



Collegiate Design Series News

Volume 4, Issue 8 December 2007

Issue Highlights

Saying Goodbye to the CDS Monthly Newsletter... 1

Baja SAE® and Supermilage® Engine Ordering..... 2

Collegiate Design Series Event Websites Gets A New Design..... 2

SAE Aero Design Innovation Award..... 2

Aero Design® Registration Reminder..... 3

NASA Systems Engineering Award..... 3

FORMULA SAE ANTHROPOMETRIC REFERENCE DATA 5TH PERCENTILE FEMALE & 95TH PERCENTILE MALE 4-5

FORMULA SAE 6

FREQUENTLY ASKED QUESTIONS FOR FORMULA SAE 7

Formula SAE and VIR Registration 8

THE 2009 COCKPIT RULES 8

Saying Goodbye to the CDS Monthly Newsletter...

Over the past year, SAE staff members have been working on developing a more user friendly way to communicate with those participating in our CDS events. In conjunction with another project, the idea of posting current news specific to each event on their homepage was initiated.

As a result, the December 2007 issue will be the last newsletter published online due to the result of a new website layout for each specific event which will roll out in January 2008. The new event specific homepages will have all news related articles online and can be updated daily, weekly or monthly. This new feature will allow the SAE staff to post information immediately online including items like event updates before, during and after the events.

The current and past newsletters will still be available online under "Resources".

All the information posted in the new "News" area will be archived and searchable specific to the events.



Editors:

Kaley Shellhammer
Samantha Jeswald

Please if you have submissions or ideas for news, contact us at:
collegiatecompetitions@sae.org

Baja SAE® and Supermileage® Engine Ordering

All engine orders for Baja SAE and Supermileage must be placed on or before Thursday, December 27, 2007. The cost for Baja engines are \$130.00 USD, engine eligibility criteria can be found in the rules. Engines for Supermileage are provided free of charge and all teams are eligible to receive a new engine each year. Any questions can be directed to CollegiateCompetitions@sae.org.

Collegiate Design Series Event Websites Gets A New Design...

For several years, the SAE CDS event websites have been undergoing some modifications/revisions trying to fit the event websites in the SAE model. Over the past year, CDS staff members have been working with the IT staff to develop a new look and feel for the CDS websites. With the proper approval, we have been able to step out of the box.

In January 2008, the new event specific websites will be launched live. Some of the major changes you will see are:

In Design:

- The websites will have a new look with a new website wrapper.
- Top finishing teams will be highlighted by having their pictures posted for 1 year in the new wrapper.
- SAE Corporate Sales will now sell and place online the CDS event websites SAE sponsored ads.

In Functionality:

- The navigation has been moved and redesigned for ease of moving through the website, in an effort to eliminate the number of clicks and hitting the back button to return to previous pages. The navigation bar will be located on the left side of the screen in a column and will function like a drop down box. The information will refresh within the wrapper, unless specifically opening a document like the Rules which will open in a new window.
- Event Series, i.e. Aero Design, Baja and FSAE will share a common website where you will be able to access all the events and news specific to those events, etc.
- News and information will be searchable by SAE, CDS or event specific fields. News will also be posted in a more timely manner versus the newsletters.

SAE Aero Design Innovation Award

SAE International has sponsored the Design Innovation Award for the first time in 2007 at both the Aero Design East & West competitions and plans to continue to sponsor this award for the 2008 events. A cash prize will be awarded to a team at both East and West who show the most innovative design that still meets the operational requirements of the competition.

Innovation Award Criteria will include:

- Innovative manufacturing process used in the design or development of their aircraft.
- Innovative use of materials on the aircraft.
- 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. Teams are also encouraged to present innovative ideas and processes during the oral presentation portion of the competition.

NASA Systems Engineering Award

This is a unique opportunity to professionally interact with NASA engineers!

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

The NASA Systems Engineering Award gives students participating 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 the NASA competition is optional.

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

The first document, the Project Readiness Review/Preliminary Design Review (PRR/PDR) is limited to four pages in length. The PRR/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 a PRR/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 Systems Engineering Report, will consist of eight pages containing a "lessons learned" summary, a configuration management list, a risk matrix, and an interface list. Teams will have the opportunity to consult with NASA experts via an online forum. 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 third document, the As Built Report, will be submitted during the onsite inspection of the aircraft at the competition. This report identifies changes from the final design and justifies the differences.

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.

