



# Collegiate Design Series News

Volume 3, Issue 10 October 2006

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## 19 Minutes!

It's another new record for Formula SAE. Registration for the 2007 FSAE Michigan event closed in just 19 minutes. Last year it took 34 minutes for the 2006 event to close out.

With a little comparison from the 2006 registered teams, 33 teams from 2006 did not register for Michigan and 11 of those teams have registered for Formula SAE West. There are a total of 22 "new" teams who have competed in Michigan attending in 2007.

As for the other Collegiate Design Series events, registration is continuing until the deadline of December 29, 2006 or the team limits.

Events still open are:

- Aero East with only 4 registered teams
- Aero West with only 1 registered team
- Clean Snowmobile Challenge with only 4 registered teams
- FSAE West with 55 registered teams, only 25 open slots still remain until event limit is reached
- SAE Baja hosted by RIT with 101 registered teams
- SAE Baja hosted by UCF with 32 registered teams
- SAE Baja hosted by SDSM with 69 registered teams
- Supermileage with only 1 registered team

For event information on all competitions please visit SAE's Student Central website: <http://students.sae.org/>



**Have one sheet per team member with the below information.**



**Returning this sheet will speed up your onsite registration process**

1. SAE Member number
2. Insurance Information: (Photo copy preferred)  
(Include; Company, Group number, ID number and a telephone number)
3. Photo copy of photo ID, Drivers MUST have a valid driver's license
4. Emergency Contact Information:  
(Include; Name, relationship and telephone number)
5. School Name
6. Email Address/Telephone Number



1. SAE number: 611124898
2. Highmark Blue Cross; ID # YBC999999999 99, Group # 27250000001, Telephone number 1-816-232-8396
3. See Copies Above
4. Angela Sample, mother, 920-845-7798
5. University of Nebraska
6. fsample@gmail.com; 920-845-7632

Hard copies (photo ID and insurance) must also be with you on-site.



**Return to: BY MARCH 1, 2007**

Jessica Cutler (Aero, Baja, or Supermileage) to jcutler@sae.org

Kaley Shellhammer (FSAE, FSAE-West, Clean Snowmobile) to shellham@sae.org

**Mail To:** SAE International /Attn:-, 400 Commonwealth Dr, Warrendale, PA 15096

## New Aero Design Award Information:

NASA (NASA Ames Research Center) will be a new sponsor to the Aero Design Competitions. The criterion for this award is still in the making.

The second new award is sponsored by an SAE Staff. This is an Innovation award, the criteria is as follows:

1. Innovative manufacturing process used in the design or development of their aircraft.
  2. Innovative use of materials on the aircraft.
  3. Introduction of a new idea/design into the competition.
- Any single or combination of these criteria can be used for the selection of a design for recognition.

A monetary award of \$250.00 will be awarded to the winning team at each Aero Design competition.

## New Aero Design Award Introduction

NASA believes in the value that hands-on engineering challenges provide to students. NASA is proud to partner with SAE's AeroDesign competition to introduce the new NASA Systems Engineering Award.

The NASA Systems Engineering Award will give students competing in the SAE Aero Design competition an additional opportunity to compete in applying best engineering practices to the design and development of their aircraft. Participation in this competition is optional.

The best practices are a subset of NASA Systems Engineering principles. The NASA competition will include key decision points as outlined in two written documents. Both documents will detail the systematic tracking, control, and integration of the project's design, construction, and implementation.

The first document, the Integrated Project Readiness/Preliminary Design Review (IPR/PDR) will be limited to three pages in length. The IPR/PDR will be submitted during the design phase of the Aero Design competition and will be evaluated by NASA systems engineering experts. Each team that submits an IPR/PDR will receive feedback and will be expected to address this feedback during the remainder of the design and development of their aircraft.

The second document, the Final Systems Engineering Report, will consist of a one-page "lessons learned" summary, a one-page log of changes made based on IPR/PDR submission, and a one-page risk matrix. Teams will have the opportunity to consult with NASA experts via online forums. Participating teams will be evaluated by NASA personnel. One \$750 award will be given to the winning team at Aero Design East, and another \$750 award will be given to the winning team at Aero Design West.

