

Issue Highlights

Mini Baja 100	pg. 1-3
April flew by	pg. 4-5
2005 Formula SAE Site Procedures.....	pg. 6-8
Simplified On-Site Registration for ALL Competitions	pg. 9
Stand point from the Rookie	pg. 9
Special Offering for 2005 FSAE Students!.....	pg. 10-11
S2005 Collegiate Competitions Sponsors.....	pg. 12



Mini Baja 100

Bring Water!

Bring Shade!

Bring Skin Protection!

Water – Bring lots of water! We can't emphasize enough – Mini Baja 100 will be very hot and very dry – you'll need to drink lots of water. Bring water, ice and ice chests.

Drivers will need water during endurance so you'll need to provide them with some type of in-car drinking water system, possibly a hydration pack (e.g. a Camelback) or even just a bottle holder. Bring your water system with you; don't depend on finding something suitable at the event.

Caution – Thirst is not a good indicator of whether or not you're becoming dehydrated – you can lose a lot of water before you become thirsty.

Shade – Shade is essential in your pits or any place else where you are going to be exposed for a long time. In the pits you'll need a pop-up or other covering.

Drivers will need to be shaded while they're waiting in line for events - bring a large umbrella or other sun shade.

Skin Protection – You need a barrier between the sun and your skin. This means some or all of the following: sun screen, lip protection, long sleeve shirts, long pants, hat. More protection is better than less.

Continued on page 2



Continued from page 1

Don't take chances with the sun, this is a four day competition and if you're not careful you will burn.

Paddock Assignments

Paddocks will be assigned as you enter at the main gate. At that point you'll also be given a registration package containing all the material your team needs for on-site registration.

The main gate will open Wednesday at 8:00 am. Since the first activity, technical inspection, doesn't start until 1:00 pm there's lots of time for everyone to get set up and registered.

Keep in mind that each paddock space is 18' x 45' and must contain the two vehicles you are allowed to park on-site.

Once you reach your paddock you should complete the registration material (discussed in the next section) and proceed to on-site registration. Team members may not work on the car, or operate tools or machinery, until they've finished on-site registration, signed the required waiver and been issued wrist bands.

Registration Package

The registration package you receive at the gate will include:

- (1) Liability waiver – All team members and the faculty advisor must sign the waiver in ink.
- (2) Team Information sheets – You won't need to complete this form if you made your own.
- (3) 2 Parking Stickers – One sticker for each on-site vehicle
- (4) Schedules including the presentation event schedule
- (5) Site maps including the overall site, paddocks, static events and dynamic events.
- (6) Supplier and restaurant lists

The site maps will include the location of staging areas and lines.

On- Site Registration

On-site registration will open Wednesday at 9:00 am. You must be registered before you can work on your car.

Before coming to the registration desk your team must complete the following:

- (1) Liability waiver – The waiver is in the registration package.
- (2) "Do-it-yourself" information sheets – These are the sheets of driver's license and insurance card copies that we discussed on page 6 of last month's Collegiate Design Series Newsletter. Either bring the "do-it-yourself" information sheets you've created or, if you like more work, fill out the information form provided in the registration package.

Registration will go faster if all team members register in a single group. Please try to have your entire team come up simultaneously.



If you don't bring all of your forms and documents with you then we may ask you to come back later.

Beginning this year all team members must have and provide proof of medical insurance. This is a change from the previous requirement that only drivers needed insurance. In order to comply with new directives from our insurance carrier we must confirm that all participants have medical insurance ... so make sure all your team members are insured. Wrist bands will be issued to all team members upon completion of the forms

Reminder: All team members must be members of SAE. If you have any members who have not joined please have them do so on-line before the event at <http://www.sae.org/servlets/membership/>

Site Procedures

Caterpillar's Tinaja Hills Training Center is an ecologically sensitive location and we need to keep that in mind throughout the competition. To preserve the environment everyone must stay on the roads and in the designated event areas at all times – don't go off the roads and especially don't wander off into the desert.

We'll be practicing "Leave no trace" outdoor ethics.

Trash Control – We need your help to keep the paddock and the entire site clean. Our goal is to leave the area as pristine at the end of the competition as it was before we arrived.

At registration every team will be given a half-dozen large trash bags – make good use of them. If you need more trash bags just ask.