For more information on this award such as project guidelines as well as an overview of NASA Systems Engineering, please visit the SAE Aero Design website at <http://students.sae.org/competitions/aerodesign/> and select the "NASA Systems Engineering Award" under General Information.

Aero Design® Registration Reminder

Time is running out to register for the 2008 SAE Aero Design® competitions. With record registrations in 2007 it is expected that the competitions will reach their maximum limit before registration closes on December 27, 2007. The East and West events are limited to 65 teams each, so be sure to register your team while space is still available. For more information on the SAE Aero Design events, please visit our website at <http://students.sae.org/competitions/aerodesign/>. To catch a glimpse of what you can expect to see at the events, select the link on our website entitled "Video Aero Design® 2007 Events".

Events:

Aero Design® West

April 4-6, 2008 • Fort Worth, Texas, USA

Hosted by Lockheed Martin

Aero Design® East

April 18-20, 2008 • Marietta, Georgia, USA

Hosted by Lockheed Martin

**FORMULA SAE
ANTHROPOMETRIC REFERENCE DATA
5TH PERCENTILE FEMALE
&
95TH PERCENTILE MALE**

For 2008, we have introduced a requirement in the Vehicle Design Objectives, Rule 1.2, that among other things, "The car... should accommodate drivers whose stature varies from a 5th percentile female to a 95th percentile male." This has been done because, in spite of the long standing design objective that "the students are to assume that a manufacturing firm has engaged them to design, fabricate and demonstrate a prototype car for evaluation as a production item," and that "the intended sales market is the nonprofessional weekend autocross racer," many cars have been designed just to fit the members of that specific team, not the wider potential market.

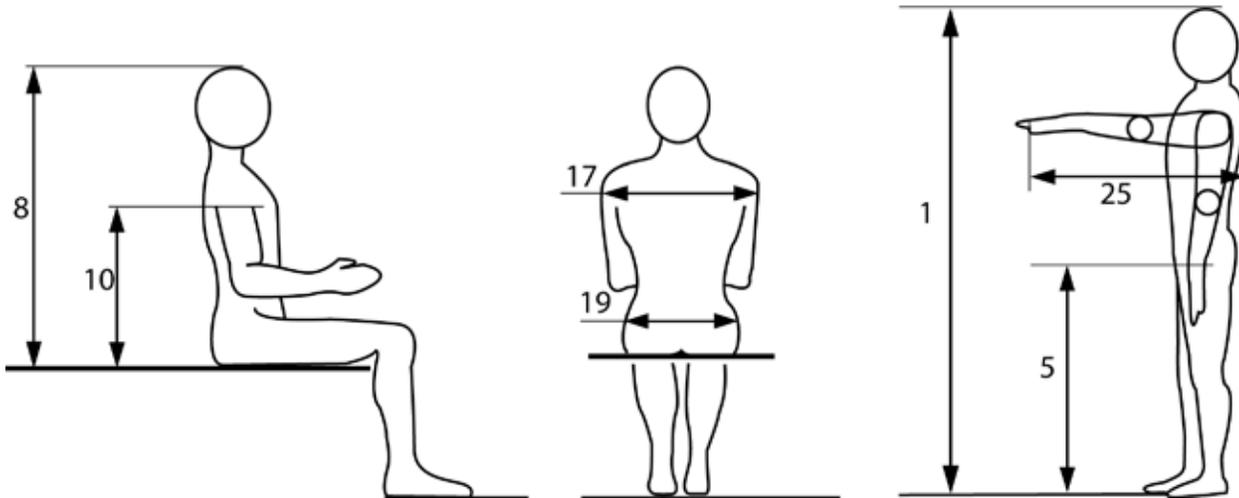
To assist the teams, the following data has been assembled to give some significant dimensions for a 5th percentile female and a 95th percentile male. While this data is primarily based on North American subjects, the information we have from the UK indicates that the UK subjects are a just fraction of an inch shorter in height and even less in sitting height. Therefore, we believe that this data is representative for North America (the USA and Canada), Western Europe, Australia and New Zealand, which are the major potential markets for a vehicle of this type.

Attached is a chart giving some basic dimensions.

