FORMULA SAE®

2013 Formula SAE Series
Official Events

- **FORMULA HYBRID**
on organized by Dartmouth College
April 29th – May 3rd
New Hampshire, United States

- **FORMULA SAE MICHIGAN**
on organized by SAE International
May 8th – 11th
Michigan, United States

- **FORMULA SAE LINCOLN & FORMULA SAE ELECTRIC**
on organized by SAE International
June 19th – 22nd
Nebraska, United States

- **FORMULA SAE-AUSTRALASIA**
on organized by SAE Australia
Australia
www.saea.com.au/formula-sae-a

- **FORMULA STUDENT AUSTRIA**
on organized by FSA
Austria
www.fsaustralia.at

- **FORMULA SAE – BRASIL**
on organized by SAE Brasil
Brasil
www.saebrasil.org.br

- **FORMULA SAE – ITALY**
on organized by ATA
Italy
www.ata.it/formulaata/formulasaeit

- **FORMULA STUDENT**
on organized by IMechE
United Kingdom
www.formulastudent.com

- **FORMULA STUDENT GERMANY**
on organized by FSG e.V.
Germany
www.formulastudent.de

- **FORMULA STUDENT JAPAN**
on organized by JSAE
Japan
www.jsae.or.jp/formula/en

http://students.sae.org/competitions/formulaserie/
Dear Formula SAE® Participants and Organizers:

Welcome to the Formula SAE competition in Lincoln, Nebraska.

Formula SAE is steeped in tradition and competition. Now in its 35th year, Formula SAE provides the real-world challenges of systems engineering, design and problem solving, along with the teaming challenges of collaboration and cooperation. In short, Formula SAE, along with all of the SAE Collegiate Design Series™ competitions, provides the skills and experiences needed for a well-rounded engineering education.

In addition to learning, Formula SAE also provides a unique form of competition. This week, collegiate engineering students from many different nations will compete in a series of static and dynamic events designed to challenge their engineering, problem-solving and teamwork skills. The students will work hard and compete to win. Some will win first place, others will not. But all will leave here a winner because they will be better engineering students.

Good luck to all who are competing in this event. Also, I want to thank everyone for their hard work, support, volunteerism and participation. The experiences and learning you gain this weekend will last throughout your lives.

Sincerely,

Donald G. Hillebrand

President, SAE International
The Formula SAE® Series competitions challenge teams of university undergraduate and graduate students to conceive, design, fabricate and compete with small, formula style, competition vehicle. To give teams the maximum design flexibility and the freedom to express their creativity and imaginations there are very few restrictions on the overall vehicle design. Teams typically spend eight to twelve months designing, building, testing and preparing their vehicles before a competition. The competitions themselves give teams the chance to demonstrate and prove both their creation and their engineering skills in comparison to teams from other universities around the world. Registered for this event are 80 Internal Combustion Teams and 20 Electric Teams from colleges and universities. The end result is a great experience for young engineers in a meaningful engineering project as well as the opportunity of working in a dedicated team effort.

For the purpose of this competition, the students are to assume that a manufacturing firm has engaged them to produce a prototype car for evaluation as a production item. The intended sales market is the nonprofessional weekend competitor. Therefore, the car must have very high performance in terms of its acceleration, braking, and handling qualities. The car must be low in cost, easy to maintain, and reliable. In addition, the car’s marketability is enhanced by other factors such as aesthetics, comfort and use of common parts. The manufacturing firm is planning to produce four (4) cars per day for a limited production run. The challenge to the design team is to design and fabricate a prototype car that best meets these goals and intents. Each design will be compared and judged with other competing designs to determine the best overall car.

Over the course of three days, the cars are judged in a series of static and dynamic events including: technical inspection, cost, presentation, and engineering design, solo performance trials, and high performance track endurance. These events are scored to determine how well the car performs. In each event, the manufacturing firm has specified minimum acceptable performance levels that are reflected in the scoring equations.
**STATIC EVENTS:**

**Design Report:** The students explain their constructive solutions to a jury of experts from the automotive and motorsport industries in report and discussion. The concept of the design is to evaluate the engineering effort that went into the design of the car and how the engineering meets the intent of the market. The car that illustrates the best use of engineering to meet the design goals and the best understanding of the design by the team members will win the design event.

**Cost Report:** The students are to assume that a serial production of 1000 cars a year will follow the prototype. The cost calculation is discussed with a jury based on a report. The objective of the event is for the participants to learn and understand the manufacturing techniques and processes of some of the components that they have chosen to purchase rather than fabricate themselves.

**Presentation:** The objective is to evaluate the team’s ability to develop and deliver a comprehensive business case that will convince the executives of a fake manufacturing firm that the team’s design best meets the demands of the amateur weekend competition market and that it can be profitably manufactured and marketed.

**DYNAMIC EVENTS:**

**Acceleration:** The cars are evaluated on their accelerating abilities from a standing start over a distance of 75 meters.

**Autocross:** The objective is to evaluate the car’s maneuverability and handling qualities on a tight course without the hindrance of competing cars. The course will combine the performance features of acceleration, braking and cornering into one event. The results of the Autocross scores determine the starting order for endurance.

**Skid-Pad:** The objective is to measure the car’s cornering ability on a flat surface while making a constant-radius turn. The course will be a pair of concentric circles in shape of the number 8; the cars demonstrate how good lateral forces can be absorbed (up to 1.4g).

**Endurance:** Over a distance of 22 km the cars have to prove their durability under long-term conditions. Acceleration, speed, handling, dynamics, fuel efficiency, reliability – the cars have to prove it all.

THE FOLLOWING POINTS ARE POSSIBLE:

<table>
<thead>
<tr>
<th>Static Events</th>
<th>75</th>
<th>Presentation</th>
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<tbody>
<tr>
<td>(Thursday)</td>
<td>150</td>
<td>Design</td>
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<tr>
<td></td>
<td>100</td>
<td>Cost Analysis</td>
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<table>
<thead>
<tr>
<th>Dynamic Events</th>
<th>75</th>
<th>Acceleration</th>
</tr>
</thead>
<tbody>
<tr>
<td>(Friday &amp; Saturday)</td>
<td>50</td>
<td>Skid-Pad</td>
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<tr>
<td></td>
<td>150</td>
<td>Autocross</td>
</tr>
<tr>
<td></td>
<td>100</td>
<td>Fuel Efficiency</td>
</tr>
<tr>
<td></td>
<td>300</td>
<td>Endurance</td>
</tr>
</tbody>
</table>

**TOTAL POINTS**: 1000
2013 Formula SAE® Lincoln & Formula SAE Electric
Schedule of Events
(Subject to change)

WEDNESDAY, JUNE 19 .................................................................LOCATION
9:00 a.m. ................................ EV Tech Volunteer Review & EV Safety Briefing ...................... Danley Building
10:00 a.m. .......................... Tech Inspection “Take-a-Number” Opens ................................. Danley Building
10:00 a.m. ......................... IC Tech Inspectors Review Session & EV Safety Briefing .......... Danley Building
4:00 p.m. – 5:15 p.m. ........ Design Training Review (open to all design judges) .................. Main Tent
5:30 p.m. .......................... Welcome Ceremony - Sponsored by Honda R&D Americas ...... Main Tent
6:00 p.m. – 6:20 p.m. ....... Captain and Advisors Meeting ......................................................... Main Tent
6:30 p.m. .......................... ALL Cost/Design and Dynamic Tech Volunteers (tilt, rain, noise, break & practice) Basic EV Safety Briefing ........................................ Main Tent
7:30 p.m. .......................... Official Closing of the Site .......................................................... Main Tent
8:00 p.m. ......................... EVERYONE MUST BE OFF SITE

THURSDAY, JUNE 20 (ALL TIMES PRECEDED BY “~” ARE APPROXIMATE) ....................LOCATION
7:30 a.m. .......................... Judges Meeting for Design .......................................................... Danley Building
8:00 a.m. .......................... Judges Meeting for Cost .............................................................. Main Tent
8:00 a.m. .......................... Judges Meeting for Presentation ..................................................... Arnold Elementary
8:00 a.m. .......................... Drivers Meeting (Brake & Practice) - MANDATORY ....................... Main Tent
8:30 a.m. – 5:30 p.m. .... Design Event - 1st Round Judging Open ........................................ Main Tent
9:00 a.m. – 5:00 p.m. .... Cost Judging Open ............................................................................. Main Tent
9:00 a.m. – 5:00 p.m. .... Presentation Judging Open ................................................................. Arnold Elementary School
Noon – 1:00 p.m. ............... Lunch Break ................................................................................. Main Tent
5:30 p.m. – 8:30 p.m. .... Design Judges Meeting - Judges only ............................................... Danley Building
6:00 p.m. .......................... Drivers Meeting (All Dynamic Events) - MANDATORY ................. Main Tent
~6:30 p.m. ........................ Track Marshalls/Dynamic Event Volunteers EV Safety Briefing .... Main Tent
7:30 p.m. .......................... Official Closing of the Site .............................................................. Main Tent
8:00 p.m. ......................... EVERYONE MUST BE OFF SITE .................................................
~9:00 p.m. ......................... Design Finalist announced online ........................................ Main Tent

FRIDAY, JUNE 21 (ALL TIMES PRECEDED BY “~” ARE APPROXIMATE) .........................LOCATION
8:30 a.m. ....................... Course Crew Briefing - Acceleration and Skid Pad ......................... Track
9:00 a.m. – 12:30 p.m. ..... Acceleration and Skid Pad Event Events Open ............................ Track
9:00 a.m. – 4:00 p.m. .... Design Feedback for Non-finalists (by appt. only) ......................... Danley Building
9:30 a.m. ....................... Presentation Seminar ................................................................. Main Tent
12:30 p.m. ..................... Lunch Break .................................................................................. Main Tent
1:35 p.m. ....................... Course Crew Briefing – Autocross ............................................. Track
2:00 p.m. – 5:00 p.m. .... Autocross Event Open .................................................................. Track
~5:30 p.m. – 8:30 p.m. Design Finals .................................................................................. Danley Building
7:30 p.m. .......................... Official Closing of the Site .............................................................. Main Tent
6:30 p.m. ....................... Volunteer Thank You Reception sponsored by SCCA Foundation .......................................................... Speedway Motors Museum
9:00 p.m. ......................... EVERYONE MUST BE OFF SITE
SATURDAY, JUNE 22 (ALL TIMES PRECEDED BY “~” ARE APPROXIMATE) ... LOCATION
7:00 a.m. – 8:00 a.m. ......Endurance Course Walk .........................................................Track
8:30 a.m...............................Endurance Course Briefing ............................................Track
~8:30 a.m. .........................Top 3 Teams Design Finalists Announced .........................Main Tent
~9:00 a.m. – 2:00 p.m. ......Design Feedback for Finalists not Top 3, by appointment......................................................Danley Building
9:00 a.m...............................Endurance/Fuel Efficiency Event Open – Group 1 Only ......Track
~12:00 p.m...........................Endurance/Fuel Efficiency Gate Closes for Group 1 ............Track
~12:30 p.m. - 1:00 pm......Endurance Course Walk .........................................................Track
~12:30 p.m. .........................Lunch Break ................................................................. Main Tent
1:30 p.m. ......................Course Crew back on track .......................................................Track
~1:35 p.m. .........................Endurance Event Opens – EV Group Only ............................Track
~2:35 p.m. .........................Endurance/Fuel Efficiency Event Open – Group 2 Only ......Track
~5:00 p.m. .........................Endurance/Fuel Efficiency Gate Closes for Group 2 ............Track
~6:00 p.m...............................Presentation Highlights ...............................................Main Tent
~7:00 p.m. .........................Public Design Review of Top 3 Finalists ..............................Main Tent
~8:00 p.m...............................Final Awards Ceremony ...............................................Main Tent
9:30 p.m. ..........................Official Closing of the Site ....................................................Main Tent
~10:00 p.m. .........................EVERYONE MUST BE OFF SITE

SUNDAY, JUNE 23
9:00 a.m. – 2:00 p.m. .......Site Open ONLY for Pick-Up of Transporters

NOTES
1) No Access Monday - Site closed to all teams Monday, June 17th & Tuesday June 18th.
2) Medical Services - There will not be a First Aid Station on site. EMS will provide any/all medical attention.
3) Overnight Removal - Overnight removal of vehicles is allowed, but tech must first pull Part 1 of your tech sticker.
4) IC & EV cars will be run in conjunction at all Static & Dynamic Events (except Endurance) but will be scored in their respected categories
5) Removing Cars - All teams not shipping cars must remove vehicles, etc. from the site not later than 2:00 p.m. Sunday, June 23, 2013.
6) Shipping Cars - Teams shipping cars must have them picked up and removed from Lincoln Airpark by 11:00 a.m. Monday, June 23, 2013.
7) FM Audio - Announcements can be heard via FM radio (Frequency will be announced at event).
8) Event Closing Times - Acceleration, Skid-Pad and Autocross close exactly at the scheduled time. Your car must cross the starting line before the event closing time in order to be allowed to complete that run.

SUPPORT SERVICES
- Ambulance on site:
  * Wed. – Sat. 7 a.m. - 8 p.m.
- Announcements (Main Tent):
  * Th – Sat. 7:30 a.m. - 6 p.m.
- Food Vendors – See map for location *
  * All days – 8:00 am – 5:00 pm
- Information (Registration Tent):
  * Th – Sat. 7:30 a.m. - 6 p.m.

- Hoosier*
  * Wed. – 1:30 p.m. – 5:00 p.m.
  * Th. – Fri. – 9:00 a.m. – 5:00 p.m.
  * Sat. – 9:00 a.m. - Noon
- Land & Sea Dyno*
  * Th. Noon – 5:00 p.m.
  * Fri. 9:00 a.m. – 5:00 p.m.
  * Sat. 9:00 a.m. – 4:00 p.m.
- Lincoln Electric Welding Services*
  * Wed. – 1:30 p.m. – 5:00 p.m.
  * Th. – Fri. – 9:00 a.m. – 5:00 p.m.
  * Sat. – 9:00 a.m. - Noon

* As business dictates. May close earlier if deemed appropriate.

