their full width within a tolerance of $\pm 0.5\text{mm}$.

T12.7 Wheel Support System Envelope [Penalty – 5pts]

Wheel support systems must be entirely contained within the cylindrical volume defined by the maximum outer diameter of the two opposing wheels.



T12.8 Wheel Rotation [Penalty – 6pts]

All four wheels must rotate freely about their own center axis. The scrutineering judge must be able to validate this with reasonably minimal effort.

T13 Nose Cone

T13.1 Nose Cone Construction

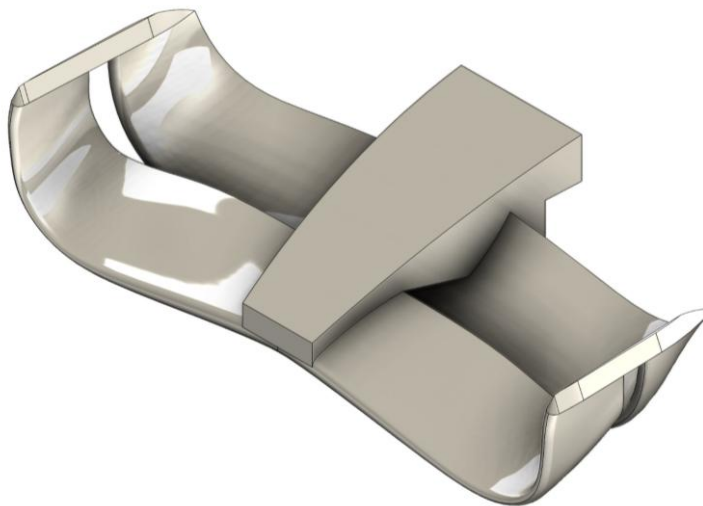
The nose cone is the portion of the car forward of the front axle centerline, excluding wheels, wheel support systems, wings, and wing supports. It is integrated with the front wing and made from the same material as the front wing.

T13.2 Integration

The nose cone must be securely attached to the main car body and must contribute to the overall structural integrity of the car.

T14 Front Wing

The front wing is a mandatory aerodynamic element. It must be designed as a proper aero foil with a clearly defined leading edge and trailing edge — not a decorative add-on. Both the wing geometry and its structural performance are subject to regulation.



T14.1 Description and Placement [Critical Regulation]

The car design must incorporate an aerodynamic wing at the front of the car. The wing must have a clearly defined leading edge and trailing edge. Refer to the definitions in Section T2.6.

T14.2 Identification [Penalty – 4pts]

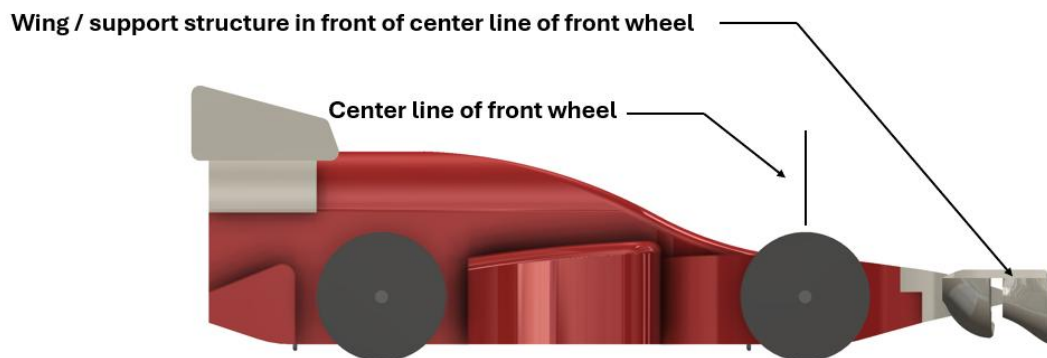
The surface representing the front wing MUST be identified clearly within the engineering drawings submitted for scrutineering judging.

T14.3 Construction and Rigidity [Penalty – 6pts]

The front wing and any support structures must be manufactured using any plastic material. The wing shape must remain unchanged during racing; the front wing must be rigid, with no warpage or distortion.

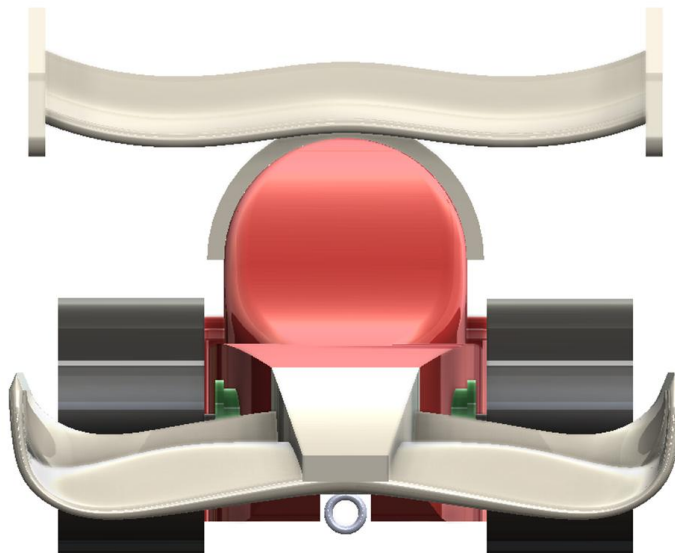
T14.4 Front Wing Location [Penalty – 4pts]

The whole of the front wing and any support structures must be in front of the centerline of the front wheel when viewed in the side elevation.



