MRT9 Specifications

Features

- *Engine*
  - Yamaha YZF-600R, 4 cylinder, 600cc
  - Garrett GT-12 Turbocharger
  - E-85 Bio-ethanol fuel
- *Transmission*
  - 6 Speed Sequential Gearbox
- *Frame*
  - Steel space frame
  - TIG welded and stress relieved
- *Suspension*
  - Cane Creek Double Barrel Mountain bike shock absorbers
  - Independent type, full carbon fiber A-arms
  - TIG welded steel uprights
- *Drivetrain*
  - Rear wheel drive
  - Torsion limited slip differential
  - Heat treated steel half shafts
- Electronics
  - McGill designed Engine Control Unit
- *Ergonomics*
  - Carbon fiber seat
  - Carbon fiber steering wheel
  - Interactive driver display
  - Push-Pull shifter with integrated clutch
- *Brakes*
  - Two outboard front, single inboard rear
  - Aluminum-Silicon Carbide brake discs
  - Wilwood calipers

Performance

- Power with 19mm restrictor
  - 100 bhp at the flywheel
- Weight
  - 450 lbs/205 kg
- Acceleration
  - 0-100km/h <4.0 seconds
- Cornering
  - g's 1.6

Comparing the Figures



	Average Mid-Size Car	Ferrari F430	MRT9 Prototype	Formula 1 Car
0-100 km/h	9.0 seconds	4.0 seconds	<4.0 seconds	1.9 seconds
Weight	3300 lbs	3200 lbs	480 lbs	1320 lbs
Price	$30,000	$250,000	$20,000	$2,000,000
Power	170 bhp	490 bhp	100 bhp	750 bhp
Economy	25 mpg	15 mpg	45+ mpg	1 mpg

Team History

The McGill Racing Team (MRT) has a rich history in the Formula SAE series. Since 1994 McGill Engineering Students have built 9 competitive race cars. Here is a short overview of the MRT history.

The First Generation 1994- 1999

The first car, known as Boomerang was built in 1994. Today, it is exposed at an indoor karting track in Montreal as a silent witness to McGill's motorsport history. To follow the Boomerang was the MRT2 affectionately referred to as Big Bird for its flashy yellow paint. Big Bird raced twice in Formula SAE, ranking 1st in Quebec and second in Canada in its 1998 season. It was used the following year for technical purposes and driver training for MRT recruits.

The Big Bertha Generation 1999 - 2001

Big Bertha, was built over almost two years, from September 1999 to May 2001. As many past team members had graduated and the new team roster was composed of inexperienced students, both design and construction phases proved long and difficult. In the end, MRT improved its best result with a 19th overall standing in the 2001 Formula SAE competition. Many lessons were learnt from the construction of this rather bulky car.

The Third Generation 2001-2005

A new crew of outstanding engineering student took over the racing team to kick off a great season for MRT. The team led by David Lemire and Jonathan Laliberte and their classmates were aiming for something better than the team has ever achieved. In order to achieve these results, aggressive technical objectives were set; 20% reduction of vehicle weight, improve engine torque and horsepower, reduce turning radius and overall car dimensions, elimination of clutch problems and improved reliability of the shifting mechanism. After a year of hard work, the McGill Racing Team achieved a great standing with a 13th overall position in the 2002 Detroit competition, 3rd in Canada, and 1st in Quebec.

However, the year 2001 marked the beginning of an important rule change made by the SAE; no car could be used more than one year. This rule change ended the short lived success of the MRT4. In 2002, the team started working on an improved version of the MRT4. The new powerful MRT5 equipped with a turbocharger finished 5th in the world at the Formula SAE 2002 autocross event.

This golden generation continued its success with the MRT6 in 2003. Featuring a smart under-tray design with Venturi effect to create down force, more weight reduction, and an award winning Engine Management System, the MRT6 finished 1st in Canada and 15th in the world among 140 teams.

After the great success with the MRT6, the team decided to concentrate on specific subsystems of the race car to come up with something new. For example, the fully carbon fiber wheel project was started. The MRT7 body work was the most attractive up to that point, and the race car had similar performance to that of the MRT6. Unfortunately, a failure in the powertrain prevented the car from finishing the race at Detroit 2005.

