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Aero Design

The Aero Design® Competition challenges engineering students to conceive, design, fabricate, and test a radio controlled aircraft that can take off and land while carrying the maximum cargo. This gives students the opportunity to apply the knowledge learned in the classroom on a practical problem.

There are two Aero Design competitions annually. Lockheed Martin was a sponsor/host of the competition. The East competition was held in Marietta, GA with 41 teams competing on-site. The flight field was donated by the Cobb County flyers. Teams traveled from Poland, Brazil, and Canada to compete. The competition consists of three classes, Regular, Open and Micro Classes. The Regular class is the most common class with the objective being to lift as much weight as possible given the dual design constraints of power available and wing span limit. The Regular Class winners received the Elliot and Dorothy Green award, first place was awarded to The Universidad Federal De Minas. The second place award went to Federal University of Uberlandia, and third place to the University of Cincinnati.

The Open Class objective is to design an aircraft to lift as much weight as possible given the gross weight design constraint; there is no wing span limit in the open class. The Universidad de Sao Paulo from Brazil was awarded the first place award and the University of Akron took home the second place award in the Open Class.

The objective of the Micro Class is to design an aircraft which can carry the highest payload fraction possible while simultaneously pursuing the lowest empty weight possible. The Micro class requires teams to make trades between two potentially conflicting requirements. Wright State University was awarded first place with Parks College of St. Louis being awarded second place in the Micro Class.

Aero Design West was held in Van Nuys, CA at the Valley Flyers RC field. There were 40 teams competing on-site including teams from Australia, Mexico, Canada and Venezuela. Elliot and Dorothy Green were present at this competition; they have sponsored the regular class awards since 1986. South Dakota School of Mines and Technology was for the second year in a row awarded first place. LeTourneau University received the second place award and The University of Akron received the third place award for the regular class.

In the Open Class the University of Akron was awarded first place with The University of British Columbia being awarded with second place.

Loyola Marymount University was the first place finisher in the Micro Class and The Universidad Catolica Andres Bellos from Venezuela was awarded with second place.

We look forward to seeing everyone next year for the 2007 Aero Design competitions. Thank you for your participation!



2006 Aero Design East Awards

Most Payload lifted:

Regular Class

- 1st – 32 Federal University of Uberlandia 28.88
- 2nd – 23 Universidad Federal De Minas 27.72
- 3rd – 6 University of Cincinnati 22.04

Open Class

- 1st – 216 Universidad De Sao Paulo 42.66
- 2nd – 214 University of Akron 41.16

Micro Class

- 1st – University of Massachusetts 3.12
- 2nd – Parks College of St. Louis 2.86

Design Report and Presentation:

Regular Class

- 1st – 23 Universidad Federal De Minas
- 2nd – Ryerson University
- 3rd – Lafayette College

Open Class

- 1st – 202 Milwaukee School of Engineering
- 2nd – 203 University of Missouri Rolla

Micro Class

- 1st – 315 University of Windsor
- 2nd – 317 Parks College of St. Louis

Overall:

Regular Class

- 1st – 23 Universidad Federal De Minas 225.1582
- 2nd – 32 Federal University of Uberlandia 220.5421
- 3rd – 6 University of Cincinnati 194.7862

Open Class

- 1st – 216 Universidad De Sao Paulo 281.0258
- 2nd – 214 University of Akron 228.1493

Micro Class

- 1st – 313 Wright State University 169.63
- 2nd – Parks College of St. Louis 149.9470

Best Flight Path – 16 College of New Jersey

Best Crash – 201 University of Windsor

2006 Aero Design West Awards:

Heaviest Payload Lifted:

#214 University of British Columbia (43.62 lbs)

Lowest Empty Weight:

#312 Loyola Marymount University (.57 lbs)

Highest Payload Fraction:

#312 Loyola Marymount University (.703)

Best Oral Presentation:

#36 San Jose State University

Best Technical Report:

#14 University of California Davis

Best Crash:

#33 California State University - Northridge

Regular Class Overall:

- 1st #1 South Dakota School of Mines and Technology
- 2nd #5 LeTourneau University
- 3rd #2 University of Akron

Open Class Overall:

- 1st #207 University of Akron
- 2nd #214 University of British Columbia

Micro Class Overall:

- 1st #312 Loyola Marymount University
- 2nd #316 Universidad Catolica Andres Bello



Electric Snowmobile Trip Report

The purpose of the trip was to facilitate the integration of two electric snowmobiles into the camp culture of Summit Station, Greenland. It was important to ensure that the snowmobiles were properly set-up and operational as part of the turn-over. Additionally, training on the operation and maintenance of the machines was given by the Team Leaders to the Science Technicians and Mechanics on site. These individuals will then provide the training on all personnel prior to allowing them to operate the equipment. The two student team leaders, Nate Hansen (Utah State), and Simon Ouellette (McGill University), provided the training.

Upon arrival at Summit, the two machines were uncrated and assembled. As it turned out, both machines had a few problems. The Utah State snowmobile had a broken battery terminal, which had then caused a second battery terminal to arc. As a result, two batteries had to be replaced before the machine would function. Fortunately, Nate had brought two replacement batteries, which were quickly installed. Two replacement batteries need to be ordered.

