



# THE FORMULA ONE™ TECHNOLOGY CHALLENGE

IN SCHOOLS

## 2012 WORLD FINALS Competition Regulations



Refer also to the 2012 World Finals Technical Regulations

Front Cover – World Champions: PentaGliders, Brooks High School, Australia. In the F1™ Paddock, at the SingTel Singapore Grand Prix, with Bernie Ecclestone, President and CEO, Formula One Management.

Amendments made on, 3 April, 2012, will be indicated thus (using red underlined text).

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## PREFACE – SUMMARY OF REVISIONS FOLLOWING 2011 REVIEW

This section provides an overview of all articles that have been revised from the 2011 Competition Regulations.

**C1.11** – Added new definition of the term ‘race event’.

**C2.1** – Revised C2.1.5 and added new article C2.1.6. These clarify conditions of entry for students who have participated in previous World Finals events.

**C2.13** – Revised

to clarify use by F1 in Schools Ltd. of the project elements to be retained by F1 in Schools Ltd.

**C2.3.4** – This is a new regulation related to security of the pit display and related elements.

**C2.9** – “Outside assistance” changed to “Team partnerships”. Also added to the team partnerships declaration form, in the appendix, that partners who have only provided financial support do not need to be declared.

**C4.5** – This is a new regulation. “Rectifying critical regulation failure - Teams that have been judged during scrutineering to have incurred a critical regulation failure will be provided with a special 20 minute car service time, prior to the commencement of racing. If during this service time the car can be modified so as to comply with the failed regulation/s, the team will then only incur the point’s penalty for that infringement, without being classified as having a critical regulation infringement”. Previous article C4.5 now becomes C4.6.

**C6.5** – Added word ‘printed’. Revised to now read “Judges will only review the first 20 PRINTED pages for assessment purposes.”

**C8.8.1** – This is a new regulation. “Cars judged to have critical regulation failures will only be permitted to race in round one of the knock-out competition and will be automatically knocked out during round one regardless of the race result.”

**C9.1** – Car repairs and car servicing. Various revisions have been made to C9.1 explaining when car repairs and car servicing will now be allowed. Penalty revised to 5 points per repair instead of a single 15 point penalty.

**C9.2.2** – Additional car service time before the commencement of each round of knock-out racing.

## ARTICLE C1 – DEFINITIONS

### C1.1 World Finals Event

The World Finals event is managed by F1 in Schools Ltd and usually held over several days to include various programmed social and competition activities. The event aims to provide all participants with an educational and personal development ‘Experience of a Lifetime’. Specifically, the competition aims to determine the World Champions of F1 in Schools™ according to the 2012 F1 in Schools World Finals Technical and Competition Regulations.

### C1.2 F1 in Schools In-Country Co-ordinator (ICC)

Person/s and/or an organisation approved by F1 in Schools Ltd. to manage and co-ordinate F1 in Schools™ The Formula One™ Technology Challenge within a specified country or region of the world.

### C1.3 Parc fermé

A secure area where all primary and back-up race cars are held to prevent unauthorised handling, but to allow technical inspections to be conducted by the Judges. (Literal meaning in French of ‘closed park’).

**C1.4 Competition Program**

The competition program will detail the schedule of judging activities for all teams.

**C1.5 World Finals terms and conditions for entry**

This is a document issued by F1 in Schools Ltd which constitutes an agreement between F1 in Schools Ltd., ICC's and supervising teachers regarding participation by teams in the World Finals event.

**C1.6 Key performance indicators (KPI's)**

These are portions of text that feature on the scorecards within a corresponding points range. The KPI's describe the type of evidence the Judges will be looking for in order to score the team appropriately.

**C1.7 Car race time value**

A 'car race time' value is the actual time taken for a F1 in Schools™ car to travel the track from start to finish, measured from the instant the launch pod fires to when the car breaks the finish line timing beam. In the case of reaction races, the 'car race time' value is calculated as the 'total race time' value displayed on the electronic start gate minus the 'reaction time' value displayed for that race.

**C1.8 Total race time value**

The 'total race time' value is displayed in the total time field on the electronic start gate at the conclusion of every race. This time is the sum of the 'car race time' value and any 'reaction time' value displayed on the electronic start gate. During time trial races where the automatic launch mode is used there is a zero reaction time value.

**C1.9 Reaction time value**

A 'reaction time' value is the time recorded from the instant the five (5) start lights extinguish to the instant the start trigger is activated by the driver. This value is displayed in the reaction time field on the electronic start gate.

**C1.10 Project elements**

These are any materials and resources that the team presents as part of its entry for any judging activity.

**C1.11 Race event**

The World Finals competition includes three separate race events. These are Time Trials, Reaction Racing and Knock-out Racing.

**ARTICLE C2 – GENERAL INFORMATION****C2.1 Competing teams**

**C2.1.1** F1 in Schools Ltd. will request that each In-Country Co-ordinator (ICC) nominates an agreed number of teams for entry to the World Finals event from their region. Once approved by F1 in Schools Ltd., these teams will then be invited to compete in the World Finals by the ICC. Normally the invited World Finals teams will be the overall winner of the in-country national final. Any special invitation teams must be approved by F1 in Schools Ltd.

**C2.1.2** F1 in Schools Ltd. will provide help to establish international collaboration teams where needed by liaising between the relevant ICC's. Teams nominated to form international collaboration teams are usually the in-country national final runner-up.

**C2.1.3** Each team must consist of a minimum of 3 students to a maximum of 6.

**C2.1.4** Collaboration teams must consist of a minimum of 4 members up to a maximum of 6 with a minimum of 2 members from any one country i.e. 3 countries collaborating is the maximum.

**C2.1.5** Student teams who have competed at a previous World Finals event are not eligible to participate. A single member of a team who has previously competed is eligible to enter, providing they are part of a new team, with no other previous participants, and this team has qualified for entry by progressing through the in-country competition. ARTICLE C2.1.1 applies.

**C2.1.6** Regulation C2.1.5 does not apply to international collaboration teams who have previously participated provided the same international collaboration team is not entered.

## **C2.2 Competition program and team number ballot**

**C2.2.1** F1 in Schools Ltd will issue the competition program before the team number ballot, showing all scheduled judging activities, with judging times listed against team competition numbers.

**C2.2.2** A ballot will be held to determine the competition number each team will be allocated. These team numbers will correspond with those published in the competition program. The ballot will usually be either webcast live or filmed and made available for viewing by internet. This will usually occur a week or two prior to the event.

**2.2.3** Following the team number ballot, the competition program may be revised slightly to accommodate a team from the host country participating in the first race of the event. The ballot may be conducted so that all collaboration teams are in the same judging stream.

## **C2.3 Team responsibilities**

**C2.3.1** Teams must read the World Finals **Technical Regulations** carefully to ensure their cars comply with those regulations.

**C2.3.2** Teams must read the World Finals **Competition Regulations** carefully to ensure that all project elements satisfy these regulations and that they understand the requirements and procedures for all aspects of the competition and judging.

**C2.3.3** During competition it is the team's responsibility to ensure that team members are present at the correct time and location for all scheduled activities.

**C2.3.4** Security of the pit display and its elements is the team's responsibility during competition.

## **C2.4 Role and responsibility of ICC and supervising teacher / adult.**

**C2.4.1** All ICC's and supervising teachers / adults should carefully read and understand the terms and conditions for entry to the F1 in Schools World Finals event, and must have explained all relevant information within this agreement to their team/s.

**C2.4.2** It is the primary responsibility of any event accredited supervising teacher / adult and / or the ICC to ensure duty of care / well-being for all their student team members, as appropriate for their home country legislation. Any concerns arising during the event in relation to this should be brought to the attention of the F1 in Schools Ltd. Event Directors immediately.

**C2.4.3** The event accredited supervising teacher / adult and / or ICC is permitted to be present during any judging activity with their team, but, must not interact in any way with the student team, Judges or judging process. Any incident considered inappropriate will be brought to the attention of the Chair of Judges.

## **C2.5 Regulations documents**

**C2.5.1** F1 in Schools Ltd. issues the regulations, their revisions and amendments made.

**C2.5.2** Competition Regulations - (This document). The Competition Regulations document is mainly concerned with regulations and procedures directly related to judging and the competition event. Competition Regulation articles have 'C' prefix.

