



The Bloomsburg (PA) High School TSA Chapter won Best Overall and Fastest Car in the international finals of the “Jaguar F1 Team in Schools CAD/CAM Design Challenge,” held October 5, 2004 in Birmingham, England. It was the first appearance by a US team.

Teams competed from Australia, Brunei, England, Northern Ireland, Scotland, South Africa, Thailand, United States and Wales. Each team designed, analyzed, built and raced a Formula One (F1)-type CO2-powered car. Their documentation was scrutinized and they were judged on their design process and oral presentation.

“Turbo,” the Bloomsburg High School Team, consisted of Alex DeRose, Austin Mantz, Tyler Marshall, Jessica Rubenstein, and Justin Wilcott with team advisor Kirk Marshall.

Team Turbo learned a vital lesson when a lack of proper documentation cost them first place in the US regionals, according to Marshall. For the nationals, the team totally re-engineered its cars to meet all design specifications, incorporated a unique new aerodynamic design, and created a display and portfolio.

According to Justin Wilcott, the team’s student graphic design engineer, the competition was much tougher than anticipated. “Yet, it was great to see how other countries handled the rules and regulations,” he says. “It’s been an educational opportunity.”

Students experience real-life engineering, according to Marshall. “Each had a responsibility and a talent,” he says. “Each strove to do their best from designing a portfolio to designing and building an F1 car. Had one student not done his work, we wouldn’t have won!”

Founded in England in 1999, the competition has exceeded all expectations, according to Andrew Denford, F1 in Schools Founder and Chairman, and has attracted more than 34,000 students in England alone.

The program showcases how fascinating engineering can be.

“It’s like taking a lid off a box and letting students grow,” says Mike Beasley, Patron of F1 in Schools, Former Managing Director of Jaguar, and Chairman of CBI.

Business, though, drives the program. “We urgently need young people to enter engineering,” says Les Ratcliffe, Manager — Community Affairs, Jaguar Cars. “We’re experiencing a crucial shortage of engineers.”

Students, 11-18+ years of age, can enter the Jaguar F1 competition, which is supported by partners Denford, Jaguar, BAE Systems, Pitsco and sponsors Technology Student Association, UGS and Pathtrace. For more information, go to www.f1inschools.us or www.f1inschools.co.uk



A New Design Challenge

For Middle School and High School

In 2002, The National Academy of Engineering and the National Research Council published their concern that the majority of American adults and children are technologically illiterate. That document, *Technically Speaking: Why All Americans Need to Know More About Technology* is available online www.nae.edu, and is essential reading for all educators.

The Technology Student Association (TSA) www.tsaweb.org is one group that has been working for many years to improve the technological literacy of American middle and high school students. The latest addition to their extensive technology challenge repertoire is a collaboration with F1 in Schools, Inc., that involves the design and construction of a 1/20th scale Formula One (F1) racing car — the **Jaguar F1 Team in Schools CAD/CAM Design Challenge**. (F1 describes vehicles meeting the Formula One racing specifications <http://formula1.com>.) This standards-based challenge originated in the United

Technological literacy, a broad understanding of the human-designed world and our place in it, is an essential quality for all people who live in the increasingly technology-driven 21st century.

Quote from the National Academy of Engineering web site www.nae.edu

Kingdom. It seeks to raise the profile of engineering among young people and give them practical access to the latest technology in the engineering and manufacturing world.

The National Academy of Engineering and TSA are not the only groups concerned with improving technological literacy. To remain competitive, manufacturers depend upon engineers, designers, and skilled workers to create reliable products that meet consumer demands. To encourage schools to produce those kinds of students, businesses and corporations have taken an interest in finding ways to attract students to careers in design, engineering, science, technology and mathematics. The **Jaguar F1 Team in Schools CAD/CAM Design Challenge** is a joint effort supported by an international group of companies including, Jaguar, Denford, BAE Systems and Pitsco and its Gold sponsors, UGS, and Pathtrace.

The designing of the scaled F1 racer is done using a 3-D CAD (computer aided design) program and the manufacturing is accomplished by passing the design to a CAM (computer aided manufacturing) program that will issue the commands to a CNC (computer numerically controlled) routing machine. If you don't have access to a

CNC router, don't let that stand in your way. The F1 Team in Schools program has arrangements with sites that will (for a modest fee) manufacture your F1 racer for you. Or you could have your team find a local manufacturer, college, or training center with a CNC machine that would be willing to manufacture it for you at no cost. For example, The College of New Jersey, School of Engineering, Department of Technological Studies will support all New Jersey and Eastern Pennsylvania TSA teams needing help with manufacturing. In this instance it will be students helping students. The TECA (Technology Education Collegiate Association) members at TCNJ will work with the NJ TSA teams to manufacture their F1 racers.

