2018 SPONSORSHIP

Rutgers Formula Racing has experienced tremendous growth over the past few months in its external relationships. In this coming year, we are excited to announce our partnership with Rectangle Health, a medical payment company that provides easy, convenient healthcare payments and premium processing for healthcare provider and insurance groups. We are also excited to announce a new expanded relationship with Nissan of North America. This season, the RFR 18 will proudly display the Nismo logo to pay homage to Nissan’s sporting heritage. RFR also attended a Nissan activation event at their local office in Somerset. The team enjoyed meetings with Jennifer Telzer, Jorge Cuevas, the Somerset team, and visiting field representatives. As a team, RFR is proud to represent Nissan in all of its events and take part in innovation that excites!

NEW SHOP SPACE

Over the summer, RFR saw its shop space nearly triple thanks to the generosity of the University. RFR now occupies half of the former packaging engineering building. In addition to our original composites lab space, engine room, storage room, and office, RFR now has a large design room with a computer lab and a full size conference table as well as a new machine shop. The two lathes, the Bridgeport upright mill, and the TIG welder, once occupying the garage, now sit in the machine room thanks to the support for the university. The machine shop provides a much larger and brighter workspace than our previous workspace in the garage. The garage is now designated for car storage and a final assembly space. The 2018 spaceframe already underway, the team is excited to see how the new space contributes to team productivity.

Not only is the shop getting an exterior makeover, it’s getting an interior one as well. Thanks to the kind folks at Brunswick Sign, Rutgers Formula Racing will be receiving a large 4’x8’ sign to place right in front of the new metal shop! We also added an automotive shop, AutoAccessories Garage, who supply auto parts for all different kinds of vehicles. Joining our list of sponsors is MasterCAM, who provides useful software and good experience for our members. OptimumG has generously helped us acquire software in order to optimize suspension components. The team is very excited to acquire these new partnerships and hopes to grow these relationships, as well as form new ones, throughout this season.
In just two semesters and a single summer, Rutgers Formula Racing experienced an unprecedented transformation, and Rutgers University shook up the Formula SAE racing series. After all the recent trials, tribulations, alumni support, corporate partnerships, and unconditional love akin to an entirely student-run, volunteer-based motorsports engineering program—RFR leaped through technical inspection, dropped jaws of judges and top-20 teams, and notably placed among 120 teams worldwide. Placing as the best team in our design queue, RFR narrowly missed design finals by a few points, placing 18th overall. While our blown valve cover breather hose during Endurance shadowed the true potential of RFR17, everyone at competition already knew from our team's size, chemistry, and recent past that the Scarlet Knight is up from its nap. Everyone on this team encouraged each other and worked hard with a sense of duty and passion for STEM. Although disappointed that the RFR17 was unable to finish endurance, the team did not allow the PCV valve issue to darken the successes of the rest of the week. Instead, the team took the opportunity to further improve before the next competition.

FORMULA SAE MICHIGAN

Michigan Results
54th Overall
18th in Design
25th in Presentation
53rd in Cost
64th in Acceleration
37th in Skidpad
33rd in Autocross
DNF Endurance
2017 marked the first year that RFR attended Formula North. Going international for the first time, the team drove up to Barrie Ontario for the competition on June 1st to June 4th. Competing against 31 other FSAE teams, the Formula North competition allowed the team to address shortcomings from the previous competition. The competition also gave the newly-elected leaders the opportunity to stretch their wings under the guidance of senior leads.

One of the challenges facing the team at this competition was difficulty passing noise. The RFR17 is no stranger to noise inspection, often arousing complaints from neighbors during drive days in the stadium lot. While noise was not difficult to pass at Michigan, it was particularly difficult to stay under 110 dB. With adjustments to the exhaust and muffler and plenty of fiberglass, the RFR17 narrowly passed noise inspection. Much of the noise comes from vibration in the engine bay rather than the exhaust, so one design goal for the 2018 is to utilize engine isolation to dampen vibration.

Despite this initial difficulty, RFR experienced one of its most successful competitions in recent RFR history, finishing endurance for the first time in several seasons. Formula North was a wonderful end to the official competition season.

Formula North Results
6th Overall
14th in Design
18th in Presentation
18 in Cost
20th in Acceleration
13th in Skidpad
3rd Endurance
2nd in Efficiency
At the beginning of August, RFR attended two smaller and more relaxed events: the Pittsburgh Shootout and the SCCA Steel Cities Solo, both hosted at the Pitt Race Complex in Wampum, PA. Hosted by the University of Pittsburgh, the Pitt Shootout allowed RFR to compete against 16 FSAE teams in an autocross-only event. RFR used this event to test out four new drivers to see how they fared against real competition. After a cold start to the day and a rainy lunchtime, RFR ended the day in third position behind Carleton University and The Ohio State University. This summer was the first time RFR has competed in the Pitt Shootout. The next morning, RFR competed in an SCCA-sanctioned autocross event: The Steel Cities Solo. This event put RFR17 up against actual passenger cars and RFR17 put on a show. With three new drivers and one veteran driver at the wheel, RFR managed second place in the event behind only Carleton University, but still 4 seconds ahead of the fastest modified production car. The following schools were in attendance:

**University of Pittsburgh** 2017
**Carleton University** 2017
**Wayne State University** 2017
**Villanova University** 2017
**Lawrence Tech** 2017
**Carnegie Mellon Racing** 2017
**Rutgers Formula Racing** 2017
**Rutgers Formula Racing** 2016
**Windsor** 2017
**Kettering University** 2017
**Wayne State University** 2016
**Syracuse University** 2017
**Grizzlies racing** 2017
**UMD Racing** 2017
**University of Missouri** 2017
**Formula Buckeyes** 2017
**Penn State University** 2017
**University of Toledo** 2017
**University of Maryland** 2017
MEET THE NEW LEADERS

