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What is STEM Racing?

STEM Racing is a global multi-disciplinary competition, open to all secondary schools on the island of Ireland. It challenges secondary school students to design, build and race miniature compressed air-powered Formula One cars of the future. Student teams will compete against each other at regional, and National championships to determine Irelands **best engineered car**, Irelands **fastest car**, and Irelands **National Champions**. The challenge inspires students to use IT to learn about physics, aerodynamics, design, manufacture, branding, graphics, leadership, teamwork, media skills, finance and communication, while applying them in a practical, exciting and competitive way. Design will play a critical role in the success of your teams – both in the design of the car itself and the people involved in bringing that design from the initial idea right through to the racetrack. Team members must be carefully chosen and trained to work together, use cutting edge engineering software and the latest in manufacturing technology. Although the challenge is primarily STEM-based, the most successful teams nationally and globally are those who utilise marketing and business techniques to raise sponsorship funds and create recognisable team identity. Students are encouraged to use software tools to manage their projects and to develop a project website and social media presence to communicate how their designs evolve. The competition runs throughout the first half of 2026, culminating in the Irish National Final in May 2026.

National Champions, 2nd Place, and 3rd Place teams will all be invited to represent Ireland at the STEM Racing World Finals in the 2nd half of 2026

Why Take Part?

STEM Racing offers students a unique opportunity to engage with the same tools, software, and manufacturing processes used by professional engineers, designers, and manufacturers. It provides a practical, project-based learning experience that directly supports skills development across all subjects, but especially **Design & Communication Graphics (DCG)**, **Engineering**, and **Technology** at Leaving Certificate level.

Through participation, students gain hands-on experience in:

Technical Skills

Computer Aided Design (CAD) – Develop 3D models, practise complex curve modelling, surface rendering, and create traditional orthographic drawings.

Computer Aided Manufacturing (CAM) – Prepare designs for production, simulate processes, and understand workflow from design to finished product.

Computational Fluid Dynamics (CFD) – Analyse aerodynamics to improve performance based on drag and turbulence data.

CNC machining – Manufacture precision components with exceptional accuracy, fit, and finish.

3D Printing – Rapidly prototype parts to test fit and function, and produce high-quality final components.

Enterprise Skills

Marketing and brand development – Create a team identity, design promotional materials, and build an online presence.

Sponsorship and funding acquisition – Approach local businesses, prepare proposals, and manage budgets effectively.

Presentation and communication skills – Prepare and deliver presentations to judges, sponsors, and the public.

Project management and teamwork – Coordinate roles, meet deadlines, and work effectively under pressure.

Confidence and resilience – Build the ability to present clearly, handle feedback, and adapt to challenges.

All essential software and manufacturing resources are provided through STEM Racing. Schools are also encouraged to collaborate with local universities or industry partners to expand access to advanced tools and specialist expertise.

By completing the project, students strengthen their Leaving Certificate coursework while gaining a balanced mix of **technical ability**, **business awareness**, and **professional confidence** – skills that are valuable in any career path.

Team Structure Overview

Each student team represents a Formula One outfit tasked with **designing, building, and racing** the fastest miniature F1® car of the future, powered by **compact compressed air propulsion systems**.

To participate in the competition, students must **assign specific job roles** within their team. Ideally, each team member should take responsibility for one key role. However, depending on team size, some students may need to take on **multiple roles** or share responsibilities.

Below are **example roles** that teams may include as part of their structure. Teachers are encouraged to help students select roles that best match their individual skills and interests.

Project Manager (maximum 1 person)

This person is responsible for managing the team, project management of all key deliverables and ensuring that all race cars are ready for the competition. The team manager works closely with all members of the team, offering assistance where necessary.

Finance Manager

This person organises budgets and resources needed for designing and making the car(s) and team project work. They might keep track of all expenses and income generated, allocating certain funds to certain areas of the project, for example Car, Pit Display, Portfolio, team uniforms.

Manufacturing Engineer

This person is responsible for advising team members on the manufacture of the car and the constraints of the machining process. Manufacturing engineers will need to liaise with the design engineers to report and help solve any problems with the construction of the car.

Design Engineer

This role is responsible for the styling and aerodynamic performance of the car design. Design engineers will need to liaise with the manufacturing engineers to ensure their ideas can be realised.

Graphic Designer

This person could be responsible for producing the colour schemes applied to the vehicle, including any special sponsorship decals, together with the final graphic renderings and any additional team marketing materials. The graphic designer will need to liaise with the design engineer to ensure any schemes will fit the shape of the vehicle and the resources manager for additional marketing development.

Sponsorship & Marketing Manager

This person could be responsible for generating sponsorship proposals for potential sponsors, contacting firms and marketing the team through different media. They may be tasked with creating and managing the team's social media accounts as well as thinking up ways to generate interest and income for the team through marketing events.

Designing, building, and racing the car requires many skills. Success depends on how well students **plan, communicate, and work together**. Like a real F1 team, every role matters — no one person is more important than another. Strong teamwork and organisation are key to great results.