The Transition Phase and the MRT8

Most of the core team graduated with the MRT7, and the team was taken over by less experienced, mainly new members. Nevertheless, the team is proud to have designed an entirely new car, built it in time, and raced at Detroit 2006. The new MRT8 featured an entirely new chassis concept, and the suspension assembly included new composite members for weight reduction.

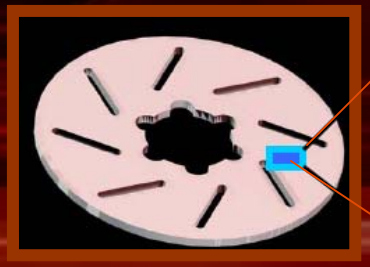
Unique Features of the MRT9

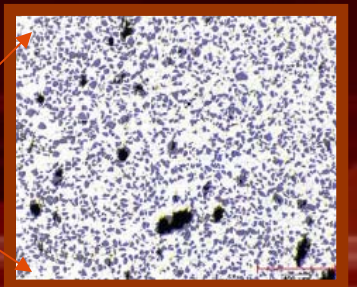
Three piece composite wheels - These were designed by undergraduate students in mechanical engineering. They reduce unsprung weight by 2 kg from each wheel. Again this aids in acceleration, braking, cornering and fuel economy. No road going vehicle has ever implemented fully composite wheels in a production car. In this regard we are among the first to attempt this ultra-lightweight design.

Engine Control Unit - Developed by a team of electrical engineering students this engine management computer is being designed from square one. It will control all functions of the engine timing as well as function as a data acquisition unit that can interpret movement, speed and rotation of suspension components and allow the team to analyze real world test data performed on the finished car. This data will allow us to confirm our design theories and help us to optimize the setup of the car for competition.

E-85 Bio-ethanol fuelled engine –. E-85 burns more cleanly than gasoline and is a much more environmentally friendly fuel. Our engine has been developed to run on ethanol as this fuel provides a very high octane rating that is useful in turbocharged applications such as ours. As with the composite wheels we are pioneering experiments with using emerging technology by implementing ethanol in small displacement, high compression ratio engines where it is normally not very well suited.

Metal Matrix Composite - Undergraduates in materials engineering are casting brake discs out of aluminium metal matrix composite. This reduces weight by approximately 65% over steel discs and reduces the rolling inertia of the wheels and unsprung weight of the car – important factors for improving performance and economy





MRT and Formula SAE

The McGill Racing Team

The McGill Racing Team is a group of approximately 40 undergraduate students from a diverse number of faculties who volunteer their time outside of class to participate in one of the most prestigious engineering competitions for students in the world. Students gain practical experience in leadership, teamwork, communication skills and engineering application. The team is an invaluable resource to the McGill community for recruitment and marketing, a provider of capstone engineering projects and research opportunities as well as an excellent extra-curricular program for students.

We participate in several public and private displays in Montreal and abroad and are continuously striving to produce a winning car and to represent our school to the degree it deserves. This goes hand in hand with helping students apply their knowledge learned in the classroom while having fun and working together on a remarkable and exciting project.

Formula SAE

The Society of Automotive Engineers was founded in 1905 and regroups nearly 90,000 engineers, business executives, educators, and students from more than 100 countries. The society is a platform for exchanging ideas and useful technical information as well as a forum for the advancement of transportation technology. More than three hundred collegiate chapters around the world participate in several students' competitions. As the SAE puts it, "the end result is a great experience for young engineers in a meaningful engineering project as well as the opportunity of working in a dedicated team effort."

The competition in which we participate each year is the main Formula SAE competition held in Detroit, Michigan. The event is sponsored by General Motors, Ford Motor Company and Daimler-Chrysler, and is covered by various media across North America. The objective is to conceive, design, fabricate, test, and race a formula style racing car to compete against more than 140 other colleges and universities from all around the world. Every year, a new car is built from scratch based on the experience learnt from the previous years. The race car is evaluated based on several criteria, both technical and non technical such as design, cost, marketing, performance, and endurance.