The team stands around the 2011 Penn State car after a successful weekend at the Formula SAE Michigan competition.

The 2011 Season in Review

The Car

With another year in the books, all the members of Penn State Racing are proud of yet another successful year. The team traveled to Brooklyn, MI to the Michigan International Speedway for the 33rd annual Formula SAE Michigan Competition with the latest iteration of Penn State’s Formula SAE car. The car saw numerous upgrades, such as a highly advanced data acquisition system and the application of forced induction. This past year, the team was able to successfully test and integrate a forced air-induction system into the 2011 vehicle. The forced induction system allowed the team to overcome some of the engine performance limitations created by the mandated 20mm restrictor. The system was a complete custom application, designed and fabricated in house. This system also helped close the gap in power output between single and four-cylinder engines. While the power output of the four-cylinder engine was not met, the power-to-weight ratio was very close, if not superior, to some of the cars that used a four-cylinder powertrain.

The team was able to upgrade the engine management system from the MoTec M4 to the M400. This was a significant leap forward in the evolution of Penn State Racing’s electronics. The new M400 has many new functions and features, which enabled the collection and logging of more engine data than in past years. It also is far more user-friendly; users are now able to connect a computer to the M400 via USB, whereas previously an RS232 connection had to be used. The new non-DOS map editing software was used, which made the engine mapping much easier to customize.

Another significant upgrade over the previous car was a data acquisition and heads-up display system. This new system utilizes a 4” LED Touch-Screen, which allows freedom to monitor and graphically display any instrumented system on the car. The new system also allowed the transmittal and storage of data in a number of ways; it can transmit the data to be stored directly onto a local computer, as in the past, it
can transmit it to an offsite server, or it can stream it live to any computer that has an internet connection.

The Competition

Despite some technical difficulties that kept the car from completing the endurance and fuel economy event, the team finished 36th, out of the 120 registered teams. This past year, the Formula SAE Michigan competition saw an extremely large number of strong teams, as many of the competing schools and judges agreed.

Attention to detail and competent system level design, represented by the 2011 car, secured Penn State Racing a 15th place finish in the Design event, which was only 1 point short of qualifying for the next tier of design finalists. Along with this solid finish in the Design event, the team achieved an 8th place finish in the Cost event. Design judging rewards the effective use of engineering materials and the Cost judging rewards careful spending and informed decision-making. The team hopes to improve its final standings in the coming year.

As for dynamic events, the team placed 42nd in the acceleration event, with a time of 4.647s on a 75 meter “drag strip.” Even more successful, was the skidpad event, with a finishing place of 19th overall, and a time of 5.306s, just 0.152s off pace from the 1st place finisher. However, after an impressive showing in the competition’s static and other dynamic events, technical challenges prevented Penn State from finishing the Endurance and Fuel Economy events. The various issues that prevented the team from competing in these events will be rectified in the 2012 design. The important lessons learned will be carried forward by an overall more experienced and cohesive team.

The Team

Although the team was originally planning to attend the Formula SAE West Competition in Fontana, California, unforeseen circumstances kept the team from traveling to the competition. Next year, the Formula SAE West competition will be held in Lincoln, NB at the Lincoln Airpark. The team does not currently know whether it will plan to attend this competition or not.

On June 29th, a few of the 2012 team members traveled to Warrendale, PA to the SAE International Headquarters. Penn State Racing’s 2010 and 2011 cars were on display, showcasing the Formula SAE Series to the SAE International Board of Directors. This opportunity allowed the team to gain great exposure to industry professionals and to get a better feel for the operation of the competition’s governing body. See the photograph on the lower left, taken at the event.

In addition to building a newly-designed car, the team focused some of its efforts on making the team more globally recognizable. Along with constantly updating the team’s website—www.PennStateRacing.com—the team now has a new Facebook page. Make sure to check both the website and the Facebook page regularly for updates and photos!