T14.5 Visibility of Front Wing [Penalty – 4pts]

Visibility of the front wing must not be obstructed by any other component when viewed in the front elevation.

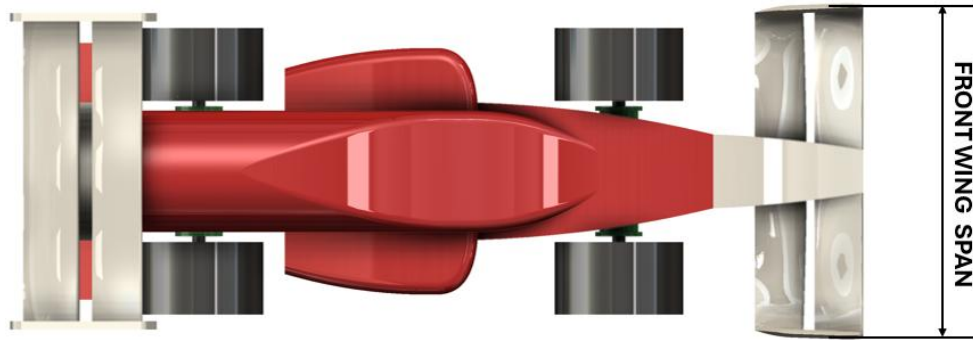


T14.6 Front Wing Dimensions

T14.6.1 Front Wingspan [Penalty – 5pts]

The wingspan is measured on the top or bottom surface of the wing, whichever element is shorter, parallel to the track surface and normal to the vertical reference plane.

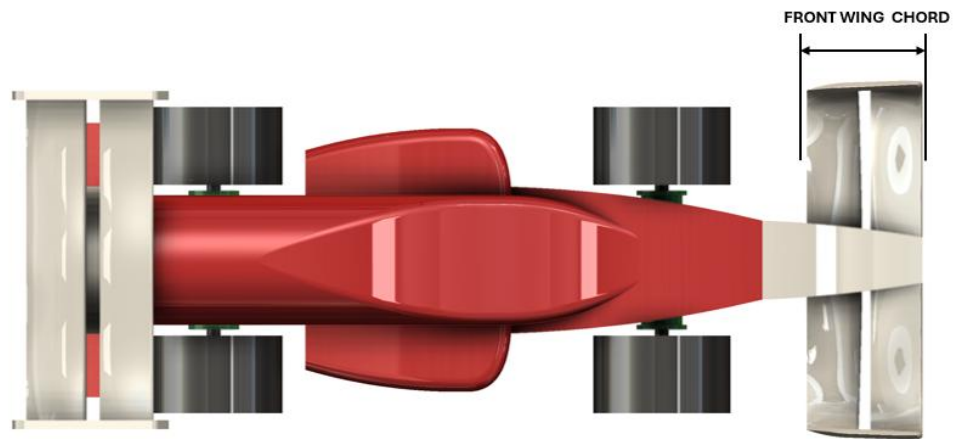
Absolute Minimum: 40 mm



T14.6.2 Front Wing Chord [Penalty – 5pts]

The chord minimum and maximum dimensions must exist throughout the wingspan. Chord is measured parallel to the vertical reference plane.

Absolute Minimum: 15 mm / **Absolute Maximum:** 30 mm



T14.6.3 Front Wing Thickness [Penalty – 5pts]

The wing thickness minimum dimensions must exist throughout the wing's minimum span, measured perpendicular to the chord line, a cross-section diagram of the wing profile must be mentioned in the engineering drawing.

Absolute Minimum: 1mm

T14.7 Front Wing Structural Requirements

T14.7.1 Minimum Impact Load

The front wing must be designed to withstand a minimum end-stop impact force of 80N, representing the load generated when the car decelerates into the finish-line brush stop at race speed.

T14.7.2 Wing Deflection

Maximum permitted wing tip deflection under the 80 N load is 1.0 mm, consistent with Section T14.3.

T14.7.3 Minimum Safety Factor

Minimum safety factor against UTS for all wing simulation is 2.0.

T14.7.4 Material Properties for Simulation

The official Race Pakistan model block has a density of 157 kg/m³ and a compressive yield stress of 2.1 MPa. These values must be used in all body-level simulation work. Teams must use the following material properties as simulation inputs:

T14.7.5 Portfolio Requirements [Penalty — 5pts]

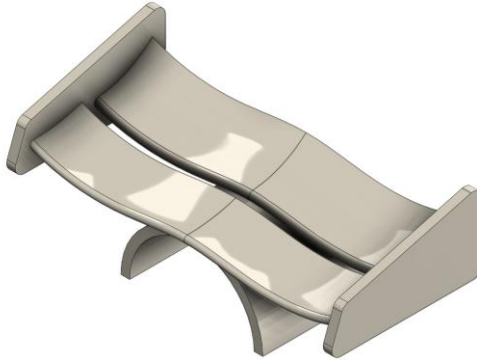
The Engineering and Design Portfolio must include FEA screenshots showing boundary conditions, applied load, mesh and stress distribution, the safety factor achieved, and all material property values used as simulation inputs.