DAILY OPERATIONS:
- Lincoln Airpark Site Open:
  * Wed. 8:00 a.m. – 7:30 p.m.
  * Th. – Sat. 7:30 a.m. – 7:30 p.m.
- Student Registration (Registration Tent):
  * Wed. – Fri. 8:00 a.m. – 4:30 p.m.
  * Th. & Fri. 8:00 a.m. – 4:00 p.m.
  * Sat. All students will be registered as spectators
- Volunteer Registration & Info (Tent):
  * Wed. 7:00 a.m. – 5:00 p.m.
  * Th. – Sat. 7:00 a.m. – 4:30 p.m.
- Tech Inspection (Danley Building):
  * Wed. 10:00 a.m. Tech “Take-A-Number” Opens
  * Wed. Noon – 5:00 p.m. (no new cars after 4 p.m.)
  * Th. 9:00 a.m. – 5:00 p.m.
  * Fri. By appointment 9:00 a.m. until 5:30 p.m.
  * Sat. By appointment 9:00 a.m. until 1:00 p.m. (Re-tech only)
- Scales (Danley Building):
  * Wed. 1:00 p.m. – 5:00 p.m.
  * Th. 8:00 a.m. – 4:00 p.m.
- Tilt/Noise/Brake:
  * See Map
  * Th. 9:00 a.m. – 5:00 p.m. (Staggered opening by 30 min. per event)
  * Fri. 9:00 a.m. - 5:30 p.m.
- Fuel Station(s)/Charging Station:
  * See Map
  * Th. 8:30 a.m. – 5:00 p.m.
  * Fri. 8:00 a.m. – 5:00 p.m.
  * Sat. 7:30 a.m. - 5:00 p.m.

Practice Area:
  * Th. 10:00 a.m. – 5:00 p.m.
  * Fri. 9:00 a.m. - 5:30 p.m.
  * Sat. 8:00 a.m. – 3:00 p.m.

NOTE: IC Cars must complete all 4 parts of tech/EV Cars must complete all 5 parts of tech by 5:30 p.m. Friday to qualify for Endurance. 30 minute notice is required for all appointments, which can be booked through the announcer in Main Tent.
2013 Formula SAE® Lincoln & Formula SAE Electric

Competition Awards

**SPIRIT OF EXCELLENCE AWARD – IC CLASS**
This award recognizes the Top 10 finishers with overall highest accumulative scores.

**SPIRIT OF EXCELLENCE AWARD – EV CLASS**
This award recognizes the Top 5 finishers with overall highest accumulative scores.

**STATIC EVENTS - (Awards will be given to both IC and EV Classes)**

**COST AWARD**
This award recognizes the Top 3 IC finishers with overall highest accumulative scores in Cost.

**ENGINEERING DESIGN AWARD**
This award recognizes the Top 3 finishers with overall highest accumulative scores in Design.

**PRESENTATION AWARD**
This award recognizes the Top 3 finishers with overall highest accumulative scores in Presentation.

**DYNAMIC EVENTS - (Awards will be given to both IC and EV Classes)**

**ACCELERATION AWARD**
This award recognizes Top 3 finishers with fastest speeds/highest accumulative scores in Acceleration.

**AUTOCROSS AWARD**
This award recognizes Top 3 finishers with fastest speeds/highest accumulative scores in Autocross.

**ENDURANCE AWARD**
This award recognizes Top 3 finishers with fastest speeds/highest accumulative scores in Endurance.

**FUEL EFFICIENCY AWARD**
This award recognizes Top 3 finishers who receive highest scores accumulated on best fuel efficiency.

**SKID PAD AWARD**
This award recognizes Top 3 finishers with fastest speeds/highest accumulative scores in Skid Pad.

**SPECIALITY AWARDS - (This are special created sponsored awards; some may require application process)**

**“PAY FOR PERFORMANCE” AWARD**
(Both IC & EV Classes Eligible)
A key to Nucor’s success has been our “pay for performance” compensation strategy that heavily rewards the team for working together to maintain our productivity and profitability and we want to share a little bit of our culture with the student teams through this award.

(Acceleration score + Skid pad score + Autocross score + Endurance score + Economy score) / (dollar amount from cost event) = points/dollar

**THREE VIEW DRAWING EXCELLENCE AWARD**
Awarded to the top ten Formula SAE teams who submit the best executed three view drawings, per the Formula SAE Rule S6.4.
SOLIDWORKS EDUCATION PROGRAM

3D Design, Simulation, Documentation, Engineering Analysis Software

Designed in SolidWorks by Aldebaran Robotics.
www.solidworks.com/education
## 2013 Formula SAE® Lincoln Registered Teams

### BRAZIL
- 11 Universidade Federal de Santa Maria

### CANADA
- 16 Univ of Alberta
- 45 Univ of Calgary
- 21 Univ of British Columbia
- 29 Univ of Victoria
- 20 Univ of Guelph
- 90 University of Manitoba
- 8 Queen's Univ - Ontario Canada
- 36 Concordia University
- 72 Ecole Polytechnique De Montreal
- 73 McGill Univ
- 14 Univ of Saskatchewan

### INDIA
- 46 Univ of Pune
- 53 Lovely Professional University
- 19 Sona College of Technology

### JAPAN
- 57 Honda Technical College Kansai

### MEXICO
- 66 Instituto Tecnologico de Chihuahua
- 52 Universidad Nacion Autonoma De Mexico
- 61 ESIA Tlalnepantla
- 63 IPN - ESIME UP Ticomán

### UNITED STATES

#### Alabama
- 70 Auburn Univ

#### California
- 7 California State Poly Univ - Pomona
- 13 California State Univ - Sacramento
- 15 San Diego State Univ
- 22 Univ of Calif - Berkeley
- 24 Univ of California-Merced
- 27 California State Univ - Fresno
- 33 California State Univ - Long Beach
- 39 California State Univ - Fullerton
- 42 Central Connecticut State Univ
- 47 California Polytechnic State Univ-SLO
- 48 Univ of Southern California
- 49 California State Univ - Northridge
- 67 Univ of Calif - Los Angeles
- 69 California State Univ - Chico
- 84 San Jose State University

#### Colorado
- 85 Colorado State University

#### Connecticut
- 17 Colorado School of Mines

#### Delaware
- 44 Univ of Delaware

#### Florida
- 9 Univ of South Florida

#### Georgia
- 75 Southern Polytechnic State Univ

#### Hawaii
- 60 Univ of Hawaii - Manoa

#### Illinois
- 51 IUPUI
- 54 Southern Illinois Univ - Edwardsville
- 58 Southern Illinois Univ - Carbondale
- 79 Univ of Illinois - Urbana Champaign

#### Iowa
- 23 Iowa State Univ

#### Kansas
- 1 Univ of Kansas - Lawrence
- 81 Kansas State Univ
- 86 Wichita State Univ

#### Massachusetts
- 41 Univ of Massachusetts - Dartmouth

#### Michigan
- 6 Michigan State Univ
- 82 Kettering Univ
- 89 Oakland University

#### Missouri
- 71 Missouri University of Science and Tech
- 76 Univ of Missouri

#### Montana
- 56 Montana State Univ - Bazeman

#### Nebraska
- 26 Univ of Nebraska - Lincoln

#### New Jersey
- 83 Rutgers Univ

#### New Mexico
- 10 Univ of New Mexico

#### North Carolina
- 68 North Carolina A & T State Univ

#### North Dakota
- 43 Univ of North Dakota

#### Ohio
- 77 Univ of Cincinnati

#### Oklahoma
- 25 Univ of Oklahoma
- 64 Oklahoma State Univ

#### Oregon
- 32 Oregon Inst of Tech

#### Pennsylvania
- 59 Drexel Univ

#### Puerto Rico
- 55 Polytechnic Univ of Puerto Rico

#### South Dakota
- 38 South Dakota State Univ
- 78 South Dakota Sch of Mines & Tech

#### Tennessee
- 30 Middle Tennessee State Univ

#### Texas
- 2 Univ of Texas - Arlington
- 5 Texas A & M Univ - College Station
- 12 Univ of North Texas
- 34 Univ of Texas - San Antonio
- 37 Univ of Texas - Austin

#### Utah
- 28 Univ of Utah

#### Virginia
- 74 Virginia Tech

#### Washington
- 4 Univ of Washington

#### Wisconsin
- 18 Univ of Wisconsin - Platteville
**2013 Formula SAE® Electric Registered Teams**

**AUSTRIA**
E202 Graz Univ of Technology

**BRAZIL**
E201 Universidade Estadual de Campinas

**CANADA**
E218 Univ of Manitoba
E203 Universite de Sherbrooke
E208 Ecole Polytechnique De Montreal
E209 McGill Univ

**UNITED STATES**

**California**
E212 California State Poly Univ - Pomona
E215 Univ of Calif - San Diego
E216 California Polytechnic State Univ-SLO
E221 Univ of Calif - Irvine

**Illinois**
E207 Illinois Inst of Tech
E217 Univ of Illinois - Urbana Champaign

**Kansas**
E213 Univ of Kansas - Lawrence

**Massachusetts**
E205 Massachusetts Inst of Tech

**Michigan**
E219 Univ of Michigan - Dearborn

**New Mexico**
E219 Univ of Michigan - Dearborn

**Ohio**
E214 Univ of Akron

**Washington**
E210 Univ of Washington
E211 Western Washington Univ

**Wisconsin**
E220 Univ of Wisconsin - Madison

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**Welcome Formula SAE® Teams!**

Lincoln is moving fast...come see what we’re all about.

Lincoln.org
For 2013, UTA Racing has focused on reducing compliance of the chassis and suspension and increasing aerodynamic downforce. The steel space frame was iterated to increase torsional stiffness without incurring additional weight over the 2012 design. To meet this goal, the front frame geometry was simplified, allowing for additional triangulation in the cockpit area. Aluminum uprights were implemented, along with a large diameter wheel bearing and live hub, which decreased compliance under lateral loading. Steering geometry was designed around tire data, in order to operate at peak slip angles at various turn radii, with emphasis placed on smaller turns typical of FSAE. The compact, lightweight Yamaha YFZ450R engine was implemented with a cfrp intake and three stage header.

Notably, UTA Racing has implemented 5 element, actively controlled wings front and rear, along with a diffuser. A 5 element layout provides substantial downforce, while active control reduces drag during maneuvers requiring less aerodynamic grip.

University of Kansas - Lawrence
Jayhawks Motorsports

The team was founded in 1994 by a group of six mechanical engineers, and is now a team of 36 undergraduate seniors and several volunteers. Team members represent several disciplines including mechanical and electrical engineering, computer science, industrial design, and business.

Jayhawk Motorsports has a long history of success in FSAE competitions with 7 top ten finishes over the past 6 years including 1st place overall at both the 2012 FSAE Lincoln and Formula Hybrid (Electric division) events. For 2013, JMS has designed two new and highly improved racecars, the JMS13c (combustion) and JMS13e (electric), to be top contenders at FSAE competitions.

University of Texas - Arlington
UTA Formula SAE

For 2013, UTA Racing has focused on reducing compliance of the chassis and suspension and increasing aerodynamic downforce. The steel space frame was iterated to increase torsional stiffness without incurring additional weight over the 2012 design. To meet this goal, the front frame geometry was simplified, allowing for additional triangulation in the cockpit area. Aluminum uprights were implemented, along with a large diameter wheel bearing and live hub, which decreased compliance under lateral loading. Steering geometry was designed around tire data, in order to operate at peak slip angles at various turn radii, with emphasis placed on smaller turns typical of FSAE. The compact, lightweight Yamaha YFZ450R engine was implemented with a cfrp intake and three stage header.

Notably, UTA Racing has implemented 5 element, actively controlled wings front and rear, along with a diffuser. A 5 element layout provides substantial downforce, while active control reduces drag during maneuvers requiring less aerodynamic grip.
With an iterative car for 2013, the UWashington Formula Motorsports team is excited to show off our best car yet. Building off of 24 years of innovation, our car runs a single-cylinder motor, and has a carbon fiber chassis, integrated CV/hubs, a full aero package, pneumatic paddle shifting, and a tightly-packaged drivetrain. Relying heavily on physical testing to validate analysis, a great deal of care and attention to detail went into every part on the car. With one of the earliest assembly completions in recent team history, ample time has been spent testing and tuning the car for ultimate speed, reliability, and overall success. After Lincoln, the team will compete outside the US at Formula Student Germany.

BRAKE: Brembo/AP, Floating Slotted Disk
BSCD: 95.0x63.4mm / 1 / 449cc
COOLING: Single Radiator w/ PWM Fan
DRIVE: Chain
ELECTRONICS: EngineLab EL140, Student Designed Dash, Sensor and Control CAN Bus
ENGINE: Yamaha WR450F
FR/RR TRACK: 1220 / 1168mm
FRAME: Monocoque
FUEL SYSTEM: Returnless in Tank, Student-Designed PWM Control
FUEL TYPE: 92-95 Octane
MATERIAL: Toray T700
MPD: 7500
MPT: 5000
OLWH: 3007 / 1412 / 1130mm
SUSPENSION: Unequal A-Arm Pullrod
TIRE: Hoosier R25B
UNIQUE: Integrated CV, hub, and centerlock system
WEIGHT: 238kg
WHEELBASE: 1537mm

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With more than 27,000 of the world’s leading product development companies, including many of the leading automotive and racing companies like Aston Martin Racing, Penske Racing, NASCAR, Hyundai-Kia and Harley Davidson, PTC understands the challenges your team faces in designing, building, developing, and marketing your race vehicles.

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Texas A & M University - College Station
Texas A&M Racing

After making a strong return to Formula SAE in 2012 and taking 5th place in the Lincoln competition, the 2013 Texas A&M team has its sights set to compete with the best. The design focus centered on a lightweight, easily manufactured, and reliable car. The combination of these principles is tried and true for building a competitive car. The 2013 car uses a Yamaha WR450F single cylinder engine placed inside a steel space frame. This pairing provides a high power to weight ratio critical to dynamic event performance. Unique to Texas A&M this year is the addition of an aerodynamic package that features front and rear wings. Using extensive CFD work to validate the effectiveness of wings, the team expects substantial increases in performance. As with each Texas A&M team, the car is designed, built and tested in an 8 month window as the students’ capstone senior design project.

Michigan State University - College Station
Michigan State University Racing

Michigan State University’s 2013 Formula SAE entry, the SR-13, is an iteration on the team’s previous carbon fiber monocoque chassis. The SR-13 is designed to provide a reliable and tunable race car with a simple human machine interface that inspires driver confidence, and promises to be an exceptional challenger in this year’s competition. The SR-13’s well-developed powertrain, built around the Honda F4i, provides more power than ever over a broad torque curve. The electrical system features over 90 sensors to monitor car and driver performance and a dash display to relay the information while driving. The SR-13 also features an electro-pneumatic paddle shifting system, traction and launch control, and MSU’s first-ever aerodynamics package.

We would like to thank Michigan State University and all of our sponsors, friends, and family for their kind contributions and support!