Dimension #	Dimension	Measurements			
		95th Percentile Male		5 th Percentile Female	
		Metric	Imperial	Metric	Imperial
	Weight	102 kgs	225 #	49 kgs	108 #
1	Standing Height	186.5 cms	73.4 ins	151.5 cms	59.6 ins
5	Hip Height	100.0 cms	39.4 ins	74.0 cms	29.1 ins
8	Erect Sitting Height	97.0 cms	38.2 ins	79.5 cms	31.3 ins
10	Sitting Shoulder Height	64.5 cms	25.4 ins	50.5 cms	19.9 ins
17	Sitting Shoulder Width	50.5 cms	19.9 ins	37.5 cms	14.8 ins
19	Hip Width	40.5 cms	15.9 ins	31.0 cms	12.2 ins
25	Shoulder Grip Length	71.5 cms	28.1 ins	55.5 cms	21.9 ins
30	Foot Length - bare	28.5 cms	11.2 ins	22.0 cms	8.7 ins
31	Foot Width - bare	11.0 cms	4.3 ins	8.5 cms	3.3 ins

The numbers in the diagram below refer to the "Dimension #" in the left hand column of the chart above.

FORMULA SAE ANTHROPOMETRIC REFERENCE FIGURES



In designing your car for this range of builds, you do not have to have the same seat or seat insert for all drivers. The idea is that the one basic car design should be able to accommodate, and hence be saleable to drivers of a range of statures from the 5th percentile female to the 95th percentile male.

Apart from the mandated requirement that your roll hoops meet the "Percy" rule (3.3.4.1), covering this range of statures will mean attention to driver visibility, steering wheel and shifter locations, pedals, and lap and shoulder belt angles. And do not forget the head restraint!

Michael Royce,
Chairman,
FSAE Rules Committee

FORMULA SAE

2008 FUELS

Sunoco is again supporting the Formula SAE events in the USA by supplying the fuels for all three events, Formula SAE VIR, Formula SAE (Michigan) and Formula SAE West (California).

The fuels for all three events will come from the same batches.

The information we have from Sunoco at this time is given below. However, gasoline formulations are seasonally adjusted and the exact chemical composition may vary. If more information becomes available, it will be posted on the official Formula SAE web site.

"93 Octane"

- This fuel will be commercially available Sunoco Ultra 93 from a Philadelphia area refinery.
- The (R+M)/2 will be 93.
- The Research Octane Number (ROM) will be 97-98.
- It will be reformulated gasoline (RFG).
- It will contain 9-10% ethanol by volume.
- It will be similar in characteristics to the "94 Octane" fuel provided for the 2007 events.

"100 Octane"

- This fuel will be supplied from Sunoco's Pennsylvania pilot plant.
- It will be Sunoco 260 GT unleaded race fuel.
- The (R+M)/2 will be 100.
- The RON will be 105
- It will be reformulated gasoline (RFG).
- It will contain 9-10% ethanol by volume.
- It will be similar in characteristics to the "100 Octane" fuel provided for the 2007 events.
- More information can be found at:
<http://www.sunocoinc.com/Site/Consumer/RaceFuels/UnleadedFuels/Sunoco260GT.htm>

E85

- This fuel will be supplied from Sunoco's Pennsylvania pilot plant.
- It will contain 80-82% ethanol by volume.
- The denatured ethanol will probably be blended with a premium (91+ octane) street gasoline to make the E85.

Michael Royce,
Chairman,
FSAE Rules Committee.
14th November 2007.

FREQUENTLY ASKED QUESTIONS FOR FORMULA SAE

In an effort to cut down on the number of questions that are sent in to the Formula SAE rules Committee every year, a number of the most frequently asked questions and their answers are posted on the official Formula SAE web site at:

<http://www.formulasae.org/forums/formula/dispatch.cgi/rules/folderFrame/100066/0/def/bf56>

In mid-October, we updated and reposted twenty nine (29) of them, and at the end of October we added another five (5).

The subjects of the first 29 were:

2.2.4.1	First Year Vehicles	3.5.3.7	Fuel Lines
3.2.6	Jacking Point	3.5.3.8.A	High Pressure Fuel Lines
3.3	Tubing Wall Thickness	3.5.3.8.C	Intake Manifold Attachment
3.3.4.1	95th Percentile Mannequin	3.5.3.9	Air Intake Side Impact Protection
3.3.4.1	Percy's Position	3.5.4	Throttle Body for Traction Control
3.3.6	Driver's Foot Protection	3.5.4.2	Electronic Throttle Control (ETC)
3.3.6.2	Square Tubing	3.5.4.2	Throttle Kickers
3.3.6.2	Front Bulkhead Support Triangulation	3.5.4.3	Restrictor Dimensions
3.3.6.4	Impact Attenuator Data Submission	3.5.4.3	Velocity Gates
3.4.1	Driver's Restraint System	3.7.1.1	Splitters
3.4.10.1	Firewall	3.7.2.2	Securing Fasteners
3.4.13	Seat	3.7.2.2	Wheel Nuts
3.4.14	Driver's Leg Protection	3.7.3	Changing Parts
3.5.1.1 & 3.5.2 Engines & Fuels		3.7.5	High Pressure Hydraulics
3.5.1.5	Catch Cans		

