★ National Finals（全国大会）用 ★

STEM RACING™ JAPAN

2025/26 ENTRY COMPETITION REGULATIONS

Welcome to the world of STEM Racing, you're in for an exciting ride!

The STEM Racing Japan Entry Class is your first step on the way to becoming World Champions, starting off with the chance to be crowned Entry Champion in your first season...

This guidebook contains everything you need to know to design and make a car, ready to compete at STEM Racing Japan Race Day. It's as easy as 1,2,3 – or in our case, Design, Make, Race!

The Japan Entry Class is an introductory competition designed for students aged 6-19 to experience STEM Racing in a simple, fun, and safe way.

This class focuses on the core elements of STEM Racing: Car Scrutineering and Racing.
To lower the barrier to participation, this class is conducted as an individual competition.
No team formation, portfolio submission, pit display, or verbal presentation will be required for the Japan National Finals Entry Class.

Eligibility & Participation

The STEM Racing Japan Entry Class is open to students aged **6 to 19** during the year of the competition. For the 2026 Japan National Finals, Entry Class will be conducted as an individual competition.
This format applies to the Japan National Finals only. Participants may receive support from teachers, parents, or guardians in manufacturing and preparation. However, the **design intention and final submission must represent the participant's own ideas**. Each participant may enter **one (1) car only**.

Project Management Plan

1. REGISTER AND READ THE RULES!

Register your information and read this guide very carefully one section at a time, so your design will be fit to race.
STEM Racing Japan Registration

2. GET YOUR ENTRY CLASS STARTER KIT FROM ICC

The starter kit conains all the standard components required to desin and make your STEM Racing Entry Car.

3. DESIGN THE F1® CAR OF THE FUTURE

Have a go at our IsoSketch® tutorial, which shows you how to sketch the basic chassis of your STEM Racing Entry Class Car.
Then start designing a super cool aerodynamic body and some sleek wings onto the chassis.
Remember no idea is too crazy at this stage, so do loads of sketches to experiment.

4. DOWNLOAD THE ENTRY CLASS CAD FILES FROM HERE:

https://stemracing.jp/resources/

There are 6 Entry Class CAD models that can be downloaded to help you build your car. These are: STEM Racing block, body 'no-go-zone', halo, helmet, standard wheel and the standard axle.

5. TURN YOUR IDEA INTO A CAD DRAWING

Using the 3D parts listed above and any 3D CAD package that you have available, turn your freehand sketches into an accurate 3D CAD model using software provided by our partners AUTODESK and ANSYS.

6. START MAKING YOUR CAR!

Make sure your design is fully legal before manufacturing your car by using 3D printers.

7. ROCK UP ON RACE DAY!

Attend the STEM Racing Japan National Finals ready to compete!

ENTRY CLASS

What is STEM Racing?

STEM Racing (formerly F1 in Schools) is an international STEM education program supported by Formula 1. Students learn through a hands-on engineering challenge: designing (CAD), manufacturing (e.g., 3D printing/CNC), testing and analyzing performance, and communicating their ideas.

In the team-based classes, students typically form teams of 3–6 and race a miniature formula-style car on a 20-meter straight track, powered by an official power unit cartridge, under strict technical and safety regulations.

Through the project and competition experience, students develop practical skills needed in the real world—engineering thinking, project management, teamwork, and communication—and broaden their interest in STEM fields and future pathways across industries such as mobility, aerospace, manufacturing, and digital technology.

Globally, STEM Racing has engaged over 1.8 million students from 28,000+ schools across 65+ countries (with around 35% female participation reported).

The STEM Racing Japan Entry Class (6–19) is an introductory category.
It focuses on scrutineering and racing as a first experience, and students can progress to team-based classes in the next stage.

At this year's Japan National Finals, the Entry Class (introductory level) focuses on Car Scrutineering and Racing. Participants can then progress to team-based classes as the next step.

CAR DESIGN

What is an Entry Class car?
What is the 'no-go-zone'?
Design Brief
Car Scrutineering

What is an Entry Class car?

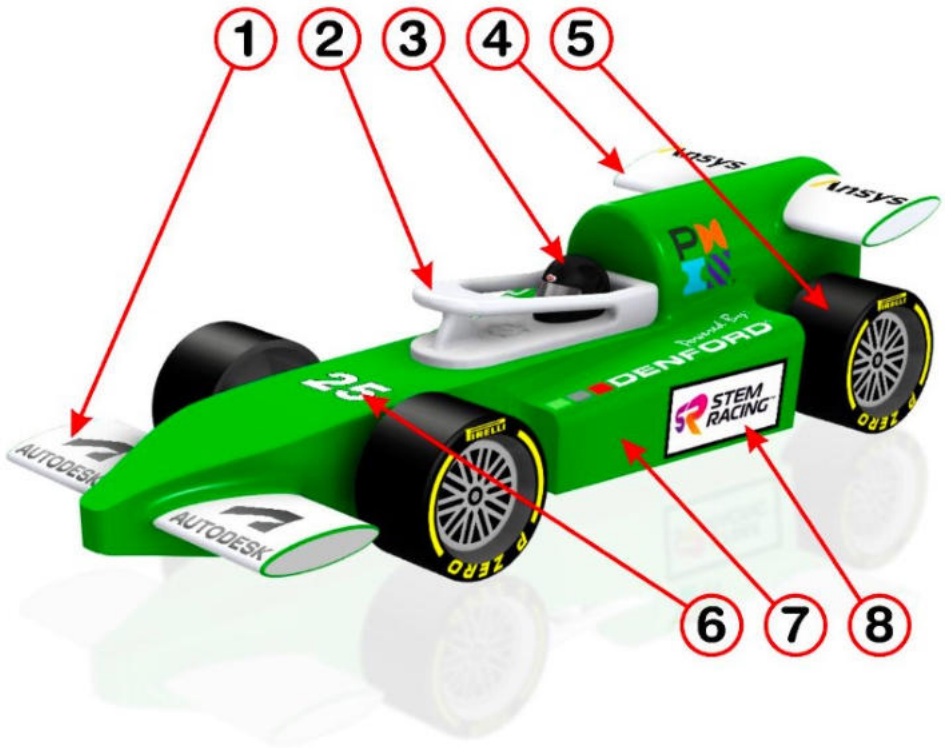
Don't worry if you've never heard of 'side pods' or 'wingspan' before, the next few pages explain everything you need to know about designing your mini F1® racing car to meet the STEM Racing Japan Entry Class rules. *Read through the following pages very carefully!*

Your STEM Racing Japan Entry Class car must have these features:

What is the car body?