**Texas A&M Racing**
- **Brake**: Outboard Front, Diff Mounted Rear
- **BSCD**: 97 mm / 64 mm / 1 cyl / 473 cc
- **Cooling**: Water Cooled
- **Drive**: Chain - Drexler Differential
- **Engine**: Yamaha WR450F
- **FR/RR Track**: 54 in / 52 in
- **Frame**: Steel Space Frame
- **Fuel System**: PE3 EFI
- **Fuel Type**: 93 Octane
- **Material**: MPD: 9500 RPM
- **MPT**: 7000 RPM
- **OLW**: 87 in, 65 in, 45 in.
- **Suspension**: SLA Pushrod
- **Tire**: 10" Hoosier LC0
- **Unique**: New Aerodynamic Package
- **Weight**: 535 lb
- **Wheelbase**: 60.5

**Michigan State University Racing**
- **Brake**: Wilwood PS-1 dual piston, Sintered metallic compound pads. Tilton 77 MC
- **BSCD**: 67 mm / 42.5 mm / Inline 4 cyl / 599 cc
- **Cooling**: Single front-ducted, sidepod mounted radiator 25.4 cm shroud-mounted fans
- **Drive**: Chain-driven Drexler Differential
- **Electronics**: Motec M400 with DDU7 Dash Display
- **Engine**: Honda CBR600F4i
- **FR/RR Track**: 1194 mm / 1194 mm
- **Frame**: Full carbon fiber monocoque with rear steel sub-frame
- **Fuel System**: Sequential fuel injection
- **Fuel Type**: 93 Octane
- **Material**: Carbon Fiber
- **MPD**: 10500 RPM
- **MPT**: 9000 RPM
- **OLW**: 2747.3 mm long, 1390.1 mm wide, 1098.3 mm high
- **Suspension**: Double unequal length A-Arm, Push-rod actuated spring and damper
- **Tire**: Continental 205 / 510 R13 M34
- **Unique**: Front and rear wing, electro-pneumatic paddle shifting system
- **Weight**: 640 lbs / 290 kg
- **Wheelbase**: 1588 mm
The 2013 Cal Poly Pomona Formula SAE team is high off their success in the 2012 event and has channeled that energy into their newest creation. The team’s efforts focused on making well justified design decisions and carefully planned manufacturing. The car features a four cylinder engine, 13in tires, custom intake and exhaust, Torsen differential and much more! In order to gain the most possible points in dynamic events the drivers went through extensive driver training and aerodynamics was added for maximum performance. With many returning members and one of the best cars Cal Poly Pomona has ever fielded this year is poised to be one of the best ever.

- BRAKE: Dual Piston 4 Caliper
- BSCD: 67mm/42.5mm/4cy/599mm
- COOLING: Custom Heat Exchanger
- DRIVE: Torsen Differential with Custom Housing
- ELECTRONICS: AEM EMS 4 with Custom Harness
- ENGINE: 2001 GSXR 600
- FR/RR TRACK: 48.7in/47.7
- FRAME: 4130 Chromoly Space Frame
- FUEL SYSTEM: Multi Port EFI
- FUEL TYPE: 91 Octane
- MATERIAL: 
- MPD: 84 BHP (9500rpm)
- MPT: 45 ft-lbs
- OLWH: 121in/48in/52.2in
- SUSPENSION: Unequal Double Wishbone
- TIRE: 13 x 7 x 21.5
- UNIQUE: Single Plane Wing Profile, Stressed Seat
- WEIGHT: 565 lbs
- WHEELBASE: 60.25
LOBOMotorSports got a taste of victory placing 10th last year and is hungry for more. The LMS-13 was designed, manufactured, and tested by 20 UNM students as a 3 semester senior design project. The focus of the design was to utilize tire capabilities to their full potential while maintaining ease of assembly and serviceability. This was achieved through careful integration of all sub-systems starting at the wheels and continuing through the entire vehicle. A tubular space frame supports a full aero package, a continuously variable transmission (CVT), highly adjustable suspension, and belt drive.

The CVT allows drivers to focus solely on the track and ensures that the engine is kept in the power band, providing optimum acceleration. The aero package reduces drag and increases down force by limiting negative interactions between components.

A great team of engineers, powerful software, and extensive physical testing have resulted in a competitive vehicle that is sure to lead the pack.

<table>
<thead>
<tr>
<th><strong>USF Racing</strong></th>
<th><strong>LOBOMotorSports</strong></th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>BRAKE</strong> : Four Wheel Disc</td>
<td><strong>BRAKE</strong> : 2 Piece Floating Rotors</td>
</tr>
<tr>
<td><strong>BSCD</strong> : 95.5mm/62.8mm/1 Cylinder/449.5cc</td>
<td><strong>BSCD</strong> : 77 mm bore / 53.6 mm stroke / 2 cylinder(s) / 499 cc</td>
</tr>
<tr>
<td><strong>COOLING</strong> : Water Cooled w/Fan</td>
<td><strong>COOLING</strong> : Single Pass, 2 row radiator located in right sidepod, 1000 cfm fan</td>
</tr>
<tr>
<td><strong>DRIVE</strong> : 520 Chain Drive</td>
<td><strong>DRIVE</strong> : Polymer Belt</td>
</tr>
<tr>
<td><strong>ELECTRONICS</strong> : DTA S80, AIM DAQ</td>
<td><strong>ELECTRONICS</strong> : MoTeC M84 ECU</td>
</tr>
<tr>
<td><strong>ENGINE</strong> : Suzuki LT-R450</td>
<td><strong>ENGINE</strong> : Yamaha / Genesis 80fi</td>
</tr>
<tr>
<td><strong>FR/RR TRACK</strong> : 1270/1270 mm</td>
<td><strong>FR/RR TRACK</strong> : Front 1270 mm, Rear 1219 mm</td>
</tr>
<tr>
<td><strong>FRAME</strong> : Steel Spaceframe</td>
<td><strong>FRAME</strong> : Welded Tubular Chromoly Spaceframe</td>
</tr>
<tr>
<td><strong>FUEL SYSTEM</strong> : Electronic Fuel Injection</td>
<td><strong>FUEL SYSTEM</strong> : Walbro Fuel Pump and Pickups, Aeromotive Filter and Pressure Regulator</td>
</tr>
<tr>
<td><strong>FUEL TYPE</strong> : 100 Octane</td>
<td><strong>FUEL TYPE</strong> : 100 Octane</td>
</tr>
<tr>
<td><strong>MPD</strong> : 9500</td>
<td><strong>MPD</strong> : 11,500</td>
</tr>
<tr>
<td><strong>MPT</strong> : 6500</td>
<td><strong>MPT</strong> :</td>
</tr>
<tr>
<td><strong>OLWH</strong> : 2405mm L, 1386mm W, 1205mm H</td>
<td><strong>OLWH</strong> : 3120 mm long, 1450 mm wide, 1232 mm high</td>
</tr>
<tr>
<td><strong>SUSPENSION</strong> : Front Pullrod, Rear Pushrod</td>
<td><strong>SUSPENSION</strong> : Short Long Arm (SLA), Non-Parallel; Pushrod actuated</td>
</tr>
<tr>
<td><strong>TIRE</strong> : 18x6-10 Hoosier</td>
<td><strong>TIRE</strong> : 20.5x7 -13 Hoosier R25B (43162)</td>
</tr>
<tr>
<td><strong>UNIQUE</strong> :</td>
<td><strong>UNIQUE</strong> : Continuously Variable Transmission</td>
</tr>
<tr>
<td><strong>WEIGHT</strong> : 485lb</td>
<td><strong>WEIGHT</strong> : 625 lbs</td>
</tr>
<tr>
<td><strong>WHEELBASE</strong> : 1574mm</td>
<td><strong>WHEELBASE</strong> : 1651 mm</td>
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</tbody>
</table>
Artax, the 3rd FSAE prototype of the Formula UFSM Team, is an evolution of the previous car, in which reliability, low cost and ease to manufacture were priority goals to be achieved. This prototype maintains the concept of a 4 cylinder Honda CBR 600RR engine, steel tubular space frame and 13” tires. It has improvements in the materials used, driver ergonomics, packaging and serviceability.

Following a tradition of the Team, the name Artax is given in honor to a famous, true-blood and race winner horse.

The Team has also focused on the prototype’s aesthetics, and the result is a bodywork design which was praised on the last Formula SAE Brazil competition. This is the first participation of the Team in a Formula SAE competition outside Brazil, what is a great achievement, considering it has started in 2010. The Team would also like to thank the sponsors, enthusiasts, supporters and University staff, which helped throughout the entire year.

**Specifications:**
- **BRAKE:** AP Calipers and Master Cylinders, Custom Floating Rotors and Balance Bar
- **BSCD:** 67 mm / 42.5mm / 4 cylinders / 599cc
- **COOLING:** Water cooled, single side-mounted radiator, single fan
- **DRIVE:** Sequential transmission, chain drive, Torsen differential
- **ELECTRONICS:** MoTeC M800 ECU
- **ENGINE:** Honda CBR 600RR
- **FR/RR TRACK:** 1165 mm / 1175 mm
- **FRAME:** 1010 Steel Tubular Space Frame
- **FUEL SYSTEM:** Electronic Fuel Injection
- **FUEL TYPE:** Gasoline 100 Octane
- **MATERIAL:** 1010 Steel
- **MPD:** 11500 RPM
- **MPT:** 9000 RPM
- **OLWH:** 2846 mm long, 1380 mm wide, 1161 mm high
- **SUSPENSION:** Double convergent and unequal length A-Arm. Push-rod acting damper
- **TIREF:** R13 20.5 x 6.0, RZ5B, Hoosier (front) / R13 20.5 x 7.0, RZ5B, Hoosier (rear)
- **UNIQUE:** Onboard wireless telemetry, traction control, CAN bus
- **WEIGHT:** 230 kg
- **WHEELBASE:** 1600 mm

**WE'RE NOT JUST MAKING STEEL.**

**WE'RE ENGINEERING LEADERS.**

By competing in Formula SAE Lincoln, you have taken a giant step toward preparing yourself for the challenges and opportunities that your future will present. The next step matters even more. Find out more at www.nucor.com/careers
The 2013 UNT, University of North Texas, Formula SAE Team is competing in the Formula SAE Lincoln competition for the first time. The team was formed in Spring 2012 and has remained on a strict schedule remembering the slogan “KISS”, “Keep It Simple Stupid”, as well as designing parts 80% and moving on to stay on schedule. With a limited amount of time, the team has also focused on manufacturability. The car was completed April 26th, 3 weeks behind schedule, where the first test drive was performed with success. In the development of the first UNT Formula SAE car, the team chose to design and manufacture the car on one main focus, complete every static and dynamic event. This goal will be obtained by ensuring all seals are made properly, all bolts are torqued to spec, extensive analysis performed on the suspension with a minimum factor of safety of 2 at 1.5 g’s, as well as ensure that the engine is tuned properly and reliably.

This 2013 car will be a car for future teams to improve upon by way of getting real world data via data acquisition.

**BRAKE**: Brembo  
**BSCD**: Standard Bore/4 cylinder/600 cc  
**COOLING**: Water Radiator  
**DRIVE**: Chain Drive  
**ELECTRONICS**: Mega Squirt  
**ENGINE**: Honda F4i  
**FR/RR TRACK**: 48/46 inches  
**FRAME**: Tube Frame  
**FUEL SYSTEM**: External Walbro  
**FUEL TYPE**: 91 Octane  
**MPD**: 10,500  
**MPT**: 7,000  
**OLW**: 96”/54”/42”  
**SUSPENSION**: Wishbone/Pullrod  
**TIRE**: 20.5 x 6.0-13 R25B  
**UNIQUE**: First year car  
**WEIGHT**: 640 lbs  
**WHEELBASE**: 68 inches

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Hornet Racing at California State University, Sacramento strives to produce the finest and most competitive Formula SAE car every year. The team enriches its members’ learning experience beyond what can be obtained in the classroom through extensive hands on design and manufacturing experience. The team makes every effort to include any student that is willing to participate regardless of academic level or major. We provide a constructive learning environment in order to help build the program further and increase its knowledge base every year. Hornet Racing accomplishes these goals through honest hard work, dedication, mentoring, teamwork and energy drinks.

The 2013 Hornet Racing Formula SAE car builds upon 2012 and 2011’s solid platform with a primary goal of reducing weight in all areas. Attention was given to simplicity and efficiency of part design and manufacturability. This lead to a reduction in overall part count resulting in earlier assembly, which allowed more time for testing and refinement.

**BRAKE**: Floating cast iron, 210 mm OD x 4.45 mm thick  
**BSCD**: 67.5 mm bore / 42.5 mm stroke / 4 cylinder(s) / 599 cc  
**COOLING**: Side mounted single pass down flow radiator, 300 cfm fan mounted to side pod  
**DRIVE**: Taylor Race Mk2  
**ELECTRONICS**: AEM ECU  
**ENGINE**: Honda / CBR600 F4i  
**FR/RR TRACK**: 1245 mm / 1220 mm  
**FRAME**: Tubular Steel Space Frame  
**FUEL SYSTEM**: Honda CBR600 F4i fuel rail and pressure regulator  
**FUEL TYPE**: 91 Octane  
**MPD**: 9500  
**MPT**: 8400  
**OLW**: 2794 mm long, 1415 mm wide, 1217 mm high  
**SUSPENSION**: Double unequal length A-Arm, push rod actuated spring / damper  
**TIRE**: 20.5 x 6.0 - 13 R25B Hoosier  
**UNIQUE**:  
**WEIGHT**: 276.6 kg  
**WHEELBASE**: 1550 mm
S9 is our 9th car entered into the 7th consecutive completion and is a marked departure from the generation of cars before it. The Honda CBR600 RR is a large driving force and meshing well with the change to a shorter wheel base. These changes and others are promising to further reduce our weight and turning radius while increasing our reliability and ultimately points total at competition this year. The increased use of composites in the steering wheel, seat and suspension links is a part of that weight loss. The drivetrain’s increased use of bought parts will help our reliability. The other major decision to keep S8 running has also increased the workload, but allowed us to make small refinements part by part. This year’s goal is the same as last year, to crack the top 20 and maintain the progression in points and places of the last three years. Ultimately we have to finish endurance which is strongly related to how much testing time we have this year. Despite the increased workload compared to S8 we will maintain the number of testing hours. This year is a good step forward in development that will pay dividends in the future.