T14.7.6 Physical Wing Deflection Test [Critical Regulation]

A physical loading test will be conducted at scrutineering, with 0.5 kg suspended from each side of the front wing.

T15 Rear Wing

The rear wing is a mandatory aerodynamic element positioned behind the rear wheel centerline. It must be designed as a proper aero foil with a clearly defined leading edge and trailing edge. Both the wing geometry and its structural performance are subject to regulation.



T15.1 Description and Placement [Critical Regulation]

The car design must incorporate an aerodynamic wing at the rear of the car. The wing must have a clearly defined leading edge and trailing edge. Refer to the definitions in Section T2.6.

T15.2 Wing Identification [Penalty – 4pts]

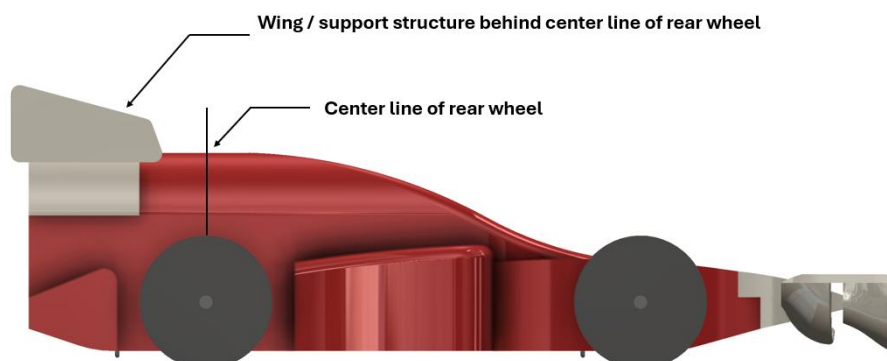
The surface representing the rear wing MUST be identified clearly within the engineering drawings submitted for scrutineering judging.

T15.3 Construction and Rigidity [Penalty – 6pts]

The rear wing and any support structures must be manufactured using any plastic material. The wing shape must remain unchanged during racing; the rear wing must be rigid, with no warpage or distortion.

T15.4 Rear Wing Location [Penalty – 4pts]

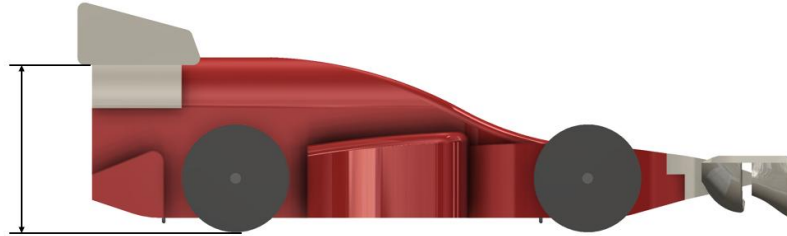
The front (leading edge) of the rear wing and any support structures must be behind the centerline of the rear axle when viewed in the side elevation.



T15.5 Rear Wing Height [Penalty – 4pts]

The bottom of the rear wing must be no higher than 34 mm when measured from normal to the track surface.

Absolute Minimum: 34 mm

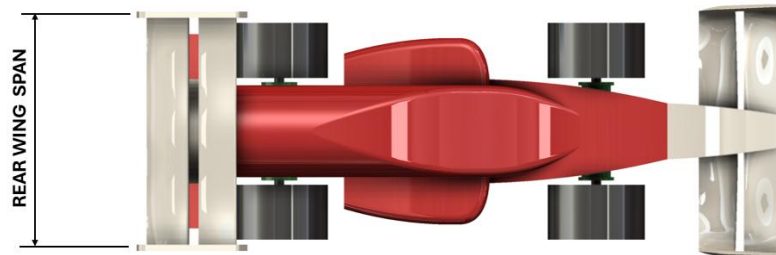


T15.6 Rear Wing Dimensions

T15.6.1 Rear Wingspan [Penalty – 5pts]

The wingspan is measured on the top or bottom surface of the wing, whichever is shorter, parallel to the track surface and normal to the vertical reference plane.

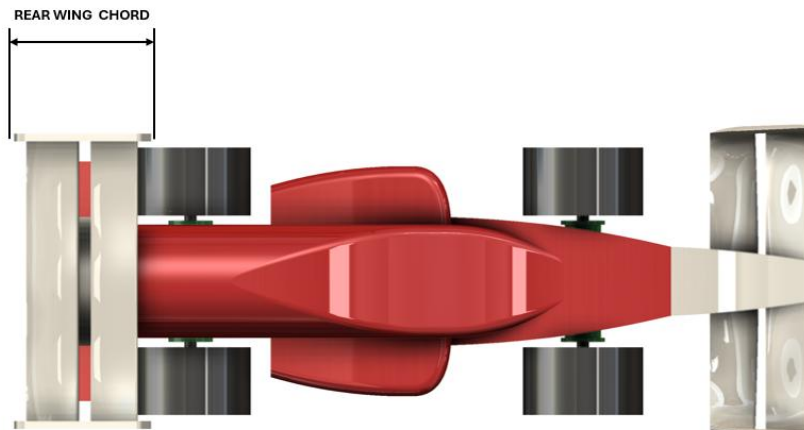
Absolute Minimum: 40 mm



T15.6.2 Rear Wing Chord [Penalty – 5pts]

The wing chord minimum and maximum dimensions must exist throughout the wingspan. Chord is measured parallel to the vertical reference plane.