Shawn Sandhu
President

Patrick Jakubowski
Project Manager,
Powertrain & Drivetrain

Madeline Bowne
Vice President

James Vertes
Design Lead

Siddu Patel
Design Lead &
Aerodynamics

Zach Joseph
Treasurer

Gabri Tagliaferro
EGC Representative

Brian Lange
Chassis

Michael Fabiano
Business

Deigo Neira
Business

Chris Golm
Controls & Ergonomics

Simon Gehrig
Brakes

Aiden Wagner
Suspension

Ike Osbun
Suspension

Dan O’Rear
Aerodynamics

Nasef Junaid
Composites

Rajan Patel
Electronics

Ciera Fedell
Junior Chassis

Tom Donohue
Junior Powertrain &
Drivetrain

Mikey Albacete
Junior Suspension

SUMMER DRIVE DAYS

Following a successful competition season, the Rutgers Formula Racing team turned to the summer into a testing grounds for future features to be implemented in the RFR18. The suspension subteam ran a number of new tests including driving with different tire compounds and with different anti-roll bar configurations. New load cells courtesy of Futek were also fitted into various suspension linkages of the RFR 17 allowing for the team to record live suspension loads to be implemented into component design for the 2018 season. Implementing a new solenoids and larger pneumatic actuators, the controls team was able to improve shifting reliability, making the ’17 more responsive to the driver.

Moving to the Engine side of things, the Powertrain team was able to modify their engine map resulting in a theoretical increase in outputted power as a result of a session on the chassis dyno at Wicked Motorsports. Looking ahead to next year, the aerodynamics subteam began mocking new structures that will be implemented in the 2018 car. These new structures included retrofitting inverted aerofoils onto the front of the RFR17 in an effort to optimize air flow.

With manufacturing season approaching, the entire team is looking forward to getting out on the blacktop again next semester with the 2018 car to pick-up where we left off and continue to prepare for Formula Michigan!
DESIGNING THE 2018

2017 was a good year for the team. This past year, we had our first real competition performance in 3 years and our first notable competition season since 2012. The car and team, however, were not flawless. At competition, we had a mediocre acceleration score, a tragic engine mishap in endurance, trouble with noise tech inspection, and a design score that left much to be desired.

For the acceleration event, we were mid pack, both overall and amongst the other single-cylinder engine teams. We need a lot of work with calibration, optimizing the powertrain package, and making sure that the driver controls are reliable. The best ways to improve our acceleration scores are to improve reliability, produce a better fuel map from dyno data, and do more drive day testing. In order to allow for more time dyno testing and tuning elements like the shifter, we must assess the timeline and insure that we have adequate testing time. The powertrain is looking to increase power and controls is looking at extensive physical testing of components.

Over the summer, we did a lot of physical testing of the controls system, improving shift quality and reliability. Powertrain focused on power output, modifying the intake plenum as well as performing physical testing with a dyno and analyzing sprocket ratio. As a secondary, aerodynamics has continued to use an adjustable wing angle setup, electronics has continued with further calibration of control systems like launch control, and suspension has optimized components and setup for the acceleration event. During future drive days with the 2017 and 2018, Electronics will spend more time testing the calibration of launch control and other control systems. Additionally, a lower weight of the final vehicle, according to optimum lap trials and physical testing with a light driver for acceleration, proves to be a benefit to our acceleration performance.

Production time and the magnitude of testing time are some of the biggest factors determining our ability to complete endurance. Even though the final straw for endurance at MIS was the pcv vent letting loose from the press fit, there was also an array of other failures associated with the 2017 car that could have been caught earlier if there was more testing time available before competition. The endurance event also brought to our attention the need to improve steer characteristics through the use of a new anti-roll bar. We feel that an emphasis on the completion of the 2018, with a good testing plan and timeline, is needed to really make the car sit in at top-10.

Noise inspection was a breeze at Michigan, but we came way too close at formula North. Consequently, our noise level requires close attention. The factors outlined were not that the exhaust outlet made too much noise, but that the engine bay made too much noise. The aerodynamic elements also contributed to the noise transmission, so the wing elements have been optimized to include a foam core in order to decrease the drum head characteristic of the hollow wings. We allotted various baffle designs and expansion diameters for testing the exhaust outlet noise.

Based on our research, testing, and reflection on the apparent shortcomings at competition events, we originally decided to make our goals 10% weight reduction, serviceability and validation of systems. While these apply to the theme of the car, they are not precisely what the car needs to excel at competition. More specifically, in order to push the RFR18 to score higher than the 17, downforce should be increased, braking capability increased, driver controls/shifting made quicker, the chassis and suspension’s cornering capability increased, driver confidence improved, and electronic controls made more reliable.

FUNDRAISING FOR 2018

This season, RFR has attended and hosted several outreach events. Over the summer, RFR brought the ‘17 out to JAKTOOL for a BBQ event to mix and mingle with JAKTOOL employees. We appreciated the opportunity to personally thank a company that has played such a pivotal role in our growth and development. RFR also brought the ‘17 out to Nissan twice over the summer to give the Nissan team a first-person perspective of the good their support has done for the team.

In addition to our industry outreach, RFR also made an effort this season to encourage aspiring young students to pursue STEM. RFR invited students from The Academy at Rutgers for Girls in Engineering and Technology for a presentation and drive day. Additionally, several RFR members presented the ‘17 and discussed the engineering process with female engineering students from DELLC.

Recently, several members of RFR also attended various college events such as the engineering kickoff the attract new members.