**BRAKE**: Outboard Floating Ductile Cast Iron Dynapro Front and PS-1 Rear Calipers  
**BSCD**: 67mm / 42.5mm / 4 cylinder / 600cc  
**COOLING**: Custom Aluminum Radiator and Swirl Pot, 10” Electric Fan, Stock water pump  
**DRIVE**: 520 Chain to Custom Torsen Differential  
**ELECTRONICS**: AEM ECU, Gear indicator and shift lights on dash  
**ENGINE**: Honda CBR600 RR  
**FR/RR TRACK**: 1334mm (52.5in.) / 1219mm (48in.)  
**FRAME**: 4130 Chromoly Space Frame  
**FUEL SYSTEM**: In-tank pump, stock regulator, rail and single stage injection  
**FUEL TYPE**: 93 octane  
**MATERIAL**: Carbon fiber composite body  
**MPD**: 10500  
**MPT**: 8500  
**OLWH**: 2720mm (107in.) long, 1530mm (60in) wide, 1131mm (45in.) high  
**SUSPENSION**: Pull rod front, upright mounted push rod rear, Ohlins TTX25 Damper  
**TIRE**: Hoosier 20.5x13.0x7.0 R25B  
**UNIQUE**: Analog timing for electro-pneumatic paddle shifting  
**WEIGHT**: 620lbs. (282kg)  
**WHEELBASE**: 1551mm (61in.)

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Aztec Racing is proud to present the AR-13 for the 2013 FSAE Lincoln competition. A refinement of previous generations, the AR-13 features a custom intake, exhaust, and multiple fuel maps to extract maximum performance from the GSX-R 600 at its heart. A lower CG and roll center with minimized scrub radius and camber change result from insights gleaned from analysis using WinGeo3 software. Better brakes, cooling, and driver ergonomics round out the improvements to this year’s car.

Aztec Racing would like to thank our sponsors for their continued support: The Corky McMillin Companies, 3M, Composite Fabrics of America, California Metals, Ron Davis Racing Radiators, and Racer Services.

**BRAKE**: 4 wheel disc brakes, Willwood components  
**BSCD**: 67mm/42.5mm/4/599cc  
**COOLING**: Side-mounted 2 Row Aluminum radiator  
**DRIVE**: Chain drive with student built LSD  
**ELECTRONICS**: AEM EMS-4, MyChron3  
**ENGINE**: Suzuki GSX-R 600  
**FR/RR TRACK**: 1219 / 1168mm  
**FRAME**: 4130 Space Frame  
**FUEL SYSTEM**: Sequential EFI  
**FUEL TYPE**: 91 Octane  
**MATERIAL**: Carbon fiber composite body  
**MPD**: 8750 rpm  
**MPT**: 8500 rpm  
**OLWH**: 2400mm  
**SUSPENSION**: Unequal length Double A-arm, Pushrod activated  
**TIRE**: 20.5 x 7 R25A Hoosier  
**UNIQUE**: New York  
**WEIGHT**: 520 lbs.  
**WHEELBASE**: 1625mm
A performance-at-all-costs approach was taken to create a car capable of winning. This was made possible through the use of Gerard’s custom lap time simulator.

The 2013 car is affectionately named “Sexy Beast”.

Come stop by our paddock to see the “Sexy Beast” and have a friendly chat!

We would like to thank all of our sponsors and our Faculty advisor for making another season of racing possible. For more details please see our website: http://www.ualbertafsaecom

P.S. It's 100% crinkle free this year!

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The Colorado School of Mines’ Formula SAE team has worked really hard to produce an FSAE car for the first time in 9 years. The newly resurrected Mines FSAE car was designed using all leftover parts, except the frame. With a tight budget and no previous car to improve upon, everything was designed from scratch.

We are excited to compete and even more so to build upon this year’s design. Our main goals were to get a car to competition and get our feet wet with design features as complex as aerodynamics. Next year we can aim high and bring everything we can to the table.

We are ready to hit the ground running. Our car is based around an inherited 2002 Suzuki GSX-R600 powerhouse. A custom intake and exhaust were fabricated to help minimize space. Our steering system is a rack and pinion attached to a lever. Our mantra for the year was “We’ll make it work,” and we would say that we did just that.

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**University of Alberta**

**University of Alberta FSAE**

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**Colorado School of Mines**

**CSM FSAE**

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The University of Wisconsin-Platteville has been involved in Formula SAE since 2003. Our Formula team has been, and will continue to be a team that prides themselves on ambitious design and implementation of new ideas. After a successful competition in 2012, we are enthusiastic for the 2013 competition and hope to improve upon our past success. Since 2012, we have focused on producing lightweight yet robust parts, improving ergonomics and optimizing all the systems to improve reliability and speed of our car. Some of the highlights of our car this year are the pushrod suspension, push-button electronic shifting, rapid prototyped steering wheel with paddle shifting, AEM engine control module, adjustable pedal trays and optimized aerodynamic undertray. Engineering new, reliable, and efficient vehicle components to implement in our Formula car gets us excited for competition every year.

We would like to thank all of our sponsors and supporters for their help during the construction and testing of PR13.

This is debut participation of Team Terasvin in Formula SAE. Being the first team from the college throughout the process of making the car learning and gaining experience is the main goal of the team. Rather than incorporating a complex developed systems the team concentrated on producing a car with descent performance and cost effectiveness. The main criteria throughout the designing process were weight reduction, manufacturability, cost and serviceability.

A Honda CBR 600RR engine was installed in a TIG welded 4130 chromoly steel space frame. Upright, Steering assembly, intake and exhaust manifold and hub are some of the parts manufactured by the team.

### University of Wisconsin - Platteville

- **BRAKE**: Dual Wilwood Master cylinders
- **BSCD**: 67 mm bore / 42.5 mm stroke / 4 cylinder(s) / 599 cc
- **COOLING**: Single Aluminum Radiator mounted to side of chassis with Fan
- **DRIVE**: Chain to Torsen Differential
- **ELECTRONICS**: AEM EMS4
- **ENGINE**: Yamaha YZF-R6
- **FR/RR TRACK**: 1245.33 mm / 1150.41 mm
- **FRAME**: 4130 Chromoly Spaceframe
- **FUEL SYSTEM**: AEM EII
- **FUEL TYPE**: 85 bhp at 9000rpm
- **MATERIAL**: Stainless Steel
- **MPD**: 14,000
- **MPT**: 10,000
- **OLWH**: 3030 mm / 1398 mm / 1257 mm
- **SUSPENSION**: Double A-arm Pushrod
- **TIRE**: 20.5" x 7.5" x 13" Hoosier R25B
- **UNIQUE**: Adjustable Aluminum Pedal Tray, Aerodynamic Undertray with Diffuser
- **WEIGHT**: 318 kg
- **WHEELBASE**: 1677.25 mm

### Sona College of Technology

- **BRAKE**: Rear inboard, Front outboard Hydraulic
- **BSCD**: 67.0 mm bore / 42.5 mm stroke / 4 cylinder(s) / 599.6 cc
- **COOLING**: Liquid Cooled
- **DRIVE**: Chain drive
- **ELECTRONICS**: RD0901 ECU
- **ENGINE**: CBR 600RR 2006 model
- **FR/RR TRACK**: 1300/1080mm
- **FRAME**: Steel space frame
- **FUEL SYSTEM**: Dual Stage Fuel Injection
- **FUEL TYPE**: 100 octane petrol
- **MATERIAL**: AISI 4130 Chromoly Steel
- **MPD**: 85 bhp at 9000rpm
- **MPT**: 45 Nm at 9000rpm
- **OLWH**: 2832mm, 1397mm, 1058mm
- **SUSPENSION**: Double unequal length A-Arm. Push rod actuated
- **TIRE**: 20.5 x 6.0-13, R25B, Hossier
- **UNIQUE**: Weight: 280Kg
- **WHEELBASE**: 1600mm
2013 brought about many changes to the Formula UBC team. Many new sponsorships as well as an abundance of new members have allowed for improved design changes from 2012. An aerodynamic package consisting of a front and rear wing is in the works for the first time in Formula UBC history. We are eager and excited to race in Lincoln this coming summer.

“I’m going to keep asking for more downforce.” - LH

This year’s design was a radical concept change from Berkeley’s previous designs, and the lightest entry in FSAE yet - a 260 pound, 250 cc single cylinder with 8” wheels. This choice came from a comprehensive review of the team’s capabilities and a points analysis rooted in a lap simulator written by the team. Concepts of varying high level parameters, such as engine size and wheel size were simulated in all the FSAE events. Compared to last year’s car, a 13” wheel package with 600 cc engine, this car is expected to score over 300 points more. This is largely due to the extremely low weight allowing for high cornering acceleration and good fuel economy. The sensitivities to weight and grip indicated it was very important to optimize those parameters.

The single speed transmission and centrifugal clutch make it easy for new drivers to maintain peak cornering traction and momentum. Design for manufacturability and usage of off-the-shelf (OTS) components were critical for this, and the car was shaken down two months earlier than last year’s as a result, allowing that much more testing and development time.

BRAKE : Front & Rear Disc.
BSCD : 2.6” Bore / 1.7” Stroke / 4 Cylinder / 599cc.
COOLING : Twin Single Core Rads.
DRIVE : Chain Driven Drexler with Custom 7475 Al Mounts.
ELECTRONICS : Haltech ECU. Custom Tuned Maps
ENGINE : CBR600RR
FR/RR TRACK : (1219mm / 48") / (47" / 1194mm)
FRAME : Cartesian Profiled 4130 Chrome Moly
FUEL TYPE : 93 Octane
MATERIAL : Sexy Carbon Fibre
MPD : More than last year @12,500rpm
MPT : More than last year @ 9500 rpm
OLWH : 113” Length / 50” Height / 56" Width
SUSPENSION : DHX RC4 Shocks with Custom ARBs
TIRE : 13” Keizers Wrapped in Hoosiers
UNIQUE : 7475 Al Uprights. Haltech IQ3 Data Logging Dash
WEIGHT : < 635
WHEELBASE : 1625mm / 64"

BRAKE : Pulls to the left
BSCD : 75 mm / 56.5 mm / 1 / 250 cc
COOLING : Duct tape and cardboard
DRIVE : Solid axle, single speed, chain drive
ELECTRONICS : MoTeC M400
ENGINE : SwissAuto 250
FR/RR TRACK : 45/45
FRAME : 4130 chewing gum
FUEL SYSTEM : Iniezione elettronica
FUEL TYPE : 100 octane unicorn blood
MATERIAL : Tears and GPA
MPD : 35 hp @ 10000 rpm
MPT : 20 ft-lbs @ 8000 rpm
OLWH : 94,51,43
SUSPENSION : Almost
TIRE : American Racer SD44/M32
UNIQUE : General lack of everything
WEIGHT : 410 lbs
WHEELBASE : 60 in
CR-18 is Iowa State University’s 18th car to compete in the Formula SAE series. For CR-18, emphasis was placed on reducing the number and complexity of components to decrease manufacturing time and improve reliability. This year’s car continues on the 10” wheels we introduced last year and features unique a-arms that are machined from aluminum plates. The powertrain remains largely the same as last year as we continue to use the Yamaha YFZ450 but have upgraded to the current generation of engine, the YFZ450R. The pedal tray is adjustable to accommodate a range of driver heights. Our goal for CR-18 was to create a platform that can be improved for years to come.

BRAKE: Steel floating rotors with Wilwood PS-1 calipers and Tilton 77 series MC
BSCD: 95mm/63.4mm/1/449cc
COOLING: Soft mounted, single core, Polaris radiator with SPAL 440 cfm fan
DRIVE: Stock Yamaha trans., chain drive, Torsen T1 differential
ELECTRONICS: Performance Electronics PE3 ECU, AIM evo4 DAQ with MyChron 3 display
ENGINE: 2010 Yamaha YFZ450R
FR/RR TRACK: 1158 mm Front, 1270 mm Rear
FRAME: 1020 DOM Steel Spaceframe, TIG welded, bonded aluminum panels in rear box
FUEL SYSTEM: PE3 ECU, Bosch MAP sensor, aluminum welded tank
FUEL TYPE: 94 octane
MATERIAL: HCP Laser sintered Unobtainium
MPD: 9500
MPT: 7500
OLWH: 2688mm length, 1470 mm width, 1073 mm height
SUSPENSION: non-parallel, unequal length, double wishbone, pushrod actuated, Ohlins TTX
TIRE: 6.0/18.0-10 LC0 Hoosier front and rear
UNIQUE: Adjustable pedal tray, CNC Rapid Prototyped Aluminum Uprights, Chick Magnet
WEIGHT: 227 kg/500 lb
WHEELBASE: 1575 mm

Space frame design, minimum wheelbase, 10” wheels, aluminum body, custom ergonomic carbon seat, Hawaiian accelerometer, escape button.

BRAKE: Tandem Master Cylinder Single Disk Rear
BSCD: 99/65/1/501cc
COOLING: Water Cooled
DRIVE: Belt Driven Spool
ELECTRONICS: Megasquirt 2, DL1 mk3
ENGINE: Honda TRX450
FR/RR TRACK: 48/46 in
FRAME: Steel Space Frame
FUEL SYSTEM: External Pump
FUEL TYPE: 93
MATERIAL: The Good Stuff
MPD: 50 Hp
MPT: 35
OLWH: 90/56/39 in
SUSPENSION: Pull Rod F/R
TIRE: Hoosier R25B 18x7.5-10
UNIQUE: Hawaiian Accelerometer
WEIGHT: 470lb
WHEELBASE: 59.9999in
For the 2013 season the Sooner Racing Team sought to continue the trend of producing a lightweight, aerodynamically enhanced vehicle. This year’s entry, affectionately known as Natalie is a complete evolution of this concept, with all vehicle systems focused on mass and inertial properties while striving to maintain reliability and ease of service. This concept was developed by determining critical vehicle performance parameters via a simulation-based approach combined with physical validation through both static tests and embedded data acquisition.