**C2.5.3** Technical Regulations - A document separate to this one which is mainly concerned with those regulations that are directly related to F1 in Schools™ car design and manufacture. Technical Regulation articles have a 'T' prefix.

## **C2.6 Interpretation of the regulations**

**C2.6.1** The final text of these regulations is in English, should any dispute arise over their interpretation. The regulation text, diagrams and any related definitions should be considered together for the purpose of interpretation.

**C2.6.2** Text clarification - Any frequently asked questions that are deemed by F1 in Schools Ltd. to be related to text needing clarification will be answered. The question and the clarification will be published to all teams at the same time.

## **C2.7 Supplementary competition regulations**

Other documents may be issued by F1 in Schools Ltd. that provide teams with further logistic and other important event information. Any supplementary regulations will be issued to all ICC's and team managers, where the team manager has supplied F1 in Schools Ltd with a contact email address. Copies of all supplementary regulations issued will be displayed on a notice board at event registration and available online.

## **C2.8 Design ideas and regulation compliance queries.**

Teams are not permitted to seek a ruling from F1 in Schools Ltd. or any competition official or judge before the event as to whether a design idea complies with the regulations. Rulings will only be made by the Judges at the World Finals event. Design compliance to the regulations forms part of the competition. As in Formula 1™, innovation is encouraged, and F1 in Schools™ teams may also find, sometimes controversial ways, of creating design features by pushing the boundaries in order to get an extra competitive edge.

## **C2.9 Team partnerships**

**C2.9.1** F1 in Schools teams' are encouraged to develop mentoring partnerships with businesses, industry or higher education organisations throughout their project.

**C2.9.2** All teams will be required to complete a 'Team Partnerships' declaration using the template issued by F1 in Schools Ltd. This is submitted as per Article C2.12.

**C2.9.3** All design work, text and scripting for all project elements presented for assessment must be wholly undertaken and created by the team. This includes all CAD and CAM data, electronic portfolio and graphic content.

**C2.9.4** All aspects of any partnerships should also be represented in the team's portfolio. For project elements produced utilising some outside assistance, teams should be able to demonstrate to the Judges a high level of understanding of, and justification for, any of the processes used.

**C2.9.5** 'Common sense' will prevail for project elements or components that a team has purchased from a supplier. E.g. bearings, screw eye, display hardware.. Teams should be able to explain and justify why a specific component was selected / purchased over other similar available components.

## C2.10 Mandatory project elements required for World Finals entry

Following is a summary of the mandatory elements to be submitted for judging:

- Three (3) F1 in Schools™ Cars
- A design portfolio
- An orthographic drawing and 3D render included in the design portfolio
- A pit display
- A 10 minute verbal presentation
- An electronic copy of all specified project data
- A separate set of engineering drawings for specification judging
- A design specification document
- A laptop containing all CAD data and relevant CAD software
- A 'Team Partnerships' declaration

The above list is detailed in the remainder of ARTICLE C2.

**C2.10.1** Cars - Each team must produce three (3) identical F1 in Schools cars - a primary race car, an identical back-up and a third display car.

**C2.10.2** Portfolio - Each team must produce a 'hard copy' 20 page maximum design portfolio, presented in an A3 (or similar) sized format for exhibition within the teams pit display. Refer to ARTICLE C6 of these regulations along with the portfolio and display judging scorecard for portfolio specification and content requirements.

**C2.10.3** Orthographic drawing - A 3<sup>rd</sup> angle orthographic projection, including plan, side and end elevations of the fully assembled car must be included in the design portfolio. A 3D rendering of the final car design must also be included. These elements must be produced using CAD. **The orthographic technical drawing should include dimensions and corresponding regulation numbers in order to illustrate regulation compliance.**

**C2.10.4** Pit display - Each team will be provided with a dedicated exhibition style booth and table for set-up of their pit display elements. The specific style and size of this space will be announced in supplementary event competition regulations. Refer to ARTICLE C6 for further pit display specifications and content requirements.

**C2.10.5** Verbal presentation - Teams will be required to deliver a verbal presentation in relation to their project to the Judges. The presentation must not last longer than 10 minutes. If teams are unable to deliver the presentation in English, then an interpreter can be present and a time of 20 minutes will be allocated. Teams should bring their own laptop with any slide show or other multimedia files that need to be shown as part of their verbal presentation. Any team who needs a laptop for verbal presentation judging and is unable to bring one to the World Finals must contact F1 in Schools Ltd, [[world@f1inschools.com](mailto:world@f1inschools.com)], at least one month prior to the event. Refer to ARTICLE C7 of these regulations for detail regarding presentation content and other requirements.

**C2.10.6** Electronic data - Teams must submit all engineering and other data specified below on a storage device compatible with the windows operating.. E.g. CD ROM.

Data submitted must include:

- all CAD parts and assembly files
- hi-res realistic renders
- full design portfolio
- all additional engineering drawings submitted for judging
- any pit display multimedia files



This data may be referred to for judging purposes and possible marketing and promotion following the event. Note that the storage device will not be returned to the team.

**C2.10.7** Engineering drawings for specification judging - Teams must submit a hard copy of any engineering drawings of their car assembly and parts they wish to be referenced by the engineering and specification Judges. As a guide, the minimum requirement is a separate duplicate copy of the orthographic drawing included in the design portfolio. These drawings must be on pages no larger than A3 in size.

**C2.10.8** Design specification sheet - Each team must complete and submit a design specification sheet using the template issued by F1 in Schools Ltd.

**C2.10.9** Laptop for engineering judging - A laptop with the CAD software used by the team and with all CAD part and assembly data must be brought to the World Finals event. This will be needed during the engineering judging session so that the team can demonstrate their CAD work and better explain how they engineered their car design. Any team unable to bring a laptop to the World Finals with CAD files installed must contact F1 in Schools Ltd ([world@f1inschools.com](mailto:world@f1inschools.com)), at least one month prior to the event.

**C2.10.10** 'Team Partnerships' declaration - Every team must complete the declaration template as issued by F1 in Schools Ltd. All partnerships and any outside assistance must be included. This document will be referenced by Judges so they can better understand team partnerships, ask questions, and therefore must be a full and accurate declaration.

## **C2.11 Team registration at the event**

**C2.11.1** Teams will be required to register with F1 in Schools Ltd. once arriving for the event. At this registration teams will be issued with World Finals accreditation, event programs and detailed welcome pack. The student team manager, supervising teacher and ICC for each team should attend. The time and location of registration will be published in further event supplementary regulations.

**2.11.2** The World Finals accreditation material issued will include the official F1 in Schools™ 30x15mm car decals, for teams that have not manufactured their own. These decals must be fitted to each of the three cars by the team following registration and prior to the submission of their project elements.

## **C2.12 Submission of project elements**

**C2.12.1** A time and location will be published in the event program for when each team must submit their project elements. This will occur well before judging commences. Following is a list of the elements which must be submitted by each team at this time;

- 1 x nominated primary race car
- 1 x nominated back-up race car
- 1 x printed 20 page design portfolio
- Electronic copy of all specified project data
- Scrutineering engineering drawings
- Design specification document
- 'Team Partnerships' declaration template

All elements must be submitted complete and ready for judging. Refer to ARTICLE C2.10

**C2.12.2** During project submission, each team will be given the opportunity to check the weight of their cars on the official World Finals scales. If either car being submitted is under legal weight, the team will be permitted to fix any issue in order that both cars can be submitted at a legal weight.

**C2.12.3** The team will be required to nominate which car is the primary race car and which is the back-up race car. Small coloured 'dot' stickers (approximately 5mm in diameter) and supplied by F1 in Schools Ltd, will be adhered to the underside of each car. The stickers will feature the team's competition number and be colour coded for identification between the primary and back-up cars.

**C2.12.4** Once cars have been submitted, they are considered as being in parc fermé.

### **C2.13 Project elements to be retained by F1 in Schools Ltd.**

It is a condition of World Finals entry that each team permits F1 in Schools Ltd to retain 1 x race car, usually the nominated back-up car, the 20 page design portfolio and the electronic copy of all specified project data submitted. Teams also permit F1 in Schools Ltd. to use any of these project elements for marketing purposes and / or publication as exemplar projects for reference by others.