The car body is the main bulk of your entry-class car. It is the middle section that the front and rear wings, halo, axles, axel guides and wheels are all attached to. Depending on how you make your car, this is manufactured from either the STEM Racing model block or any 3D printing material and must be manufactured according to the 'no-go-zone' *(don't worry – this is explained on the next page!).*

Please note that you do not need to manufacture your car from the STEM Racing model block for the National Finals in Japan.

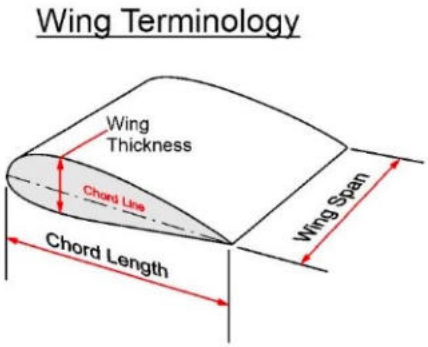


1. Front Wing
2. Official Halo
3. Official Helmet
4. Rear Wing
5. Standard Wheels and Axles
6. Team Number
7. Side Pods
8. STEM Racing Official Decal

Wing design explained:

- A **leading edge** is the edge of the wing that cuts through the air first.
- The **trailing edge** is the edge that the air touches last as it leaves the wing.
- Wing **span** is a bit like the arm span of a human, or the wing span of a bird or plane. It is the total width of the wings, including the nose cone or body of the car.
- Wing **chord** is the widest point of the wing's cross section, between the leading and trailing edges.
- Wing **thickness** is the deepest point of the wing across its cross section.

Wing cross-section diagram:



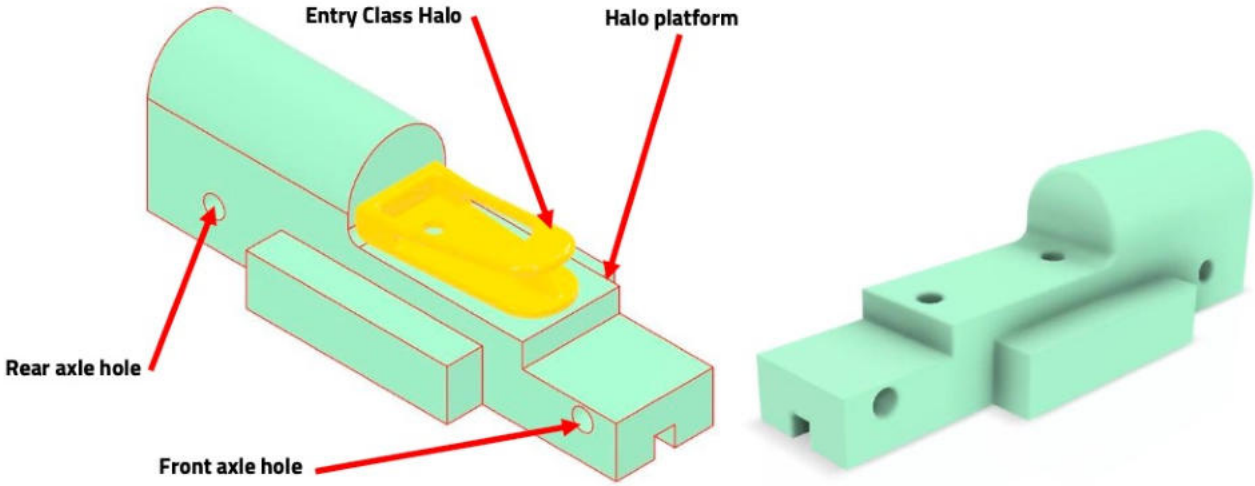
What is the 'no-go-zone'?

Entry Class cars must be safe to race down our 20m elevated racetrack, powered by a power unit cartridge. To ensure this, the STEM Racing Japan rules committee has created a 'no-go-zone' that car designers **MUST use** as a minimum for the body of their car. Think of this like starting with a basic shape that you add to, to create the shape of your car.

The 'no-go-zone' has been carefully designed so you can still make your Entry Class car look like a real F1® racing car, so use all your imagination and styling ideas to make sure your car doesn't just look like the no-go-zone with some wheels stuck to it!

The 'no-go-zone':

Below is an illustration of the Entry Class no-go-zone, showing the minimum shape of your car body. It is a **PERFORMANCE** regulation that you don't cut or machine inside the no-go-zone, so make sure you measure and make your body carefully to avoid losing out on lots of points!
The no-go-zone includes accurate axel holes to ensure the height of your Halo is correct for use with the Halo Deceleration System. Please do not move the location of the axel holes.



REMEMBER: After 3D printing, gently sanding your model can reduce the size of the no-go-zone underneath the minimum dimensions, so be extra careful to leave enough material and measure your car yourself to be sure it will pass all the 'Technical Regulations', which are explained on Page 10. Full no-go-zone dimensions can be found at the back of this guidebook in Appendix ii.

The Design Brief

Your task is to design, make and race a miniature F1® racing car, which will race down the STEM Racing 20m elevated racetrack, powered by a power unit cartridge. You must use a range of techniques to show design work, including freehand 3D sketches **and** 3D CAD development drawings.

The Car:

Your car must include the following features:

- F1® style body including side pods
- Front wing
- Rear wing
- **Halo + Helmet**
- Standard STEM Racing wheels, axles and axle guide tubes

Note: See 'Technical Regulations' (next page) for all body and wing dimensions

Body Manufacturing:

In the STEM Racing Japan Entry Class, cars must be manufactured using a 3D printer.
The car body must be produced as a single, one-piece component using approved 3D printing materials.