2025-2026 Calendar

Date	Event
17 th October 2025	Registration Deadline
14 th November 2025	5 Page Plan Deadline
February 13 th 2026	OPTIONAL Feedback Round Submission Deadline
March 13 th 2026	OPTIONAL Aston University Car Submission Deadline
May 12 th 2026	National Finals

Preliminary calendar - all dates are subject to change.

Competition Stages

Qualifying Round

The Qualifying Round will require all registered teams to submit a **5 Page Season Plan**. The 5 Page Plan will be evaluated by our team of judges and individual feedback will be provided to each team. The top teams at this stage will progress to the National Finals. More details on what is expected in the 5 Page Plan can be found in the **competition regulations** at stemracing.ie/downloads.

OPTIONAL Feedback Round

The feedback round gives teams the chance to receive guidance from our judges before the National Finals in May. To participate teams must submit an engineering and enterprise portfolio for evaluation. Participation is optional, but we strongly encourage it to gain valuable insights and improve performance ahead of Nationals.

National Finals

The National Finals are the peak of the STEM Racing Ireland season, bringing together the top 45 teams from the Qualifying Round to compete in person. Each team must bring two cars, a pit display, and their engineering and enterprise portfolios. The event showcases the best of student innovation, teamwork, and technical skill as teams race for a chance to represent Ireland at the World Finals.

World Finals

The top three teams at the National Final will be invited to represent Ireland at the prestigious STEM Racing World Finals. This seven-day spectacle, which runs in conjunction with a Formula One Grand Prix, sees the world's top STEM Racing teams compete for the title of World Champions, university scholarships, and coveted places on Williams F1 team's Engineering Academy. Previous locations have included Singapore, Abu Dhabi, Malaysia, and Texas. World Finalists will enjoy an experience of a lifetime, while greatly enhancing their career prospects.

The Car

CAD Software

Before process, teams should ensure they have access to suitable 3D CAD software. We recommend Autodesk Fusion 360, which is available free of charge through the STEM Racing website: www.stemracing.ie/downloads

Teams should also download the official **STEM Racing Model Block** 3D CAD file from the same link. Full block dimensions are included in the Technical Regulations appendix.

Training

CAD software enables students to design and refine their cars in 3D. Although there's a learning curve, it's an essential skill for the project. Teachers can offer initial guidance, but students should be encouraged to explore and experiment independently to build confidence and problem-solving ability.

A range of CAD tutorial videos tailored to STEM Racing are available on our website and YouTube channel. Once students are comfortable with the basics, we recommend this [Off The Track Car Design video series](#) for more advanced techniques.

Most STEM Racing tutorials use **Autodesk Fusion 360**, but the tools and functions are similar across most CAD programs, so the lessons are valuable regardless of which software your teams choose to use.

Virtual Testing

Virtual testing allows teams to analyse and improve their car's aerodynamic performance before manufacturing. Using simulation software, students can test different car designs or individual components in a virtual wind tunnel to see how changes affect airflow and drag.

There are several software options available, including **SolidWorks Flow Simulation**, **ANSYS** and **Autodesk Flow Design**. Autodesk software can be downloaded free of charge through our website at www.stemracing.ie/downloads.

Encourage teams to test multiple design variations and interpret the results carefully - small changes can have a big impact on performance.

Manufacturing

Teams are encouraged to design and manufacture their cars in school using available CNC machines and 3D printers. This hands-on process helps students experience the full engineering workflow from design to production.

If your school doesn't have access to this equipment, teams are advised to **contact local universities, colleges, or manufacturing companies** for support.

Aston University Manufacturing

STEM Racing Ireland has partnered with Aston University to provide a manufacturing service for teams unable to produce their own cars. This is an independent service operated entirely by Aston University and **not recommended** due to long lead times.

Aston University can provide:

- CNC machining of the car body
- FDM 3D printing of wings, wheels, wheel supports, halos, and helmets

Teams are responsible for finishing their cars (e.g. painting, gluing, assembly) as outlined in the regulations.

To use this service, teams must complete the [manufacturing request form](#). Designs for the National Finals must be submitted by **March 13th** to ensure on-time delivery. Submissions are accepted year-round, and earlier submissions will be processed and delivered sooner. The cost of manufacturing is **£35**, excluding shipping. **Teams must arrange their own shipping directly with Aston University.**

For queries or assistance, contact stemracing@aston.ac.uk

Car Assembly and Finishing

Car components can be assembled using a strong adhesive such as epoxy. More advanced teams may design snap-fit fixtures to make parts easier to replace or upgrade in future iterations. Simple jigs are recommended to ensure all parts align correctly during assembly.

Finishing Steps:

1. Smooth the machined body using rough or medium-grade sandpaper.
2. Refine with fine-grade sandpaper.
3. Apply a sanding sealer if available, and sand lightly once dry.
4. Apply several coats of paint (an undercoat may help achieve a smoother finish).
5. Decorate the car body with decals and stickers as desired.

Teams are expected to present a **high-quality paint finish** with clean graphics and sponsor logos where appropriate. Care should be taken to ensure that any finishing work does not alter the car's dimensions in a way that breaches technical regulations.



Please make sure you have also read the STEM Racing Competition, and Technical Regulations.

Work hard, see you on the track!

If you need any help at all, just get in touch with us:

info@stemracing.ie

www.stemracing.ie