## **ARTICLE C3 – COMPETITION AND JUDGING FORMAT**

### **C3.1 Competition program**

**C3.1.1** Each team will be judged as per the competition program. The competition program will be formulated by F1 in Schools Ltd to best and fairly accommodate all judging and other competition activities. Teams will rotate around judging activities as per this program, with each rotation usually of 40 minutes in duration.

**C3.1.2** Judging Streams – The competition program will normally be divided into two parallel judging streams, Stream A and Stream B, to help ensure quality judging time intervals within the event time constraints. A number of strategies are implemented within the judging process, including Judge briefings and Judge reviews for cross-moderation to ensure there is consistency across the judging streams.

### **C3.2 Judging categories**

There are five (5) main judging categories, each with its own team of judges and specified judging activities as detailed in further articles.

- Specification Judging
- Engineering Judging
- Portfolio and Display Judging
- Verbal Presentation Judging
- Racing

### **C3.3 Judging score cards**

The F1 in Schools™ World Finals judging score cards provide detailed information in relation to what the Judges will be looking for. They include key performance indicators which are referred to by the judges in awarding points during judging activities. The 2012 World Finals judging score cards can be found in the appendix of this document. **READING THE SCORE CARDS CAREFULLY IS IMPORTANT. THEY PROVIDE CRITICAL INFORMATION FOR TEAMS AS TO WHAT NEEDS TO BE PRESENTED FOR EACH JUDGING CATEGORY.**

### **C3.4 World Champions**

The Bernie Ecclestone F1 in Schools™ World Champions perpetual trophy will be awarded to the team with the highest total score, sum of all judging categories (ARTICLE C3.5). In the case of a tied points score, the team with the highest time trial score will be determined the winner. The Chair of Judge's decision is final.

### C3.5 Point allocations

Points will be awarded to teams across five (5) categories with maximum possible scores as detailed in the following table;

**World Finals Judging Categories and Point Allocations**

<b>Specification Judging</b>	
Specifications	120 points
<b>Engineering Judging</b>	
CAD CAM and Analysis	60 points
Quality of Manufacture	60 points
<b>Portfolio and Pit Display Judging</b>	
Portfolio	90 points
Pit Display and Marketing	60 points
F1 Car Design Process	60 points
<b>Verbal Presentation Judging</b>	
Technique	60 points
Composition	60 points
Subject Matter	60 points
<b>Racing</b>	
Time Trials	170 points
Reaction Racing	60 points
Knock-Out Racing	40 points
<b>TOTAL</b>	<b>900 points</b>

### C3.6 Critical regulations

**C3.6.1** Some of the Technical Regulations have been identified as being critical regulations. If following scrutineering and time given to rectify any infringement (Refer C4.5), a team's primary race car is judged as being NON-COMPLIANT with any critical technical regulation, they will be INELIGIBLE for the following awards:

- World Champions
- Fastest Car
- Best Engineered Car

**C3.6.2** If the back-up race car is used for any races, it must also comply with all critical Technical Regulations for the team to be eligible for these awards.

**C3.6.3** The critical Technical Regulation articles are:

**T3.1 / T3.2 / T3.3 / T3.4 / T3.5 / T3.6 / T4.1 / T4.2 / T4.3 / T6.1 / T7.1 / T8.1 / T8.2 / T8.3 / T8.4 / T8.8 / T10.1 / T10.2 / T10.3 / T10.4 / T10.5 / T10.6**

Note well: The above article numbers are from the World Finals Technical Regulations.

### C3.7 Best team website

Whilst a team website is not a mandatory project element, F1 in Schools Ltd recognises that many teams produce a website for team marketing and promotional purposes. There is a Best Team Website Award and teams will be given an opportunity to send F1 in

Schools Ltd a link to their team website so these can be reviewed to determine a winner for this award.

## **ARTICLE C4 – SPECIFICATIONS JUDGING (120 points)**

### **C4.1 What will be judged?**

Specification judging is a detailed inspection process where BOTH the primary and back-up race cars are assessed for compliance with the F1 in Schools™ World Finals Technical Regulations. Refer to the specification judging scorecard for scoring details.

### **C4.2 Team preparation**

Teams must ensure that their primary and back-up race cars are complete and ready for specification judging before they are submitted. Notice is also drawn to the critical technical regulations, refer ARTICLE C3.6. Teams must have also submitted an electronic copy of all specified project data, scrutineering engineering drawings, and design specification document, which may all be referenced. Refer ARTICLE C2.10

### **C4.3 Who needs to attend?**

Specification scrutineering is a closed activity that no team member or supervising teacher may attend. There will be a specification review session scheduled that must be attended by the team manager, team design and manufacturing engineers as a minimum.

### **C4.4 Judging process / procedure**

Teams begin specification judging with a full allocation of 120 points. Any infringements of the Technical Regulation articles, on either car, will result in point's being deducted as detailed in the Technical Regulations.

There are two parts to the specification judging process.

- A. **Scrutineering** – this is conducted within the confines of parc fermé, where the specification Judges will scrutinise both cars for compliance to the Technical Regulations. A series of specially manufactured gauges will be used to broadly check compliance. Accurate measuring tools, such as vernier callipers will then be used to closely inspect any dimensions found to be near to dimensional limits per the initial gauge inspection. Scrutineering commences as cars are submitted.
- B. **Scrutineering Review Interview** – each team will be scheduled a period of time for a review of any specification infringements ruled. The Judges will highlight to the team any regulation infringements and provide necessary explanations. The team is then given opportunity to explain to the Judges why they feel any identified infringements should be considered as permissible. Following the teams explanation, the judges may choose to reverse their original decision or uphold it. No further discussion will then be permitted.

### **C4.5 Rectifying critical regulation failure**

Teams that have been judged during scrutineering to have incurred a critical regulation failure will be provided with a special 20 minute car service time, prior to the commencement of racing. If during this service time the car can be modified so as to comply with the failed regulation/s, the team will then only incur the point's penalty for that infringement, without being classified as having a critical regulation infringement.

### **C4.6 Specification judging decision appeals**

Teams may appeal the specification Judges decision if they still believe their justification for regulation compliance should be accepted. An appeal must be submitted in writing directly to the Chair of Judges within two (2) hours of the team completing their scrutineering

review session. Refer ARTICLE C10. The Chair of Judges will discuss the appeal with the scrutineering judges and may seek additional advice from F1 in Schools Ltd. regulation authorities. The Chair of Judges will then meet with the team, to discuss the appeal and explain the final decision.

## **ARTICLE C5 – ENGINEERING JUDGING (120 points)**

### **C5.1 What will be judged?**

The engineering Judges will assess the team's use of CAD/CAM technologies along with the quality of manufacture of both the primary and back-up race cars submitted. The specific areas to be assessed are:

- Application of CAD CAM
- Analysis
- Organisation of CAD data
- Orthographic drawing and 3D rendering
- Quality of manufacture and assembly of the two submitted cars
- Manufacturing process discussed in the portfolio
- Use of CNC machining

Refer to the engineering judging scorecard for key performance indicator information.

### **C5.2 Team preparation**

A laptop needs to be ready and taken to engineering judging along with the design portfolio. (Refer ARTICLE C2.10). Other items may also be taken to help the team explain any engineering or manufacturing concepts. The engineering judges will not have access to the team pit display for judging purposes. Teams must not take their display (3<sup>rd</sup>) car to engineering judging. Preparation should include careful reading of the scorecard. The key performance indicators for the application of CAD CAM, analysis and associated data organisation, describe what the judges will be looking for.

### **C5.3 Who needs to attend?**

This judging session must be attended by the team manager and team design and manufacturing engineers as a minimum.

### **C5.4 Judging process / procedure**

Teams will be awarded points as per the key performance indicators shown on the engineering scorecard. The scheduled engineering judging interview session will focus on the application of CAD CAM, analysis, CAD data organisation, orthographic drawing, 3D render and use of CNC machining. This is an informal interview where Judges will ask the team to demonstrate their CAD / CAM work and query teams on what they have done. The quality of car manufacture and car assembly will be judged during a separate 'closed to teams' session.

## **ARTICLE C6 – PORTFOLIO AND DISPLAY JUDGING (210 points)**

### **C6.1 What will be judged?**

The portfolio and display judges will examine each teams 20 page design portfolio and pit display so that they can assess the following specific areas.