The purpose of this award is to engage students in the systems engineering process. Although not always taught in traditional engineering programs, systems engineering is integral to industry and research in the real world. Because many students lack the level of systems engineering experience necessary, engineering firms and research institutions invest vast resources in systems engineering training and courses to bring early-career employees up to speed. NASA wants to expose more of today's engineering students to systems engineering concepts and practice; this new award is one approach to reaching that goal.

### Overview of NASA Systems Engineering

Systems engineering is a logical set of grouped processes performed by multidisciplinary teams to engineer and integrate systems to ensure products meet customers' needs. The logical set of grouped processes forms a systems approach to meeting an organization's development goals. Implementation of this systems approach will enhance an organization's core engineering, management, and scientific capabilities and processes to ensure safety and mission success, increase performance, and reduce cost. This systems approach is applied to all elements of a system and all hierarchical levels of a system over the complete project life cycle.

*Continued on page 4.*

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The engineering of complex systems requires the application of a systematic, disciplined engineering approach that is quantifiable, recursive, iterative, and repeatable for the development, operation, maintenance, and disposal of systems integrated into a whole throughout the life cycle of a project or program. The emphasis of systems engineering is on safely achieving stakeholder functional, physical, and operational performance requirements in the intended use environments over the system's planned life within cost and schedule constraints.

A systems engineering plan implements a core set of common technical processes and requirements needed to define, develop, realize, and integrate the quality of the system products created and acquired by or for an organization. Systems engineering processes build upon and apply best practices and lessons learned from NASA, as well as other governmental agencies, academia, trade associations, and industry to clearly delineate a successful model to complete comprehensive technical work, reduce program and technical risk, and improve mission success. The set of common processes may be supplemented and tailored to achieve specific project requirements.

### **Document Format**

The NASA Systems Engineering Award requires two separate documents. Both documents should follow the following format specifications.

#### **Electronic Report Format**

All documents should be submitted in PDF format only.

#### **Font**

The minimum size type is 12 point proportional or a 10-character-per-inch non-proportional font.

#### **Margins**

1" Left, 1/2" right, top, and bottom

#### **Page Size**

All report pages will be ANSI A (8 1/2 x 11 inches) page format.

#### **Cover Page**

All documents must feature a cover page that states the team's name, school, and team number. The cover page will not count against the page limit.

### **Award**

One \$750 award will be given to the winning team at Aero Design East and one \$750 award will be given to the winning team at Aero Design West. In addition, special NASA commemorative awards will be given to each of the winning teams.

\*\* More information will be provided.

## Student Chapter Volunteerism/Community Service Grant

Volunteerism and community service are an essential responsibility of individuals in a community. It is important to SAE International that its members be active in the community to further the understanding and appreciation of science, engineering, technology and mathematics, in not only the mobility industry, but also in our everyday lives.

With that purpose in mind, the SAE Foundation is offering the Student Chapter Volunteerism/Community Service grant opportunity. This award seeks to recognize efforts made by student members to engage in meaningful volunteer or community service projects that advance the public's understanding and awareness of engineering and the mobility industry.

All projects must incorporate the use of SAE International's A World In Motion K-12 educational materials. A World In Motion (AWIM) brings math and science principles to life. Our programs are exciting and interactive and make learning fun. Laws of physics, motion, flight and electronics are learned and then demonstrated as students build cars, skimmers and gliders and conduct experiments with electricity and electronics. There are four separate kits (Challenges) available. Each Challenge is focused on a distinct set of grade ranges which encompass fourth through tenth grade. For more information on the Challenges and obtaining materials, please visit [www.awim.org](http://www.awim.org).

Applications are due by February 15th each year. Please be sure to enclose all supplemental materials with the completed application form and signature page.