Equipment – The paddocks are on a remote part of the training center without utilities – there are no lights, no water and no power. Actually that's not unusual at Mini Baja, but we thought we'd mention it. So if you're planning to work after dark you'll need both a generator and lights.

Paddocks – After measuring the site in detail we've determined that the paddocks will be 18 ft wide and 45 ft long. With 131 registered teams paddock space will be tight and each team will be limited to just 2 vehicles within the training center.

Your on-site vehicles should be: (1) vehicle transporter, e.g. pick-up and trailer, Ryder truck, etc. (2) a team vehicle, usually a van or car. Tractor trailer rigs may not be driven onto, or parked on, the site.

All other vehicles must be parked in the external parking area outside the main gate.

Parking space both inside and outside the site is limited, so please don't bring more vehicles than is absolutely necessary.

Parking Permits - Each team will be issued 2 on-site parking permits – these permits must be displayed in the window of the on-site vehicles at all times. Only vehicles with parking permits displayed will be allowed on-site.

External Parking Lot – General parking for all vehicles, other than the two allowed per team, will be at a designated external parking area along the entry road. Watch for parking signs.

Shuttle Busses - Shuttle busses will run all day between the paddocks and the external parking lots.

Site Availability – The site will open to teams shortly after sunrise and will officially close at 10:00 pm with everyone required to be off site by 11:00 pm. Keep in mind that Arizona doesn't observe daylight savings time so sunset will be around 7:30 pm.

Technical Inspection – **New Procedure** – To reduce the amount of time teams spend waiting in line for Part 2 of Technical Inspection, i.e. the vehicle inspection itself, we are going to call teams for inspection in the sequence in which they finish Briggs and Stratton governor setting. As your team passes governor setting you will be assigned an inspection number. Teams will be called to inspection in groups – don't get in line until your number is called.

2006 Competition Registration

Registration for 2006 events will open Monday, October 3, 2005 at 10:00 am Eastern Standard Time. Unlike this year and previous years, registration for all competitions will close December 31, 2005 at midnight EST. Mark your calendars!!! And start preparing your team for next year!! Remember competitions with registration limits may close much earlier.

April flew by...

The month of April was home to the two SAE Aero Design Competitions. With the idea to challenge engineering students to conceive, design, fabricate and test a radio controlled aircraft that can take off and land while carrying the maximum cargo, this year's event sites added some challenges of their own – trees and wind.



The 2005 Aero Design East event returned to Deland, Florida and was another success with the participation of 32 teams from the United States, Canada, and Brazil. Hosted by Eric Schwartz of the University of Central Florida and the Deland Golden Hawks Radio Control Club, the students faced a tree-line; in fact it was given the nickname "tree-line of death" as many teams found their planes crashing into the trees as result of slow right-hand turn or too much predicted weight aboard the plane.

Overall results are as follows:

Top 3 Overall – Regular Class (point total in parenthesis)

- 1st - Universidad Federal do Rio Grande do Norte, team # 24..... (196.790)
- 2nd - Universidad Estadual Paulista, team #26 (173.302)
- 3rd - Ecole Polytechnique De Montreal, team #23 (165.768)

Top 3 Overall – Open Class (point total in parenthesis)

- 1st - University of Windsor, team# 211 (153.575)
- 2nd - Milwaukee School of Engineering, team #217 (135.791)
- 3rd - University of Missouri-Rolla, team #213 (89.333)

Top 3 Overall – Micro Class (point total in parenthesis)

- 1st - University of Puerto Rico, team #302 (148.834)
- 2nd - University of Dayton, team #303 (127.809)
- 3rd - Parks College of St Louis University, team #301..... (70.133)

The 2005 Aero Design West event returned to Ft. Worth, Texas and had a total of 39 registered teams from United States, Canada and Venezuela and Australia. Hosted by Oliver Alvarado of Lockheed Martin and the Fort Worth Thunderbirds Radio Control Association Inc., SAE was provided with another successful event in 2005. Students competed even through the gusty winds which unfortunately assisted many teams into crashing into the ground.