- Project management
- Team work

- Portfolio for clarity and quality
- Team identity
- Marketing
- Pit display for clarity and quality
- F1 car design process
  - Ideas
  - Development and testing
  - Evaluation

Refer to the portfolio and display judging scorecard for detailed point scoring and key performance indicator information.

## **C6.2 Team preparation**

Each team must prepare a design portfolio and pit display as per ARTICLE 2.10. Most importantly, teams need to read the portfolio and display judging score card carefully to ensure that all areas to be assessed are included within the context of their design portfolio and pit display. It is each team's decision how and where each area is presented. Teams should be mindful of the time constraints of judging when making these decisions.

## **C6.3 Who needs to attend?**

All team members must be present during the portfolio and display judging session.

## **C6.4 Judging process / procedure**

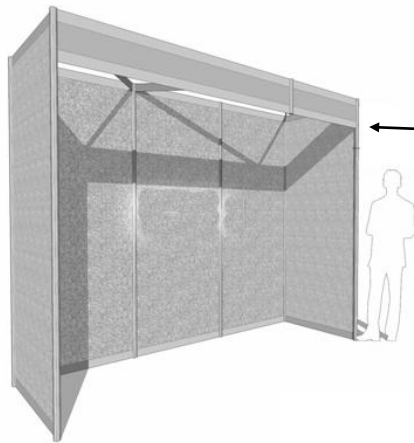
Portfolio and display judging will take place at each teams pit display. The Judges will usually introduce themselves then ask the team to stand clear of their display so the Judges can conduct assessments. Team members may be asked questions by Judges to help them find certain content and or seek further explanation. In addition to the scheduled judging session, the Judges will also be given time to conduct pre-judging and review of each teams pit display and design portfolio. This will be a 'closed to teams' session programmed before the commencement of scheduled judging sessions. Design portfolios will be returned to teams so that these can be integrated into each teams display.

## **C6.5 Design Portfolio requirements**

The design portfolio must be in a printed 'hard copy' format of A3 or similar size. The portfolio is limited to 20 pages which includes the front and back covers. This can be 20 single sided or 10 double sided sheets. If a portfolio comprises more than 20 pages, the Judges will only review the first 20 PRINTED pages for assessment purposes. There MUST be content related to the use of CAM and CNC manufacturing included in the portfolio and this will be referenced by the engineering Judges. An orthographic drawing and 3D render must also be included in the portfolio, refer ARTICLE C2.10. Content related to project management, the team, design ideas, design development, research, testing and evaluation are commonly presented within the portfolio.

## **C6.6 Pit display setup and parameters**

**C6.6.1** F1 in Schools Ltd will provide each team with a self contained exhibition style display booth including integrated lighting and 1 x power supply with pins and rating configured to the host country format. Teams need to supply any power adaptors they may require. A trestle style table will also be supplied, use of this is optional. The precise booth and table dimensions will be announced closer to the event. Display booths are normally of approximate dimensions 3m wide x 1m deep x 2.4m high. The display booth will be a design similar to that shown in the following diagram.



This front facia is reserved for exclusive use by F1 in Schools Ltd. Information placed here may include the team name, home school and country.

**C6.6.2** A time period will be scheduled for when all teams will set-up their pit displays, usually during the day prior to judging commencing. A time limit will be enforced. The time limit is usually two hours, this will be confirmed in supplementary regulations.

**C6.6.3** No part of the teams completed pit display is allowed to protrude beyond the physical dimensions of their allocated pit booth. This includes anything that might protrude above the pit booth highest point e.g. Flags.

**C6.6.4** **ONLY** student team members are permitted to set-up their pit displays. There must be no supervising teacher / adult or other outside assistance, unless deemed by F1 in Schools Ltd to be a health and safety issue.

**C6.6.5** F1 in Schools Ltd and / or the Chair of Judges may instruct a team to take action to reduce noise or remove display inclusions deemed to be inappropriate. F1 in Schools Ltd. will instruct teams to remove or alter any display inclusions considered to be a safety hazard.

**C6.6.6** Any electrical appliance connected to the power supply must be safe and compatible with the host country power rating.

## ARTICLE C7 - VERBAL PRESENTATION JUDGING (180 points)

### C7.1 What will be judged?

The verbal presentation Judges will assess each teams 10 minute verbal presentation across the areas of technique, composition and subject matter:

- Presentation technique
  - use of visual aids – effective use of multimedia and / or other ‘props’.
  - team contribution – effective participation by all team members
  - dynamic – levels of enthusiasm and energy.
  - engagement – audience interest and excitement.
- Presentation composition
  - concepts clarification – clear and concise explanations where required.
  - use of time – how effectively was the 10 minutes used.
  - Presentation structure – overview explained and connection between topics.
- Subject Matter (the topics which need to be talked about)
  - innovation – detail key innovations related to car design, project management, marketing or any other aspect of the teams project.

- collaboration – detail any partnerships or mentoring from outside the team and justify in terms of improving project outcomes.
- learning experiences – explain how the F1 in Schools™ project has benefited team members.

Refer to the verbal presentation judging scorecard for detailed point scoring and key performance indicator information.

## **C7.2 Team preparation**

Each team is required to prepare a verbal presentation as per the requirements at ARTICLE C2.10. Any multimedia content, slides etc must be saved on, and shown, using the teams own laptop. Teams need to have all presentation resources tested and ready with them for verbal presentation judging. Most importantly, teams should read the verbal presentation judging scorecard carefully to ensure their verbal presentation features all elements and content that the verbal presentation judges will be looking for.

## **C7.3 Who needs to attend?**

All team members must be present during the verbal presentation judging session.

## **C7.4 Judging process / procedure**

Verbal presentation judging is scheduled for the same duration of other judging sessions, usually 40 minutes. Teams will be given an opportunity at the start of their time to set-up and test their laptop and any other presentation technologies and resources. The team will inform the Judges when they are ready to begin. The Judges start timing the 10 minute duration (20 minutes if not speaking English and using an interpreter), and will provide a discreet time warning signal when one minute of presentation time remains. The team will be asked to cease presenting when the time limit has been reached. At the conclusion of the team's presentation time, the Judges may choose to provide some feedback and / or ask any clarifying questions they feel necessary. Verbal presentations may be filmed for Judges review or promotional and future resource purposes.

## **C7.5 Verbal presentation judging provisions**

F1 in Schools Ltd. will provide a dedicated private space, such as a small meeting room, where each team will deliver their presentation to the Judges. This space will include a data projector, screen and multimedia sound system. These will be in fixed positions but usually with sufficient cable length to allow teams some freedom for choosing where they wish to locate their laptop. A single table will also be made available with its use and location in the presentation space being optional.

# **ARTICLE C8 – RACING (270 points)**

## **C8.1 What races will be conducted?**

The F1 in Schools™ World Finals racing points will be awarded through the staging of three types of race events.

- A. Time Trials – automatic launch mode, two races in each lane.
- B. Reaction Racing – manual / driver launch mode, two races in each lane.
- C. Knock-out Competition Races – manual / driver launch mode, one race in each lane per round of competition.

Time trial races will be conducted first, followed by reaction racing. **The single fastest 'car race time' value from all time trial and reaction races will determine the Fastest Car Award.** The knock-out competition is the last of the scheduled races. Refer to ARTICLE 3.5 and further information following for details on how points are calculated and awarded.



## **C8.2 Team preparation**

**C8.2.1** Teams should be familiar with the operation of the F1 in Schools™ Race System. There will normally be a demonstration track within the venue where teams can practice race starts during free time prior to their scheduled races.

**C8.2.2** Manual / driver starts - One or more team members (driver/s) must be appointed for launching of the teams' car using the manual launch method.

**C8.2.3** Finish line management - At least one member of the team must be appointed as responsible for managing the finish line deceleration system. I.e. standard deceleration towels or teams own system (refer C8.13), and return of car along the track to the start.

**C8.2.4** Start line car staging - one team member may be appointed as being responsible for 'staging' the car. This team member is permitted to set the alignment of the car with respect to the launch pod and track under close supervision from the race track Judges. Appointment of this team member is optional. The race Judges can assist or perform this task for the team.

## **C8.3 Who needs to attend?**

All team members must be present during their scheduled racing sessions and should assemble at the track start for briefing by the race track Judges at their scheduled time.