Absolute Minimum: 15 mm / **Absolute Maximum:** 30 mm



T15.6.3 Rear Wing Thickness [Penalty – 5pts]

The wing thickness minimum dimensions must exist throughout the wing's minimum span, measured perpendicular to the chord line, a cross-section diagram of the wing profile must be mentioned in the engineering drawing.

Absolute Minimum: 1 mm

T16 Surface Finishes and Decals

T16.1 Application Standards

Surface finishes and decals are included in all dimensional and weight measurements. They must not compromise the structural integrity or safety of any car component.

T16.2 Quality Standards

All surface finishes must be applied uniformly and professionally, free from runs, drips or defects, compatible with the model block material, and durable enough to survive racing conditions.

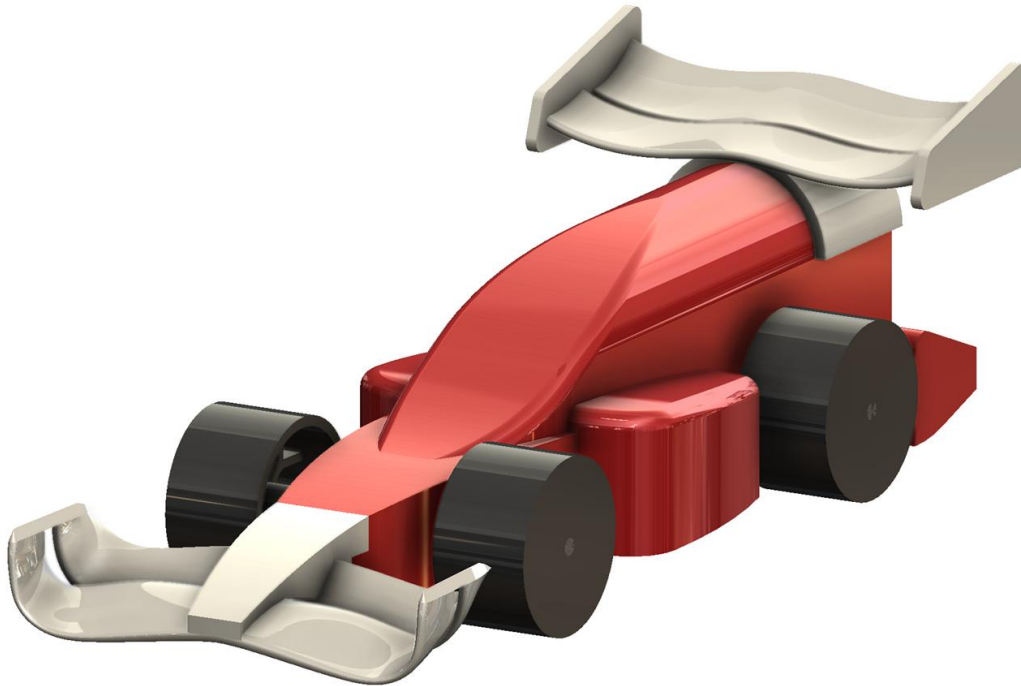
APPENDIX

Appendix A — Official Race Pakistan Model Block

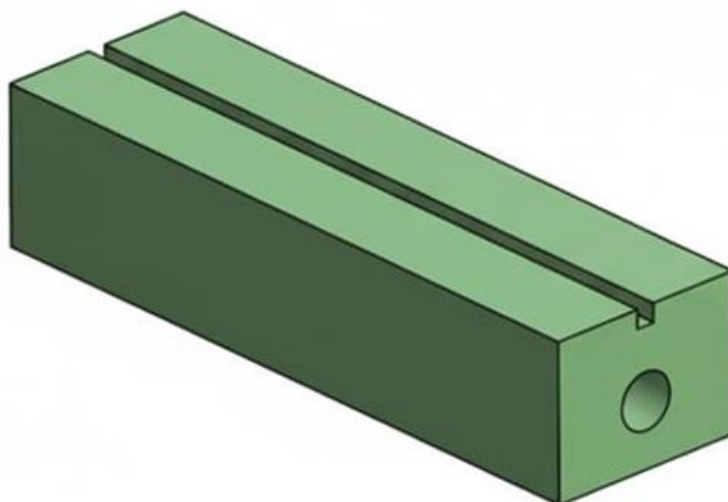
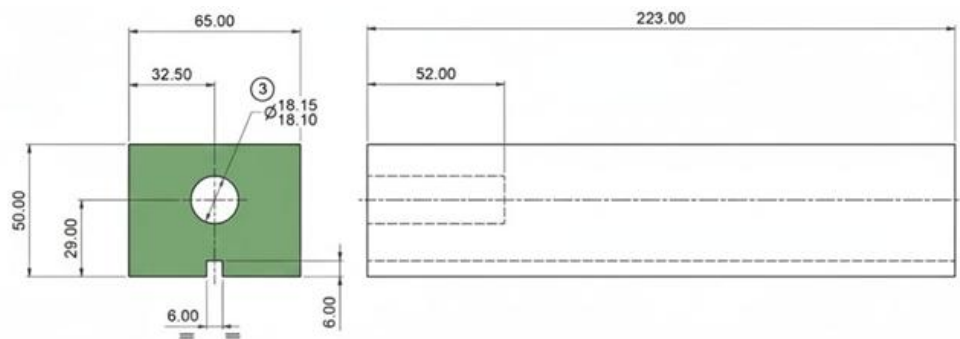
The official Race Pakistan model block is a single piece of medium-density polyurethane foam, processed to the dimensions below. It is the only permitted raw material for the car body. Your car design template must be at least 10mm shorter than the model block at one end to account for CNC machine fixture attachment points.