Overall results are as follows:

Top 3 Overall – Regular Class (point total in parenthesis)

- 1st - South Dakota School of Mines & Tech, team #12 (180.037)
- 2nd - University of Akron, team #8 (172.005)
- 3rd - University of Kansas-Lawrence, team #4 (153.730)

Top 3 Overall – Open Class (point total in parenthesis)

- 1st - University of British Columbia, team #213..... (257.488)
- 2nd - Mississippi State University, team #214 (194.860)
- 3rd - Kansas State University, team #212..... (147.560)

Top 3 Overall – Micro Class (point total in parenthesis)

- 1st - University of California-Davis, team #313 (186.176)
- 2nd - University of Akron, team #303 (160.241)
- 3rd - University of Wisconsin – Platteville, team #312..... (154.399)

SAE would like to extend thanks to all of the competitors, sponsors, and volunteers for these events! Education is what it is all about and these competitions give the students great opportunities to apply the knowledge learned in the classroom and transfer them to real world application to learn from the experience.



2005 Formula SAE Site Procedures

After reviewing the suggestions you made on last year's post-Formula survey we've implemented a number of changes to make the competition run smoother and to improve our communications. You'll notice a number of obvious improvements although we've made others that are more subtle.

The following operating procedures will be in effect:

Paddock Assignment

Paddocks will be assigned as teams enter at the main gate. At that point you will also be given a registration package containing all the material your team needs for on-site registration.

The main gate opens Wednesday at 8:30 am. Since the first activity, early tech inspection, doesn't start until 4:00 pm there's lots of time for everyone to get set up and register.

Keep in mind that each paddock space is 17' x 34.5' which is equivalent to 4 standard parking spaces. As in the past we may be able to accommodate a few larger trucks **IF** you tell us what you are bringing and we approve it in advance. Big rigs can not be accommodated. **Teams that are bringing a rig that exceeds 35' in length must notify Kathleen McDonald at katklauz@aol.com no later than April 15.**

Once you reach your paddock you should complete the registration material (discussed in the next section) and proceed to on-site registration. Team members may not work on the car, or operate tools or machinery, until they've finished on-site registration, signed the required waiver and been issued wrist bands.

Competition vehicles must remain within the event site and may not be moved back-and-forth between the paddocks and a support vehicle outside the site. The only exception to this policy is that a vehicle may be taken to the GM shop if for some reason the entire car, rather than just components, is required.

Registration Package

The registration package you receive at the gate will include:

- (1) **Liability waiver** – All team members and the faculty advisor must sign the waiver in ink.
- (2) **Information sheets** – You **won't** need to complete this form if you made your own.
- (3) **Schedules** including those for design judging, cost judging and presentation
- (4) **Site maps** including the overall site, paddocks, Wednesday & Thursday static events, Friday dynamic events and Saturday dynamic events. The site maps will include the location of staging areas and lines.
- (5) **Event descriptions**
- (6) **Supplier and restaurant lists** with maps.

On- Site Registration

On-site registration will open Wednesday at 9:00 am.

Before coming to the registration desk your team must complete the following:

- (1) **Liability waiver** – The waiver is in the registration package.
- (2) **“Do-it-yourself” information sheets** – These are the sheets of driver’s license and insurance card copies that we discuss on page 6 of this month’s Collegiate Design Series Newsletter.
Either bring the “do-it-yourself” information sheets you’ve created or, if you like more work, fill out the information form provided in the registration package.

Registration will go faster if all team members register in a single group. Please try to have your entire team come up simultaneously.

If you don’t bring all of your forms and documents with you then we may ask you to come back later.

Beginning this year all team members must have and provide proof of medical insurance. This is a change from the previous requirement that only drivers needed insurance. In order to comply with new directives from our insurance carrier we must confirm that all participants have medical insurance ... so make sure all your team members are insured. Wrist bands will be issued to all team members upon completion of the forms

Reminder: All team members must be members of SAE. If you have any members who have not joined please have them do so on-line before the event at <http://www.sae.org/servlets/membership/>

Technical Inspection

Due to limited space inside the tent, only four (4) team members will be permitted inside the technical inspection tent during the Wednesday and Thursday inspections. Other team members, the Faculty Advisor and spectators will be required to watch from the periphery of the tent. Tool boxes and rain tires must also remain outside the tent. The team’s 4 dynamic area passes will also be used as technical inspection tent passes. Team members may rotate in and out of the inspection area as required, as long as there are no more than four in the tent at one time.