McGill University's machines problem proved to be a bit more difficult to diagnose and repair. In brief, the battery management system sensed a problem in the battery stack, which likely does not exist. The result of that condition is that it would shut down the batteries without warning. The problem was very intermittent, increasing the difficulty of diagnosis. Simon had several telephone conversations with the manufacturer, who proved to be quite responsive and helpful. At present, it is not clear if the problem is 100% resolved. A replacement component is on order, which will likely be installed by the Science Techs when it arrives.

There was considerable interest expressed in the machines, culminating in Simon and Nate offering after-dinner rides to anyone interested in trying them out. Summit camp staff provided the pre-ride training, which was a good opportunity to test their own training. It all seemed to go pretty well.

A significant amount of time was spent in the shop at Summit, troubleshooting and repairing problems, installing heaters, and optimizing the units for use in the polar environment. Fortunately, shop space could be made available, and the two Mechanics on site (Pat Smith and Shannon Zellerhoff) were quite helpful in seeing that we got what we needed to make it happen. A charging station also had to be built for the Utah State machine, which took the better part of a day to build and install at the equipment pole. This also incorporated a small battery blanket heater to keep the electronics within their working temperature range.

Testing of the machines showed a range of about 9.5 miles on a groomed surface (skiway) for both machines. A 5-mile range across ungroomed snow seems entirely feasible, which is more than adequate for accessing the satellite camp and tasking in the immediate station area. The USU machine clocked out at an astounding top speed of 45 mph, while the McGill machine managed a respectable 50 kph (31mph). Both machines are a little bit "tippy" on the handling, due to a high center of gravity and rearward weight bias. All personnel will be encouraged to take it easy during the training sessions.



McGill University's Simon Ouellette (left) and Utah State University's Nate Hansen, about five miles into the hike up to the Ice Cap.

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Both electric snowmobiles in the shop at Summit Station. Machines had to be equipped with electric heaters, and optimized for use in the polar environment.

Also of interest, the “Backwoods Buggy” arrived on station on the same aircraft that we departed on. This is another electric vehicle that is commercially available – essentially a high performance, 4WD golf cart. There was little time to test it out – in fact the test ride lasted for only about 12’ before we got stuck. It appears that considerable optimization of this unit may be required, including larger, high-floatation tires, battery heaters, etc. Despite this disappointing first ride, wheeled vehicles may be workable at Summit, although areas of travel will need to be groomed and defined.

Back in Kangerlussuaq, the student team leaders were treated to a great hike up to the ice cap on Friday. This was possibly a once in a lifetime opportunity, and definitely a highlight of their trip to Greenland. The 15-mile hike was a good workout for all, but well worth the effort. Lot’s of wildlife and scenic vistas abounded.

The preliminary conclusion is that electric vehicles in general, and electric snowmobiles in particular, can be made to work at Summit. These “zero emissions” vehicles can fill an important niche at Summit, by providing Researchers with a relatively quick and reliable means to access their sampling sites without compromising the data being collected. Doubtless there will be a lot of lessons learned from this summer, which will point out the direction we need to go with this effort. Whether we continue to work with university teams or build units ourselves remains to be determined. Both Nate and Simon expressed a great interest in building custom machines tailored specifically for Summit’s extreme environment. Now that they have experienced it firsthand, they have a better understanding of exactly what that means. Hopefully we can maintain an open dialog with all interested parties, then come to a consensus as to how to proceed at the conclusion of the summer test period.

Tracy Dahl
May 15, 2006

2006 Supermileage Awards

Collegiate Division Highest Points:

1. University of British Columbia
2. Universite Laval
3. Ivy Tech

High School Division Highest Points:

Mater Dei High School

Collegiate Division Best Design Report:

Rose Hulman Institute of Technology

High School Division Best Design Report:

Mishawaka High School

Most Visually Appealing Vehicle:

Ivy Tech

Closest Estimated To Actual Fuel Economy:

University of California Berkley

Best Team Attitude Award:

Ivy Tech

2006 Supermileage Competition

The 27th Annual Supermileage was held at the Eaton Proving Grounds in Marshall, MI. Supermileage is a design competition in which students design and build a single person fuel efficient vehicle. This year there were 22 competing colleges and five competing high schools. Supermileage is the only SAE design competition allowing high schools to compete.

The top three Universities were; The University of British Columbia with first place, Universite Laval with second place, and Ivy Tech State College of Indiana with the third place finish. Ivy Tech averaged 1314 miles per gallon and Universite Laval averaged 1823. The University of British Columbia managed to design and construct their vehicle to average 3145 miles per gallon!

First place in the high school division was awarded to Mater Dai High School, their average was 1897 miles per gallon. Winamac Community High School finished in second place averaging 1200 miles per gallon, and Mishawaka High School finished in third place with 731 miles per gallon.

We are excited for the 28th Annual Supermileage competition to be underway. We would like to thank you for your participation and feedback and look forward to seeing you next year!