When 3D printing the car body, shrinkage must be taken into account.
Particular attention must be paid to the dimensions of the power unit (cylinder) chamber after manufacturing.

The 8g power pack cartridge must fit securely into the car body.
If the cartridge does not fit correctly, the car will not be permitted to compete.

Wing Manufacturing:

For this year's Japan National Finals, all wings must be 3D printed as an integral part of the car body. Separate or detachable wings are not permitted.

Software: Autodesk & Ansys

To enhance your team's performance and ensure compliance with the Aramco STEM Racing World Finals Technical Regulations, we highly recommend utilizing Autodesk and Ansys software.

Autodesk provides powerful tools like Fusion 360 for 3D design and modelling, which are essential for creating innovative and competitive car designs. Ansys software, including Ansys Discovery, offers advanced simulation capabilities to optimize your car's aerodynamics and structural integrity.

Both software packages are available for free download and installation on our official website, www.stemracing.com .

Detailed instructions and tutorials are provided to help you get started and make the most of these industry-leading tools.

AUTODESK

AUTODESK - https://www.stemracing.com/autodesk.html

Premier Global CAD / CFD Partner

Ansys

ANSYS - https://www.stemracing.com/ansys.html

Global CFD Simulation Partner

Technical Regulations

Technical Regulations dictate how the car must be designed so it is suitable to compete.

All regulations carry a points penalty, so double check your car is fully legal and ready to race BEFORE you arrive on race day!

Here is an explanation of the different types of rules in STEM Racing Japan and what they mean:

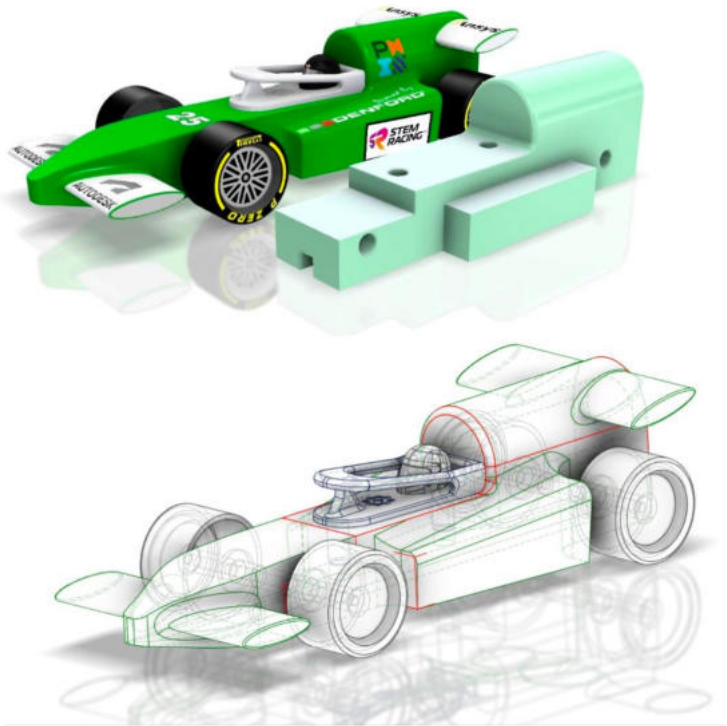
Regulation type:	Purpose:	Points:	Extra penalty:
GENERAL	Aesthetics of the car	5	None
SAFETY	Suitability to race	10-20	Car may require modification or not race
PERFORMANCE	How fast the car can travel	20	Unable to win Fastest / Best Eng. Car award

E1.1 Car body material - [SAFETY | 20pts]

The car body can be manufactured from any 3D printing material.

E1.2 No-Go-Zone - [PENALTY – 20PTS]

The car body must have a minimum size no less than the official Entry Class no-go-zone including two (2) axle holes. You **MUST** not compromise the No-Go-Zone during manufacture. Please refer to **Appendices i & ii** for more details.



**Example Car W/Entry Class No-Go-Zone highlighted in Red.*

E1.2.1 Assembled Car Length - [PENALTY – 5PTS]

The assembled car length including body, front and rear wings, must be between the following dimensions:

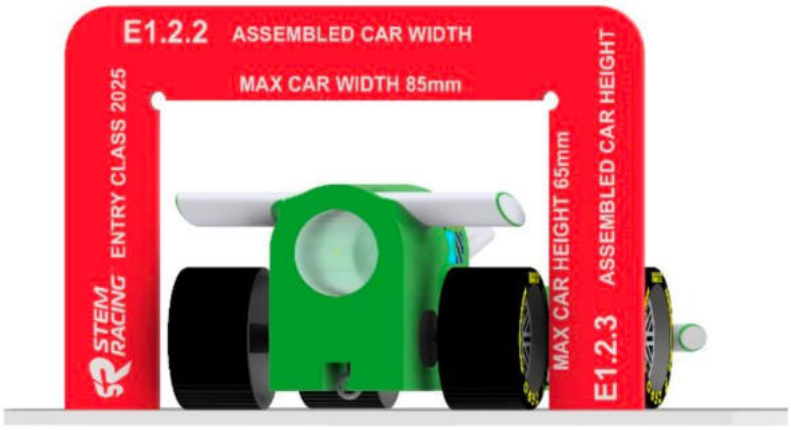
Length - Min. 170 mm - Max. 210 mm

E1.2.2 Assembled Car Width - [PENALTY - 5pts]

The assembled car width including body, wheels, front and rear wings, must be shorter than the following dimension: **Width - Max. 85 mm**

E1.2.3 Assembled Car Height - [PENALTY - 5pts]

The assembled car Height including body, halo, front and rear wings, must be shorter than the following dimension: **Height - Max. 65 mm**



P! E1.3 Halo/Helmet - [PERFORMANCE I PENALTY - 10pts]

The Halo/Helmet MUST be included in the car design without any dimensional changes. The file can be downloaded from WEBSITE. Please see appendix iii for detailed dimensions.