BRAKE : AP Racing CP4226 calipers; Front Outboard disc brakes, rear inboard disc
BSCD : 80mm / 55mm / 2 cylinders / 550cc
COOLING : Dual parallel radiators mounted in series airflow
DRIVE : 428 Chain, Taylor Race Differential with Quaife internals
ELECTRONICS : PE-3 ECU, National Instruments sbRIO Embedded Control and Acquisition
ENGINE : Aprilia RXV 550
FR/RR TRACK : 1156 mm / 45.5 in (Front), 1156 mm / 45.5 in (Rear)
FRAME : 4130 Steel tubular space frame
FUEL SYSTEM : Sequential Fuel Injection
FUEL TYPE : 93 Octane
MATERIAL :
MPD : 10000
MPT : 8000
OLWH : 2840 mm / 112 in (Length), 1372 mm / 54 in (Width), 1397 mm / 55 in (Height)
SUSPENSION : SLA with pushrod actuated coilover dampers
TIRE : Hoosier 18x6.0-10 LC0
UNIQUE : Integrated PDU board
WEIGHT : 480 lb (218kg)
WHEELBASE : 1588 mm / 62.5 in

The Husker II was designed to fill a market gap between shifter carts and Formula Ford. It was designed to be a mid-range vehicle that would allow the weekend autocross runner to run a slightly more technologically advanced car than a shifter cart, while at the same time being less costly and difficult to work on as a Formula Ford. This turn key racing solution is much less complex compared to other FSAE Vehicles that employ aerodynamic systems, high-end manufacturing, and complex electronic systems.

The Husker Mark II is an improvement over it’s predecessor in almost all aspects. Coming off the line at 43kg lighter, the Husker Mark II has a 15% increase in brake horsepower, resulting in 90 bhp. Likewise the torque has increased to 50ft-lb.

The Husker Mark II will also employ more uniform, easier to design parts. The car will be built using common fasteners, simplistic pedal designs, and the use of widely available components for the shifter, springs, and differential. All of these improvements lead to the conclusion that this vehicle will be easy to maintain and operate.

Once you get in, you may never get out…

BRAKE : Hydraulic Disc
BSCD : 600cc
COOLING : Liquid
DRIVE : Chain Drive
ELECTRONICS : Megasquirt 3
ENGINE : Kawasaki ZX-6R
FR/RR TRACK : 1219mm/1168mm
FRAME : Tubular Space Frame
FUEL SYSTEM : EFI
FUEL TYPE : E-85
MATERIAL : 4130 Chromoly
MPD : 8000
MPT : 10000
OLWH : L = 2809mm/W = 1372mm/H = 1130mm
SUSPENSION : Unequal Length Double A-Arm, Pull Rod Actuation
TIRE : 18x6-10 R25B Hoosier
UNIQUE : Flex-Fuel Vehicle
WEIGHT : 217kg
WHEELBASE : 1676mm
The UVic Formula SAE Team started competing in Formula SAE in 2001, and has been striving for continuous improvements every year since. The past few years has taught the team the importance of organization, dedication, and seamless knowledge transfer and most of all reliability.

This year’s car is focused on driver controls, overall car handling, and weight reduction. Key design features include an combined mechanical clutch and shifting system, a student designed PCB integrating the MegaSquirt 3 engine management hardware, and a new custom differential housing.

We would like to thank all of our sponsors for their help and support this season. Without their contributions UV13 would exist only on paper.

Oregon Tech Racing 2013 brings a stiffer, lighter chassis design while keeping the same 4 cylinder Suzuki engine/steel tube chassis combo that has proven itself over the last two years. Many innovative components have been implemented in this year’s design, with the goal of testing new ideas and an attitude of “anything is possible”. While the aero package may seem at odds with our primary goal of decreasing vehicle mass, sometimes (very rarely!) an exception must be made. Besides, aero just plain looks good!

We would like to thank our many new sponsors, as well as those that have continued their support of us from previous years. Such a project would not be possible without the assistance of companies dedicated to furthering the education of our group of future engineers.

How fast do YOU have to go to drive upside down?

BRAKE : Twin piston calipers w/ floating rotors front, single inboard rear
BSCD : 67mm/42.5mm/4/599cc
COOLING : Sidepod mounted radiator
DRIVE : Chain
ELECTRONICS : Performance Electronics PE3
ENGINE : 2007 GSXR600
FR/RR TRACK : 48/48in
FRAME : Steel tube
FUEL SYSTEM : In-tank pump/regulator
FUEL TYPE : 91
MATERIAL : Carbotanium
MPD : 11000rpm
MPT : 10000rpm
OLWH : 114in, 57in, 53in
SUspENSION : Unequal length, nonparallel A-arms
TIRE : 20.5x7-13 R25B Hoosier
UNIQUE : Forward facing roll hoop supports
WEIGHT : 625lb
WHEELBASE : 62in
The primary focus of the CSULB SAE 2013 Formula project is to produce a reliable and comfortable vehicle that will perform well in the hands of drivers of any skill level. The CSULB Formula team is a very young team and as such the design and build of the 2013 car is relatively conservative in order for it to be practically manufacturable given our experience and limited facilities. Given these constraints the CSULB Formula team focused on making the 2013 car an easily operable, solid and low cost vehicle as opposed to going for all-out performance.

We hope the 2013 car will be the starting point for improvements and increased performance and utility our team’s future vehicles. The design and central concept of the 2013 car targets the entry-level drivers that want reliable performance on a budget.

**BRAKE** : Dual 5/8” bore BMCs acting on 32mm bore dual piston calipers at each wheel  
**BSCD** : 67mm bore / 42.5mm stroke / 4cyl / 599cc  
**COOLING** : Single 317mm x 245mm x 40mm core bar and plate radiator with 2950 cfm fan  
**DRIVE** : Chain Drive, 12 tooth output sprocket, 42 tooth drive sprocket  
**ELECTRONICS** : MegaSquirt MS3X  
**ENGINE** : 2007 Honda CBR 600RR  
**FR/RR TRACK** : FR 1400mm / RR 1325mm  
**FRAME** : 4130 Steel Space Frame  
**FUEL SYSTEM** : Low pressure EFI with multi-point fuel injectors  
**FUEL TYPE** : 93 Octane  
**MATERIAL** : SAE 4130 Chomoly  
**MPD** : 50 kW  
**MPT** : 40.6 Nm  
**OLWH** : 2480.4 mm long, 1623.3 mm wide, 1187.7mm high  
**SUSPENSION** : FR unequal length A-Arms, RR trailing unequal length A-arms  
**TIRE** : Hoosier 20.5” x 7.0”-13.0” R25B  
**UNIQUE** : Customizable dash display and adjustable driver controls  
**WEIGHT** : 294.4 kg  
**WHEELBASE** : 1625 mm

For the 2013 Formula SAE competition the University of Texas at San Antonio’s Road Runner Racing team has strived to create the best FSAE car UTSA has ever seen.

A steel space frame incorporates 4 bar multi-link independent suspension, a 2012 Kawasaki KFX450 with MicroSquirt ECU, The Brake Man Tornado F1 calipers, and a Torsen differential. All of these systems have been combined to create a competitive driving machine that maintains the highest level of reliability, performance, and drivability.

Remember the Alamo.

**BRAKE** : The Brake Man Tornado F1 Aluminum  
**BSCD** : 96 mm bore / 62.1 mm stroke / 1 cylinder(s) / 449 cc  
**COOLING** : Liquid Cooled  
**DRIVE** : Chain  
**ELECTRONICS** : MicrosQuirt ECU  
**ENGINE** : 2012 Kawasaki KFX450  
**FR/RR TRACK** : 52 inches / 48 inches  
**FRAME** : Steel Spaceframe  
**FUEL SYSTEM** : Custom Port Fuel Injection  
**FUEL TYPE** : 93 Octane  
**MATERIAL** : 1020/4130 Steel  
**MPD** : 7500  
**MPT** : 7000  
**OLWH** : 2667 mm Long, 1498.6 mm Wide, 1168.4 mm High  
**SUSPENSION** : Four Bar Link, Unequal Length, Non-Parallel, Double A-Arm Suspension  
**TIRE** : 18.0 x 6.0 - 10 , R25B , Hoosier  
**UNIQUE** : Reverse  
**WEIGHT** : 550 lbs  
**WHEELBASE** : 62 inches
For more than thirty years, Concordia University’s racing team has shown innovation through progressive development. This year’s team of 20 dedicated first through fourth year students will be introducing a much-improved vehicle. A lighter chassis encases several reformed features. A fine tuned engine now includes a brand new intake system for better airflow, as well as an adapted exhaust system, resulting in a flattened torque curve for better drivability. A geometrically simplified inline layout for suspension components, along with torque bias ratio improvement via a Drexler differential have greatly contributed to weight reduction. The electrical system has undergone a radical change, from a spark ignition Microsquirt engine control unit to a Motec M400 with sequential ignition.

Concordia Formula Racing team of 2013 would like to thank all of our generous sponsors, without whom this project would not be possible. A big thank you as well to the friends and family of our team members for their encouragement and support.

For the 2013 season, Longhorn Racing is building on the success of previous years while moving in a direction that will keep future vehicles at the forefront of FSAE performance. After a thorough look at the most important components affecting overall competition performance, we have decided to retain a lightweight, single-cylinder engine as the heart of our car. Also in place is a full aero package, an evolution of the 2012 aero kit, which has proven to provide substantial performance benefits in both simulation and testing. The end result is an aggressive package capable propelling UT Austin to the podium.

Longhorn Racing would like to thank its sponsors for their support:

The University of Texas at Austin, Cockrell School of Engineering, Solidworks, EMJ Metals, G & H DIVERSIFIED MANUFACTURING, University Co-op, Schlumberger, General Motors, Apache Corporation, Maxwell Ford, FMC, Cummins, Bell Helicopter, Student Engineering Council, UT Mechanical engineering Machine Shop, Reverse Austin, Sears Auto Center, Albany Engineered Composites, Chris Drew, Pavan Dendi, Jeff Gjertsen, Pedro Viteri, Matt and Jennifer Travis, Micah Harbour, and James Stewart.
South Dakota State University chose to continue along the previous years design path as a consideration to its small team size. The team motto of “simple is elegant and complex is arrogant” was kept in mind with the new additions and modifications of previous designs. Non-radical changes helped maintain an already reliable car that is growing in features and functionality.

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**California State University - Fullerton Titan Motorsports**

The Titan VI is California State University, Fullerton’s sixth submission into the FSAE West competition. This car is the first design to utilize a light-weight front carbon fiber monocoque along with a chromoly sub-frame. The drivetrain system consists of an OEM Yamaha R6S engine and transmission, and a Torsen T1 differential. This year’s team consists of 15 senior mechanical engineering students, 8 electrical engineering students, 10 engineering underclassmen students, and 4 business students. Utilizing the lessons learned from previous years, the Titan VI has made improvements in widespread use of structural composites, a new more advanced suspension, and a new engine program focused around a more powerful engine management system. Vehicle weight was reduced from previous iterations with the help of sophisticated FEA software, advanced manufacturing techniques and new materials.

The CSUF FSAE Team would like to extend their appreciation to the sponsors and supporters of the Titan VI project. The advancements and accomplishments would not be possible without their continued support.
The 2012-2013 University of North Dakota Formula SAE team is composed of twenty members with varying backgrounds including Mechanical Engineering, Electrical Engineering, and Business. This year is UND’s seventh time competing in Formula SAE events since the 2003 season. The starting point for this year’s car was to improve upon the reliable and proven designs from our program’s history. Significant steps were taken to increase torsional rigidity in the chassis, improve suspension performance, and reduce the overall weight of the car. Optimization of the intake, exhaust, and engine management system to provide a powerful, yet much more fuel efficient car than before, was another main goal this year. With members’ experience, depth, and character, this year’s team aspires to be the most successful in UND’s program history.

**BRAKE**: Wilwood single caliper disk, front and rear  
**BSCD**: 4-cylinders, 600 cc’s  
**COOLING**: Single Radiator; Water Cooled  
**DRIVE**: Chain Driven; RWD  
**ELECTRONICS**: Haltech Engine Management Systems  
**ENGINE**: 2002 Honda CBR600F4i  
**FR/RR TRACK**: 1270 mm / 50 inches  
**FRAME**: 4130 Chromoly Tubing  
**FUEL SYSTEM**: Fuel Injection  
**FUEL TYPE**: 93 Octane  
**MATERIAL**:  
**MPD**: 46.12 hp @ 10,000RPM  
**MPT**: 28.23 ft-lbs @ 8200RPM  
**OLWH**: 2642 mm / 104 in. long; 1492 mm / 58.75 in. wide; 1156 mm / 45.5 in. tall  
**SUSPENSION**: Double, unequal length A-Arm / Push rod  
**TIRE**: 20.5x7x13 Hoosier  
**WEIGHT**: 281 kg / 620 lbs  
**WHEELBASE**: 1569 mm / 61.75 in.
The University of Calgary Formula SAE team, Schulich Racing, is back for our 15th competition season. With a strong, dedicated team, we are prepared for our best year yet.

The SR-15 is a focused iteration on previous Schulich Racing designs. Schulich Racing chose to develop our concept by focusing on reliability, ease of maintenance, and a balance of performance and drivability.

She’s lost over 20 pounds and is smarter than ever with a newly implemented micro controller for the dash display and electro-pneumatic shifter. Additionally, our comprehensive track testing plan has helped to ensure that the SR-15 is the University of Calgary’s fastest and most reliable car to date.

The team has participated in Formula SAE Lincoln for the very first time. The car has been developed by the students’ basic understanding of a Formula SAE car. The car has been kept as simple as possible.

The engine used to power the car is that of Suzuki GSX-R600. The chassis is a basic tubular space frame chassis with proper triangulation for stress distribution. The drive-train and power-train has been fabricated suitably to optimize the performance or the car.

After continuous efforts of the team members, we now proudly announce the entry of University Of Pune into Formula SAE!
With a long history in Formula SAE, Cal Poly Racing is looking to put San Luis Obispo back on the map. A new team took the pictured car to Lincoln last year, and this year we’ll return with a completely new car and the potential to finish in the Top 10. Superior design, manufacturing, and testing processes have produced a fast, safe, and reliable car of the highest build quality.

The 2013 car features a carbon-fiber monocoque at the front for driver safety and a chromoly space frame at the rear for packaging. Inside the monocoque is a rigid pedal assembly, single-shaft steering system, and paddle shifters. Inside the space frame is a Yamaha WR450F and a custom differential assembly. At the corners are center-locking wheels and boxed-steel uprights. Connecting the dots is an A-arm suspension with pushrod-actuated dampers and springs balanced by a front ARB. After stopping the car with ductile iron disc brakes, drivers have the data and analysis tools they need to drive even faster.

The team has set a new standard at Cal Poly that will lead to success for this year and many more to come. Follow us at FSAE Lincoln 2013 and into the future at calpolysae.org.

**University of Southern California**

USC Racing has aimed to develop and refine a base of knowledge for the future of our club. In this spirit, the main design objectives this year were reliability and manufacturability. The steel space frame supports a Yamaha R6 engine with custom intake and exhaust as well as a modified oil pan to decrease cg height. The car employs a conventional push-rod suspension system with double unequal length A-arms.