Embry Riddle Aeronautical Team Wins Formula SAE Grant

WARRENDALE, Pa., May 31, 2006 - Formula SAE team members from Embry Riddle Aeronautical University have been selected to receive the William R. "Bill" Adam Formula SAE Grant for Rookie Teams. The award was presented to the team prior to this year's Formula SAE competition in Romeo, Mich., May 17-21.

The grant, established in 2004, provides funding for a Formula SAE rookie team to assist with the development of their project. It honors William R. "Bill" Adam, a 35-year member of SAE International and major contributor to Formula SAE, for his lifelong dedication to mentoring young engineers.

This is the first time that Embry Riddle Aeronautical University has entered a team into the Formula SAE event. The team, led by captain David Majko, built the car as an extracurricular activity.

"With this being the team's first-ever car, we learned a lot about designing and building cars and how much hard work goes into them," Majko said.

Other team members include: Yadira Chatman, Craig Czlapinski, Senkosal Hun, Nicole Ferraro, Michael Lind, Ryle Maxson, Nazim Mohd Nur, Dino Paolucci, Andrew Pope, Jason Sabarese, Jeff Sikorski and Adam Stawinski. The team's advisors are Dr. Hany Nakhla and Dr. Darris White.

Formula SAE is part of the SAE Collegiate Design Series, which provides students with real-world, hands-on experience in automotive and aerospace engineering. They work as a team to build a competitive vehicle while staying within a budget. For more information about the SAE Collegiate Design Series, contact the SAE Corporate Communications department.



First row kneeling - Senkosal Hun, Nicole Ferraro, Craig Czlapinski, David Majko, Dr. Darris White, Andrew Pope

Back Row - Nazim Mohd Nur, Adam Stawinski, Jeff Sikorski, Yadira Chatman, Ryle Maxson, Michael Lind, Jason Sabarese, Dino Paolucci, Dr. Hany Nakhla)

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2006 Formula SAE

This year's Formula SAE, sponsored by Ford, General Motors and DaimlerChrysler, was held May 17 – 20 at the Ford Michigan Proving Grounds in Romeo, Michigan. Holding a competition of the size and complexity of Formula at a working proving ground was a substantial change from the previous location of the Silverdome parking lots. Teams were given the same paddock sizes as previous years; however the event site proved to be a little tight and challenging. Still many teams were pleasantly surprised about the logistics, many thought the buildings which Ford allowed SAE to use for static judging was an improvement over tents. And we can't forget to mention the 40 acres of open smooth asphalt that lent a hand to creating one of the best autocross and endurance tracks in the history of Formula SAE. As one team member put it "the surface makes our suspension set up a lot simpler."

The 2006 FSAE event attracted college and university teams from around the world. Competing in the event were 119 teams from the universities representing Australia, Brazil, Canada, Finland, Germany, Japan, Korea, Mexico, Puerto Rico, Singapore, United Kingdom, United States and Venezuela.

Rookie teams, 2005 top 10 finishers, and all the teams falling somewhere between to two extremes all sought success at the 26th annual Formula SAE event. The multi-day competition in May capped months of work by students to design, fabricate and compete with the open-wheeled racers in both static and dynamic events.

With the damp weather that plagued most of the event until the final day of endurance, the Australian team from Royal Melbourne Institute of Technology (RMIT) managed to clinch first place position in what started out as an insecure event for them. The team was forced to change engines right before the competition due to problems experienced after shipping their car, however, with the best fuel economy score the team performed faultlessly and won the Endurance/Fuel Economy event, while many teams who were ranked with RMIT before the event started unfortunately failed to finish. Teams such as Cornell University who experienced engine problems and overheating, Texas A&M who experienced some mechanical problems along with other universities like Wisconsin-Madison, Western Australia, Saginaw Valley State University, and University of Missouri-Rolla who were the top ten finishers in 2005 failed to place in the top ten overall in 2006. Just two of the top ten finishers from 2005 who completed the endurance and remained in the top ten for 2006 were Penn State University and North Carolina State University-Raleigh.



1st place – RMIT



3rd place –
University of Michigan-Ann Arbor



2nd place – Penn State

2006 FSAE Awards Finalists

Spirit of Excellence Award (Top Ten Overall)

1st place - RMIT
 2nd place – Pennsylvania State University
 3rd place – University of Michigan-Ann Arbor
 4th place – University of Kansas-Lawrence
 5th place – Helsinki Polytechnic
 6th place – North Carolina State – Raleigh
 7th place – Iowa State University
 8th place – University of Florida
 9th place – Michigan State University
 10th place – University of Akron

SAE Foundation Cup honoring Neil A. Schilke

RMIT (Royal Melbourne Institute of Technology)

IMechE Best Engineering Design Award

Penn State University

Continental Teves Best in Class Brake Systems Award

1st place – RMIT
 2nd place – ETS
 3rd place – RWTH

Ricardo Powertrain Award

1st place – University of Wisconsin-Madison
 2nd place – University of Oklahoma
 3rd place – Helsinki Polytechnic

Robert Bosch Corporation Engine Management System Award

1st place – Helsinki Polytechnic
 2nd place – University of Wisconsin-Madison
 3rd place – ETS