Bittersweet Farewells

Because the team is comprised mostly of undergraduate students, a few senior members of the team move on from the team every year. This year, the graduating seniors are:

- **Stephen Crudele:** (Team Captain) Graduating with a degree in Mechanical Engineering, Steve is going to work for SpaceX in Hawthorne, California, where he will be working as a structural engineer on the Dragon Capsule. For Steve’s fourth year on the team, not only was he the team captain, but he did a large portion of the design work on the suspension, as well as the electronics and the all-new data acquisition system.

- **Gavin Barr:** (Project Adviser) Graduating with a degree in General Science, Gavin is currently undecided about future work plans. His fifth year on the team, Gavin was an adviser and mentor to everyone on the team. An expert in the Formula SAE competition, Gavin oversaw every aspect of the car and team, from the car design, to part fabrication and administrative decisions.

- **Benjamin Zuk** (Powertrain) Graduating with a degree in Mechanical Engineering, Ben will be spending the summer with Siemens Healthcare Diagnostics in the Fluidics Research and Development group. He plans to attend
graduate school starting in the spring of 2012 in the field of Fluid Mechanics. Since he joined the team four years ago, Ben has prided himself in designing the powertrain system, particularly the air intake, cooling, and forced induction system.

- **Zachary Penrod**: (Composites) Graduating with a degree in Mechanical Engineering, Zach will be working with Cummins Diesel starting in the fall. During his two years on the team, Zach focused his efforts on Composites, particularly the steering wheel, all shrouds, all closeouts, and other bodywork.

- **Joshua Aciukewicz** (Powertrain) Graduating with a degree in Mechanical Engineering, Josh will also be working with Cummins Diesel. Josh worked heavily on the implementation of the forced induction system on the 2011 car.

Surely, the team will not be the same without these five members—they will certainly be missed.

**The Upcoming Year**

For the 2012 season, Joseph Caparosa, a junior in Mechanical and Nuclear Engineering, will be stepping up as Team Captain for Penn State Racing. By far the most experienced of the remaining members of the team, Joe feels that he is up for the challenge. Joe had this to say about the upcoming year: “This will be my third year as a member of the team. During my tenure, I have worked on just about every system of the car. My experiences on the team have provided me with many abilities to help foster the potential of a great team. These experiences have also showed me that no one can do this alone; it takes a number of very dedicated individuals to accomplish what we do. I have never met a group of individuals who are so dedicated and passionate about achieving a common goal.

I have placed a lot of focus on working on new ways to improve our design process, which in turn should allow us to get the car done sooner. While the team’s emphasis is trying to get the car done as soon as possible, we will not compromise our build quality for any reason. I would like to take this opportunity to express my gratitude and thanks to all of our corporate partners and supporters – without your generosity we would not be able to compete on the level that we do. I would also like to extend the offer to all of you that anytime you are in the State College area, please let us know, as we would love to have you stop by the shop, to show you where every one of our cars come to life.”

Also stepping up to bat for the upcoming year will be Gregory De Giorgis, who will be the 2012 Team President. An Eagle Scout and experienced leader, Greg plans to lead the team in a new direction. “I want to bring the team into a new era, not only in terms of the car we bring to competition, but in the way the team operates and the way other teams and the world look at us. *We are Penn State Racing.* We are a professional race team, and I want other Formula SAE teams, the University, and the whole world to know it. I definitely feel up to the challenge!" Please direct all questions and/or inquiries about the team, the car, or the competition to Gregory, as he is in charge of the team’s public relations and administrative decisions.

**Thank You!**

As Joe said perfectly, *Penn State Racing* would not be able to compete at such high an echelon every year without the continuous support of such a wonderful university and such generous corporate partners. On behalf of everyone on the team, we would like to sincerely thank every supporter of Penn State’s Formula SAE team!
2011–2012 Corporate Partners
As always, Penn State Racing would like to sincerely thank its generous university and corporate partners who make this project possible.