## **C8.4 Time trial race procedure**

Cars are launched in automatic mode with four (4) races total per team, two (2) races in each lane. The total time displayed on the start gate for each race is recorded for scoring purposes. The time trial race events will be conducted using the following procedure:

- i. Teams race in order as shown in the competition program. To begin, Judging stream A in track lane 1 and stream B in lane 2.
- ii. One team member to track finish for deceleration system control.
- iii. Race 1 - Judge sets cars on track / tether line and inserts CO2 canister.
- iv. Judge arms launch pod - SAFETY ON - makes initial launch pod adjustments.
- v. A team member is then allowed to 'fine tune' the staging of their car.
- vi. Judge switches launch pod - SAFETY OFF - checks track is clear for racing.
- vii. Judge presses the start system reset button - car is launched.
- viii. Judge records TOTAL RACE TIME displayed on start gate.
- ix. Team member at finish control returns car and canister along track to the start.
- x. Race 2 conducted in same lane using same process as above.
- xi. Judges remove cars from tether line and change lanes.
- xii. Race 3 and Race 4.
- xiii. Cars removed from track and returned to Parc Ferme.

## **C8.5 Time trial race scoring**

The eight (8) 'car race times' recorded during the time trials and reaction races will be considered. Of these eight (8) races, the team's 2<sup>nd</sup>, 3<sup>rd</sup>, 4<sup>th</sup> and 5<sup>th</sup> best 'car race times' will be averaged. This average time is used in the following formulae to calculate the points awarded:

- Fastest average (avg.) time = 170 pts
- Second fastest avg. time = 165 pts
- Third fastest avg. time = 160 pts.
- 'Base Time' = 120% of the third fastest avg. time of all teams avg. times.
- Fourth (4<sup>th</sup>) to slowest avg. time score points using the following formula:

**Team Points = 28 + (132 / (Base Time - 3<sup>rd</sup> fastest avg.)) x (Base Time - teams avg.)**

- Any team that has an average slower than the base time will score 28 points. To further discriminate between these teams, a deduction will be made of 7 points for any did not finish (DNF) time trial result.
- If after discarding a team's fastest time there remains less than 4 times from races finished, due to DNF's, the slowest time recorded is again input to the average equation until there are a total of four times to average.

### **C8.6 Reaction race procedure**

Cars are launched in manual / driver reaction mode with four (4) races total per team, two (2) races in each lane. The TOTAL RACE TIME displayed and the REACTION TIME displayed for each race is recorded. The reaction races will be conducted as follows:

- Teams race in order as shown in the competition program. To begin, Judging stream A in track lane 1 and stream B in lane 2.
- Driver and team stands trackside with corresponding lane start trigger.
- One team member to track finish for deceleration system control.
- Race 1 - Judge sets cars on track / tether line and inserts CO2 canister.
- Judge arms launch pod - SAFETY ON - makes initial launch pod adjustments.
- A team member is then allowed to 'fine tune' the staging of their car.
- Judge switches launch pod - SAFETY OFF - checks track is clear for racing.
- Judge presses the start system reset button - car is launched.
- Judge records TOTAL RACE TIME and REACTION TIME displayed on start gate.
- Team member at finish control returns car and canister along track to the start.
- Race 2 conducted in same lane as above, driver can be inter-changed.
- Judges remove cars from tether line and change lanes.
- Race 3 and Race 4, driver can be inter-changed.
- Cars removed from track and returned to Parc Ferme.

### **C8.7 Reaction race scoring**

All four (4) 'total race times' recorded from the reaction races are considered. The fastest of these four (4) times is used in the following formulae to calculate the points awarded:

- Fastest 'total race time' = 60 pts
- 2<sup>nd</sup> fastest 'total race time' = 58 pts
- Slowest 'total race time' = 5 pts
- Base Time = 125% of 2<sup>nd</sup> fastest 'total race time'
- 3<sup>rd</sup> fastest and all other teams score points using the following formula:

**Points = 5 + (53 / (Base Time - fastest 'total race time')) x (Base Time - teams fastest 'total race time')**

- Any team with a best 'total race time' that is slower than the base time will score 5 points. To further discriminate between any teams scoring 5 points, a deduction of 1 point will be made for any did not finish (DNF) reaction race result.

### **C8.8 Knock-out competition procedure**

Teams will be issued the knock-out racing draw prior to this racing commencing. The racing order for the first knock-out round is determined through ranking all teams using the fastest 'total race time' they achieved from the reaction racing event. Some teams may draw a 'bye' in round 1. Cars are launched in manual / driver reaction mode, with two

(2) races total, one (1) race in each lane, for each round of the knock-out. The team with the fastest 'total race time', as displayed on the start gate, from the two races conducted, is the winner of that knock-out round. In case of a tied result, a further 'sudden death' race will be conducted. The knock-out competition will be conducted as follows:

- i. Teams race in order of the competition draw. Top of draw in lane 1.
- ii. Driver stands trackside with corresponding lane start trigger.
- iii. One team member to track finish for deceleration system control.
- iv. Race1 - Judge sets cars on track / tether line and inserts CO2 canister.
- v. Judge arms launch pod - SAFETY ON - makes initial launch pod adjustments.
- vi. A team member is then allowed to 'fine tune' the staging of their car.
- vii. Judge switches launch pod - SAFETY OFF - checks track is clear for racing.
- viii. Judge presses the start system reset button - car is launched.
- ix. Judge records TOTAL RACE TIME displayed on start gate.
- x. Team member at finish control returns car and canister along track to the start.
- xi. Judges remove cars from tether line and change lanes.
- xii. Race 2, driver can be inter-changed.
- xiii. Cars removed from track and returned to Parc Ferme.

**C8.8.1** Cars judged to have critical regulation failures will only be permitted to race in round one of the knock-out competition and will be automatically knocked out during round one regardless of the race result.

## **C8.9 Knock-out competition scoring**

Points are awarded based on the round of competition a team is eliminated as follows:

- Eliminated in Round 1 = 10 pts
- Eliminated in Round 2 = 18 pts
- Eliminated in Quarter Final = 25 pts
- Eliminated in Semi Final = 32 pts
- Eliminated in Final = 36 pts
- Knock-out Winner = 40 pts

## **C8.10 DNF (Did not Finish) race results**

Damage or part separation occurring during a race, before the car crosses the finish line, (e.g. wheel or any other part of the car separating), or car not crossing the finish line at all, effects in a DNF race result. The Judges may refer to video evidence to verify a DNF result.

## **C8.11 False starts**

**C8.11.1** A false start (jump start) occurs when the driver depresses the trigger button before the 5 start gate lights have extinguished. This will be signalled with the outer red light above a lane illuminating.

**C8.11.2** All false starts will incur a 5 point penalty and by default forfeit that race. This penalty does not apply to knock-out racing.

**C8.11.3** During knock-out racing - If one team false starts (jump starts), the other team should continue to race as normal. The team who false started forfeits that race, scoring a DNF, and the other team's time is recorded. If both teams false start, the race is re-run.

## **C8.12 Track, tether line and timing system information**

**C8.12.1** The F1 in Schools™ Elevated Race Track, as manufactured by Pitsco Inc., will be used. The official length of the track, from start line to finish, is 20 metres. A monofilament

tether line of diameter 0.6mm, fixed at the start end, passes down the centre of each lane. At the finish end the line passes through 90 degrees over a single pulley then attached to a 1.0kg mass suspended above the floor.



Race track section

**C8.12.2** Launch / Timing System – The F1 in Schools™ F1 Race System will be used for launching cars and timing races and driver reaction times to 1/1000<sup>th</sup> of a second.



Launch / Timing System Components

### **C8.13 Deceleration system**

**C8.13.1** The deceleration system acts to bring cars to rest once crossing the finish line. F1 in Schools Ltd. will provide a standard race car deceleration system, consisting of two towels positioned behind the finish line of each lane.

**C8.13.2** Teams may supply their own deceleration system and the team will be responsible for its management. Any system supplied by a team must be simple to setup and must not impede the opposing track lane, race car or the race schedule in any way. The Judges, at their discretion, can rule any system supplied by a team to be inappropriate and revert to use of the standard deceleration system.