All drivers must be present at technical inspection with their helmets, suits, etc., during inspection for confirmation of the driver’s gear, roll hoop clearance and driver escape requirements. The technical inspectors will select one or more drivers, at the inspector’s discretion, for the various drivers’ compartment tests.

Early technical inspection will run from 4:00 to 8:00 pm on Wednesday. The inspectors estimate that they should be able to do complete first inspections on between 70 and 80 cars during that time. We will designate a “line closed” point at roughly 7:00 pm so that teams at the end of the line will know to return on Thursday morning.

Operations

Better maps and signage – We’ll be posting site maps at several prominent locations and we’re adding additional signs that will make it clearer where to go and where the queues form for every event.

Continued from page 7

Paddock list – Once all the teams have been positioned in the paddock we'll generate a complete paddock list that will be posted and copies made available.

Line opening and closing times – Line opening and closing times will be based on the official event time maintained by the very popular "announcer dude". Times will be announced over the public address system and will be strictly adhered to by the event officials. Both acceleration and skid pad operate with a strict closing time policy – specifically, a team must have crossed the starting line by the official closing time for the attempt to be scored. Simply being in the staging line is not enough – your car must have at least started its run.

There's more than enough time for every team to make all of their acceleration and skid pad runs if every team gets in line promptly and doesn't wait.

Weather emergencies – A reminder: If we have a weather emergency, which we all know has occasionally happened, and we are asked to evacuate the site, everyone must immediately follow the official instructions. This is not optional – if we announce that the site has to be cleared, go and go quickly.

Bull Horns – We're bringing some bull horns to help us make announcements in places not reached by the PA system.

In-line adjustments – Traditionally teams have been permitted to make minor adjustments and do some fine tuning while in line or near, practice, brake testing, noise testing and dynamic events. You can still do minor adjustments near those areas with the following slight policy adjustments: (1) some events may designate a specific area for such work, and (2) if what you're fixing takes longer than about 10 minutes then you may be asked to do the work in your paddock. Our goal is to keep the various queues moving smoothly – and the event areas relatively open - so individual event captains have complete discretion to decide how much work to permit and where it may be done. **Bottom line: If there aren't a lot of cars in line you'll probably be able to do more work, if the line is full then you'll probably have to work in your paddock.**

Power cables – Reminder: Under no circumstances may you lift or move any power cable! Last year some teams lifted cables to move their cars underneath. We know cars can bottom on the cables, but the solution is go around the end of the row not to lift the cables.

Cooking at Formula Event Site – There is no cooking permitted in the paddocks. The designated area for BBQs is just outside of the Butler Building, which is the cinderblock garage in the West Parking lot, just inside of Gate 5.

Teams may only use propane grills (per the Silverdome's rules). Per the rules of the Silverdome, charcoal is prohibited. BBQs must be attended at all times. This information will be reviewed at the Team Captain's meeting on Wednesday, May 18, 2005.

Simplified On-Site Registration for ALL Competitions!!

On-site registration at all Collegiate Design Competitions is being simplified to make the process quicker and easier. Starting this year, there will be only 2 required forms. First – The liability waiver which must be completed and signed by all participants. Second – The new team record sheets which **YOU** create and bring with you to the event.

Team record sheets are just copies of each team member's driver license and insurance with their emergency contact information written below the cards. It is simple and should be relatively easy to create. The layout to the right shows what we have in mind, although we don't care how many members you include on each sheet – just make sure that you have all the information present.

If you don't create the team record sheets covering all the team members, then you will be required to fill out forms on-site which will take time and cause your registration to be delayed.

If you have any questions about this improved process, please email collegiatecompetitions@sae.org.



Newest member to the Collegiate Design Series in SAE's Education Relations Department is Jessica Cutler. Jessica has worked for SAE for a little over a year and transferred internally to the department back in February. Excited to bring new ideas to the small group, Jessica has made no problem fitting in.



With this being her first competition year, she labeled as the newest staff meaning "Rookie". In her first two events, she attended the SAE Aero Design East and West competitions. Jessica had this to say about what she saw, "I recently had the liberty of experiencing my first two event, both being Aero Design. It was absolutely amazing to see how much heart the students put into their designs. The teams would not let anything deter them from giving 110%. There were obstacles I saw teams overcome, when so many

others would have just given up. It isn't about winning, it's about learning and although I wasn't competing, I learned so much."