Property	Specification
Material	Medium-density polyurethane foam
Overall Length	223.0 mm
Width	65.0 mm
Height	50.0 mm
Tether Slot Width	6.0 mm
Tether Slot Depth	6.0 mm
CO ₂ Hole Diameter	18.15 mm / 18.10 mm
CO ₂ Hole Position from base	29.0 mm
CO ₂ Hole Position from side	32.5 mm

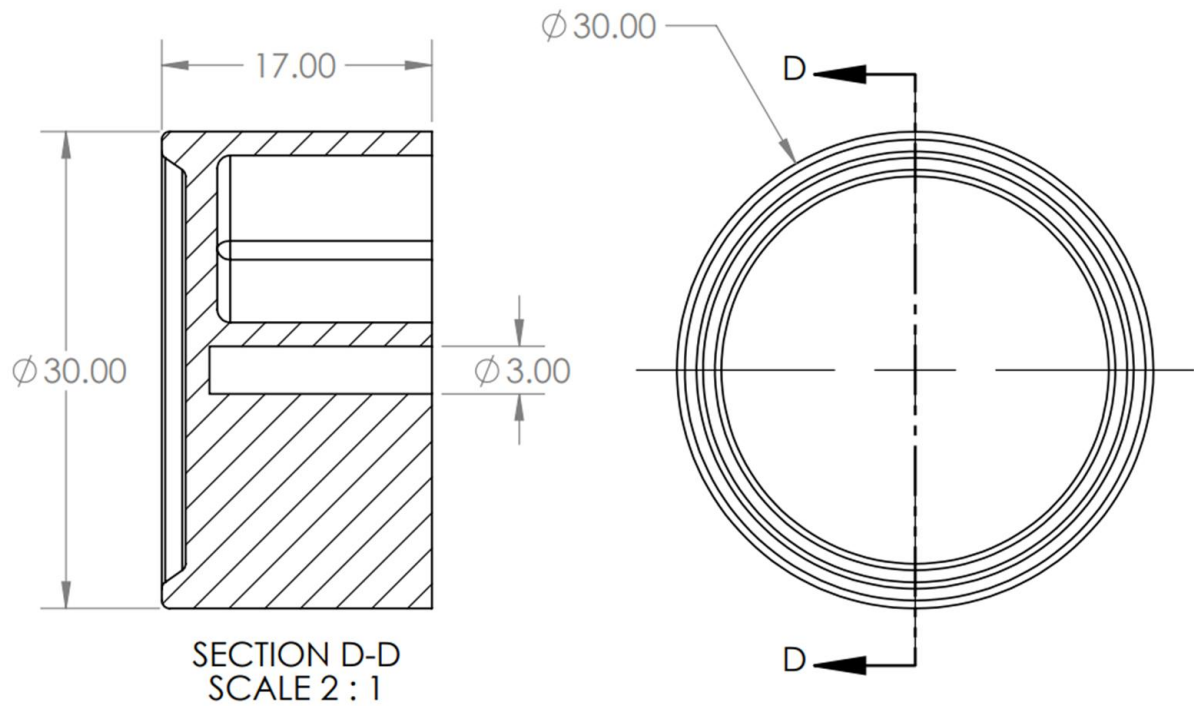
Appendix B — Complete Assembly of Car



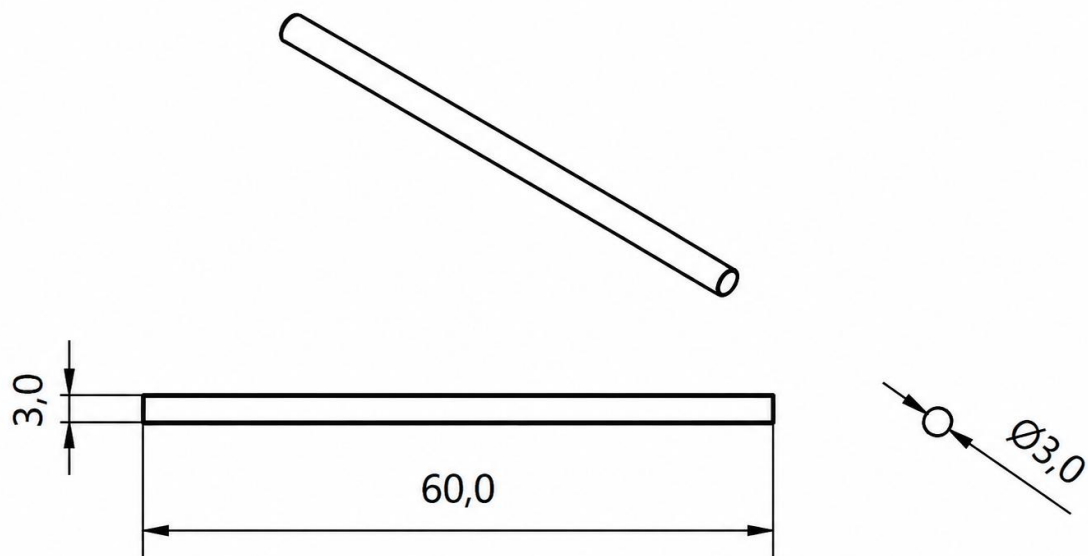
Appendix C — Race Car Block



Appendix D — Standard Wheel Design



Appendix E — Standard Axle



Appendix F — Scoring Sheets

Engineering and Design Portfolio

Team Number:

Team Name:

Achieved Score

Conceptualization

Very limited concepts. No variation. No clear design direction or engineering reasoning.