The carbon fiber airfoil and body panels were optimized in STAR-CCM to minimize weight and increase downforce. A Performance Electronics ECU allows for engine tuning, along with an NI Rio DAQ, for multi-channel data acquisition, including linear pots, accelerometers, and strain gauges.
California State University - Northridge

Matadors

Four words, Simple, light, cheap, and easy. Those words put a smile to every weekend hobby racer. The 2013 California State University Northridge vehicle is all of that and more! Building off 23 years of constant innovation, this vehicle weighs in as the lightest in CSUN history, first to run a spool final drive, first to use 10 inch wheels, and first to use a KTM single cylinder. Multi part assemblies have been integrated into 1 component simplifying the overall design. Driver comfort was enhanced via full size chassis prototypes. The team focused on weight and simplicity saving 85 lbs. from the previous year’s vehicle. FAA aircraft fabric skins the vehicle for a super light body resistant to puncture. The 10 inch wheels cause packaging issues, however they were solved with Adams car software. The suspension design was optimized to transfer weight off of the rear inside wheel to the diagonal outer front wheel to allow the vehicle to rotate. This is accomplished via 45 way adjustable sway-bars front and rear. This year’s vehicle will feature a semi-automatic gearbox. The clutch is centrifugally operated and delivers perfect clutch engagement every time.

BRAKE: Floating front rotors with fixed single rear rotor, Wilwood calipers
BSCD: 97mm bore / 72mm Stroke / 1 Cylinder / 540cc
COOLING: Liquid cooled single radiator mount radiator
DRIVE: Chain drive to Spool
ELECTRONICS: Microsquirt ECU
ENGINE: KTM 525 MXC
FR/RR TRACK: FR 1290mm / RR 1219mm
FRAME: 4130 chromoly spaceframe
FUEL SYSTEM: Intank pump, single fuel injector
FUEL TYPE: 100 Octane
MATERIAL: Twizzlers
MPD: 8000 RPM
MPT: 4000 RPM
OLWH: L 2794mm / W 1543mm H 1365mm
SUSPENSION: Non-parallel, unequal length double a-arm
TIREF: 18-6x10 front / 18-7.5x10 rear R25B Hoosier
UNIQUE: Centrifugal Clutch
WEIGHT: 485 Lbs.
WHEELBASE: 1549.4mm

IUPUI

IUPUI Jaguars

The IUPUI 2013 FASE car design was focused on chassis, suspension and cockpit improvements over our previous generation car. The chassis provides improved access over our previous car to aid the weekend racer in preparation and maintenance. A push-rod style suspension is utilized in the rear, while pull-rods are featured in the front. Significant effort was expended in the design and manufacturing of the uprights, hubs, wishbones, and all other suspension components this year. The cockpit of the car is designed with ergonomics in mind and will accommodate drivers of varying height. The pedal box was manufactured in-house to achieve this goal. The steering wheel was specially created through rapid prototyping and attached to the wheel which will be metal paddle shifters, and feature an active data system; both of which should aid the driver during competition. With the exception of the inclusion of a ground-effects diffuser, aerodynamics was kept relatively simple for this year’s design, and will become a larger focus in our next car.

BRAKE: Dual piston, caliperized, bias bar controlled system
BSCD: 67 mm bore, 42.5 mm stroke, 4-cylinder, 600 cc Honda motor
COOLING: side-pod mounted, single 13”x8” core, fan 360 cfm cooled
DRIVE: 520 roller chain on helical slip differential
ELECTRONICS: AIM mychron4 telemetry sys. and a shift without lift system.
ENGINE: Honda CVR 600 RR
FR/RR TRACK: 1144 mm both front and rear track.
FRAME: 2 piece tubular space frame of 4130 steel .375 to 1.0 inch diameters
FUEL SYSTEM: Honda sequential multi-port injection @ 2.97 bar of pressure.
FUEL TYPE: 100 octane
MATERIAL: Materials chosen based upon design weight to strength calculations.
MPD: 13, 250 rpm
MPT: 10, 750 rpm
OLWH: 2537 mm x 1321 mm x 1141 mm
SUSPENSION: Front pull rod double wishbone, rear push rod
TIREF: Hoosier 20.5 x 7.0-13
UNIQUE: Detachable Rear End Section
WEIGHT: 850 pounds
WHEELBASE: 1550 mm
This year UNAM Motorsports team design philosophy was to reduce weight without losing reliability with the main objectives of finishing and having a good performance on dynamic tests.

**Brake:** Fully Floating, A36 steel rotors, hub mounted, 195,4[mm] drilled
**BSCD:** 67x42.5mm/4/
**Cooling:** Water cooled single radiator
**Drive:** Sequential
**Electronics:** PE3 ECU, electromechanic paddle shifter, on-wheel dashboard
**Engine:** Yamaha YZF-R6
**FR/RR Track:** 48/43.32 inches
**Frame:** Steel Space Frame
**Fuel System:** Full sequential multi-port fuel injection, external in-line fuel pump.
**Fuel Type:** 100 Octane
**Material:** Steel ASTM A36
**MPD:** 85HP@ 11399
**MPT:** 42lb/ft @10700
**OLWH:** 2860,1370,1020 [mm]
**Suspension:** AA Arm push(F) & AA Arm Pull (R) road system
**Tire:** TS:13, RB25
**Unique:** Kevlar Body, Rapid Prototype Intake & Steering Wheel, and Monkey Teammates
**Weight:** 700
**Wheelbase:** 63 inches

The powertrain (Engine) we have selected is Honda CBR600 RR. The drivetrain selected is of Maruti 800 car it fulfills our need. The main reason for taking this drivetrain is easily availability cost and main thing is we made it compatible with the transmission of honda engine. For Intake and Exhaust we have made many calculation like for calculating the mass flow rate, fluid flow characteristics, runner length for the intake and exhaust and apply the concept of free flow and the analysis on CFD. Petrol tank is also made by us of metal sheet for this we have considered the fluid flow concept, losses and main issue of leakage. The Frame of the vehicle is made by 4130 steel tubes and the designing of the frame is done on the Solid works 2012. we have tried to make the weight of chassis as-low-as possible and we have got succeeded to achieve our goal with a weight of 132 lb. The Uprights part we have manufactured and the material used for the upright is 7075 aluminium grade.

Suspension part includes the Double unequal length A-Arm. Push rod actuated system.

Steering also we have customized having steering ratio 5:1. All four wheels have disk brakes. We innovate our car with Pedal shift.
This new team F-SAE 2013 of Polytechnic Motorsports is focused in the drive ability of the vehicle, and effective way to control the vehicle with high precision. The Polytechnic University fundamentals are based in design new ideas and testing the creations of students. Our goal as students of mechanical engineer is to analyze every detail of the vehicle and achieve a better performance. One of the biggest achievements was the creation of new arrangement in the vehicle control which make the car user friendly and easy to drive. The characteristic of this car is that the main functional parts and components as steering, clutch, gear shifters and intake throttle are all mechanical systems and not electric without changing the comfort ability of driving.

BRAKE: Wilwood Front Calipers Custom Rotors, Racing Rear Calipers, Custom Rotors
BSCD: Stock, 600cc, 4 cylinders
COOLING: Water cooled
DRIVE: 520 Chain, LSD differential
ELECTRONICS: Megasquirt Programmable, digital dashboard
ENGINE: Honda CBR600RR
FR/RR TRACK: 52”/48”
FRAME: 4340 Steel tube structure
FUEL SYSTEM: Electronically controlled Fuel injection
FUEL TYPE: 100 octane
MATERIAL: AISI-4340
MPD: 63.82HP 10,800RPM
MPT: 31.06 FT/LB 8,500RPM
OLWH: 98.5”X62”X67”
SUSPENSION: Double unequal length A-arms
TIRE: Hoosier 10” in
UNIQUE: Adjustable Suspension, Narrow rear driveline, Adjustable Pedals and Easy handling.
WEIGHT: 530 lb
WHEELBASE: 63”

The purpose of the design for this year’s Formula car is to build from the successes and failures of previous entries. The areas specifically chosen for improvement are to decrease weight, improved steering input and driveability, and simplified manufacturability. There is a strong focus on improving manufacturability due to previous entries involving unnecessary complications in the frame and powertrain. The simplification and improvement in manufacturability work concurrently to reduce weight through elimination of redundant features.

Design Goals
Weight: 20% weight reduction from previous entry.
Steering: Greater than 1.0g.
Reliability: Complete dynamic events.
Manufacturability: Reduce redundancies, minimize construction time, minimize custom tooling.

BRAKE: 3 rotors, Wilwood caliper
BSCD: 67/42.5/599
COOLING: OEM
DRIVE: Chain driven RWD
ELECTRONICS: OEM
ENGINE: Kawasaki 600cc
FR/RR TRACK: 1359mm/1397mm
FRAME: Space Frame
FUEL SYSTEM: Fuel Injection
FUEL TYPE: Gasoline
MATERIAL: 4130
MPD: 80hp (10000)
MPT: 35lb-ft (7500)
OLWH: 2565mm, 1448mm, 1219mm
SUSPENSION: Unequal length, independent
TIRE: 20.0x7-13 D2629
UNIQUE: Lightweight shift knob
WEIGHT: 650lb
WHEELBASE: 1524mm
Our concept is "The machine which conveys the formula car pleasure ".

We manufactured a machine that formula car beginners can also run drive safely, purchase easily with emphasis on pleasure more than speed.

The greatest feature of our machine is the compactness.

Our machine has a side engine layout for this.

Thereby, the machine's advantages are shift changes with direct feeling, a large cockpit, and a seat arrangement as near the rear tire as possible to grasp easily the action of the machine.

<table>
<thead>
<tr>
<th>BRAKE</th>
<th>Front outboard/ Rear inboard</th>
</tr>
</thead>
<tbody>
<tr>
<td>BSCD</td>
<td>96mm x 62mm/1cylinder/449cc</td>
</tr>
<tr>
<td>COOLING</td>
<td>Water cooling</td>
</tr>
<tr>
<td>DRIVE</td>
<td>520 Chain drive</td>
</tr>
<tr>
<td>ELECTRONICS</td>
<td>MoTeC Fuel injection control</td>
</tr>
<tr>
<td>ENGINE</td>
<td>PE06E (CRF450X)</td>
</tr>
<tr>
<td>FR/RR TRACK</td>
<td>1210mm(47.6&quot;)/1200mm(47.2&quot;)</td>
</tr>
<tr>
<td>FRAME</td>
<td>Tubular steel space frame</td>
</tr>
<tr>
<td>FUEL SYSTEM</td>
<td>Injection</td>
</tr>
<tr>
<td>FUEL TYPE</td>
<td>100 octane gasoline</td>
</tr>
<tr>
<td>MATERIAL</td>
<td></td>
</tr>
<tr>
<td>MPD</td>
<td>50ps/7500rpm</td>
</tr>
<tr>
<td>MPT</td>
<td>40N&amp;40/ 4000rpm</td>
</tr>
<tr>
<td>OLWH</td>
<td>as 2320mm(91.3&quot;),1416(55.7&quot;),1191(46.9&quot;)</td>
</tr>
<tr>
<td>SUSPENSION</td>
<td>unequal length, unequal parallel Double wishbone suspension</td>
</tr>
<tr>
<td>TIRE</td>
<td>18.0 x 6.0-10 / Hoosier R25B</td>
</tr>
<tr>
<td>UNIQUE</td>
<td>Side engine layout</td>
</tr>
<tr>
<td>WEIGHT</td>
<td>170kg(374lb)/238kg(524lb)</td>
</tr>
<tr>
<td>WHEELBASE</td>
<td>1530 mm(60.2&quot;)</td>
</tr>
</tbody>
</table>

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Honda Technical College Kansai

CL2

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Southern Illinois University - Carbondale

Saluki Formula Racing

BRAKE : Carbon/Carbon, floating rotors, Wilwood PS-1 calipers
BSCD : 67mm bore/ 42.5mm stroke/ 4 cylinder/ 599 cc
COOLING : Side mounted heat exchanger, temperature controlled variable speed fan
DRIVE : 520 chain drive, clutch pack limited slip differential
ELECTRONICS : MegaSquirt-3
ENGINE : Kawasaki ZX-6R
FR/RR TRACK : 1300mm / 1250mm
FRAME : 4130 Steel Tubular Space Frame
FUEL SYSTEM :
FUEL TYPE : 93
MATERIAL :
MPD : 12,500 rpm
MPT : 10,000 rpm
OLWH : 2640mm / 1485mm / 1130mm
SUSPENSION : Unequal length A-arm with push rod actuated spring & dampener
TIRE : 20x7-13 R25B Hoosier
WEIGHT : 290kg (640 lb.)
WHEELBASE : 1572mm

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Information published as supplied by teams on or before May 17, 2013
For the 2013 season, the weight of the tubular spaceframe has been reduced, along with further optimization of the suspension. A lightened and improved rear shear plate has been developed from the past season's which allows for better packaging and integration with suspension components.

As a product Drexel Racing, everything from the carbon fiber panels, to the chassis, to the brake system is designed and built in our small shop in West Philly by dedicated students with a passion for both engineering and motorsport.

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**Drexel University**

**Drexel Racing**

As a product Drexel Racing, everything from the carbon fiber panels, to the chassis, to the brake system is designed and built in our small shop in West Philly by dedicated students with a passion for both engineering and motorsport.

**BRAKE**: Front and rear disc brakes
**BSCD**: 2.6 in/1.7 in/4 cylinder/599 cc
**COOLING**: Liquid-cooled
**DRIVE**: Chain drive
**ELECTRONICS**: Stand alone programmable engine controller
**ENGINE**: Honda CBR600F4i
**FR/RR TRACK**: 18 in. Front, 45.5 in. Rear
**FRAME**: Spaceframe
**FUEL SYSTEM**: Programmed Fuel Injection
**FUEL TYPE**: 100 Octane
**MATERIAL**: 4130 Chromoly Steel
**MPD**: 12,500
**MPT**: 10,000
**OLWH**: 102.5 in. long, 52 in. wide, 43.7 in. high
**SUSPENSION**: Front and rear Double unequal length A-Arm. Pushrod actuated.
**TIRE**: 20.5 x 7.0 - 13/ Hoosier R25B
**UNIQUE**: Runs on energy drinks and mediocrity
**WEIGHT**: 645 lbs
**WHEELBASE**: 60 in.

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**Oklahoma State University**

**Okstate Racing**

The 2013 Oklahoma State University car, designated TENA, was designed to exemplify the successes of previous generations while building upon the foundations of previous lessons learned. The car was created, not only with the technical rules in mind, but with the intent of creating a business friendly car that would be easy to manufacture and remain affordable to the everyday autocrosser.