With this new knowledge at her hands, Jessica is even more eager for the continuous events to come. In addition to the Aero Design events, Jessica will be attending all three Mini Baja's, Supermileage and Formula SAE.

Seats Filling Quickly

Special Offering for 2005 FSAE Students!

Tires and Handling for Racing and High Performance Vehicles

Taught by Paul Haney, acclaimed tire expert and author of *The Racing & High Performance Tire*

Monday, May 23, 2005; 8:30 a.m. to 4:30 p.m.

SAE Automotive Headquarters

755 W. Big Beaver Road, Top of Troy Building, 16th Floor, Troy, MI

Fees: \$195, Students; \$495, SAE Mbrs; \$595, Non-Mbrs

Overview

The pneumatic tire is extremely complex and not well understood. Automotive and race engineers are forced to rely on experience as well as trial and error methods when trying to get the most from their vehicles.

Capitalizing on the instructor's 20-year struggle to understand how tires work on a car, this seminar provides a practical applied approach to understanding how a car gets around a corner, rubber friction, tire behavior, and basic vehicle dynamics. While the information presented explains tire technology and vehicle dynamics in general, the seminar uses racing and high performance settings to illustrate the major points.

Benefits of Attending

By attending this seminar, you will be able to:

- Explain how a tire develops a slip angle and develops a lateral force enabling a car to turn a corner with speed and control.
- Describe rubber friction and rubber's sensitivity to temperature, sliding speed, surface texture, and vertical loading.
- Illustrate how tires and vehicle dynamics influence car's balance and control.
- Summarize the importance of inflation pressure and how to use temperature measurements to find the best pressure.
- Judge how to choose basic starting spring and anti-roll bar rates and develop them toward an optimum setup.

Who Should Attend

Anyone involved with racing and high performance driving as well as engineers involved with tire design, tire testing, or chassis/suspension development. While no technical background is required, attendees are encouraged to have a basic understanding of high-school-level math and physics.

Seminar Content

- How a Car Turns a Corner
- How a tire generates lateral force with slip angle
- How lateral force and slip angle allow a vehicle to turn a corner with control at high speed
- Rubber & Rubber Friction
- Brief history of rubber and its unique characteristics

- Complexity of how rubber interacts with a surface to produce friction forces
- Rubber's sensitivity to temperature, sliding speed, surface texture, and vertical loading
- The real reason there's more grip off-line in the rain
- Rubber Compounding
- Rubber choices; the complex nature of tires starts with rubber.
- How carbon loading and the vulcanization process modify rubber characteristics
- Tire Design and Manufacture
- How tires can be flexible but strong while describing some design goals and structural variables
- Why inflation pressure is so critically important to tire performance and reliability
- How a tire generates heat as it rolls
- Tire Behavior
- How a tire produces lateral force and turns a car
- Importance of camber thrust, induced drag, aligning torque, the friction circle, and load sensitivity
- The real reason wide tires produce more grip
- Why tires are load sensitive and how that affects suspension trade-offs
- Balance and Control
- Understeer and oversteer
- How good drivers maintain control at the limit of adhesion
- Race Tires
- How to take tire temperatures
- Scrubbing, blistering, and graining
- How to find the right inflation pressure
- Typical data provided by tire manufacturers to race teams—how useful is this data?
- Basic Vehicle Dynamics
- Physics of a car in a corner
- Lateral and longitudinal weight transfer
- Suspension anti
- Importance of roll centers and how to calculate the different components of lateral weight transfer.
- Tuning for Grip and Balance
- How to tune a racecar one level at a time
- Difference between spring rate, wheel rate, and tire rate
- How to choose initial spring rates, anti-roll bar rates, and roll center locations
- Geometric stiffness and why it is so important
- Importance of wedge and how both anti-roll bars and dampers produce wedge effects that help balance a car and generate grip
- Sequence of tuning changes and how those changes affect tire contact patch forces
- Why a front anti-roll bar is so useful

About the Instructor

Paul Haney attended drag races and sports car races in Texas in the 1950s. This began an intense interest in motor racing that led to an engineering degree followed by several decades in the aerospace, materials, and electronics industries.

