



Collegiate Design Series News

Volume 4, Issue 2 February 2007

Issue Highlights

Formula SAE — Frequently Asked Questions And Rules Interpretations..... 1

Formula SAE West – Cost Report Submission Information..... 2

Jessica Cutler says Farewell to Student Competitions 2

Midwest Division Formula SAE Challenge... 3

Start Your Hybrid Engines..... 4-5

Car Suspension and Handling, Fourth Edition..... 6

FORMULA SAE

Frequently Asked Questions and Rules Interpretations

The following Rules Interpretations and clarifications have recently been added to the Frequently Asked Questions section on the official SAE web site.

- 2.2.2 Car Eligibility – The Competition Year
 - 2.2.3.1 First Year Vehicles
- 3.3.4.1 “Percy’s” Position in the car.
- 3.4.9.2 Cockpit Mounted Master Switch
 - 3.4.10.1 Firewall
- 3.7.2.2 Securing Fasteners
- 3.7.3 Modifications and Repairs - Changing Parts.

Additional questions and clarifications will be added as appropriate.



The Frequently Asked Questions section can be found under “Rules Discussion” on the Formula SAE Forum at:

<http://www.formulasae.org/forums/formula/dispatch.cgi/rules>

We suggest that team members bookmark this site and check it regularly.

Teams are requested to check this site before submitting any questions to the organizers for any of the events in the Formula SAE Series.

20th January, 2007

Michael Royce
Chairman
FSAE Rules Committee

Formula SAE West – Cost Report Submission Information

Until recently the address of where to send the reports was TBD. Now online, you will find a revised Document Deadline Pdf file posted for your information.



The deadline date is **May 1, 2007** and the address to mail the reports is:

Dean Case
Formula SAE West/Cost
4733 Torrance Blvd #405
Torrance, CA 90503

Please Note: If you are one of the 13 teams who are competing in both FSAE in May and FSAE West in June, then you must also submit an electronic version of the report (in addition to the electronic Bill of Materials) to the cost judge for FSAE West. The electronic reports can be burnt onto CD and mailed to address above or emailed to:

FormulaWest.Cost@gmail.com.

Please only email the report once and wait for returned confirmation email acknowledging receipt. (Once your report is submitted via email, further versions of the report will not be evaluated and any changes must be made at the competition via the proper addendum form.)

Jessica Cutler says Farewell to Student Competitions

If you are a student, you may have come to know Jessica Cutler over the past two years as she has helped you with issues on registration, engine orders or just providing a simple answer to your question. If you are an organizer or sponsor, you may have developed a great working relationship and friendship with Jessica. She has worked with the student competitions for two seasons and over the past two years has become a wonderful asset to the Aero Design, Baja SAE and Supermileage competitions.

Leaving us on January 19, 2007, Jessica said farewell to student competitions as will be taking on new challenges with her role at Carnegie Mellon University. SAE International and the staff in Education Relations wish her the best of luck! She will be missed.

Salina Region, Sports Car Club of America, PRESENTS
~ The Third Annual ~

Midwest Division Formula SAE Challenge

March 17-18, 2007 ~ Salina, Kansas
East Crawford Recreation Area (south end)

- This event will be part of Salina Region's regular Solo II season opener -- a test 'n tune on Saturday and autocross competition on Sunday. Saturday will have a short autocross-style test course and a figure-8 skidpad, while Sunday will feature a longer autocross course.
- Formula SAE teams are encouraged to shake down their cars with any number of drivers on Saturday. There may also be an informal autocross driving school.
- On Sunday, the F/SAE teams run in heats along with our regular autocross competitors.
- Schedule: Coursewalk about 9 am, cars on course about 10:30 am each day.

Rules for the Formula SAE Challenge:

1. Each team will consist of three to five drivers from the same school, either 2-3 male plus 1-2 female, or three or four male drivers. Team drivers must be eligible to compete in the Formula SAE competition in Detroit (e.g. a current student). More than one car/team may be entered by a school.
2. Cars must be Formula SAE-legal per SCCA rules. A team may use any number of cars, and may use older cars, but the cars must have been constructed by the team's school.
3. The first two runs will be the Challenge runs. Times comprising the team's score will be either:
 - a. The best two male times plus the best female time, -or-
 - b. The best two male times plus the fourth-best male time with handicap added (two pylons added to best time and one pylon added to second-best time, best resultant time to count)
 - c. The best two male times plus a double-handicap on the third time for a three-man team.