Basic concepts presented. Limited alternatives. Weak justification of selected concept.

Multiple concepts explored. Logical selection process. Concepts linked to system requirements.

Wide concept exploration. Strong engineering reasoning. Final concept well justified and aligned with performance goals.

0 - 5

6 - 10

11 - 15

16 - 20

Out of 20

Development Iterations and Engineering Trade-Offs

No iteration shown. No comparison or trade-off discussion.

Limited iterations. Basic comparisons. Weak explanation of decisions.

Clear iterations shown. Trade-offs identified. Decisions partly justified.

Structured iteration process. Clear trade-off analysis. Design decisions strongly supported by data and reasoning.

0 - 5

6 - 10

11 - 15

16 - 20

Out of 20

Manufacturing Feasibility and Engineering Practices

No manufacturing consideration. Poor engineering practices. Design not feasible.

Basic feasibility. Limited understanding of processes. Weak engineering practices.

Good feasibility. Suitable processes identified. Acceptable engineering practices followed.

Fully feasible design. Strong understanding of manufacturing processes, constraints, and standards. Good engineering practices applied.

0 - 4

5 - 8

9 - 12

13 - 15

Out of 15

Engineering Figures and Drawings

Missing or poor drawings. No dimensions. No technical clarity.

Basic drawings. Limited dimensions. Weak clarity and standards.

Clear drawings with key dimensions. Acceptable standards followed.

High-quality engineering drawings. Complete dimensions, tolerances, and standards. Easy to interpret.

0 - 2

3 - 5

6 - 8

9 - 10

Out of 10

Clarity and Structure

Poor structure. Missing sections. Difficult to follow.

Basic structure. Limited clarity. Weak flow of information.

Clear structure. Logical flow. Technical content understandable.

Well-structured document. Clear, concise communication. Strong flow and readability.

0 - 4

5 - 8

9 - 12

13 - 15

Out of 15

Design Verification Rules

T6.1 and T6.2 [Critical Regulation] No Reuse of Previous Season Car Bodies. The car for Season 2 must be a completely new design, manufactured specifically for RP 2026 season. All RP cars must be designed and engineered using CAD and CAM software. The car body must be manufactured by material removal using a CNC router only. The primary and backup cars must be identical in design and construction in every way.

T7.3 [Critical Regulation] Virtual cargo represents a theoretical payload space that must be incorporated into every car design as a solid, unused volume within the car body. Virtua Cargo Must be fully enclosed within car body and entirely positioned between front and rear wheel center lines and must minimum dimensional requirements.

T7.4 [Penalty - 6 pts] The virtual cargo's position and dimensional compliance must be clearly marked in the engineering drawings included in the Design Portfolio

T13.8 [Penalty - 4pts] The surfaces representing both the front and rear wings must be clearly identified in the engineering drawings submitted for specification judging or within the Design Portfolio.

0 - 5

6 - 10

11 - 15

16 - 20

Out of 20

Custom Tires:



TOTAL SCORE:

Out of 100

Engineering Problem Definition and KPIs	Problem vague or generic. No KPIs or only qualitative. No link to system or vehicle.	Basic problem defined. 1 to 2 KPIs, mostly qualitative. Weak link to performance or constraints.	Clear problem definition. 3 to 4 KPIs, some measurable. Linked to system performance and constraints.	Well scoped problem. 5 or more measurable KPIs with targets. Direct link to performance, constraints, and validation plan.	
	0 - 5	6 - 10	11 - 15	16 - 20	Out of 20
Concept Development and Innovation	Very few concepts. No variation. No innovation.	Basic concepts. Limited alternatives. Weak differentiation.	Multiple concepts. Logical selection. Some innovation.	Wide exploration. Strong justification. Clear innovation and originality.	
	0 - 7	8 - 15	16 - 22	23 - 30	Out of 30
CAD and Technical Model Quality	Single part or incomplete model. No assemblies. No dimensions or constraints.	Basic assemblies. Limited mates. Few critical dimensions. No tolerance consideration.	Complete assemblies. Proper constraints. Key dimensions defined. Basic tolerance or DFM considerations.	Complete assembly, accurate constraints, dimensions/tolerances, and DFM/manufacturing evidence.	
	0 - 10	11 - 20	21 - 30	31 - 40	Out of 40
Engineering analysis and Design Justifications	No calculations or simulations. Decisions based on assumptions only.	Basic calculations. Weak assumptions. Limited justification.	Good analysis. Reasonable assumptions. Key decisions supported.	Deep analysis. Design justified with strong analysis and calculations.	
	0 - 7	8 - 15	16 - 22	23 - 30	Out of 30
Design Iteration and Development Process	No iteration shown. Only final design presented.	1 to 2 iterations. Limited explanation of changes.	3 to 4 iterations. Changes documented. Improvements partially justified.	5 or more iterations. Clear evolution of design. Each change justified with data or analysis.	
	0 - 7	8 - 15	16 - 22	23 - 30	Out of 30
Manufacturing and Implementation Strategy (CAM)	No manufacturing plan. No CAM or process selection.	Basic process identified. No sequencing or tooling details.	Defined processes and sequence. Basic tooling and machine selection. Some feasibility consideration.	Complete manufacturing plan with processes, tooling, materials, constraints, and CAM evidence.	
	0 - 6	7 - 12	13 - 18	19 - 25	Out of 25
Prototype Quality and Functionality	Prototype incomplete or non-functional. Poor assembly.	Basic prototype. Partial functionality. Visible defects.	Functional prototype. Acceptable build quality. Minor issues.	Fully functional prototype. Clean assembly. Reliable performance under expected conditions.	
	0 - 4	5 - 8	9 - 12	13 - 15	Out of 15
Technical Communication and Defense	Cannot explain design. No technical clarity.	Basic explanation. Limited ability to answer technical questions.	Clear explanation. Answers most questions with reasonable depth.	Clear explanation with strong technical defense using data, drawings, and analysis.	
	0 - 2	3 - 5	6 - 8	9 - 10	Out of 10
TOTAL SCORE:					Out of 200