Society of Plastics Engineers' Composites Division Award

1st place – ETS
 2nd place – Lehigh University
 3rd place – RMIT

ArvinMeritor Suspension System Award

1st place – ETS
 2nd place – Ohio State University
 3rd place – Helsinki Polytechnic

Altair Engineering's William R. Adam Engineering Award

Lehigh University

Bruel and Kjaer Quiet Car Cup
 University of New Hampshire

Polaris Intake Systems Design Award

University of Wisconsin-Madison

Lincoln Electric Welding Award

Kansas State University

Goodyear Best Performance Award

1st place – RMIT
 2nd place – University of Florida
 3rd place – Iowa State University

Hoosier Tire Autocross Award

1st place – Texas A & M
 2nd place – Cornell University
 3rd place – University of Kansas-Lawrence

William C. Mitchell Rookie Award

Kumoh National Institute of Technology

SAE Perseverance Award

1st – Kumoh National Institute of Technology
 2nd – St. Cloud University
 3rd – Chungbuk National University
 4th – La Universidad del Zulia
 5th – Southern Illinois University-Edwardsville

Yazaki North America Presentation Award

University of Missouri-Columbia

Yazaki North America Cost Award

Oxford Brookes University

Road & Track Triathlon Award

Cornell University

Formula SAE Certificate of Accomplishment

Brown University
 Clemson University
 Florida Atlantic University
 Kanagawa Institute of Technology
 Kanazawa University
 Kokushikan University
 Kookmin University
 Kumoh National Institute of Technology
 Louisiana State University
 Minnesota State University - Mankato
 National University of Singapore
 Rensselaer Polytechnic Inst
 Rochester Institute of Technology
 Rutgers University
 Southern Polytechnic State University
 St Cloud State University
 Universidad Simon Bolivar
 Universite Laval
 University of Alabama-Tuscaloosa
 University of Colorado-Boulder
 University of Hertfordshire
 University of Michigan-Dearborn
 University of Missouri-Columbia
 University of Oklahoma
 University of Toledo
 University of Toronto
 University of Western Ontario
 University of Windsor
 Vanderbilt University
 Yeungnam University

2006 Formula SAE - Fuel Test Results

Ethanol has, in varying amounts, been used as an oxygenate additive in gasoline since the 1970's. The majority of the pump gasoline in the United States now contains ethanol as does all of the fuel provided to teams at the North American FSAE competitions. To make sure that teams are aware of this FSAE Rule 3.5.2 "Fuels" includes the following statement: "...fuel supplied in the United States is subject to various federal and state regulations and may contain up to ten percent (10%) ethanol."

During this year's FSAE competition several teams raised questions about the composition of the fuel dispensed on site specifically contending that the fuels contained higher percentages of ethyl alcohol than allowed by the designations E10 and E85.

To address those concerns samples of fuel were taken on-site during the competition and our good friends at Ford Motor Company arranged to have them tested by an independent laboratory. The results of those tests are shown in the following table:

Parameter	FSAE "E85"		FSAE "100 Octane"	Sunoco 260 GT	FSAE "94 Octane"		Test Method
	Measured	Specification	Measured	Specification	Measured	Specification	
Antiknock Index (R+M)/2				100	93.0		
RON, Research Octane	*		*	105	97.8		ASTM D 2699
MON, Motor Octane	*		93.3	95	88.1		ASTM D 2700
Ethanol (Volume %)	80.0	79 minimum	9.0		9.4		ASTM D 5501
Hydrocarbons (including denaturant) (Volume %)		17-21					ASTM D 4815
Oxygen, Wt %				3.3			
Vapor Pressure (psi)	5.7	5.5-8.5	6.4	6.6	6.3		ASTM D 5191

Notes:

The test results given above are from an independent fuels testing laboratory courtesy of the Ford Motor Company.

* The octane numbers of the E85 and the RON of the "100 Octane Gasoline" were not measured, as it would have required time consuming re-calibration of the rating engines.

The specifications for E85 have been taken from the official U.S. Department of Energy-Energy Efficiency & Renewable Energy web site, and from ASTM D5798-99 "Standard Specification for Fuel Ethanol for Automotive Spark-Ignition Engines".

The specification for "Sunoco 260 GT" was taken from the official Sunoco web site for "Unleaded Race Fuels"

As the tests prove all of the fuels were within their specifications. The fuels used at the US competitions are batch blended and both FSAE and FSAE West received fuel from those batches.

2006 Formula SAE West – 1st Annual



For the first time in the 25 plus years of Formula SAE, SAE International created a second domestic event. Due to the growing demand for registration slots at the United States competitions, on June 14 – 17th Formula SAE invaded the California Speedway in Fontana, California for the first annual FSAE West event. The event was the second of the season, following the May event at Ford Michigan Proving Grounds in Romeo, Michigan. With 51 teams onsite to compete, the four day event drew teams from colleges and universities from Australia, Brazil, Canada, Japan, Mexico, Puerto Rico, Sweden, United States and Venezuela.