All competitors also will be competing in the Formula SAE class, or the F/SAE Ladies class, in the regular autocross. Any other drivers, including ringers, faculty, alumni, etc., may compete in the autocross competition (but not in the Challenge) in the FSAE classes, or any other class with other cars.

The normal limitation of two drivers per car per class will not apply to F/SAE entries.

~ Entry fees ~

\$20 per driver -- includes both days ~ (Saturday only -- \$8)
There is no team entry fee. Only bona-fide college Formula SAE teams may enter the Challenge

Why?

- It'll be fun. All teams from schools within SCCA's Midwest Division (and any others) are invited.
- F/SAE teams can shake down their cars and give drivers seat time before Detroit or Fontana.
- We hope to encourage teams to participate in SCCA Solo (autocross) events, including the MiDiv Divisional Solo Championship Series and the Solo Nationals in September.
- We want to encourage female participation in the F/SAE-L class. Including at the SCCA Nationals.



Further Information / RSVP:

Rocky Entriken
785-827-5143
Rocky@spitfire4.com



Start Your Hybrid Engines Thayer School test-drives a new competitive field

By Randy Stebbins '01

Pull over Formula racecars. Thayer School is driving hybrid technology to a new starting line by holding the nation's first collegiate Formula Hybrid competition.

The May 4 event at the New Hampshire International Speedway in Loudon is so revolutionary that Thayer School's cars are the only hybrids ready for racing. So Thayer School devised a way around that roadblock: Thayer School students will race this year's hybrid against the hybrid they built last year. Teams from schools around the country will participate in a Formula Hybrid conference at Thayer School May 3 and enter the race next year.

The Formula Hybrid competition and conference are the brainchild of Thayer School research engineer Douglas Fraser, faculty advisor to Dartmouth Formula Racing (DFR) since 1995 and to the two-year-old Hybrid arm of it. Formula Hybrid has already won endorsement from the Society of Automotive Engineers (SAE), which oversees conventional Formula racing, and from the Institute of Electrical and Electronics Engineers (IEEE). Both organizations have signed on as Formula Hybrid sponsors to support this year's efforts and build momentum for next year's events.

"Formula Hybrid builds on the Formula SAE program and takes it to the next level," says Fraser. "It adds a layer of complexity and provides an additional technical challenge to student teams."

Formula Hybrid challenges undergraduate and graduate college and university students to design, build, and race an open-wheel, single-seat car. Each racecar must conform to a formula that emphasizes drive-train innovation, fuel efficiency, and high performance. At the inaugural Formula Hybrid conference, race team advisors will determine the racecar formula and the rules of future competitions. They will define what qualifies as a hybrid, work out testing methods, assess safety issues, and thrash out details of hybrid design.

The aim of the Formula Hybrid program, says Fraser, is to spur student creativity in high-power electronics, regenerative electric/hydraulic braking systems, and other areas of engineering useful not just on the track but on the real-life road. "We hope to be turning out engineers who will design new hybrids," he says.

Hybrid Vigor

Hybrid automotive technology replaces a conventional drive train with a smaller, more efficient gasoline engine coupled with electric motors. The system cuts fuel consumption, saving money and resources. But for a nation used to muscle cars, hybrids are often seen as anemic weaklings.

Thayer students want to give hybrids a shot in the arm. "Hybrids are associated with low performance as well as a box-like image," says Dana Haffner '06, Th'06, a member of the Hybrid mechanical team. "We hope to challenge this stereotype by creating a hybrid race car that could potentially be capable of outperforming its gasoline counterparts. Americans like powerful cars, and this is often a more important factor in buying a car than

gas mileage and environmental concerns. With our car and new competition we hope to contribute toward bridging the gap between performance and fuel efficiency."

The team's recently appointed captain, Sarah Corcoran Smith '05, Th'06, '07, sees the Formula Hybrid program as a vehicle for working toward sustainability. "Racecars aren't a sustainable technology in themselves, but the things we are optimizing are the same things that are sustainable," she says, ticking off the team's goals: reducing fuel consumption, boosting electricity generation and transfer, and delivering that power to the car's drive wheels in the most efficient way possible.

Many of the engineering challenges facing students in the hybrid competition are similar to those of the current Formula SAE program. Students must design robust mechanical systems for suspension, steering and braking; create innovative chassis and body designs; improve ergonomics; develop race strategy and management; plan for computerized systems control and data acquisition; modify the intake, exhaust and ignition systems of internal combustion engines; manage fuel consumption; and learn how to oversee a large project, all the while keeping an eye on the economics of automobile engineering, manufacturing, and marketing.