### Please check all activities that apply:

- Volunteered in a classroom to help with A World in Motion® programs  
*Please indicate which Challenge, grade, school and teacher.*
- Hosted or participated in a workshop/summer camp and used A World in Motion® materials  
*Please indicate which Challenge(s), grade, location and host.*
- Other use of A World in Motion® curriculum in a volunteer or community service project.  
*Please be specific about your activities and how they fulfill the requirements of volunteerism and/or community service.*

### Required Information

1. Please write a brief description of your project, how many chapter members participated, the number of people served and the overall outcomes of the volunteer or community service activity.
2. Please attach any photos from your volunteer/community service activity. (A CD-ROM is preferred.)

### Optional Attachments

1. Please attach any press received or letters of thanks for your work.
2. Any additional items or materials that are representative of your project that support this application.

### Signature Page

By signing this page and returning it with the completed application materials you certify that all information presented in the grant request are accurate and true, to the best of your knowledge.

Have **both** the student chapter/CDS team leader sign this form along with your faculty advisor on the lines below. Please type or print their names, title and contact information below the signature line. *Signatures must be original.*

Chapter President/Team Leader

Faculty Advisor

\_\_\_\_\_

\_\_\_\_\_

**Please return this signed form with all applicable attachments and the application form to the SAE Foundation at the address listed below.**

SAE Foundation, 400 Commonwealth Drive, Warrendale, PA 15096 • 724-772-8507



## Success at Japan's 4th annual J-FSAE competition!

### Competition Results

The team placed 3rd overall of the 50 competing schools, MRacing being the only competitor from outside Asia. We enjoyed top finishes in nearly every event. As a result, the team was presented with a total of nine awards:

- Third Place: Formula SAE of Japan
- Third Place: FISITA World Cup
- Governor of Shizuoka Prefecture Award (overall points based on evaluation scores for static inspections, acceleration, skid-pad, autocross, noise, fuel economy, safety, and efforts to reduce vehicle weight)
- First Place: Spirit of Static Event Award (for overall static inspection score)
- Second Place: Presentation Award (for presentation of the business plan)
- First Place: Design Award (design inspection and presentation)
- Second Place: Autocross Award (autocross performance)
- Sixth Place: JAMA Chairman Award (overall points based on evaluation scores for design safety, passive safety, efforts to reduce vehicle weight, fuel economy, noise, and sportsmanship)
- Third Place: Good Frame Design Award (excellence of vehicle frame)

Official results are online at <http://www.jsae.or.jp/formula/en/docu/result2006.xls>



Formula SAE at the University of Michigan  
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Ann Arbor, MI 48109-2101  
Website <http://www.engin.umich.edu/soc/sae/Formula/>

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This was the first international event the MRacing team has participated in, and it was a very exciting experience. The team was thrilled to arrive at competition and find our shipping crate safely waiting for us, our precious project unscathed inside. So many challenges had to be overcome to field a racecar on the other side of the world, and we're ecstatic that we were able to get the job done and have a successful finish.

Our first impressions of the competition were very positive, and we were amazed how much the other schools were interested in our team. Organization at Japan's FSAE competition has room to improve in hosting foreign-language teams, but it was clear that they were making sincere efforts to welcome us and assist us with whatever tools and information we needed. We thank them for this. Even with a language barrier, Japan lives up to FSAE's reputation as an outstanding environment for learning about professional automotive engineering. We truly enjoyed the spirit of this competition, and we hope the wheels of the *Wolverine* will be turning overseas again soon.



Above: Kanazawa driver in the 2006 *Wolverine*. After the events were finished, the organizers graciously accommodated our request to have other team's drivers in our car in the practice area. Drivers from both Kanazawa and Sophia put the car through its paces. In return, we got a chance to put a driver in both of their cars, which was a wonderful comparison of suspension handling and engine response.

Formula SAE at the University of Michigan  
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## Formula-Hybrid

Written by: Abigail H. Davidson,  
Dartmouth College

The inaugural Formula-Hybrid competition will be held May 1st, 2nd and 3rd, 2007 at the New Hampshire International Speedway in Loudon, NH. This competition will host a number of gasoline-electric hybrid racecars built to compete in an arena modeled after formula-SAE. The goal of the competition is to encourage and promote the development of high-efficiency automotive drivetrains.