 Business Strategy Portfolio				Team Number:	
				Team Name:	
					Achieved Score
Strategic Planning & Execution Logic	No clear plan. Activities appear reactive. Timelines and responsibilities missing.	Basic plan exists but lacks structure. Execution appears inconsistent or loosely controlled.	Clear roadmap with defined phases, timelines, and ownership. Execution is tracked through structured systems.	Well-defined execution system with clear milestones, tracking, and iteration. Appropriate planning and tracking tools are used to guide and adjust execution.	
	0 - 2	3 - 5	6 - 8	9 - 10	Out of 10
Organizational Systems & Decision Tracking	No defined system. Work appears disconnected. No visibility of how decisions are made.	Some structure present but inconsistent. Roles or decisions not clearly tracked.	Defined team structure and workflows. Responsibilities clear. Decisions documented through basic systems.	Strong operational system. Clear ownership across functions. Decisions are traceable, with structured systems supporting coordination and tracking.	
	0 - 2	3 - 5	6 - 8	9 - 10	Out of 10
Sponsorship Strategy & Value Creation	Outreach-focused. No clear sponsor value or reasoning behind approach.	Basic sponsor mapping. Benefits mentioned but not clearly structured or justified.	Defined sponsorship approach. Clear value proposition aligned with team activities.	Strong partnership strategy with clear sponsor value, structured proposals, consistent engagement, and strong execution.	
	0 - 2	3 - 5	6 - 8	9 - 10	Out of 10
Commercial Thinking & ROI Logic	Activities not linked to value. No understanding of outcomes or returns.	Some linkage between activities and value, but inconsistent or unclear.	Clear connection between actions (marketing, outreach, sponsorship) and expected outcomes.	Decisions consistently driven by value creation. Clear reasoning supported by measurable outputs or tracked performance.	
	0 - 2	3 - 5	6 - 8	9 - 10	Out of 10
Financial Planning & Resource Allocation	Budget missing or unrealistic. No clear allocation logic.	Partial budget. Allocation exists but lacks justification.	Clear budget with logical allocation aligned to activities.	Well-controlled financial plan. Allocation reflects priorities, with structured tracking of expenses and resource use.	
	0 - 2	3 - 5	6 - 8	9 - 10	Out of 10
Marketing Strategy & Brand Positioning	No clear positioning. Communication inconsistent or ineffective.	Basic strategy present. Messaging unclear or inconsistent across platforms.	Defined positioning. Communication aligned with strategy. Evidence of audience engagement.	Strong positioning with clear audience focus. Multi-channel execution supported by consistent messaging and performance tracking.	
	0 - 4	5 - 8	9 - 12	13 - 15	Out of 15
Team Identity & Narrative Alignment	No clear identity. Team appears inconsistent across materials and activities.	Basic identity defined but weak connection to actions or messaging.	Clear identity reflected across branding, communication, and decisions.	Strong, distinctive identity reflected consistently in strategy, communication, execution, and team presentation.	
	0 - 2	3 - 5	6 - 8	9 - 10	Out of 10
Outreach & Professional Engagement	Limited engagement. Communication lacks clarity or professionalism.	Some outreach present. Quality of communication inconsistent.	Structured engagement approach. Communication is professional and clear.	High-quality engagement. Communication is consistent, purposeful, and supported by structured outreach methods.	
	0 - 2	3 - 5	6 - 8	9 - 10	Out of 10
Documentation Quality & Clarity	Difficult to navigate. Information unclear or poorly structured.	Basic structure present but requires effort to understand.	Information logically structured. Content is clear and easy to follow.	Information is clearly structured, easy to navigate, and organized for review.	
	0 - 2	3 - 5	6 - 8	9 - 10	Out of 10
Execution Evidence & Outcome Alignment	Claims not supported. Little evidence of actual work.	Some evidence present but inconsistent or incomplete.	Clear evidence linking planned activities to execution.	Clear evidence links decisions to actions and measurable outcomes.	
	0 - 1	2 - 3	4	5	Out of 5
TOTAL SCORE:					
					Out of 100