**C8.13.2** Deceleration systems must be located a minimum of 25mm after the finish line.

### **C8.14 CO2 Race cylinders**

CO2 cylinders to be used for all World Finals competition races will be supplied by F1 in Schools Ltd. Each CO2 cylinder will be separately weighed before competition to ensure that all CO2 cylinders used for races are within a weight range of 0.5 grams. All race cylinders will be kept in a temperature controlled environment of 21 degrees Celsius.

### **C8.15 Car weight checks**

Cars will have their weight checked at the race track prior to commencing a race event. This is done to ensure each car remains at a legal weight during all races. If a car is judged to have gone under weight whilst stored in parc fermé, the judges will add ballast to return the car weight to what it was when first submitted to parc fermé, without penalty.

### **C8.16 Judges handling cars**

The race Judges will not be required to comply with any special car handling requests made of them by teams. This includes use of any special gloves or tools.

## **ARTICLE C9 – CAR REPAIRS AND CAR SERVICING**

### **C9.1 Car repairs**

**C9.1.1** All damage issues and related repair work during racing is at the Judge's discretion and may be referred to the scrutineering Judges and/or Chair of Judges for a final decision.

**C9.1.2** No items can be removed or added to a car during racing, other than CO<sub>2</sub> cylinders, except in the case of a repair.

**C9.1.3** If the primary race car sustains damage during racing and this damage is ruled to be related to engineering deficiencies, the back-up race car will be reverted to immediately. This will incur a 5 pt penalty, against the teams score for this race event.

**C9.1.4** Team members will be allowed to make 'trackside' repairs to the damaged car as racing continues.

**C9.1.5** If the back-up car is damaged the repaired primary car will be reverted to and another 5 pt penalty will be applied.

**C9.1.6** The Judges may choose to suspend racing in order that repairs can be made.

**C9.1.7** If the Judges rule that damaged sustained was not due to engineering deficiencies, immediate repairs or revert to back-up car will be permitted without penalty.

**C9.1.8** No penalty is applied for damage incurred during knock-out racing or a team's final race of any race event.

### **C9.2 Car servicing**

**C9.2.1** Teams will be scheduled time to carry out penalty free maintenance on their race cars in the designated car service area. The length of time will be the same as other judging sessions, normally 40 minutes. The service time will occur between the team's time trial and reaction racing as per the competition program. No other car service time will be permitted.

**C9.2.2** Teams will also be provided with a 15 minute car service interval prior to the commencement of each knock-out racing round.

**C9.2.3** Only team members and Judges are allowed to enter the car service area.

**C9.2.4** Tool kits are allowed to be taken into car service. Teams must supply all of their own tools and other necessary resources. Judges will not be able to assist teams with any additional resource requirements.

**C9.2.5** Maintenance and alterations can only be made to the front and rear wings, nose cone, tether line guides, wheels and wheel support systems. The car body **MUST NOT** be modified or substituted.

**C9.2.6** Each team will be required to complete a car service log form, declaring any maintenance or repair work completed. This will be validated by the Judges.

**C9.2.7** Teams must hand their race cars and completed car service log to the service area Judges **BEFORE** the conclusion of their scheduled service interval. A penalty will apply for exceeding the scheduled service time limit of 5 pts for every minute late.

## ARTICLE C10 – PROTESTS

### C10.1 Scrutineering decision appeals

These must be submitted within two hours of the team completing their specification review judging. Other rules for submitting these will be the same as for protests.

### C10.2 Submitting a protest

Any protest issues must be submitted by the team manager to an Event Director, who will register this and immediately lodge it with the Chair of Judges. This must occur by the date and time stated in the event supplementary regulations. All protests must be lodged in writing via the official protest form available from the Event Directors. The Chair of Judges decision related to any protest is final.

### C10.3 Unsuccessful protests

Teams should carefully consider their grounds for submitting a protest or appeal. Any protest or appeal that is unsuccessful, with the Judges initial decision remaining unchanged, will result in the team having a 15 point penalty applied against their total score.

## ARTICLE C11 – JUDGES

### C11.1 Overview

There will be six (6) teams of Judges that form the entire Judging panel. Each judging team will have one Judge appointed as the Lead Judge. Judges are nominees from ICC's and other education and industry experts invited by F1 in Schools Ltd. All Judges sign a 'declaration' to ensure there are no conflicts of interest with respect to Judges and the teams they are judging.

### C11.2 Chair of Judges

An independent authority appointed by F1 in Schools Ltd. to oversees all Judging procedures. The Chair of Judges will determine the final judging decision where a protest has been submitted or other judging issue needs resolution. The Chair of Judges will also preside over a meeting of all lead Judges to ratify the final results along with nominations and winners for relevant awards.

### C11.3 The judging teams

**C11.3.1** Specification Judges - will scrutinise each primary and back-up race car with respect to the World Finals Technical Regulations.

**C11.3.2** Engineering Judges - The Engineering Judges will be assessing each team's use of CAD/CAM, CNC technologies and quality of manufacture. They will be nominating team's deserving the Best Engineered Car Award.

**C11.3.3** Verbal presentation Judges - will assess each team as per the verbal presentation scorecard. They will also be nominating team's deserving of the Best Verbal Presentation Award and the Innovative Thinking Award.

**C11.3.4** Portfolio and display Judges - will assess each team as per the portfolio and display scorecard. They will also be nominating team's deserving of the Best Pit Display Award and Best Team Sponsorship and Marketing Award.

**C11.3.5** Race Judges - will oversee and rule on all race events and any incidents. This will determine the Fastest Car Award and Knock-out Champions Award.

**C11.3.6** Car servicing Judges - will oversee all car service activities and rule on any infringements that may occur.

## C11.4 Judging Decisions

THE DECISION OF THE JUDGES IS FINAL.

## ARTICLE C12 - AWARDS

### C12.1 Awards Celebration

The World Finals awards will be presented at a gala Awards Celebration. Details of this event will be released closer to the event.

### C12.2 Participation recognition

All students, supervising teachers / adults, ICC's and Judges will receive an official participation certificate.

### C12.3 Prizes and Trophies

**C12.3.1** Team mementos – Teams that win an award will be presented with a minimum of a SINGLE main trophy or similar memento. This is normally a F1™ team sponsored trophy. The team members and / or supervising teacher will need to decide how this memento is to be shared and displayed amongst the team stakeholders.

**C12.3.2** Student mementos – students winning an award may be presented with their own individual medallion or certificate.

**C12.3.3** Formula One™ Team Trophies – In past years F1 in Schools Ltd. has been extremely fortunate to have a number of F1™ Teams generously supply purpose built 'one off' trophies for various awards. These trophies are normally constructed from F1™ car components.

**C12.3.4** Bernie Ecclestone World Champions Trophy – This is a perpetual trophy presented to the World Champions, and as such, must be returned to F1 in Schools Ltd. before the following years World Finals event.

### C12.4 List of awards to be presented

(This list may be amended at the discretion of F1 in Schools Ltd.)

- **World Champions**  
**(Team must comply with all critical regulations. Refer to Article C3.6)**  
The team which achieves the highest total score out of 900 points.
- **2<sup>nd</sup> Place**  
The team which achieves the 2<sup>nd</sup> highest total score out of 900 points.
- **3<sup>rd</sup> Place**  
The team which achieves the 3<sup>rd</sup> highest total score out of 900 points.
- **Fastest Car Award**  
**(Team must comply with all critical regulations. Refer to Article C3.6)**  
This will be awarded to the team that achieves the fastest 'car race time' recorded during the time trial and reaction racing events.
- **Best Engineered Car Award**  
**(Team must comply with all critical regulations. Refer to Article C3.6)**  
This will be awarded to the team that scores the highest score from
  - Specification Judging
  - Quality of manufacture
  - Use of CAD

- F1 Car Design Process
- **Team Sponsorship and Marketing Award**

At the Judge's discretion, this will be awarded to the team with the best marketing and sponsorship related project content.
- **Innovative Thinking Award**

At the Judge's discretion, this award will be presented to the team that displays the most unique / clever feature or idea that impresses the judges.
- **Team Identity Award**

At the Judge's discretion, awarded to the team with the best overall identity.
- **The Best Collaboration Team Award**

This will be awarded to the collaboration team with the highest overall score.
- **Outstanding Sportsmanship Award**

At the Judge's discretion, this will be awarded to a team that exhibits outstanding support/friendship and encouragement to other teams.
- **Perseverance in the Face of Adversity Award**

Awarded to a team that against all odds, participated in the World Finals and / or overcame obstacles during the event to compete and succeed.
- **Best Newcomer Award**

This is awarded to the team with the highest total points score from all teams representing any country competing at the World Finals for the first time.
- **Pit Display Award**

At the Judge's discretion, awarded to team with most impressive pit display.
- **Verbal Presentation Award**

At the Judge's discretion, this is awarded to the team who delivers the most engaging verbal presentation.
- **Portfolio Award**

At the Judge's discretion, awarded to the team with most impressive portfolio.
- **Research and Development Award**

Awarded to the team demonstrating excellence in the application of R&D to the final design
- **'Event Sponsors' Award**

The criteria for this award will be published closer to the event. This award will be presented at the sponsor's discretion.
- **Team Website Award**

Awarded at the Judge's discretion, this will be presented to the team that has produced the best website promoting their team.