Thayer's hybrid team is hard at work on hybrid racecar-specific challenges. Whereas commercial hybrids use heavy nickel-hydrate batteries, Thayer's hybrid lightens the load by using an array of 106 soda-can-sized ultra-capacitors. The team must also design and make a DC-to-DC converter--no mean feat--to boost the voltage coming out of the hybrid's generators. Commercial automakers have solved that power problem but hold their methods close. With no off-the-shelf solutions to turn to, Thayer students have to come up with one on their own.

"The hybrid is more open-ended, in the sense that we get to choose all the major components and how they work together," says hybrid electrical team member Arne Kepp Th'06. "We have to find our own way, which I think is exciting."

Road to the Future

Although the first hybrid auto was designed in 1905, the American auto industry has been slow-moving in its approach to hybrids. Japanese automakers, however, weren't asleep at the wheel. Toyota introduced the hugely successful Prius in 2000. Since then hybrid cars have moved steadily onto American roads, with more than 200,000 hybrids of various makes sold in the United States in 2005. Federal tax breaks for hybrids take effect this year. Twenty states already offer incentives for hybrid car buyers, ranging from free rides in the carpool lane for solo drivers to tax credits and emissions-tax exemptions. Some cities offer free parking and other perks to hybrid owners, and a number of corporations are giving employees some financial incentives to help buy hybrids. Federal tax breaks for hybrids take effect this year.

While Japan has beaten Detroit thus far on the hybrid road, Fraser, who drives a Prius, hopes Formula Hybrid ideas will benefit American carmakers. "We're doing our part to help them," he says.

Just as hybrids and conventional cars are likely to co-exist in the commercial world for the foreseeable future, Thayer and other engineering schools around the nation have no plans to abandon the Formula SAE program. "We expect that one path of entry to the Formula Hybrid competition will be for teams to construct a vehicle, develop the chassis and related systems in the Formula SAE program and then replace the internal combustion engine with a hybrid drive train the following year for the Formula Hybrid competition," says Fraser.

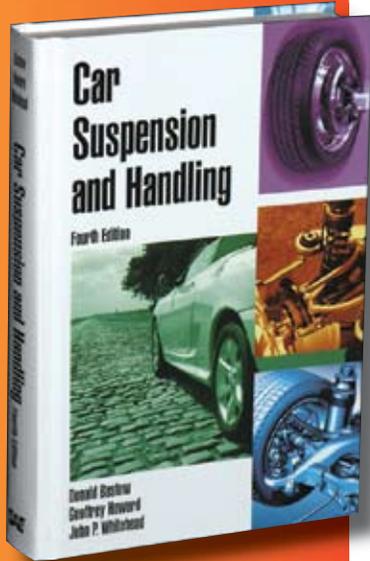
Fraser expects the new Formula Hybrid team to be as successful in competition as DFR teams have been

in FSAE contests. Thayer students have been competitive even against many of "the big schools with a whole department devoted to auto engineering," he says. Other engineering schools, large and small, are revving up to participate in Thayer's Formula Hybrid program. In the hybrid race, Thayer is setting the pace.

Editor's Note: Randy Stebbins is a freelance writer based in Lyme, N.H.

Photo's provided by Douglas Fraser, Dartmouth College





Car Suspension and Handling, Fourth Edition

By Roger Frederick Haycock, Arthur J. Caines, and John Hillier

Originally published in 1980, this classic book has now been updated and expanded to make it invaluable for today's engineers.

Car Suspension and Handling, 4th Edition focuses on the suspension and handling of cars, or automobiles, as opposed to those characteristics of other types of road vehicles, while always recognizing that there are differences in suspension requirements for different classes of vehicles, and in various markets of the world for a given vehicle.

Through appendices and diagrams, *Car Suspension and Handling, 4th Edition* outlines the purpose and history of vehicle suspension systems, while defining the basic parameters of suspension geometry. In addition, the book delves into human sensitivity to vibration, and offers data on durability, tire background information, steering calculations and suspension calculations.

Chapters include:

- Disturbances and Sensitivity
- The Wheel and Tire
- Steering
- Suspension Systems and their Effects
- Dampers
- Front Suspensions
- Rear Suspensions
- Drive Layouts and their Effects
- Advanced Suspension Systems
- Computer Aided Engineering (CAE) for Suspension

Published in February 2004

474 Pages

Hardbound

Product Code: R-318

ISBN Number: 0-7680-0872-7

List Price: \$79.95

SAE Member Price: \$63.96