At the heart of this year’s car lies a Yamaha YFZ450R single-cylinder ATV engine. The power supplied by this engine will propel the car to a maximum vehicle speed of 116 kph. The engine would be nothing without a frame to propel. This year’s frame is a tubular space frame made out of 4130 steel of the round and square varieties. TENA was designed to float like a butterfly on a double unequal length A-Arm suspension attached to both, the front and the rear. TENA also relies upon four 18x6-10 R25B Hoosier tires to lay the power down to the asphalt as she rounds corners and flies down straightaways.

Manufacturer-purchased parts aside, all other aspects of TENA were handcrafted and machined with the utmost attention to detail by the members of the Okstate Racing Team.

**BRAKE**: Dual Wilwood, 19mm (rear) 15.9mm (front) bore w/ bias bar
**BSCD**: 95mm bore / 63.4mm stroke / 1 cylinder / 450cc
**COOLING**: Side mounted radiator with thermostatically controlled fan
**DRIVE**: O-ring chain / sprocket driven
**ELECTRONICS**: PE3 Performance Electronics ECU
**ENGINE**: Yamaha YFZ450R
**FR/RR TRACK**: 1295mm / 1245mm
**FRAME**: Tubular Spaceframe (square and round tube)
**FUEL SYSTEM**: Yamaha fuel injection
**FUEL TYPE**: 91 octane
**MATERIAL**: 4130 steel tubing .625” to 1.0” dia.
**MPD**: 8300 RPM
**MPT**: 7900 RPM
**OLWH**: 2412mm long, 1414mm wide, 1308mm high
**SUSPENSION**: double unequal length A-arm. Push rod actuated (front)
**TIRE**: 18x6-10 R25B Hoosier
**UNIQUE**: TENA’s name is spelled incorrectly
**WEIGHT**: 128kg (front) / 138kg (rear) w/ 68kg driver seated
**WHEELBASE**: 1600mm
The Instituto Tecnologico de Chihuahua formula SAE team is composed by members of different careers. The standing of the institute is backed for our significant way in this competition.

The principal goal for this design is to improve the past projects. The manner in which it was made having experience from the last projects; we used this information for by a design methodology, methods of testing, analysis with software to improve the design for this year, always trying to learn from our own defects and improve the new design.

Based on the experience of the last year, the Honda CBR 600 RR engine was chosen again because of its high performance, reliability, and power. Also, the oil pan was redesigned so that the engine could be nearer to the floor lowering the gravity center.

One of the most important things between the pilot and the vehicle is the comfort because in this time has become in a necessity. The goal is satisfied this necessity with a design comfortable, sensible and friendly environment for the driver.

**BRAKE**: Brake Disc polaris, PS_1 Calipers
**BSCD**: 67mm bore / 42.5mm stroke / 4 cylinder / 599cc
**COOLING**: Radiator
**DRIVE**: 30mm x 10mm wooden caged belt
**ELECTRONICS**: ECU Haltech Platinum Sport 1000
**ENGINE**: Honda CBR600RR
**FR/RR TRACK**: 50 in / 47 in
**FRAME**: Steel Spaceframe
**FUEL SYSTEM**: Student design/fuel injection, sequential
**FUEL TYPE**: 93 octane gasoline
**MATERIAL**: 4130 N Steel "Chromoly"
**MPD**: 11500
**MPT**: 11250
**OLWH**: 2704.35 mm long, 1448.78mm wide, 1192.74 mm high
**SUSPENSION**: Pull rod (front) push rod (rear)
**TIRE**: 508mm x 152.4mm hoosier R25B C2500
**WEIGHT**: 560 lb
**WHEELBASE**: 1549.4mm

The 2012-2013 season is the first UCLA will be competing in Formula SAE. UCLA’s inaugural car was designed to be both cost effective and reliable. All components were designed to be robust to prevent them from breaking under extreme conditions.

The car was built around a 1020 mild steel spaceframe and is powered by a 450cc single cylinder engine. A custom starter system was designed to convert the engine from kickstart to electronic start.

**BRAKE**: Wilwood calipers and master cylinders
**BSCD**: 96.0mm / 62.1mm / 1 cylinder / 449.4cc
**COOLING**: Dual side mounted radiators with fans
**DRIVE**: Chain Drive
**ELECTRONICS**: Stock
**ENGINE**: Honda CRF450R
**FR/RR TRACK**: 1168 mm/ 1118 mm
**FRAME**: Tubular steel spaceframe
**FUEL SYSTEM**: Carbureted
**FUEL TYPE**: 100 octane
**MATERIAL**: 1020 mild steel
**MPD**: 8000 RPM
**MPT**: 6000 RPM
**OLWH**: 1346 mm, 2819 mm, 1219 mm
**SUSPENSION**: Double unequal length A-Arm, push rod actuated spring & damper
**TIRE**: Hoosier 20.5 x 7 x 13in R25B
**WEIGHT**: 525 lbs
**WHEELBASE**: 1525 mm

Information published as supplied by teams on or before May 17, 2013
California State University - Chico
Chico State Racing

The 2013 Formula SAE Competition in Lincoln, NE will be the first ever event that the Chico State Formula SAE Team will be competing in. Being a first year team, a certain design philosophy was kept in mind and that was to keep the car simple. This year’s focus was to get a car out to competition that could take part in all of the dynamic events and give the team something to work on and build upon for future years. The vehicle utilizes a 2007 GSX-R600 engine driven by a spool. Simplicity and ease of manufacturing was kept in mind when designing the suspension and driveline components, allowing for a car that is straightforward to fabricate and assemble.

The Chico State Formula SAE Team hopes to make their first year not only a successful one, but a memorable one as well.

BRAKE: Wilwood Dynalite
BSCD: 67mm Bore / 42.5mm Stroke / 4 Cylinder / 599 cc
COOLING: Stock
DRIVE: Spool
ELECTRONICS: Power Commander
ENGINE: 2007 GSX-R600
FR/RR TRACK: 1220 mm / 1170 mm
FRAME: Mild Steel Round Tubing
FUEL SYSTEM: Stock
FUEL TYPE: 91 Octane
MATERIAL:
MPD: 13500
MPT: 10750
OLWH: 2000 mm long, 1425 mm wide, 1105 mm high
SUSPENSION: Direct Acting Front, Push Rod Rear
TIRE: 20.5x7.5-13 R25B Hoosier
UNIQUE:
WEIGHT: 290 Kg
WHEELBASE: 1600 mm

Auburn University
War Eagle Motorsports

AU-2013 utilizes a hybrid monocoque and steel rear sub-frame construction to produce a light-weight and user friendly racing machine. The car is powered by a 600 cc Yamaha R6, and utilizes active intake runners to create a smooth and drive-able power curve. AUFSAE would like to thank the Samuel Ginn College of Engineering, Walt and Virginia Waltosz, and Hyundai and Kia Technical Centers North America for their effort and support. War Eagle!

BRAKE: floating rotor, adjustable bias, custom ABS
BSCD: 67 mm, 42.5 mm, 4 cylinders, 599 cc
COOLING: dual parallel single pass radiators
DRIVE: chain drive, salisbury differential
ELECTRONICS: Motec ECU, Motec ADL
ENGINE: Yamaha R6
FR/RR TRACK: 1270 mm (50 in), 1244 mm (49 in)
FRAME: monocoque fore, chromally space frame aft
FUEL SYSTEM: EFI
FUEL TYPE: 93 Octane
MATERIAL: varies by application
MPD: 84 HP (11000 RPM)
MPT: 41 lbf*ft (8000 RPM)
OLWH:
SUSPENSION: SLA, double a-arm
TIRE: Hoosier 20.5x7.0-13 R25B
UNIQUE: 13" Wheels
WEIGHT: 615 lbm
WHEELBASE: 1651 (65 in)
We would like to extend our sincere gratitude to our loyal and generous sponsors and alumni that helped make this build and test season a success. We would not be able to produce such a formidable vehicle without your continued support.

BRAKE: Outboard floating rotors with custom masters
BSCD: 65.5 mm bore / 44.5 mm stroke / 4 cyl / 599 cc
COOLING: Rear mounted radiator with inlet duct
DRIVE: Drexler Limited Slip Differential
ELECTRONICS: Motec M600 ECU
ENGINE: 1999-2002 Yamaha YZF-R6
FR/RR TRACK: 48 inches/46 inches
FRAME: 4130 steel round tubing
FUEL SYSTEM: Direct port injection
FUEL TYPE: 100 Octane
MATERIAL: 4130 Steel
MPD: 12,000 RPM
MPT: 10,700 RPM
OLWH: 123” x 52” x 50”
SUSPENSION: Double A-Arm; Front pull rods; Rear push rods
TIRE: 13” Hoosier R25B
UNIQUE: Custom Masters, steering rack, and 450lbs downforce at 60mph
WEIGHT: 580lbs
WHEELBASE: 64.5 inches

The MRT15 combustion prototype will mark the McGill Racing Team’s 15th entry into the FSAE series. For the first time, MRT and the former McGill Hybrid Racing Team have joined forces to design and build both an electric and a combustion vehicle from the ground up.

MRT15 is powered by the Rotax DS450 single-cylinder engine and features a full aerodynamics package. Focus has been set on developing a reliable yet competitive package backed by simulation and physical validation.

BRAKE: AP Racing Master Cylinders & CP4227/CP4226
BSCD: 97 mm / 60.8mm / 1 Cylinder / 449 cc
COOLING: Water Cooled
DRIVE: Slipper Clutch, Torsen Differential
ELECTRONICS: Vi-Pec V88 ECU; AiM Data Acquisition
ENGINE: Rotax DS450
FR/RR TRACK: 47 in / 47 in
FRAME: Tubular Mild Steel Space Frame
FUEL SYSTEM: Injection
FUEL TYPE: 93 Octane
MATERIAL: 1010 Steel
MPD: 8500
MPT: 7000
OLWH: 118.12 in / 54.32 in / 45.82 in
SUSPENSION: Pushrod / Penske 7800 Double-Adjustable Dampers / Adjustable ARB
TIRE: 18x6-10 LC0 Hoosier
UNIQUE: Full Aerodynamics Package
WEIGHT: 550 lbs
WHEELBASE: 62 in

Information published as supplied by teams on or before May 17, 2013
VTM13 is the 26th vehicle produced by Virginia Tech Motorsports for competition in Formula SAE sanctioned events. The team established quantifiable goals and a formal testing program to validate the predictive models used for system level designs. A light weight, fuel efficient vehicle platform, incorporating a tube frame chassis and single-cylinder engine was chosen. For the benefit of an amateur driver, assistive control systems are included. Custom body molded seating system is included along with adjustable pedals and a molded steering wheel. An undertray with diffuser and a complete aerodynamic package were designed in order to increase the tractive limits of the 10” wheels with Hoosier R25B tires. A single-cylinder, Yamaha WR450F powers the car utilizing a MoTeC M400 engine management system. An adjustable limited-slip differential allows the torque bias ratio to be tuned for acceleration and deceleration scenarios. The suspension, powertrain, electrical and ergonomic systems were analyzed, tested, and refined in order to ensure drivers of any skill level are capable of consistently driving the car at its tractive limit, the primary goal of the 2013 vehicle.

**BRAKE**: Slotted floating rotor, Front: AP4227/Rear: AP4226, Tilton m/c  
**BSCD**: 95mm/63.4mm/1 cyl/ 449 cc  
**COOLING**: Sidepod-mounted radiator with 366 cfm thermostatic-controlled fan  
**DRIVE**: Chain Drive, stock gearbox  
**ELECTRONICS**: Custom MOSFET power distribution with MoTeC M400 ECU  
**ENGINE**: Yamaha WR450F  
**FR/RR TRACK**: 1194mm/1194mm  
**FRAME**: AISI 4130N Chrome-Moly Tubular Steel Space-frame  
**FUEL SYSTEM**: Custom Port Fuel Injection  
**FUEL TYPE**: 93 Octane  
**MATERIAL**: 4130-N, 7075-T6 & T651, Ductile Iron, Magnesium, CFRP, ULTEM 9085  
**MPD**: 8500 RPM  
**MPT**: 7500 RPM  
**OLWH**: 2990mm/1403mm/1066mm  
**SUSPENSION**: Unequal length Double A-arm Pushrod front/Pullrod rear, Ohlins TTX-25 dampers  
**TIRE**: 18x5.0-10 Hoosier R25B  
**UNIQUE**: Custom molded seat & steering wheel grips, NI Wireless Telemetry  
**WEIGHT**: 226 kg  
**WHEELBASE**: 1537mm

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Southern Poly Motorsports is constantly developing new ways to improve upon previous designs to enhance the experience of the race car driver, whether it be a novice or skilled racer. The largest design goal for our 2013 car is “thoroughly designed” simplicity. This includes reducing part count and increased serviceability, all while incorporating excellent performance capabilities. This has played an integral role in the design process, which has seen many changes due to these constraints. The reduction in parts as well as multifunction parts has led to an overall weight reduction of about 14% compared to previous designs. Manufacturability and cost were the other big factors in the design process, with an overall goal to reduce the overall cost and design parts for low to medium size production runs. Emphasis was placed on minimal custom fixturing and minimal setups per part without sacrificing performance characteristics.

**BRAKE**: Front: Inverted Stainless Steel 190mm, Rear: Standard Stainless Steel 178mm  
**BSCD**: 65.5 mm bore / 44.5 mm stroke / 4 cylinder(s)  
**COOLING**: Dual Radiators Mounted in the Sidepods 250 mm X 150 mm  
**DRIVE**: Chain drive Through Quaife ATB  
**ELECTRONICS**: AEM EMS-4  
**ENGINE**: 2003 Suzuki GSXR 600  
**FR/RR TRACK**: Front: 1270 mm, Rear: 1193 mm  
**FRAME**: 4130 Chromoly  
**FUEL SYSTEM**: Port Injected EFI with Intanke Fuel Pump  
**FUEL TYPE**: 93 Octane  
**MATERIAL**:  
**MPD**: 80 Horsepower @ 9000 RPM  
**MPT**: 38 ft/lb @ 8000 RPM  
**OLWH**: Length: 2736 mm, Width: 1441 mm, Height: 1240 mm  
**SUSPENSION**: Short Long Arm Front: Pull Rod, Rear: Push Rod  
**TIRE**: Front: Hoosier 18.0x6.0-10 R25A, Rear: Hoosier 18.0x7.5-10 R25B  
**UNIQUE**:  
**WEIGHT**: 580 lb/ 263 kg  
**WHEELBASE**: 1575 mm
### University of Missouri

**Mizzou Racing**

Mizzou Racing is proud to introduce the 2013 entry into FSAE. Building on almost 30 years of Mizzou Formula SAE history, we have designed a car that champions reliability and drivability, while also embracing creativity and innovation, testing our engineering limits. Starting with the bullet-proof Honda CBR600RR, and following the motto "you gotta give the engine what it wants", we have produced a formidable power train that reliably produces a supply of relentless but controllable power. We also focused heavily on putting that power to use. Our switch back to Hoosier tires demanded that our suspension be highly optimized to squeeze out every last bit of performance, so a premium was placed on maintaining optimum camber angles. To maximize lateral acceleration, our already impressive aerodynamics package was overhauled, and now produces an incredible amount of downforce. To help manage the massive aerodynamic loads, an active-aerodynamics system was developed to allow for a tunable aero-balance at any speed, with the ability to react dynamically to various different driving maneuvers, keeping us as close to the limit as possible at all times.