The idea for a Formula-hybrid competition was sparked three years ago when a number of students at the Thayer School of Engineering at Dartmouth College speculated that a formula-hybrid racecar could potentially outperform a gasoline-only formula car. Soon after, Formula-SAE changed the rules of their competition, effectively prohibiting the entrance of a gasoline-electric hybrid vehicle. This idea, however, caught the interest of a number of students and faculty at Thayer and initiated the formula-hybrid program at the university.

Last year, six students at Thayer designed and constructed a formula-hybrid prototype using the recycled chassis of their university's 2003 formula racecar. We brought our prototype to FSAE in Detroit last May and also presented our work at Formula-Student in England this past July. Compiling the feedback from many students, advisers, and judges we assembled the rules and specifications of the formula-Hybrid competition this coming May. We encourage all students who are interested in green engineering and cutting-edge racing technology to consider entering this competition. It will be an exciting event that will showcase many different and innovative hybrid racecar designs.

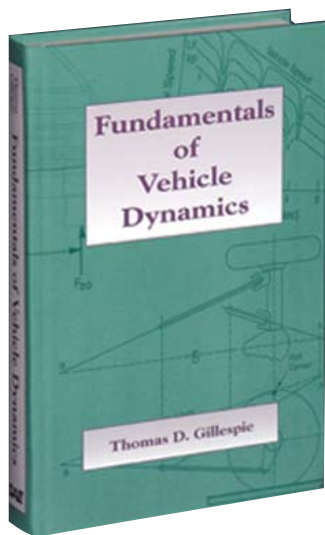
Registration for the event opens on October 9<sup>th</sup> at noon, EST. Go to <http://www.formula-hybrid.org/index.html> for details.

## Important Deadlines

**Registration Closes: December 29, 2006**

BAJA SAE Series	Aero Design Series	Supermileage
<p><b>BAJA SAE Deadlines:</b></p> <p>Engine Orders: December 29, 2006</p> <p>Cost Reports (ALL): March 30, 2007</p> <p><b>Design Reports:</b></p> <p>UCF: March 4, 2007</p> <p>SMSM: April 3, 2007</p> <p>RIT: May 5, 2007</p>	<p><b>AERO DESIGN Deadlines:</b></p> <p><b>Design Reports</b></p> <p>Aero Design WEST: February 27, 2007</p> <p>Aero Design EAST: March 24, 2007</p>	<p><b>Supermileage Deadlines:</b></p> <p>Engine Orders: December 29, 2006</p> <p>Design Reports: March 31, 2007</p>





## Fundamentals of Vehicle Dynamics

Thomas D. Gillespie

The first book providing comprehensive coverage of vehicle dynamics in a single volume, *Fundamentals of Vehicle Dynamics* provides a foundation of engineering principles and analytical methods to explain automotive vehicle performance.

Acceleration, braking, turning, and ride are among the most fundamental properties of a motor vehicle. To understand the vehicle as a system, it is necessary to acquire knowledge of all these modes. Motion is the common denominator of all these modes; thus, the study of this field is denoted as vehicle dynamics.

*Fundamentals of Vehicle Dynamics* introduces the basic mechanics governing vehicle performance and familiarizes the reader with analytical methods and terminology.

This book attempts to find a middle ground by balancing engineering principles and equations of use to every automotive engineer with practical explanations of the mechanics involved, so that those without a formal engineering degree can still comprehend and use most of the principles discussed. Either as an introductory text or a practical professional overview, this book is an ideal reference on the forces and factors affecting the movements of a vehicle – accelerating, braking, ride, and turning.

### Major topics include:

- acceleration performance
- braking performance
- aerodynamics and rolling resistance
- ride
- tires
- steady-state cornering
- suspensions
- steering systems
- rollover

Published in February 1992  
 519 Pages  
 Hardbound  
 Product Code: R-114  
 ISBN Number: 1-56091-199-9

**List Price: \$79.95**

**SAE Member Price: \$63.96**

### Reviews

“The absolutely definitive book on automotive suspensions...Plenty of equations and good solid engineering principles...Still accessible to the non-specialist.”

- Road & Track

“Fills the gap between popularized books with spare engineering content and the very theoretical books...Everything you need in one volume.”

- Heavy Vehicle Systems