Please note: The Halo/Helmet file for entry class teams is different to that of the development and professional classes. Entry Class teams MUST use the correct Halo.

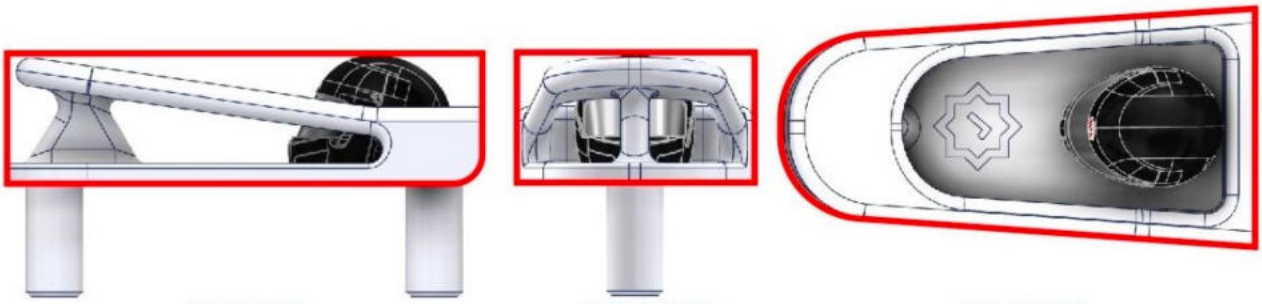
E1.3.1 Halo Circular Notch Height- [SAFETY I PENALTY - 20pts]

To be effective the centre of the Circular Notch must be 34.0mm (±1.0mm) above the track surface. To achieve this the **NEW Entry Class No-Go-Zone MUST** be used with no modification to the axel holes and Halo Bed.

E1.3.2 Halo visibility front, side and plan views – [GENERAL | Penalty – 5 pts]

Visibility of the Halo must not be physically obstructed by any other component when viewed in the front, side or plan views.

E1.3.2 Halo and Helmet Visibility



Side View	Front View	Plan View
When viewed from the side, everything inside the red outline **must** be visible.	When viewed from the front, everything inside the red outline **must** be visible.	When viewed from the top, everything inside the red outline **must** be visible.

E1.3.3 Halo Safety Test– [SAFETY | Penalty – 5pts]

With the car supported on a power unit cartridge a 1kg load will be suspended to give a loading of 2kg (to be reviewed) at point of contact on the Halo circular notch.

E1.4 Front wing – [GENERAL | 5pts]

The front wing must be securely fixed to the body of the car, either as a single piece or as part of a nose cone assembly. The front wing can be manufactured using any suitable material.

E1.4.1 Front wing thickness:

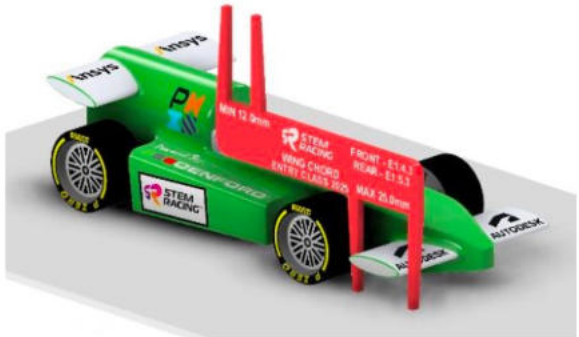
Min: 3mm / Max: 15mm [Penalty – 5 pts]

E1.4.2 Front wing span:

Min: 60mm / Max: 80mm [Penalty – 5 pts]

E1.4.3 Front wing chord:

Min:12mm / Max: 25mm [Penalty – 5 pts]



E1.5 Rear wing - [GENERAL | 5pts]

Rear wings must be securely fixed to the body of the car, either as a single piece or as separate elements that make up the total wing span when measured as part of the finished car.

E1.5.1 Rear wing thickness:

Min: 3mm / Max: 15mm [Penalty – 5 pts]

E1.5.2 Rear wing span:

Min: 60mm / Max: 80mm [Penalty – 5 pts]

E1.5. 3 Rear wing chord:

Min:12mm / Max: 25mm [Penalty – 5 pts]

E1.6 Wheels - [GENERAL | 5pts]

Entry Class cars **MUST** use the STEM Racing Japan standard wheel, unmodified in any way. Please refer to **Appendix iii** for more details.

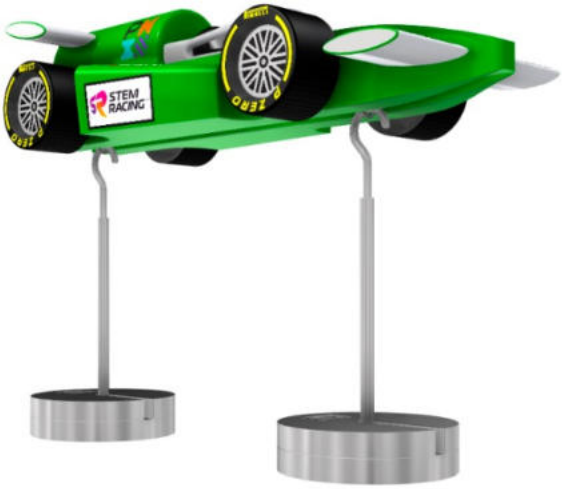
E1.7 Axles - [GENERAL | 5pts]

Entry Class cars **MUST** use two (2) standard axles and axle bushes, modified only in length within the dimensions below. Please refer to **Appendix iv** for more details.

Min: 50mm / Max: 66mm

E1.8 Tether line guides - [SAFETY | 10pts]

Entry Class cars **MUST** use two (2) standard tether line guide screw eys, secured safly into the underside of the car body. Tether guide screw eyes must be unmodified.



E1.9 Total car weight - [PERFORMANCE | 20pts]

This is the minimum weight the finished car must be to race, including wheels, axles, paint and any decals.

Min: 65g

THE COMPETITION

How it works – Race Day
How it works – Judging
Judging Score cards
Next Steps – Development Class

Race Day —What to Expect

Race Day happens at the National Finals, which brings together all classes of the STEM Racing Japan family.

