Rutgers University
Formula Racing
Sponsorship Packet
2016-2017

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Formula SAE® is an international student design competition organized by SAE International (formerly Society of Automotive Engineers). The concept behind Formula SAE is that a fictional manufacturing company has contracted a design team to develop a small Formula-style race car. The prototype race car is to be evaluated for its potential as a production item. The target marketing group for the race car is the non-professional weekend autocross racer. Each student team designs, builds and tests a prototype based on a series of rules whose purpose is both to ensure onsite event operations and promote clever problem solving. The race car is scored on the basis of its cost effectiveness and display of sound engineering practices. Its real world performance is also evaluated by various racing events consisting of endurance, autocross, acceleration, and skid-pad.

Formula SAE promotes careers and excellence in engineering as it encompasses all aspects of the automotive industry including research, design, manufacturing, testing, developing, marketing, management and finances. Formula SAE takes students out of the classroom and allows them to apply textbook theories to real work experiences.
Rutgers Formula Racing (RFR) is a high-demanding, high-outputting, illustrious academic organization that serves as a platform for engineering students to gain invaluable knowledge and skills reaching far beyond the realms of the classroom and curriculum. Every year, we participate in the United States Formula SAE (FSAE) Collegiate Design Series. It consists of two competitions for which we engineer, manufacture, test, and tune a small formula style racecar governed by FSAE rules.

The team consists of 20-30 dedicated members, who design, build and then collect and analyze data from real world testing of a formula style racecar. The students range in age and vary between all grade levels within the undergraduate and graduate programs at Rutgers University. Being a part of the team requires an enormous amount of time, effort and persistence that is unmatched by another organization at the university. The organization helps the members become immersed in a “real world” scenario that gives them experience and knowledge that would otherwise be impossible in the classroom.

At Rutgers Formula Racing, the team strives to exist and thrive as if it were a professional engineering team. We use advanced analysis and modeling techniques and software,
as well as physical testing of the car in order to make future design decisions. The team is broken up into executive positions such as the President, Vice President, Treasurer, and Chief Engineer. To further manage projects and vehicle subsystems, positions such as Design Lead, Manufacturing Lead, Aerodynamics Lead, Chassis Lead, Powertrain/Drivetrain Lead, Suspension Lead, Composites Lead, Electronics Lead, Brakes Lead, Ergonomics Lead, Business Lead, and Website/Social Media Coordinator are delegated. These positions are filled by the most exceptional team members and are chosen by team vote at the start of each year. Team members outside of the design leadership are also essential to the completion of the car, aiding in machining projects, composite layups, final assembly and much more. The team hopes to be welcoming, and will teach members almost everything they need to know to be a valuable asset.

We strive to be one of the top teams at competition each year. Every year brings new challenges, new innovations, and new team members. The team has been very successful in the past, as noted by our numerous awards since our initial establishment in 1989 (Page 4). In the years to come, we are confident that our team will grow into a perennial worldwide contender.

All of this being said, you can imagine that this task is not feasible without proper funding. While the team receives a certain amount of money with Rutgers University's help, and through fundraising, we would be unable to compete if it weren't for our sponsors. The team receives various sponsorships in a variety of ways that help us grow, learn, and compete in these competitions. For this, we thank you for considering sponsoring RFR.
Rutgers Formula Racing was founded in 1989.

Major design and fabrication work on the first vehicle was completed in 1990.

RFR entered its first carbon fiber monocoque at the Pontiac Silverdome which ranked 9th overall and won “Best Prototype Fabrication Award” in 1994.

Car #56 ranked 15th place in the competition in 2001.

Car #48 ranked 9th place in Endurance in 2006.

VIR Car #14 ranked 3rd in acceleration and 9th place in design. MIS Car #26 ranked 3rd place in design in 2009.

Formula West car #73 finishes in all events and places 14th place overall in 2011.

Michigan car #58 places 18th overall in 2012.

Car #102 was created in 2016.
TECHNICAL SPECIFICATIONS

General Dimensions

Weight: 420 lbs
Wheelbase: 62"
Front Track Width: 50"
Rear Track Width: 48"

Powertrain

Single-cylinder Yamaha YFZ450R 450cc engine 55 hp and 30 lb-ft of torque. Extremely light-weight with a linear power output throughout rev range. Factory dry sump lubrication system with internal oil reservoir.