The site, though massive, provided a true motorsport atmosphere to the event. With state of the art facilities, teams used the VIP motorcoach area for their paddocks, the NASCAR garages were used for judging of static events along with several suites above the hot pits, and SAE used the NASCAR drivers briefing room for the various driver meetings. To add to the excitement, students got to sit in the same seats that NASCAR drivers themselves sit in for driver meetings. The dynamic events were all set up on sections of the infield road course.

The weather was hot, dry and sunny; almost perfect conditions for the event. Being a new event, there were no top ten finishers to set the benchmark, but there was a good mix of experienced and rookie teams from some of the best engineering schools ready to compete for the overall champion title. Leading up to

the Endurance/Fuel Economy event, many of the teams were in the running for first place overall. Giving Royal Melbourne Institute of Technology (RMIT), the FSAE Champions from Michigan, a run for the race was Texas A&M. Completing the endurance event with an almost flawless run, the Texas A&M team who failed to complete the endurance event just one month earlier in Michigan; finished strong capturing not only the first place position in the event but the title of FSAE West Champions. What a way to come back! In addition the team finished first in skid pad and won the Honda Dynamic Events award for amassing the top score in combined dynamic events.

Among the many corporate sponsors present at the event, Honda R & D America strongly supported the first annual event by becoming the Platinum Sponsor. In addition, they supplied event volunteers and hosted a recruiting luncheon for the students in conjunction with Honda Performance Development, the auto racing subsidiary of Honda America based in California. Representatives from the Formula SAE Consortium in Michigan were also present at this event. Members of Ford, General Motors and DaimlerChrysler attended the event to assist in training of the new event captains and volunteers.

The feedback received by students in a recent survey supported SAE's original thought of having a successful event with only room for improvement. The 2007 event will return to California and the limit will be increased by 10, capping registration off at 80 teams.



2006 FORMULA SAE WEST AWARDS

Finalists

Spirit of Excellence Award

- 1st place – Texas A & M University
- 2nd place - RMIT
- 3rd place – University of Wollongong
- 4th place – University of Washington
- 5th place – Rochester Institute of Technology
- 6th place – Auburn University
- 7th place – University of Toledo
- 8th place – University of Oklahoma
- 9th place – University of Missouri Rolla
- 10th place – University of Akron

Altair Engineering's William R. Adam Engineering Award

University of California – San Diego

Bruel and Kjaer Quiet Car Cup

University of Alberta

Continental Teves Best in Class Brake Systems Award

- 1st place – Ecole de Technologie Superieure
- 2nd place – Auburn University
- 3rd place – RMIT

Goodyear Best Performance Award

- 1st place – Texas A & M University
- 2nd place – University of Wollongong
- 3rd place – University of Missouri-Rolla

Honda Acceleration Award

- 1st place – Oregon State
- 2nd place – Sophia University
- 3rd place – University of California – San Diego

Honda Dynamic Event

- 1st place – Texas A & M University
- 2nd place – University of Wollongong
- 3rd place – University of Toledo

Hoosier Tire Autocross Award

- 1st place – University of Kansas-Lawrence
- 2nd place – Michigan State University
- 3rd place – University of Wollongong

Lincoln Electric Welding Award

University of California - Davis

Road & Track Triathlon Award

Texas A & M University

SAE Perseverance Award

- 1st place - Faculdade de Engenharia de Sorocaba
- 2nd place – Lafayette College
- 3rd place – Brigham Young University
- 4th place – Montana State-Bozeman
- 5th place – Universidad Iberomaericana

William C. Mitchell Rookie Award

Faculdade de Engenharia de Sorocaba

Formula SAE Certificate of Accomplishment

- California State Poly University – San Luis Obis
- California State University – Northridge
- Chalmers University of Technology
- Clemson University
- Faculdade de Engenharia de Sorocaba
- Kettering University
- Lafayette College
- Sophia University
- South Dakota School of Mines & Technology
- University of Akron
- University of California – Davis
- University of Kansas-Lawrence
- Washington State University



1st place – Texas A & M University



2nd place - RMIT



3rd place – University of Wollongong

Letter from FSAE Rules Chairman

For many years, FSAE Rule 3.3.4.1.A has required that "When seated normally and restrained by the Driver's Restraint System, a straight line drawn from the top of the Main Hoop to the top of the Front Hoop must clear by 50.8 mm (2 inches) the helmet of all the team's drivers and the helmet of a 95th percentile male (anthropometrical data)." A two dimensional template is used to check compliance with this requirement.

In the 2006 FSAE Rules, the dimensions of the template were updated. They now represent a 95th percentile North American male. He is 186.4 cms (6 foot 1 ½ inches) tall with a sitting height of 97.1 cms (38 1/4 inches). Our USA template has been updated, and has been given the name "Percy". A similar template, "Sir Percy", has been made for Formula Student, and we expect that FSAE-Italy and FSAE-Australasia will follow suit.

Percy and Sir Percy have been used at both of the 2006 USA events and at Formula Student. Approximately 50% of the cars we checked have not been in compliance. As we have not used a template to check roll hoop heights in the past, we decided to use the same criteria as we have in recent years, i.e. the team's tallest driver, and that measurements with Percy would only be advisory for 2006.