The F1 Team in Schools Challenge is open to all middle and high school students nationwide. As an F1 team, student members will be exposed to CAD, CAM, and CNC, as they perform various activities at each phase of a five step process of design, analyze, make, test, and race. Teams may face a state level elimination event, in order to determine advancement to the culminating F1 National Challenge, which will be sponsored by TSA and held at the annual national TSA conference. In 2005, the national conference will be held in Chicago, Illinois from June 28th to July 2nd.





Your Design Brief

The following information is reprinted directly from the 2004 – 2005 rules for F1 in Schools.

(<http://f1inschools.us>)

You are the Formula One team commissioned to design, construct, and race the fastest Formula One car of the future, powered by new compact CO₂ (carbon dioxide gas) power plants. In order to enter the championship, you must work in a team of at least three to a maximum of six people, allocating job roles to the members of your group. Ideally, one role should be allocated to each person. However, you may have to double or triple up on your roles and responsibilities – depending on the number of people you have available.

The members of your team should cover the following job roles:

Team Manager (maximum of one person)

This person will be responsible for managing the team and ensuring that the primary and backup cars are ready for competition. The team manager works closely with all members of the team offering assistance when necessary.

Resources Manager (maximum of one person)

This person organizes time, materials, and equipment for designing and making the cars and is also responsible for developing ideas regarding team marketing (presentation). The resources manager will need to work with all members to ensure tasks are progressing on time and offer additional help, if needed.

Manufacturing Engineer (maximum of two people)

These people are responsible for advising team members regarding the manufacture of the car and the constraints of the machining process.

Manufacturing engineers will need to work with the design engineers to report and help solve any problems with the construction of the car.

Design Engineer (maximum of two people)

These people are responsible for the styling and aerodynamic performance of the car design. Design engineers will need to work with the manufacturing engineers to ensure their ideas can be realized.

Graphic Designer (maximum of one person)

This person will be responsible for producing the color 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 work with the design engineer (to ensure the schemes will fit the shape of the vehicle) and with the resources manager for additional marketing development.

There are so many tasks that must be mastered in order to design, manufacture, prepare, and finally enter a car for racing that teamwork will be vital to your success. A real F1 team succeeds because all the people learn to work together and support each other. Remember, no one person is more important than another.

Design Preparation

Before beginning to design your car, you will need:

- Solid Edge or a similar 3-D CAD software program at your school.
- A design template suitable for the balsa wood blank.
- Finally, an endless supply of ideas.



Training

CAD programs will help you draw and develop your ideas in 3-D. Of course, as with most drawing programs, it takes time to learn how to use them. Your teacher should be able to show you how the software works. However, members of your team will need to spend some time exploring the software, so you can see what it can do and how it can help you design your F1 car.

Research

Investigate existing F1 car designs. Your teacher may be able to help you use the Internet to learn the latest developments occurring in the world of F1 design. Concentrate your research on areas that could help your team – for example,

aerodynamics and car body designs – and then try to apply the principles to your own ideas.

Testing

Your team might want to consider testing a variety of car designs, or car parts, in a wind and/or smoke tunnel to evaluate their aerodynamic performance.

Manufacturing Considerations

In the F1 Car Kit, you will receive two balsa wood blocks, two sets of four wheels and two axles, and some sandpaper, which are the minimum supplies needed to enter the challenge. ●

Participation in the F1 Challenge involves an annual team fee of \$150. This fee covers team registration and all items in the F1 Challenge Kit (F1 rules book, two car kits, free software options, etc.). If you have students who would like to work together as an F1 team, complete the F1 Challenge Agreement Form 2004-2005 and fax or mail it along with the appropriate payment to TSA. By submitting the Challenge Agreement Form and payment, your team will be registered for the F1 event to be held at the National TSA Conference in June 2005, in Chicago, Illinois.



For more information, to read the complete rules and to access the F1 Frequently Asked Questions go to www.f1inschools.us. You may also contact the national TSA office (Hillary Lee at 703.860.9000, ext. 16 or hlee@tsaweb.org.) To see the United Kingdom Jaguar F1 in Schools site visit <http://www.f1inschools.co.uk>.