Engine modelled in GT-Power, a 1-dimensional gas analysis software coupled with Star-CCM+ CFD. Model used to develop intake and exhaust pathways for power curve optimization.

Rapid prototyped Polyamide-12 Intake reinforced with carbon fiber composite.

TIG-welded stainless steel exhaust with dual carbon fiber straight-through muffler

Custom fuel injection system. All ignition and fuel calibrations done in-house.

Close-ratio 5-speed manual sequential “dog box” transmission.

Back-torque limiting clutch prevents rear wheel lockup or hopping during engine braking and allows for smoother clutchless downshifts.

Drexler FSAE Salisbury-type differential. Light-weight and fully adjustable for power lockup, coasting lockup, and preload.

Aerodynamics

Aero package analyzed through Computational Fluid Dynamics studies to obtain a final downforce figure of 180lbs at top speed.

Front wing created from resin infused carbon fiber elements reinforced by foam cores. Multi element and multi sectioned. GAW 2 main element incorporated to utilize ground effects.

Rear wing made from three carbon fiber elements. Highly cambered main element with aggressively angled secondary and tertiary elements.

Dual tunnel diffuser with a flat underbody constructed from multiple layers of carbon fiber reinforced with a composite core material. Curved tunnels provide maximum underbody area to optimize downforce.
**Chassis**

4130 Chromoly TIG-welded steel space frame

Superior torsional rigidity achieved and verified through Finite Element Analysis and physical testing

Efficient packaging allows for low center of gravity height and low polar moment of inertia

**Controls**

 Electro-pneumatic shifting system can change gears as quickly as 200 milliseconds

CFRP steering rack with integrated steering position sensor

Fully adjustable heel rest and pedal distance

Custom CFRP seat and driver inserts for increased comfort

Newly integrated MoTeC M150 ECU accompanying a C185 data logging system

**Suspension**

Hoosier LC0 18x6-10 FSAE tires and Keizer aluminum 3 piece forged billet wheels with adjustable offset

Center-locking hubs with integrated tripod housing reducing rotational un-sprung mass

High performance deep groove bearings to minimize rolling friction

Aluminum uprights with adjustable camber and steer arm plates

Front pull-rod and rear push-rod actuated 4-way adjustable Öhlins spring and damper system

Aluminum rockers with interchangeable front and rear anti-roll bar attachment

Integrated spherical bearings in A-Arms

Adjustable front and rear tie rods
Rutgers Formula Racing is a sponsor-based organization that could not exist without your help. Sponsoring us is a unique way to help support technology and science education in New Jersey. Rutgers Formula Racing can be sponsored through financial support to help buy materials, equipment, and funding for operating expenses and competition fees, as well as through material, part, and labor donations.

In return for joining our team, we will help your company gain exposure and recognition to the international engineering community and industry professionals at multiple local and national competitions and events. In addition, the car and your branding is seen by thousands of faculty, students, and members of the general public. When we are invited to display our vehicle at an event, we also publicize our sponsors’ contributions. Past events have included the New York International Auto Show, Rutgers Day, races at New Jersey Motorsports Park, American Le Mans Series at Lime Rock Park, CT, Historic F1 Races at Lime Rock Park, CT, the Rutgers Alumni Parade, and the NJ Tool and
Manufacturing Association Dinner. We have also been featured in magazines, such as Popular Science, YouTube videos, and newspaper articles from the Star Ledger.

Your support will also be featured on various social media platforms in addition to a bimonthly newsletter received by our extensive alumni network.

Your business will gain access to top-graduating engineering students seeking employment and your support leaves lasting impressions on team members who when entering the industry, are more likely to return to sponsors for goods and services.

RUTGERS UNIVERSITY IS A 501(C)(3) ORGANIZATION AND ALL DONATIONS ARE TAX DEDUCTIBLE.
SPONSORSHIP LEVELS

PLATINUM ($7000+)
- Gold Rewards +
- Company logo placed on nose
- RFR customary gift package +

GOLD ($3500-$7000)
- Silver Rewards +
- Company logo placed on wing endplates
- RFR customary gift package +

SILVER ($1500-$3500)
- Bronze Rewards +
- Large sized company logo on competition car
- RFR T-Shirts (max. 5)

BRONZE ($500-$1500)
- Signature Rewards+
- Invitation to Team Drive Day
- Small sized company logo on competition car

SIGNATURE (< $500)
- Recognition on Team Website
- Company featured in newsletter
- Company name advertised on team apparel