However, as we announced at Formula SAE, Formula SAE-West and Formula Student, for all 2007 events, compliance with Rule 3.3.4.1.A with the team's tallest driver and Percy (or Sir Percy) will be mandatory.

The template will be set in the car as follows:

- The template will be placed in the car on the seat's centerline..
- The circle representing the hips and buttocks will be placed so as to contact the seat bottom and the seat back.
- The circle representing the shoulders will be placed contacting the seat back.
- The upper circle representing the driver's head and helmet will be placed no more than 25.4 mm (1 inch) away from the head restraint. However, to prevent teams from attempting to locate the head restraint too far rearwards, the line between the centers of the middle and upper circles must not be inclined rearwards by more than 8 degrees. (For initial design studies, putting this line at 0 degrees, i.e. vertical, is recommended.)

Teams are advised that Percy is taken into account from the very start of their design studies. Rectifying non-compliance at an event will be extremely difficult.

Michel Royce,
Chairman,
FSAE Rules Committee.



Special Thanks!!!!

SAE International would like to thank the following sponsors for their support at Formula SAE and Formula SAE West!

Altair Engineering, Inc
ArvinMertitor, Inc
Bruel & Kjaer
Chief Cart
Clemson - ICAR
Comsource Inc
Continental Teves
DaimlerChrysler Corporation
EDS
Fibre Glast Developments Corporation
Ford Motor Company
General Motors Corporation
Goodyear Tire & Rubber Company
Henkel Technologies
Honda R & D Americas

Hoosier Racing Tire
Land & Sea, Inc
Lincoln Electric Company
Mahle Powertrain LLC
MSC Software Coporation
Polaris Industries
Raymond James
Ricardo, Inc
Risse Racing Technology
Robert Bosch Corporation
SAE Foundation
Solidworks Corporation
Sunoco, Inc
William C. Mitchell Software
Yazaki North America, Inc.

Formula SAE would also like to recognize those for In-Kind Donations:

Automobile Club of Southern California (AAA)
Church of Jesus Christ of Latler Day Saints Sisters and Elders
Edmunds.com & CarSpace.com
Mercedes-Benz USA, LLC
Mitsubishi Motors North America, Inc
United Parcel Service (UPS)
The Wally Parks NHRA Motorsports Museum



And a *Special Thank* you goes out to all the **volunteers** who donated their time to participate at either the **Formula SAE** event or **Formula SAE West** event!

Formula SAE Registration for 2007!

As announced at every event, slots will be reserved for the top finishing teams of the official competitions of the 2006 Formula SAE Series as follows:

- Formula SAE (Michigan) – Top 10 teams
- Formula SAE West – Top 5 teams
- Formula SAE Australasia – Top 2 teams
- Formula SAE Brazil – Top team
- Formula SAE Italy – Top 2 teams
- Formula Student – Top 5 teams

Teams that earned a reserved slot will have the option of registering early for either the 2007 Formula SAE (Michigan) or 2007 Formula SAE West (California) events at the team's choice. Any reserved slots that are not taken by the winning teams will be offered as part of the open registration. Kaley Shellhammer, Formula SAE Program Coordinator will be contacting teams one week before registration opens. If you need to contact her, you can reach her anytime at shellham@sae.org

Registration for all teams will follow the 2006 model in that teams will only be allowed to register for one event for the first month, after the conclusion of the first month if any slots are still open they will be free game to everyone.

**REGISTRATION OPENS
OCTOBER 2, 2006 at 10:00 am EDT**



MARK YOUR CALENDARS!!!!



The 2006 Mini Baja Season

The 2006 Mini Baja season has come to an end. This was the last season using the term "mini" in the baja name, as well as the last season with the "geographic" distinguisher. The name change to Baja SAE (hosted by...) will begin being used for the 2007 competitions.

Students design, build, test, promote and race the vehicle they have built. It's a great learning experience.

Three Baja competitions take place annually. Each competition includes a specialty dynamic event; the events are water maneuverability, a rock crawl, and a pulling contest. Along with the other Collegiate Design Series, the Baja competitions give students hands on experience. Teams compete against one another as well as help each other to maintain successful vehicles. The camaraderie at these competitions is amazing.

The 2006 Mini Baja East was the first of the bajas for the 2006 season. It was hosted by Auburn University in Auburn, AL. A year was spent constructing the layout for the dynamic events at the National Asphalt Testing Center. There were 61 competing teams on site. The third place overall went to Universite de Sherbrooke, second place to Clarkson University, and the first place overall went to Tennessee Tech!

The 2006 Mini Baja West was the second baja competition. It was hosted by the SAE Oregon Section in Portland, OR. The dynamic events were held at a motocross track in Washougal, WA. 69 teams were onsite competing, the Overall winner went to Oregon State University, second place was awarded to The University of South Florida, and third place to Queen's University.

Midwest was the last and largest baja competitions of the season. The Milwaukee SAE section hosted the competition. There were 119 teams on-site competing at the very muddy event site! Third place overall went to Auburn University, second place to Universite De Sherbrooke, and the first place overall went again to Oregon State University.