You will race at the same event as Primary, Development, and Professional Class teams, but don't worry – you'll only be competing against other Entry Class participants!

This is your chance to check out the competition and ask the Development and Professional Class teams about the next stages of the competition.

Registration & Car Scrutineering

When you arrive you'll register with us, where you'll be given some important information including your judging timetable. Then, you must take your car immediately to our Scrutineering area, where our judges make sure your car will be ready to race. Make sure your car is ready to hand in when you arrive!

Race

You will go head-to-head with another Entry Class participant to compete for the top spot on our leaderboard. Racing will consist of 2 timed runs in each lane of the 20m STEM Racing Japan elevated racetrack.

Judges Debrief & Awards Ceremony

After all the judging has been completed, the team of judges will gather to discuss their scores and work out who will go home from Race Day with our various awards. Awards will be handed out to teams/participants in all three classes, including the prestigious **Entry Class Champion** award. Fingers crossed!

- **Entry Class awards**: Fastest Car, Best Engineered Car, Best Reaction Time, Knock-Out Winner
- **Entry Class top prize**: Entry Class Champion

*** Award categories may be updated depending on the number of participants and event operations.**

The Judges - what they're looking for

The judges will have a total of 275 points to give you throughout the day and will score your work in two areas: Car Scrutineering and Racing.

Below is a quick guide explaining how the judges score your work, on the next pages are the official Entry Class score cards so you can see exactly what the judges are looking for!

The STEM Racing Japan Entry Class Champion trophy will be awarded with the highest total score, sum of all judging categories (see below). In the case of a tied points score, the participant with the highest racing score will be determined the winner.

Car Scrutieering

Your car will be assessed and hopefully declared safe to race by our judges, who will check your car against the Technical Regulations on Page 10. Car Scrutineering will be scored using the scorecard on page 19.

Total points available for Car Scrutineering : 175 pts

Racing

You will be awarded racing points depending on how you perform on track. Points will be awarded for your reaction time, the time your car takes to complete the track and the combined 'total race time'.

Total points available for Racing : 100 pts

Now have a look at the judging scorecards to see exactly what the judges will be awarding points for when they meet you on Race Day.

Car Scrutineering Scorecard

Team Number:
Team Name:
School:

Specifications					
Regulation	**Summary**	**Criteria**	**Points available**	**Pass/Fail**	**Score**
E1.1	Body material (award points for one ONLY)	~~**E1.1.1**: CNC Model block~~	~~20~~		
		E1.1.2: 3D printed body	20		
E1.2	No-Go-Zone	Compromised	20		
E1.2.1	Assembled Car Length	Min: 170mm Max: 210mm	5		
E1.2.2	Assembled Car Width	Max: 85mm	5		
E1.2.3	Assembled Car Height	Max: 65mm	5		
E1.3	Halo	Entry Class Halo W/Spigot Used	10		
E1.3.1	Halo Circular Notch Height	34.0mm (±1.0mm) Above Track Surface	10		
E1.3.2	Halo Visibility front/side/plan view	No physical obstruction in the front/side/plan view	5		
E1.3.3	Halo Safety Test	Halo can withstand 2KG load	5		
E1.4.1	Front wing thickness	Min: 3mm Max: 15mm	5		
E1.4.2	Front wingspan	Min: 60mm Max: 80mm	5		
E1.4.3	Front wing chord	Min: 12mm Max: 25mm	5		
E1.5.1	Rear wing thickness	Min: 3mm Max: 15mm	5		
E1.5.2	Rear wingspan	Min: 60mm Max: 80mm	5		
E1.5.3	Rear wing chord	Min: 12mm Max: 25mm	5		
E1.6	Wheels	Standard wheels	5		
E1.7	Axles	Standard axles and axle guide tubes	5		
E1.8	Tether line guides	Standard guides	10		
E1.9	Weight	Min: 65g	20		
				Specifications Total	**/155**

Aesthetics				
F1® style body	Few recognisable F1® design features	Attempt to create F1® style body with most features present	Highly recognisable F1® style body design, including side pods, front and rear wing and nose cone	
	1 2 3	4 5 6 7	8 9 10	
Quality of Finish and Assembly	Reasonable finish with some inconsistencies	Good overall finish quality and assembly with attention to details	High level of accuracy shown on all manufactured components. High attention to detail across all assembly and finishing	
	1 2 3	4 5 6 7	8 9 10	
			Aesthetics Total	**/20**
			Specifications Total + Aesthetics Total = Car Scrutineering Total =	**/175**

Notes:

2025/26 2025/26 2025/26 2025/2

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Next steps...

Development Class

STEM RACING™ JAPAN

Next steps - Development & Professional Class

Entry Class is your first step on what could be the journey of a lifetime.

With STEM Racing Japan, you could travel the world as one of our World Finalist teams, meeting real F1® team members and drivers. This could be your chance to land the job of your dreams!

Looking ahead and understanding what comes next is crucial if you want to be among the world's top teams. In Development Class, some aspects will be familiar, while others will be more complex.

Start reviewing the rules and regulations for Development Class and aim to return next year, challenging for a place at our STEM Racing Japan National Finals!

Additionally, if your dream is to compete in the STEM Racing World Finals, consider the Professional Class.

Work hard because nothing is impossible.