The titles of the most recent 5 are:

1.2	Vehicle Design Objectives (5th Percentile Female & 95th Percentile Male)
3.3	Shoulder Harness Bar
3.3	Closed Section Tubing
3.3.5.1	Main Hoop Bracing
3.4.13	Seat Back Angle

Please go to this web site and see if your questions are answered before sending them in to katklauz@aol.com.

For those teams entering any of the events in the official Formula SAE Series, i.e. the three US events, Formula Student, Formula SAE-Australia, Formula SAE Italy and Formula SAE Brazil, the answers you get to questions should be consistent between events, as we share questions and answers between the technical staffs of these events.

Michael Royce,
Chairman,
Formula SAE Rules Committee.

Formula SAE at VIR Registration

Registration for the Formula SAE at VIR event will close on Thursday, December 27, 2007. There are still eight (8) slots available for any teams who have not already registered for the event and who are interested. The event is April 23 – 26, 2008 and is being hosted at the Virginia International Raceway in conjunction with the Rolex 400. Any questions can be directed to CollegiateCompetitions@sae.org.

THE 2009 COCKPIT RULES

The Rules Committee has noticed several disturbing trends. While it is now mandatory that all cars meet the "Percy Rule" for roll bar heights, quite a number of cars still do not accommodate the 95th percentile male driver, which is part of the intent of Rule 1.2. Cockpits have shrunk around the drivers, making getting in and out more difficult. More drivers are having to thread their feet past the steering rack as they get into the car, and many drivers are driving with their knees or legs either touching or hard against the front roll hoop, the lower edge of the instrument panel or some other hard surface.

Also, some sled tests performed by Kettering University on an FSAE chassis have indicated that with a horizontal bar or steering rack directly above the driver's shins, a typical design feature in Formula SAE cars, there would be a high risk of injury to the driver's legs in the event of a severe frontal impact.

Additionally, as some teams become more established, we are seeing a large number of chassis or monocoques becoming "evolutionary", i.e. even though the team builds a "new chassis", it has changed in only minor details from the previous year or years.

Therefore, the Rules Committee has decided to shake things up a little bit.

- For 2009, the plan is to take a leaf out of Formula1's Rule Book, and require:
- A minimum cockpit opening when viewed from above
- A minimum vertical pass-through area from the driver's seating position towards the pedals
- The ability of the belted-in driver to bring his knees up towards his chest past the Front Roll Hoop and past the plane of the steering wheel.
- These proposed 2009 requirements are all listed in Section 6 of the 2008 Formula SAE Rules with drawings of the two templates that are proposed to be used.
- We have been asked whether the templates, Drawings X and Y, shown in the 2008 Rules are the ones that will be used for 2009.

Our answer has been as follows:

"Obviously, the 2009 Rules are not yet formulated. However, Section 6 of the 2008 Rules gives you a preview of the major changes the Rules Committee is contemplating for 2009, including the templates that will be used to evaluate cockpit size. What we can say is that the templates will not be any bigger than the drawings currently in the 2008 Rules. Based on final surveys from the Australian event, they might, only might, be a little smaller. But if they do change, it will not be by much. If you build your car to the templates currently shown in the 2008 Rules, they will meet the 2009 Rules."

Another word of caution. The Formula SAE Rules are applied by calendar year, i.e. the 2009 Rules will apply to ALL events held in 2009, and ALL cars must meet these rules, even if they fall within the 12 month period of the "first year car" rule. Therefore, any team that is building a car that will be first used in a competition held after May 2008, i.e. the car's first competition is 2008 Formula SAE West, 2008 Formula Student, 2008 Formula SAE Italy, 2008 Formula SAE Brazil or 2008 Formula SAE Australasia, with the intention of entering 2009 Formula SAE (Michigan) or perhaps 2009 Formula SAE VIR if there is one, will have to be built to the new template rules, or be heavily modified for the 2009 events. This is an area where a lot of teams will need to be careful because the rule year and the "first year car" use limit won't always coincide.

Michael Royce,
Chairman,
Formula SAE Rules Committee.