It was a successful year for the 2006 Mini Baja competitions. Thank you all for your participation and help!!

The locations for the 2007 Bajas will be:

Baja SAE South Dakota

Baja SAE Rochester, NY

Baja SAE Florida (this will be a water event)



2006 Mini Baja Midwest Awards: Milwaukee, WI

Acceleration:

1. #2 Escola de Engenharia Sao Carlos
2. #30 Lawrence Tech University
3. #38 LeTourneau University

Mud Bogg:

1. #123 University of Wisconsin Madison
2. #4 Oregon State University
3. #130 SUNY Stony Brook

Chain Pull:

1. #9 Tennessee Tech University
2. #55 Grand Valley State University
3. #151 Northeastern University

Maneuverability:

1. #111 University of South Florida
2. #4 Oregon State University
3. #28 Michigan State University

Honda Dynamic:

1. #9 Tennessee Tech University
2. #101 Cape Peninsula University of Technology
3. #4 Oregon State University

Practice Lap Times:

1. #111 University of South Florida (4:01.5)
2. #74 Queen's University (4:07.4)
3. #68 Universite de Sherbrooke (4:09)

Endurance:

1. #4 Oregon State University
2. #111 University of South Florida
3. #40 LeTourneau University
4. #28 Michigan State University
5. #38 LeTourneau University

Design Report:

1. #24 University of Waterloo
2. #68 Universite de Sherbrooke
3. #135 University of Dayton

Design Evaluation:

1. #4 Oregon State University
2. #68 Universite de Sherbrooke
3. #74 Queen's University
4. #80 Michigan Tech
5. #3 University of Michigan Ann Arbor

Cost:

1. #25 University of Maryland Baltimore
2. #111 University of South Florida
3. #161 University of Nebraska Lincoln

Schmidt Award:

1. #74 Queen's University
2. #111 University of South Florida
3. #28 Michigan State

Alienware:

#111 University of South Florida

Polaris Suspension and Innovation:

#81 Michigan Tech University

Most Improved:

#141 Boston University

Rookie Team:

#161 Binghamton University

1. #4 Oregon State University
2. #68 Universite de Sherbrooke
3. #6 Auburn University
4. #111 University of South Florida
5. #2 Escola de Engenharia de Sao Carlos
6. #40 LeTourneau University
7. #123 University of Wisconsin Madison
8. #158 University of North Carolina Charlotte
9. #28 Michigan State University
10. #151 Northeastern University

2006 Mini Baja East Awards Auburn, AL

Engineering Design Award – Presented by Polaris

1st - Tennessee Tech University
2nd - Universite De Sherbrooke
3rd - Queen's University

Suspension Innovation (Polaris)

Universite De Sherbrooke

Cost Award – Presented by Honda Manufacturing

1st - Universite De Sherbrooke
2nd - University of South Florida
3rd - Virginia Tech

Technology Innovation Award – Presented by Digital Engineering Solutions

Clarkson University

Acceleration Award – Presented by Mercedes – Benz U.S. International

1st – University of Wisconsin Madison
2nd – University of Michigan
3rd – Tennessee Tech University

Log Pull Award – Presented by RSC

1st – New York Institute of Technology
2nd – Clarkson University
3rd – Northeastern University

Water Maneuverability Award – Presented by Emily Johnson

1st – Clarkson University and Tennessee Tech University
2nd – Villanova University
3rd – Bucknell University

Land Maneuverability Award - Presented by Digital Engineering Solutions

1st – Auburn University
2nd – Rochester Institute of Technology #1
3rd – Rochester Institute of Technology #2

Suspension and Traction Award – Presented by Alfa

1st – University of South Florida
2nd – Michigan State University
3rd – Auburn University

Endurance Award – Presented by Honda

1st – Universite De Sherbrooke
2nd – Queen's University
3rd – Bucknell University

Total Short Dynamic Award – Presented by Honda

1st – Clarkson University
2nd – Louisiana State University
3rd – Tennessee Tech University

Overall Award – Presented by Briggs & Stratton and the Samuel Ginn College of Engineering

1st – Tennessee Tech University
2nd – Clarkson University
3rd – Universite De Sherbrooke
4th – Queen's University
5th – Auburn University

Briggs & Stratton Extra Parts

University of Central Florida Knights 1
North Carolina A & T
University of Alabama (GRITS)
Middle Tennessee Blue Raider Baja
Fairmont State University
US Military Academy

Generator – Embry Riddle Ladies

Power Washer – University of Vermont

Dirtiest Endurance Driver – Presented by Auburn Mini Baja

Northeastern University

Team that Traveled the Longest Distance – Presented by Auburn Mini Baja

Universite De Sherbrooke

Team that Slept the Least – Presented by Auburn Mini Baja

Johns Hopkins University

2006 Mini Baja West Awards: Portland, OR

Acceleration:

1. #152 LeTourneau University
2. #9 University of Louisville
3. #21 Cal Poly San Luis Obispo

Hill Climb:

1. #21 Cal Poly San Luis Obispo
2. #136 Michigan State University
3. #5 University of Michigan Ann Arbor