## APPENDIX



# PORTFOLIO & PIT DISPLAY SCORE CARD

Team Number:

Team Name:

**20 PAGE FOLIO LIMIT - mark only the first 20 PRINTED pages including cover page.**

PORTFOLIO ONLY ASSESSMENT ITEMS			
<b>Project Management</b>	Little evidence of project management presented.	Simple management and planning used to guide progress. A range of project resources identified.	Comprehensive project management. A range of factors considered; e.g. scope, time, resources and project risks. Plan changes discussed
	1 2 3 4 5 6 7	8 9 10 11 12 13 14 15 16 17 18	19 20 21 22 23 24 25 26 27 28 29 30
<b>Team Work</b>	Limited team work evident.	Evidence of effective team work with roles defined	Highly structured team with clear roles. All team members had effective and critical contributions. Role interactions recognised
	1 2 3 4 5 6 7	8 9 10 11 12 13 14 15 16 17 18	19 20 21 22 23 24 25 26 27 28 29 30
<b>Portfolio Clarity &amp; Quality</b>	Difficult to follow with basic presentation standard.	Clear structure, well organised. Good use of ICT's enhancing presentation and impact.	High impact and professional throughout. Consistent and clear organisation. Excellent use of ICT's to enhance presentation
	1 2 3 4 5 6 7	8 9 10 11 12 13 14 15 16 17 18	19 20 21 22 23 24 25 26 27 28 29 30

Portfolio Total /90

MARKETING & PIT DISPLAY ASSESSMENT			
<b>Team Identity</b>	Inconsistent, limited or obscure identity	Effective team identity consistent through various project components.	Excellent and highly effective team identity. Team 'brand' consistently applied through all project elements.
	1 2 3 4	5 6 7 8 9 10 11	12 13 14 15 16 17 18 19 20
<b>Marketing</b>	Limited or irrelevant	Some marketing activity / sponsorship explained	Creative and effective activities linked to sponsorship & sponsor 'return on investment' (ROI)
	1 2 3 4	5 6 7 8 9 10 11	12 13 14 15 16 17 18 19 20
<b>Pit Display</b>	Repetition of folio elements	Clear and effective presentation and messaging. ICT's used to enhance presentation	Clean, well organised with high impact. Highly professional with attention to detail. Excellent integration of technology and ICT's
	1 2 3 4	5 6 7 8 9 10 11	12 13 14 15 16 17 18 19 20

Pit Display & Marketing Total /60

F1 CAR DESIGN PROCESS - PRESENTED IN PORTFOLIO OR DISPLAY			
<b>Ideas</b>	Single or basic concepts	Multiple concepts with links to research.	Several technically inspired ideas for different car components
	1 2 3	4 5 6 7 8	9 10 11 12 13 14 15
<b>Development</b>	Limited development shown	Logical design developments explained	Clearly justified developments based around research and testing
	1 2 3	4 5 6 7 8	9 10 11 12 13 14 15
<b>Testing</b>	Little evidence of testing	Tests which are relevant and results documented	Quality test method. Accurate results data linked to design revisions
	1 2 3	4 5 6 7 8	9 10 11 12 13 14 15
<b>Evaluation</b>	No or limited evaluation	Ideas or process evaluations at different stages	Excellent ongoing project evaluations linked to improvement actions
	1 2 3	4 5 6 7 8	9 10 11 12 13 14 15

F1 Car Design Process /60

**Portfolio + Pit Display & Marketing + F1 Car Design Process = Portfolio and Display Total = /210**

# VERBAL PRESENTATION SCORE CARD

Team Number:

Team Name:

**10 MINUTE TIME LIMIT FOR VERBAL PRESENTATION**

PRESENTATION TECHNIQUE																
<b>Visual Aids</b>	Little use of aids.			Some aids used effectively					Highly professional aids effectively improve communication							
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	
<b>Team Contribution</b>	Minimal team participation			Good contributions from most team members					Excellent team work with all members participating effectively							
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	
<b>Dynamic / Energy</b>	Artificial and/or low energy			Speakers generally enthusiastic with lively delivery					Passionate with effective and appropriate levels of liveliness							
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	
<b>Engagement</b>	Minimal engagement			Some audience connection at times					Audience fully engaged and excited throughout presentation							
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	

Technique Total /60

COMPOSITION OF THE PRESENTATION																				
<b>Concept Clarification</b>	Several concepts lacked clarification				Clear and appropriate concept explanations						Everything presented was understood through excellent explanations									
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20
<b>Use of Time</b>	Too fast or ran out of time				Good timing. Balanced topic depth and pace						Ran on time or under. Excellent balance of depth for each topic									
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20
<b>Presentation Structure</b>	No structure presented				A basic structure / outline provided and could be followed by audience						Clear presentation outline / overview. Excellent connections between topics and easy for audience to follow									
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20

Composition Total /60

SUBJECT MATTER / PRESENTATION CONTENT / TOPICS																				
<b>Innovation</b>	Little innovation presented				Innovations described and justified						Originality. Clever innovations with high positive project impact									
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20
<b>Collaboration</b>	Little collaboration discussed				Links with industry or higher education described						Collaborations justified with links to learning and project outcomes									
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20
<b>F1 in Schools Learning Experiences</b>	No real reflections discussed				Good explanation of some learning outcomes						A range of personal, life-long learning and career skills acquired and identified as project outcomes for a range of team members									
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20

Subject Matter Total /60

**Technique + Composition + Subject Matter = Verbal Presentation Total = /180**

## ENGINEERING SCORE CARD

Team Number:

Team Name:

COMPUTER AIDED DESIGN AND ANALYSIS																
<b>Application of CAD-CAM</b>	Basic application. Final design in CAD only			Appropriate use of CAD in product development stages. Good understanding of CAM evident					Advanced use of CAD and CAM technologies throughout. Final CAD identical to the physical model car produced							
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	
<b>Computer Aided Analysis</b>	Minimal analysis shown			Good analysis. Results applied to development					Variety of advanced and relevant analysis techniques conducted							
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	
<b>Organisation</b>	Generally unorganised			Satisfactory organisation of data and models					Data & parts highly ordered & linked. Full CAD product assembly							
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	
<b>Orthographic &amp; Rendering</b>	Basic drawing & rendering			Good technical drawing and realistic rendering					High detail & includes spec dimensions. Photorealistic render							
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	

Only the orthographic and 3D rendering presented in the 20 page portfolio are to be assessed.

CAD & Analysis Total

/60

MANUFACTURING																				
<b>Quality of Finish and Assembly</b>	Reasonable finish with some inconsistencies				Good overall finish quality and assembly with attention to detail						Showcase' finish quality on all components. Exceptional attention to detail across all assembly and finishing. Two cars are identical.									
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20
<b>Manufacturing discussed in portfolio</b>	Little manufacturing details				Manufacturing processes and some issues						Detailed assessment of all manufacturing, stages, materials & issues									
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20
<b>Use of CNC Machining</b>	Minimal evidence of CNC understanding				Effective use and understanding of CNC machining processes used						High level of CNC machining competence. Appropriately complex techniques and processes used to achieve manufacturing goal									
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20

Manufacturing Total

/60

**CAD & Analysis + Manufacturing = Engineering Judging Total = /120**

# SPECIFICATIONS SCORE CARD

Team Number: \_\_\_\_\_ Team Name: \_\_\_\_\_

For clarification on individual regulations, refer to the World Finals Technical Regulations.