 Business Strategy Presentation				Team Number:	
				Team Name:	
					Achieved Score
Strategic Narrative & Structure	Disorganized; no logical progression; difficult to follow.	Basic structure present but lacks clarity in flow and transitions.	Clear sequence; logical progression; ideas connected effectively.	Highly coherent narrative; strong strategic flow; seamless progression reinforcing key messages.	
	0 - 6	7 - 12	13 - 19	20 - 25	Out of 25
Clarity of Communication & Delivery	Unclear delivery; lack of confidence; reliance on notes; difficult to understand.	Moderate clarity; inconsistent confidence; noticeable hesitation.	Clear and confident delivery; controlled pace; effective articulation.	Highly engaging delivery; strong presence; communicates with precision and authority.	
	0 - 6	7 - 12	13 - 19	20 - 25	Out of 25
Team Coordination & Role Clarity	Uneven participation; lack of coordination; unclear roles.	Some coordination; inconsistent participation across members.	Balanced participation; defined roles; smooth transitions.	Seamless coordination; clear ownership of sections; highly synchronized team execution.	
	0 - 5	6 - 10	11 - 15	16 - 20	Out of 20
Depth of Understanding & Ownership	Limited understanding; unable to explain decisions; superficial responses.	Partial understanding; explanations lack depth or clarity.	Good understanding; able to explain decisions with reasonable depth.	Strong ownership; deep understanding; confidently articulates reasoning behind decisions.	
	0 - 6	7 - 12	13 - 19	20 - 25	Out of 25
Portfolio Integration & Evidence Usage	Portfolio not referenced or poorly used; lacks supporting evidence.	Limited reference; weak linkage between presentation and portfolio.	Portfolio used appropriately; supports key arguments.	Portfolio acts as central evidence base; seamlessly integrated to reinforce credibility.	
	0 - 6	7 - 12	13 - 19	20 - 25	Out of 25
Decision Justification & Commercial Logic	Decisions unclear or unjustified; weak reasoning.	Basic explanations; limited linkage to outcomes or strategy.	Logical justification; decisions linked to objectives and execution.	Strong strategic reasoning; decisions justified with clear commercial and operational logic.	
	0 - 5	6 - 10	11 - 15	16 - 20	Out of 20
Visual Communication & Information Design	Visuals unclear or distracting; information difficult to interpret.	Basic visuals; limited contribution to understanding.	Visuals support communication; information presented clearly.	Visual execution enhances clarity; reinforces key insights; highly professional and intentional.	
	0 - 5	6 - 10	11 - 15	16 - 20	Out of 20
Responsiveness in Q&A	Unable to respond accurately; lacks awareness of project details.	Partial responses; inconsistent clarity; struggles under questioning.	Relevant and accurate responses; demonstrates understanding.	Precise, confident responses; demonstrates full command of project and decisions.	
	0 - 5	6 - 10	11 - 15	16 - 20	Out of 20
Time Management & Delivery Control	Poor pacing; exceeds or fails to utilize time effectively.	Inconsistent pacing; uneven time allocation across sections.	Well-managed timing; balanced coverage of key areas.	Highly controlled delivery; optimal pacing; strong prioritization of key content.	
	0 - 2	3 - 5	6 - 8	9 - 10	Out of 10
Authenticity of Execution	Appears memorized; lacks connection to real work.	Some authenticity; limited evidence of ownership.	Demonstrates real involvement; credible connection to work.	Clearly reflects real execution; strong ownership and alignment with portfolio evidence.	
	0 - 2	3 - 5	6 - 8	9 - 10	Out of 10
TOTAL SCORE:					Out of 200

Paddock Inspection

Team Number:	
Team Name:	
Achieved Score	Judges Remarks

Cleanliness & Organization	Paddock cluttered. Items disorganized. Layout unclear.	Basic setup but inconsistent organization. Some clutter or poor placement.	Clean and organized. Logical placement of items. Easy to navigate.	Highly controlled setup. Layout is intentional, efficient, and allows immediate understanding of space.		
	0 - 2	3 - 5	6 - 8	9 - 10	Out of 10	
Branding & Visual Identity	Weak or inconsistent identity. No clear visual direction.	Basic identity present but inconsistently applied.	Clear and consistent identity across display elements.	Strong, distinctive identity. Consistently applied and reinforces team positioning.		
	0 - 4	5 - 8	9 - 12	13 - 15	Out of 15	
Technical Display & Project Visibility	Cars, portfolios, or project work missing or not clearly presented.	Basic display present but unclear or poorly explained.	Cars, portfolios, and key work clearly presented and understandable.	Setup clearly communicates engineering work. Cars, components, and outputs are displayed to support understanding and discussion.		
	0 - 4	5 - 8	9 - 12	13 - 15	Out of 15	
Professionalism & Readiness	Setup appears incomplete or rushed. Team not prepared to engage.	Basic setup complete but lacks refinement or readiness.	Professional setup. Team prepared and able to engage when required.	Highly polished and competition-ready. Setup reflects preparation, control, and a functioning team workspace.		
	0 - 2	3 - 5	6 - 8	9 - 10	Out of 10	
TOTAL SCORE:						
					Out of 50	

RACE PAKISTAN 2027

RULEBOOK





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