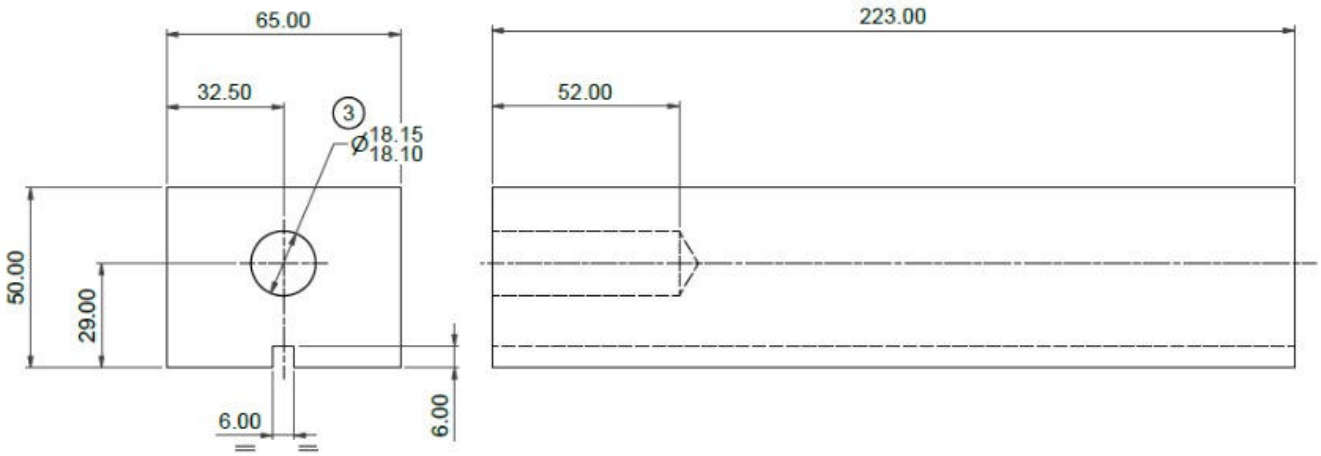
More information will be available soon about the classes to enter in 2027.

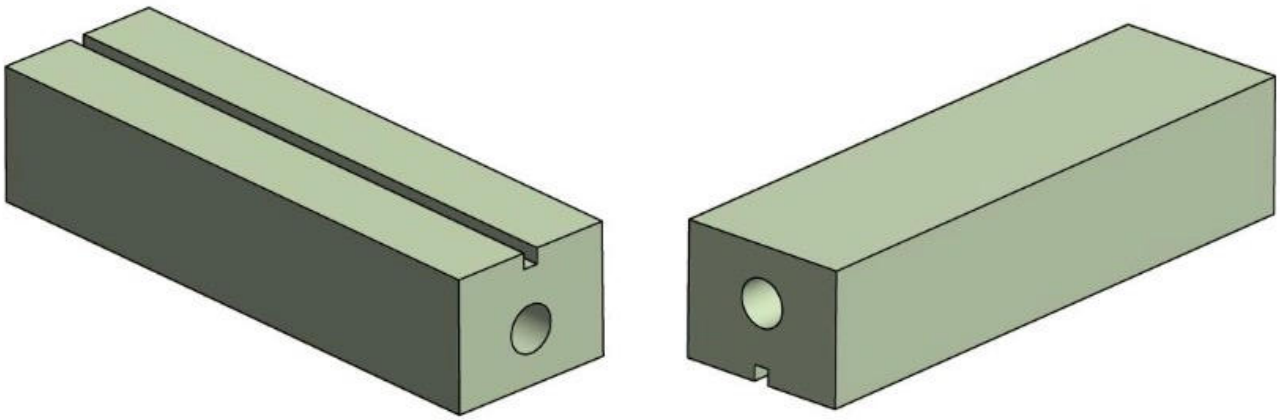
#RoadToNationals starts here...

APPENDIX

Appendix i. Official Model Block

This component is available to download a FREE 3D part from the STEM Racing website.
For this part and more, please visit HERE