During the 1980s Paul became involved in racing, working for several racing businesses and writing for motorsports publications. Paul has published three books and now offers a web site, www.insideracingtechnology.com. Paul's latest book, *The Racing & High-Performance Tire*, co-published with SAE in April 2003 is the result of 20 years trying to figure out how tires work and how a car uses them to get around a corner.

Paul now works with race teams and presents seminars on tires and racecar tuning that explain how tires work on a car and how to approach chassis setup with the goal of optimizing tire usage for traction and driver control.

A member of the planning committee of the SAE Motorsports Engineering Conference and Exhibition, Paul chaired the MSEC vehicle committee in 1998. He holds a B.S. in mechanical engineering from Southern Methodist University.

To Register

For complete registration information, visit www.sae.org/seminarinfo or call SAE Customer Service at 877-606-7323 (U.S. & Canada only) or 724-776-4970. Fee includes all learning materials, lunch, and refreshment breaks. Reference ID# C0517. CEUs: .65.

Cancellations

If you cannot attend, you may send a substitute or transfer to a future offering. A full refund is issued if you notify SAE at least 14 days prior to seminar start date. If canceled less than 14 days prior, the full fee is charged. For \$50, you may process a one-time transfer to a future offering within one year of canceled seminar. SAE reserves the right to change instructors or cancel seminars and cannot be held responsible for costs incurred other than the registration fee.

2005 Collegiate Competitions Sponsors

Interested in being a sponsor? Email Doug Shymoniak at Shymoniak@sae.org for sponsorship opportunities.

Corporate Sponsors

FSAE Consortium Member Companies

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Platinum Sponsors

Briggs & Stratton Corporation - Mini Baja and Supermileage

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ArvinMeritor, Inc. - FSAE
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Henkel Corporation - FSAE
Honda R&D Americas, Inc. - Mini Baja
Hoosier Racing Tire - FSAE
International Snowmobile Manufacturers Association (ISMA)
- Clean Snowmobile Challenge
Land & Sea, Inc. - FSAE
Lincoln Electric Co. - FSAE
Lotus - Clean Snowmobile Challenge
Michigan Snowmobile Association (MSA) - Clean Snowmobile
Challenge
Robert Bosch Corporation - FSAE
Solidworks Corporation - FSAE
Visteon Climate Control - FSAE

Silver Sponsors

DENSO - Clean Snowmobile Challenge
Emitec - Clean Snowmobile Challenge
Polaris Industries, Inc. - FSAE and Mini Baja
Yazaki North America, Inc. - FSAE

Bronze Sponsors

American Council of Snowmobile Associations (ACSA) - Clean
Snowmobile Challenge
Blue Ribbon Coalition (BRC) - Clean Snowmobile Challenge
CPC Colder Products - Clean Snowmobile Challenge
PCB Piezotronics - Clean Snowmobile Challenge
Portage Health System - Clean Snowmobile Challenge
Risse Racing Technology - FSAE
ThermoAnalytics, Inc. - Clean Snowmobile Challenge
Woody's - Clean Snowmobile Challenge

Supplier Sponsors

Corsa Instruments, Inc. - FSAE
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Hoosier Racing Tire - FSAE
igus, Inc. - FSAE, Aero Design, Mini Baja
Imagine Software, Inc. - FSAE
Mechanical Simulation Corporation - FSAE and Mini Baja
Performance Electronics, Ltd. - FSAE
Risse Racing Technology - FSAE
Superior Engine Technology - FSAE
Visteon Climate Control - FSAE

Award Descriptions

Briggs & Stratton Overall Performance Award - Mini Baja
Briel and Kjaer Quiet Car Cup - FSAE
Goodyear Best Performance Award - FSAE
Honda R&D Americas Endurance Award - Mini Baja
Honda R&D Americas Engineering Design Award - Mini Baja
Hoosier Tire Autocross Award - FSAE
Lincoln Electric Welding Award - FSAE
Polaris Innovative Suspension Award - Mini Baja
Polaris Intake Systems Design Award - FSAE
Robert Bosch Corporation Engine Management System
Award - FSAE
Society of Plastics Engineers' Composites Division Award -
FSAE
Solidworks Fastest Time to Market Skid Pad Award - FSAE
Yazaki North America Cost Award - FSAE
Yazaki North America Presentation Award - FSAE

Organizing Sponsors

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