Car 1 = Primary race car & Car 2 = Back-up race car.

Regulation	Critical	Regulation Overview	Penalty per Car	Pass or Fail		Score
				Car 1	Car 2	
<b>ARTICLE T3 - FULLY ASSEMBLED CAR</b>						
T3.1.1	Y	Designed and engineered using CAD / CAM	NA			0
T3.1.2	Y	Body manufactured using CNC only.	NA			0
T3.1.3	Y	Hand finishing as per definition.	NA			0
T3.1.5	Y	Both cars designed the same.	NA			0
T3.2	Y	Undefined features	-12			
T3.3	Y	Overall length	-12			
T3.4.1	Y	Overall MAXIMUM width	-12			
T3.4.2	Y	MINIMUM width	-12			
T3.5	Y	Overall height	-12			
T3.6	Y	Total weight	-12			
T3.7	N	Body to track distance	-6			
T3.8	N	Car status during races	-12			
<b>ARTICLE T4 - BODY</b>						
T4.1	Y	Body construction	-12			
T4.2	Y	Implants and voids	-12			
T4.3	Y	Virtual cargo	-12			
T4.4	N	Body thickness	-6			
T4.5	N	F1 in Schools™ logo decal	-12			
<b>ARTICLE T5 - CO2 CYLINDER CHAMBER</b>						
T5.1	N	Diameter	-6			
T5.2	N	Distance from track surface	-3			
T5.3	N	Depth	-3			
T5.4	N	Thickness of chamber surrounds	-6			
T5.5	N	Finishing of chamber surrounds	-3			
<b>ARTICLE T6 - TETHER LINE SLOT</b>						
T6.1	Y	Location and length	-12			
T6.2	N	Tether line slot cross-section	-6			

Regulation	Critical	Regulation Overview	Penalty per Car	Pass or Fail		Score
				Car 1	Car 2	
<b>ARTICLE T7 - TETHER LINE GUIDES</b>						
<b>T7.1</b>	<b>Y</b>	Location	-12			
T7.2	<b>N</b>	Track clearance	-6			
T7.3	<b>N</b>	Diameter	-3			
T7.4	<b>N</b>	Guide separation	-3			
T7.5	<b>N</b>	Tether line guide safety	-6			
<b>ARTICLE T8 - WHEELS</b>						
<b>T8.1</b>	<b>Y</b>	Number and location	-12			
<b>T8.2</b>	<b>Y</b>	Diameter	-12			
<b>T8.3</b>	<b>Y</b>	Width	-12			
<b>T8.4</b>	<b>Y</b>	Visibility	-12			
T8.5	<b>N</b>	Race track contact	-3			
T8.6	<b>N</b>	Rolling surface consistency	-6			
T8.7	<b>N</b>	Wheel support systems	-6			
<b>T8.8</b>	<b>Y</b>	<b>Rotation</b>	<b>-12</b>			
<b>ARTICLE T9 - NOSE CONE</b>						
T9.1	<b>N</b>	Construction	-12			
<b>ARTICLE T10 - WING AND WING SUPPORT STRUCTURE</b>						
<b>T10.1</b>	<b>Y</b>	Description and placement	-12			
<b>T10.2</b>	<b>Y</b>	Construction	-12			
<b>T10.3</b>	<b>Y</b>	Clear airflow	-12			
<b>T10.4</b>	<b>Y</b>	Rear wing location	-12			
<b>T10.5</b>	<b>Y</b>	Rear wing height	-12			
<b>T10.6</b>	<b>Y</b>	Front wing location	-12			
T10.7	<b>N</b>	Visibility of front wing	-6			
T10.8	<b>N</b>	Identification method for scrutineering	-6			
T10.9.1	<b>N</b>	Front wing span	-6			
T10.9.2	<b>N</b>	Rear wing span	-6			
T10.10	<b>N</b>	Span segments	-6			
T10.11.1	<b>N</b>	Front wing chord	-3			
T10.11.2	<b>N</b>	Rear wing chord	-3			
T10.12.1	<b>N</b>	Front wing thickness	-3			
T10.12.2	<b>N</b>	Rear wing thickness	-3			
<b>TOTAL DEDUCTIONS</b>						



**TEAM PARTNERSHIPS DECLARATION**

**TEAM NUMBER:** \_\_\_\_\_ **TEAM NAME:** \_\_\_\_\_

Please complete the fields below in type, no hand writing. Use one section for each project element a team partner assisted you with.

PARTNERS / SPONSORS WHO HAVE ONLY ASSISTED WITH FINANCIAL CONTRIBUTIONS DO NOT NEED TO BE INCLUDED.

<b>Project Element</b> What you got help with. I.e. Front wing RP, Pit display poster printing.	<b>Name of Partner Organisation</b> I.e. ABC Bearings Co.	<b>Contact Name</b> I.e. The main person you worked with	<b>Email Address</b>
<b>Describe the Partnership Work</b> I.e. What did the partner do for you?		<b>Reason for Partnership</b> I.e. Why did you need to get this help?	

<b>Project Element</b> What you got help with. I.e. Front wing RP, Pit display poster printing.	<b>Name of Partner Organisation</b> I.e. ABC Bearings Co.	<b>Contact Name</b> I.e. The main person you worked with	<b>Email Address</b>
<b>Describe the Partnership Work</b> I.e. What did the partner do for you?		<b>Reason for Partnership</b> I.e. Why did you need to get this help?	

Include more pages as necessary to list ALL of your teams Partnership activities

## TEAM SPECIFICATION SHEET

Team Number: \_\_\_\_\_ Team Name: \_\_\_\_\_

Each team is required to document the dimensional regulations on this template as listed below.  
 (For clarification on individual regulations, refer to the Technical Regulations.)  
 Note: Car 1 = Primary race car & Car 2 = Back-up race car.

Reg. No.	Critical	Regulation Overview	Team Car Measurements	
			Car 1	Car 2
<b>ARTICLE T3 - FULLY ASSEMBLED CAR</b>				
T3.3	Y	Overall length - Min:170mm / Max:210mm		
T3.4.1	Y	Overall MAXIMUM width - 85mm		
T3.4.2	Y	MINIMUM width - 60mm		
T3.5	Y	Overall height - Max:60mm		
T3.6	Y	Total weight - Min: 55.0grams		
T3.7	N	Body to track distance - Min:3mm / Max:15mm		
<b>ARTICLE T4 - BODY</b>				
T4.3	Y	Virtual cargo - Min:25mm x 40mm x 8mm		
T4.4	N	Minimum body thickness - Min:3mm		
<b>ARTICLE T5 - CO2 CYLINDER CHAMBER</b>				
T5.1	N	Diameter - Min:19.5mm +/- 0.5mm		
T5.2	N	Distance to track surface - Min:22/Max:30mm		
T5.3	N	Depth - Min:50mm / Max:60mm		
T5.4	N	Thickness of chamber surrounds - Min:3mm		
<b>ARTICLE T6 - TETHER LINE SLOT</b>				
T6.1	Y	Length - Min: 90mm		
T6.2	N	Slot cross-section sides - Min:6mm +/-1.0mm		
<b>ARTICLE T7 - TETHER LINE GUIDES</b>				
T7.3	N	Diameter - Min:3mm / Max:5mm		
T7.4	N	Guide separation - Min:120mm / Max:190mm		
<b>ARTICLE T8 - WHEELS</b>				
T8.2	Y	Diameter - Min:26mm / Max:34mm		
T8.3	Y	Width - Min:15mm / Max:19mm		
<b>ARTICLE T10 - WING AND WING SUPPORT STRUCTURE</b>				
T10.3	Y	Clear airflow around wing surface - Min:3mm		
T10.9.1	N	Front wing span - Min:40mm		
T10.9.2	N	Rear wing span - Min:40mm		
T10.11.1	N	Front wing chord - Min:15mm / Max:25mm		
T10.11.2	N	Rear wing chord - Min:15mm / Max:25mm		
T10.12.1	N	Front wing thickness - Min:1.5mm / Max:6mm		
T10.12.2	N	Rear wing thickness - Min:1.5mm / Max:6mm		