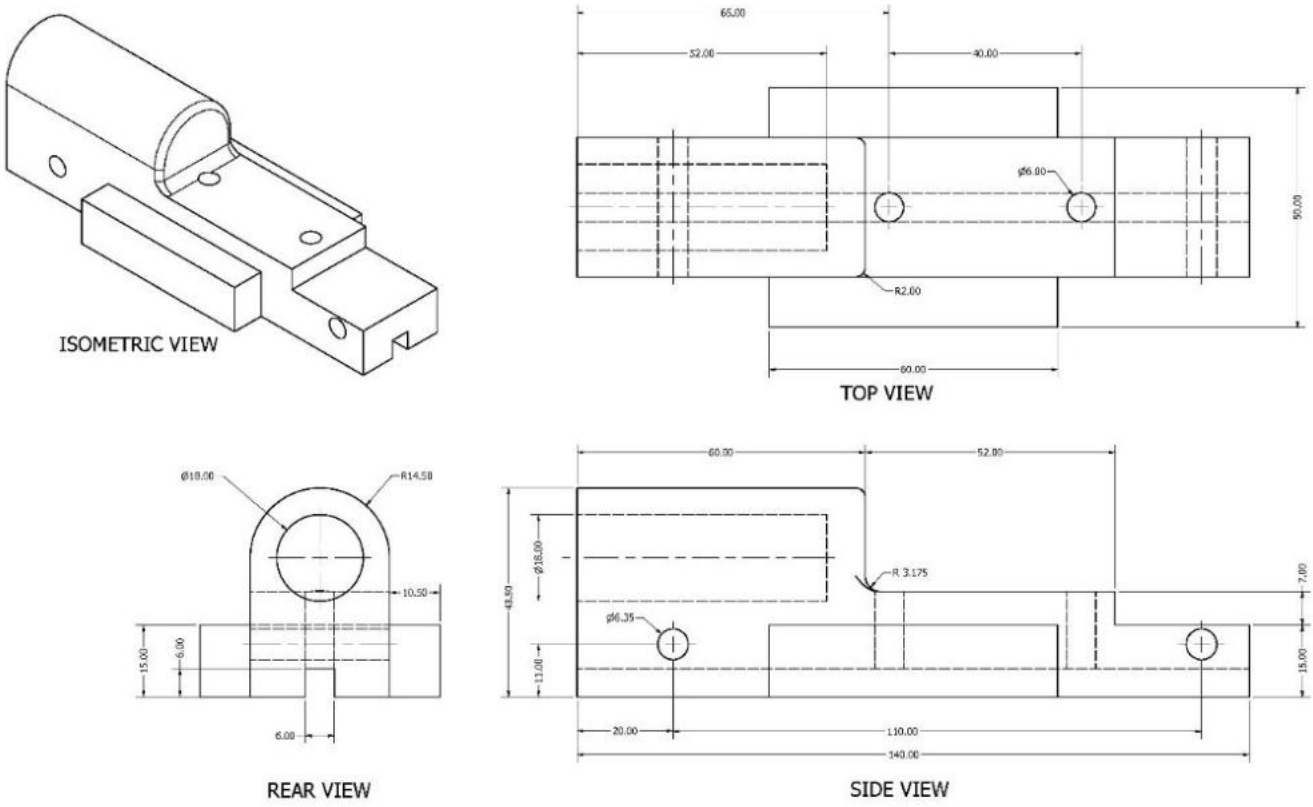




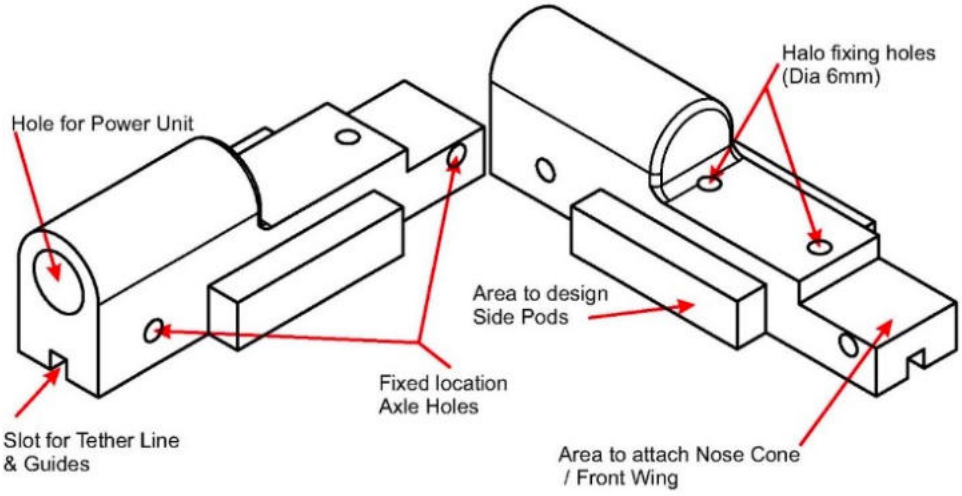
Appendix ii. Entry Class 'no-go-zone'

This component is available to download a FREE 3D part from the STEM Racing Japan website. For this part and more, please visit HERE

Orthographic projection:



Note: See how to sketch the no-go-zone and quickly start designing, by watching our tutorial on the STEM Racing YouTube.

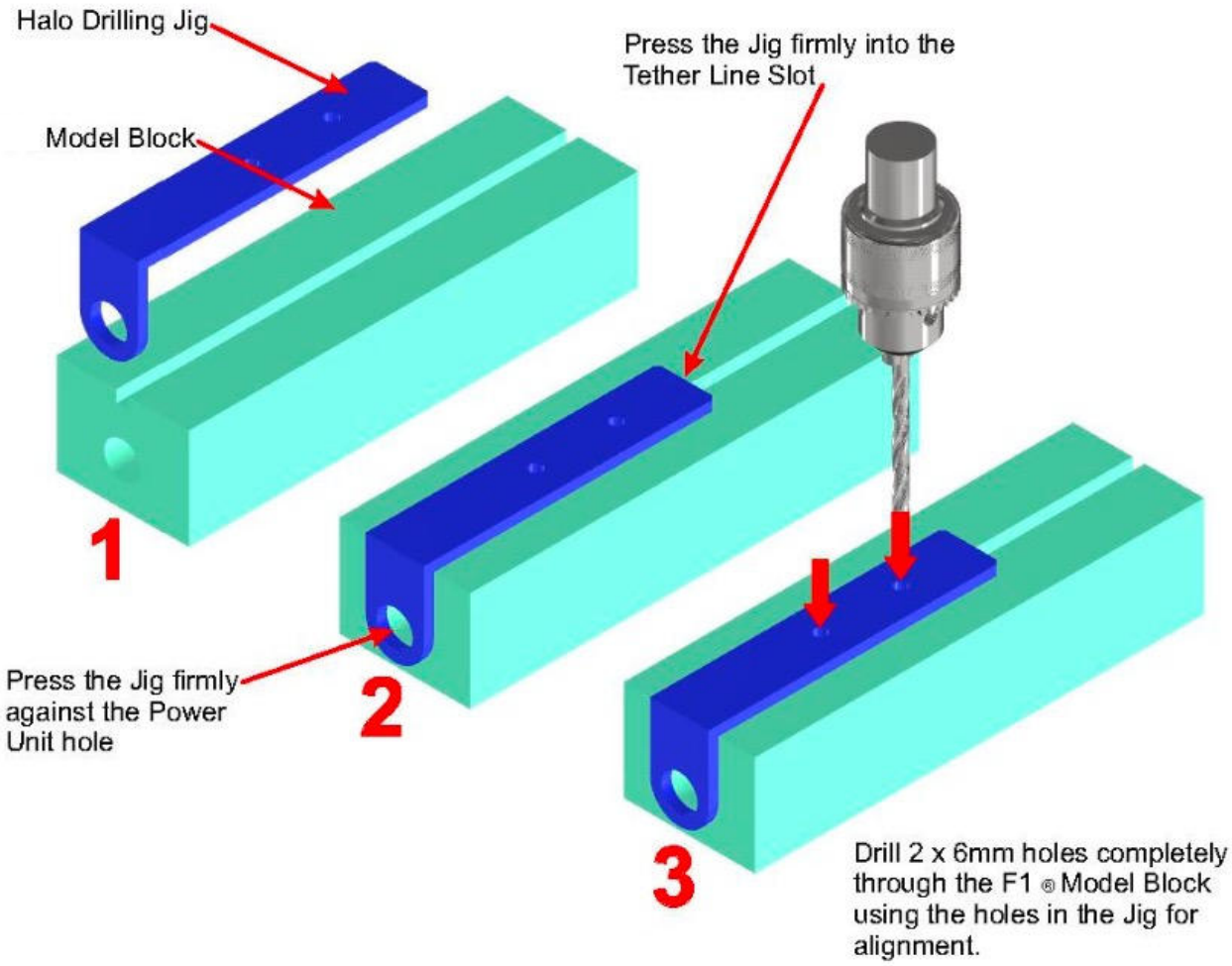


Appendix iii. Entry Class Halo

This component is available to download a FREE 3D part from the STEM Racing website.
For this part and more, please visit HERE

CNC machining is not required for the STEM Racing Japan National Finals.