Maneuverability:

1. #111 University of South Florida
2. #13 Wichita State University
3. #152 LeTourneau University

Rock Crawl:

1. #139 North Carolina A & T
2. #2 Oregon State University
3. #University of Louisiana Lafayette

Honda Dynamic:

1. #2 Oregon State University
2. #152 LeTourneau University
3. #15 University of Louisiana Lafayette
#111 University of South Florida

Endurance:

1. #111 University of South Florida
2. #3 Queen's University
3. #136 Michigan State
4. #2 Oregon State University
5. #5 University of Michigan Ann Arbor

Presentation:

1. #2 Oregon State University
2. #7 Purdue University
3. #5 University of Michigan Ann Arbor

Design:

1. #2 Oregon State University
2. #3 Queen's University
3. #5 University of Michigan Ann Arbor

Cost:

1. #157 Instituto Politecnico Nacional
2. #111 University of South Florida
3. #137 Universidad LaSalle

Sportsmanship Award:

- #23 Arizona State University
#140 Cal Poly San Luis Obispo
#11 University of Iowa

Chairman's Award:

- #167 SV Regional College of Engineering and Technology

Alienware:

- #111 University of South Florida

Polaris Suspension and Innovation:

- #19 Western Washington University

Overall:

1. #2 Oregon State University
2. #111 University of South Florida
3. #3 Queen's University
4. #136 Michigan State University
5. #152 LeTourneau University
6. #15 University of Louisiana Lafayette
7. #112 South Dakota School of Mines and Technology
8. #21 Cal Poly San Luis Obispo
9. #5 University of Michigan Ann Arbor
10. #153 LeTourneau University



Award Nominations

Nominate your professor for the Ralph R. Teetor Educational Award. The Ralph R. Teetor Educational Award is a great way to recognize an outstanding professor at your school. The deadline is October 16.

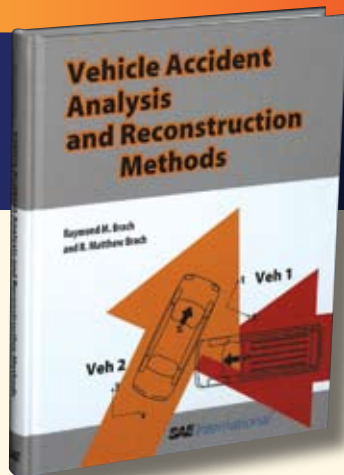
<http://www.sae.org/news/awards/list/teetor/>. See below for recent aerospace faculty award recipients.

Think your SAE Faculty Advisor is awesome?

Nominate them for the SAE Faculty Advisor Award. If selected, they will be recognized at the SAE World Congress in April. The deadline for your nomination is October 31 - you can find more information here <http://www.sae.org/news/awards/list/faculty/>

Student Chapters - As you begin the new academic year:

- Refer to the Collegiate Chapter Procedures Manual <http://students.sae.org/chapters/collegiate/manual/>.
- Update your list of student officers today <http://students.sae.org/chapters/collegiate/contact.htm>
- The deadline to request student branch allocations is December 31.



Vehicle Accident Analysis & Reconstruction Methods

By Raymond M. Brach and Matthew Brach

A number of books already exist on the topic of accident reconstruction. With some notable exceptions, many of them are tomes devoted to how the authors and perhaps a few colleagues used intuition and insight to decide how they

thought an accident happened. In a few cases, these books are collections of "war stories" or case histories, usually presentations of one view of the events. In contrast, this book is one of methods. The perspective taken here is that accident reconstruction is a field of applied science, namely, an application of the principles of science, mathematics, and engineering, and is a quantitative endeavor. The same principles of mathematics, physics, and engineering that allow us to safely race vehicles over 200 mph, build space stations, and navigate the depths of the oceans can be used to reconstruct vehicle accidents.

A concerted goal of this book is to raise the analytical level of accident reconstruction practice such that commonly known scientific, engineering, and mathematical methods increasingly become a more common part of the field. Intended for seasoned practitioners and those entering the field of accident reconstruction, the topical coverage is aimed at the problems reconstructionists encounter from day to day and the types of methods used. Readers are guided through

a multitude of practical, useful, and informative examples that show how, when, and why many of these problems occur - key requirements for designing safer vehicles, handling insurance claims, and litigating court cases.

Representing a significant improvement in the level of quality and rigor in the presentation of reconstruction analytical techniques of light and heavy vehicle crashes, this book is an invaluable reference for consultants, lawyers, engineers, students, vehicle manufacturers and suppliers, police departments and academies, insurance companies, and those involved in the field of accident reconstruction.

Chapters include:

- Uncertainty in Measurements and Calculations
- Tire Forces
- Straight-Line Motion
- Critical Speed from Tire Yaw Marks
- Reconstruction of Vehicular Rollover Accidents
- Analysis of Collisions, Impulse-Momentum Theory
- Reconstruction Applications, Impulse-Momentum Theory
- Crush Energy and V
- Frontal Vehicle-Pedestrian Collisions
- Photogrammetry
- Vehicle Dynamic Simulation

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