



Cornell *Racing*

FALL 2013 NEWSLETTER

ARG14 UPDATE

The 2013-2014 year is off to a strong start as the current Cornell Racing FSAE team works to engineer ARG14. Final designs are already nearing completion and weekend driving days have been very successful this semester. Team members will return to campus on January 2nd to manufacture the car by February 1st. ARG14 design highlights are detailed below:

AERO: The return of wings! ARG14 will have a front and rear aero package to help balance the car at higher speeds and increase cornering speed capabilities. Preliminary tests using ARG13 are featured on the next page.

COOLING: The cooling system has been redesigned to decrease engine swap time and increase reliability. We are designing a duct for the radiator to reduce fan weight.

DRIVETRAIN: The drivetrain sub-team is focusing on weight savings and optimizing the differential settings to improve ARG14's cornering speeds.

ELECTRICAL: New instrumentation includes suspension-link and drivetrain load cells, tire temperature sensors, and front and rear accelerometers. Custom microcontrollers for the front and rear of the car will expand data collection capability and reduce complexity within the wiring harness.

ERGO: To give our drivers more room in the cockpit, the firewall seat interface has been redesigned. This will also improve access to the engine bay for repairs.

FLOW: Flow is integrating many design features to simplify assembly and is revisiting the use of composites for the intake manifold to drop weight. We have printed and will be testing multiple rapid-prototyped turbine housing geometries.

FUEL: The fuel tank is being redesigned

to optimize space behind the driver. Quick disconnects are being integrated to make tank removal possible in under 1 minute.

LUBE: The lubrication system will feature an internal dry sump oil pump to integrate the stock pump with the external scavenge pump. This eliminates 3 lbs and fixes packaging issues.

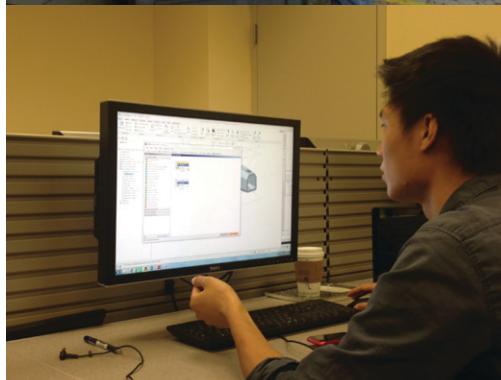
MONOCOCQUE: ARG14 will employ the lightest frame Cornell Racing has ever constructed! The use of higher modulus carbon fiber and an optimized layup schedule will decrease the number of necessary plies to reach the target torsional stiffness.

REBUILDS: The transmission is being rebuilt with only 3 gears to achieve a 2 lb weight savings. We are tuning the slipper clutch to improve drivability.

SUSPENSION: ARG14's suspension will feature raised rockers, better packaging, and a less aggressive steering geometry. Tire width and soaking compound testing is in progress.

TUNING: CAM phasing tests are underway to increase overall power and efficiency. Tuning will focus on improving drivability at lower speeds.

UNSPRUNG: Unsprung aims to optimize previous designs and reintroduce carbon fiber wheels. Design estimates predict a 1.5 lb weight reduction from hubs and uprights, and an additional 4-6 lbs from the wheels.



SEMESTER HIGHLIGHTS

This is an exciting time for the team both in the lab and on the test track. Over the summer, we made the decision to design ARG14 with an aero package. The exploitation of down force is a key performance differentiator, and a necessary addition to remain competitive. We are currently testing the wings from ARG05 on ARG13 to gauge the amount of down force and drag they achieve. In the initial testing sessions, the wings generated about 125 lbs of down force and 22 lbs of drag at 60mph. Moving forward, the team plans to utilize this data to verify our lapsim program and design wings that enable ARG14 to attain higher cornering speed, better braking ability, and faster lap times.

To justify design decisions, the team has made data analysis a priority. During weekly team meetings, we devote time to technical discussions, wherein team members display data collected during testing, and discuss how to evaluate the data using i2 pro. These sessions not only benefit newer members, but also encourage overall team participation. A common understanding of each subsystem is critical for proper interfacing.

With the loss of our GM sponsorship this year, the team has had to work diligently to secure material sponsorships and donations. So far, we have received two rapid-prototyped turbine housings from MCT, and have also acquired new sensors to enhance wastegate tuning and improve gear detection. Sponsors have provided consumables such as safety glasses, gloves, E-85 (110 gallons) and oil. In our quest for a new engine, State Farm generously agreed to donate a motorcycle to the team. Support from sponsors and donors will be critical to ARG14's success!

CONNOR ARCHAARD

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NATHANIEL GILBERT



UNIV. OF TORONTO SHOOTOUT

Cornell Racing participated in the 2013 University of Toronto Shootout on Saturday, October 19th. Over 30 team members made the trip to Canada to race last year's competition car, ARG13. Unfortunately, the team experienced technical problems, including a serious clutch failure after only a few laps, and was unable to finish the competition. The event served as a good learning experience for old and new members, and as a prime example of the uncertain nature of engineering design. We will use the lessons learned in Toronto to improve our plans for ARG14. Our next race will be the 2014 Formula SAE Michigan competition at the Michigan International Speedway from May 14-17th.



10TH ANNIVERSARY: ARG04

Having narrowly missed the sought after "three-peat" in 2003, the 2004 team dominated the track in Pontiac, Michigan, claiming Cornell Racing's eighth world championship title! This year marks the 10th Anniversary of ARG04's historic first place win.

ARG04 boasted the first-ever electronically controlled turbocharger wastegate, and benefitted from extensive road testing in the months prior to Michigan competition. By Spring Break that year, the car had logged over 130 hours of testing.

We want to hear from ARG04 alumni! Send us an email, photos, or your favorite team memory, and take a tour of the lab if you return to campus for Class of 1994 Reunion events!



ATTENTION ALUMNI!

Cornell Racing is excited to present a new opportunity to alumni! Pressed for space, Cornell University recently granted the team permission to begin selling our old cars. Sales will directly support the current team's work and future Cornell Racing efforts.

We have gone through and inventoried the Mitchell Street storage barn, and discovered many frames to sell. See below for available years. The frames are in varying conditions, having been gradually stripped for parts and scrap. We can provide digitized design and technical reports on file for each car, as well as manufacturing and competition photos to help individuals or groups of alumni rebuild the cars.

If you are interested in buying an old car to support Cornell Racing, we have prepared a detailed photo catalog of the remaining frames and body panels for alumni to view. Please email Jesse Greene (jag423@cornell.edu) for details.

Sales so far: ARG01 to Rory Jorgensen, ARG05 to Bill Riley, and ARG06 to Zack Eakin.



Cornell Racing now boasts 28 years of alumni beginning with the Cornell Engineering Class of 1987. Before members from this year's freshmen Class of 2017 were even born, the team had already won three championships in 1988, 1992, and 1993.

THANK YOU TO ALL OUR SPONSORS!



Jesse Yorio
Bob Garmezy
Michael Murphy



SKF
...and more!

DONATE TODAY!

To donate to the Cornell Racing FSAE team, please make checks payable to "Cornell Formula SAE" and mail to the address below:

Cornell Formula SAE
Attn: Albert R. George
100 Rhodes Hall
Ithaca, NY 14853