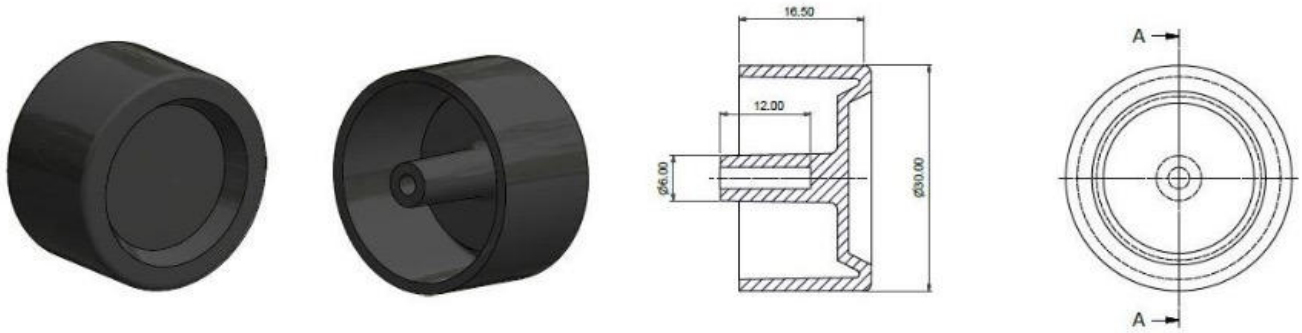
Tip: To ensure you properly align your halo on top of the 'No-Go-Zone' platform, download and use the halo spigot hole jig. The jig aligns perfectly with the official STEM Racing Model Block, and we advise that you predrill (using a 6mm drill bit) your halo spigot holes prior to CNC machining your car body. Just visit Downloads and Resources section to download the jig!



Appendix iv. STEM Racing Japan Standard Wheel

This component is available to download a FREE 3D part from the STEM Racing website.
For this part and more, please visit HERE

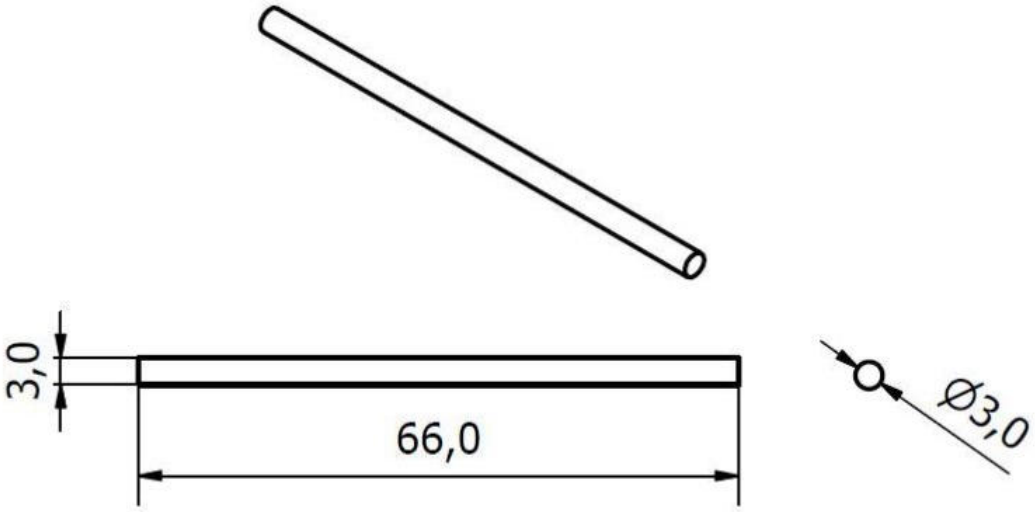
Please note this file is for assembly purposes on CAD and wheels should not be 3D printed for your physical car submission.



Individual wheel weight: 3.5-3.8g

Appendix v. Entry Class Standard Axle

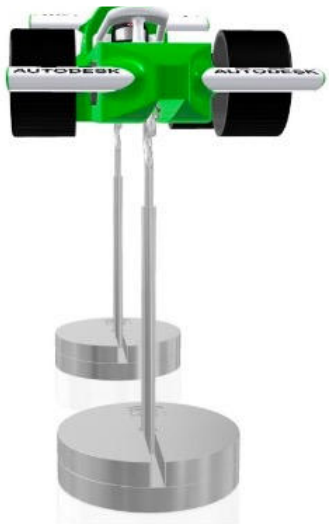
This component is available to download a FREE 3D part from the STEM Racing website. For this part and more, please visit HERE



Individual axle weight: 4.0g

Appendix vi. Tether Line Guide Safety Test

The Tether Line Guide Safety Test is recommended for all teams to ensure that your tether line guides are safely in place and your car is safe to race on track. This test replicates what the scrutineer will do at the National Finals.



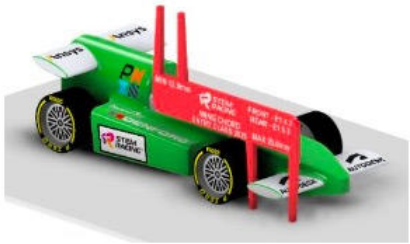
Appendix vii. Entry Class Scrutineering Gauges

The followings images are a to support with using the new Entry Class scrutineering gauges.

The gauges are available to download for FREE as a DXF/Illustrator file for you to laser cut and use to check your car(s).

These gauges are for a quick visual check for the relevant regulation, please use proper measuring equipment for accurate dimensions E.G. Digital Calipers.

Scrutineering Gauges



Good Luck!

See You Soon

If you have any questions, please do not hesitate to contact us!

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