<table>
<thead>
<tr>
<th>BRAKE</th>
<th>4 wheel outboard disc</th>
</tr>
</thead>
<tbody>
<tr>
<td>BSCD</td>
<td>600cc 4-cyl</td>
</tr>
<tr>
<td>COOLING</td>
<td>Single Radiator w/Fan</td>
</tr>
<tr>
<td>DRIVE</td>
<td>Chain, #520</td>
</tr>
<tr>
<td>ELECTRONICS</td>
<td>Pe-3 ECU</td>
</tr>
<tr>
<td>ENGINE</td>
<td>2012 Honda CBR600RR</td>
</tr>
<tr>
<td>FR/RR TRACK</td>
<td>1219/1194mm -48/47in</td>
</tr>
<tr>
<td>FRAME</td>
<td>Steel Spaceframe</td>
</tr>
<tr>
<td>FUEL SYSTEM</td>
<td>External</td>
</tr>
<tr>
<td>FUEL TYPE</td>
<td>93 Octane</td>
</tr>
<tr>
<td>MATERIAL</td>
<td>Hopes and Dreams</td>
</tr>
<tr>
<td>MPD</td>
<td>80 RWHP (10,000rpm)</td>
</tr>
<tr>
<td>MPT</td>
<td>40 ft-lb (8,500rpm)</td>
</tr>
<tr>
<td>OLW</td>
<td>2971x1511x1193mm</td>
</tr>
<tr>
<td>SUSPENSION</td>
<td>Double A-Arm, Pullrod front, pushrod rear</td>
</tr>
<tr>
<td>TIRE</td>
<td>Hoosier R25B 20.5x7-13&quot;</td>
</tr>
<tr>
<td>UNIQUE</td>
<td>Active Aerodynamics, Electro-mechanical Shifting</td>
</tr>
<tr>
<td>WEIGHT</td>
<td>650lb</td>
</tr>
<tr>
<td>WHEELBASE</td>
<td>1549mm/61in</td>
</tr>
</tbody>
</table>

### University of Cincinnati

**Bearcat Motorsports**

The 2013 car from the University of Cincinnati is a cornerstone. Bearcat Motorsports has a history of several successful years followed by lean years of the recent past. The 2012 team set a new design direction by changing car concept from the 600cc engine, 13" wheel packaging to a 450cc, 10" wheel package. After a summer of testing and revisions, the 2013 design takes the lessons learned and lays the foundation for a winning car concept the team will refine year after year. The car is a reliable test bed for instrumented testing and driver training capable of directing a team with high yearly turnover into the future.

To build a car to compete and continue developing of the program, our design goals are:
- Safety: Exceed minimum safety required per FSAE rules.
- Reliability: Finish all events of competition, accumulate 2000 miles of track testing
- Ease of Manufacture/ Maintenance: tuning parameters easily adjusted and repeatable
- Efficiency of fuel, tires, and part count: approximately 0.5 gallon fuel use in endurance
- High acceleration capability: Expand driver’s friction circle to its limits

<table>
<thead>
<tr>
<th>BRAKE</th>
<th>Cast Iron floating rotors, Brembo/AP Racing calipers, AP Racing MC</th>
</tr>
</thead>
<tbody>
<tr>
<td>BSCD</td>
<td>95mm bore/63.4mm stroke/lawnmower/449cc</td>
</tr>
<tr>
<td>COOLING</td>
<td>9&quot; x 7&quot; x 1.3125&quot; aluminum radiator in CF side pod with extractor fan</td>
</tr>
<tr>
<td>DRIVE</td>
<td>Chain drive, 520 pitch chain</td>
</tr>
<tr>
<td>ELECTRONICS</td>
<td>Performance Electronics ECU</td>
</tr>
<tr>
<td>ENGINE</td>
<td>Yamaha YFZ-450R</td>
</tr>
<tr>
<td>FR/RR TRACK</td>
<td>1117.6mm Front/1079.5mm Rear</td>
</tr>
<tr>
<td>FRAME</td>
<td>1020 Steel</td>
</tr>
<tr>
<td>FUEL SYSTEM</td>
<td>42 lb/hr injector, Ford Ranger pump, 43.5 psi</td>
</tr>
<tr>
<td>FUEL TYPE</td>
<td>93 Octane</td>
</tr>
<tr>
<td>MATERIAL</td>
<td>Hopes and Dreams</td>
</tr>
<tr>
<td>MPD</td>
<td>9500</td>
</tr>
<tr>
<td>MPT</td>
<td>6500</td>
</tr>
<tr>
<td>OLW</td>
<td>2504mmx1336mm/1033mm</td>
</tr>
<tr>
<td>SUSPENSION</td>
<td>Double unequal length A-arms front and rear, direct acting dampers</td>
</tr>
<tr>
<td>TIRE</td>
<td>18x6-10 Hoosier R25b</td>
</tr>
<tr>
<td>UNIQUE</td>
<td>Laser Sintered Titanium intake</td>
</tr>
<tr>
<td>WEIGHT</td>
<td>500lbs</td>
</tr>
<tr>
<td>WHEELBASE</td>
<td>1558mm</td>
</tr>
</tbody>
</table>
Formula Hardrocker Racing’s has developed it’s 2013 entry, affectionately known as Chandra, with a design philosophy focused on performance, reliability, and innovation.

Several iterative designs will ensure that reliability is gained without a sacrifice in the cars proven speed.

Key aspects of this years car include; fully unsuspended aerodynamics, carbon fiber A-Arms, LDT uprights, and Cold-Spray Metal Matrix Composite brake rotors.

**BRAKE**: Aluminum Metal Matrix Composite Floating Rotors, AP Racing calipers  
**BSCD**: 80mm / 55mm / 2 / 550cc  
**COOLING**: Single Carriage Mounted AL Radiator with 8” fan  
**DRIVE**: 520 Chain Drive  
**ELECTRONICS**: Pectel SQ6, LiFePO4 Battery  
**ENGINE**: Aprilia SXV 5.5  
**FR/RR TRACK**: (1219/48) / (1118/44)  
**FRAME**: 4130 Tubular Space Frame  
**FUEL SYSTEM**: Electronic Port Fuel Injection  
**FUEL TYPE**: E-85  
**MATERIAL**: Titanium, Aluminum, Steel, Carbon Fiber, MMC, Nylon 6/6  
**MPD**: 8500rpm  
**MPT**: 5700rpm  
**OLWH**: 3112/12.2.5, 1384/54.5, 1098/43.2  
**SUSPENSION**: Unequal length A-Arm. Pull rod actuated  
**TIRE**: 20.5x6-13 R25B Hoosier  
**UNIQUE**: Fully Unsuspended Aerodynamics, LDT Uprights  
**WEIGHT**: 540lbs / 245kg  
**WHEELBASE**: 1575mm / 62in

Ilanni Motorsports 2013 competition entry has been designed using points analysis coupled lap simulation and a renewed focus on reliability. We would like to give a special thanks to our friends, families, and sponsors for their continued support.

**BRAKE**: AP Racing 4-piston front, 2-piston rear  
**BSCD**: 67mm bore / 42.5mm stroke / 599cc  
**COOLING**: Vertically mounted single core double pass radiator, 944 cfm fan  
**DRIVE**: RWD  
**ELECTRONICS**: Motec M400 ECU and student designed data acquisition and data logger  
**ENGINE**: Honda CBR600 F4i  
**FR/RR TRACK**: 49in front, 49in rear  
**FRAME**: 4130 Steel space frame  
**FUEL SYSTEM**: Stock Honda  
**FUEL TYPE**: 93 Octane  
**MPD**: 10500 rpm  
**MPT**: 9000 rpm  
**OLWH**: L: 3249mm / W: 1468mm / H: 1124mm  
**SUSPENSION**: Double unequal length A-Arms, Ohlins TTX25 dampers  
**TIRE**: 20.5x7x13 Hoosier R25B  
**UNIQUE**: Carbon fiber anti roll bands  
**WEIGHT**: 640lb  
**WHEELBASE**: 66in
Building on two decades of experience, Queen's Formula celebrates its 20th anniversary with the Q13. The 2013 entry is an evolution on the successful platform created in 2012. Combining the simplicity of the steel space frame, the power of the 4 cylinder Honda CBR-600 powerplant, and the superb handling of a push and pull rod actuated suspension system, all of which are complimented by the addition of front and rear wings, the Q13 aims to be the fastest and most reliable Queen’s car to date. New systems to this year are AP Racing rear calipers, a PE3 ECU, an onboard Race Technology dash, and a host of new sensors. For the first time in recent years, the car will incorporate adjustable front and rear anti-roll bars, improving both handling and track side tuning capabilities. The combination of these elements will allow the drivers and the development team to maximize the vehicle’s performance during testing and competition.

**BRAKE**: 4 wheel independent, floating cast iron rotors with 2 piston calipers  
**BSCD**: 67.0mm/ 42.5mm/ 4 cylinders/ 599cc  
**COOLING**: Single sidedpod mounted water radiator  
**DRIVE**: 520 chain with Salisbury Limited Slip Differential  
**ELECTRONICS**: colour coded wiring harness with separate telemetry and car harness  
**ENGINE**: Honda CBR 600 F4i  
**FR/RR TRACK**: 1250mm/ 1150mm  
**FRAME**: TIG welded 4130 Steel  
**FUEL SYSTEM**: Multi Port Sequential Injection  
**FUEL TYPE**: 93 Octane  
**MATERIAL**: 4130 Steel Tubing  
**MPD**: 11000 rpm  
**MPT**: 8250 rpm  
**OLWH**: 3076mm/ 1446mm/ 1060mm  
**SUSPENSION**: Push/ Pull Rod actuated spring and damper  
**TIRE**: 20.0x7.5-13 R25B Hoosier  
**WEIGHT**: 615lbs  
**WHEELBASE**: 1550mm

The aim of the Kansas State University Formula SAE team is to design an efficient formula style vehicle that can compete at the highest level of competition. Due to the high level of competitiveness between teams, it was determined that a vehicle must achieve a minimum of 900 points out of a possible 1,000 in order to place among the top five. This minimum is achieved by placing within the top five percent in dynamic events, an estimated 650 points, and the top ten percent in static events, an estimated 250 points.

Using this template, the team established that a desirable vehicle should be developed around the three main goals of 1) minimizing weight, 2) minimizing cost, and 3) improved reliability. With these in mind the performance parameters of the designs are, a vehicle with a mass of 350 pounds, without driver, and able to produce 2.5g’s laterally that responds in a stable and predictable manner.

**BRAKE**: 4 Wheel Disc Floating Rotor  
**BSCD**: 63.4/95/1/450  
**COOLING**: Single Radiator  
**DRIVE**: Torsen  
**ELECTRONICS**: Electromotive TECs  
**ENGINE**: YFZ 450  
**FR/RR TRACK**: 48/45 inches  
**FRAME**: CFRP Monocoque  
**FUEL SYSTEM**: Fuel Injected  
**FUEL TYPE**: E-85  
**MATERIAL**: Carbon Fiber!!! (What else is there???)  
**MPD**: 8000  
**MPT**: 6500  
**OLWH**: (3150,1220,1220/125,48,48)  
**SUSPENSION**: Pull Rod/ Pull Rod Double Wishbone  
**TIRE**: Hoosier R25B 20.5x7.0x13  
**UNIQUE**: DOWNFORCE  
**WEIGHT**: 500  
**WHEELBASE**: 1625/64

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Information published as supplied by teams on or before May 17, 2013
Kettering University has a very rich history in the automotive industry being that it was originally General Motors Institute. This history helps create a clear path to a goal of a successful racecar by simply going off of the core values that our team stands for. These values are ingenuity, being cost savvy, doing the appropriate amount of research, and an endless pursuit of going fast. 2013 is a year that encapsulates these goals more than previous years in the careful crafting of designs, components, and calibrations. Our use of exotic materials has decreased drastically over the previous season’s in addition to all materials in general being used more efficiently. This is part of our design renaissance that will yield major changes going forward. As Charles Kettering said, “If you have always done it that way, it is probably wrong” and here at Kettering University, we take that concept seriously.

We would also like to sincerely thank all of our sponsors for their commitment to our 2013 season!

BRAKE: ISR Calipers, AP Master Cylinders, Floating Steel Rotors
BSCD: 95mm / 62.4mm / 1 cyl / 450cc
COOLING: Unfrozen Wet Ice
DRIVE: Large Mechanical Gears
ELECTRONICS: Mil-Spec Tubes filled with Mil-Spec Smoke
ENGINE: Yamaha WR450f
FR/RR TRACK: Front: 1240mm/48.8in Rear: 1198mm/46.8in
FRAME: Made in America from American Steel
FUEL SYSTEM: Returnless relatively-low-pressure EFI
FUEL TYPE: E85
MATERIAL: Conglomeration of impractical materials
MPD: 4.975 Microfirkin-Hectare/Furlong-Fortnight @ 10,000 RPM
MPT: 155 N-ft @ 7000 RPM
OLWH: L:2273/89.5 W:1346/53 H:1113/43.8
SUSPENSION: Multidirectional tensile force multiplexors
TIRE: 13” Hoosier R25B
UNIQUE: Suspension designed for Michigan roads
WEIGHT: 244.6 Megadyne
WHEELBASE: 1524/60

Rutgers University
Rutgers Formula Racing

For 2013 Rutgers Formula SAE focused on competitive design while accommodating driver needs. Historically, emphasis was placed on the performance of individual sub-systems compromising the synchronization of driver and vehicle. Concentrating on total vehicle performance, a new set of principles was adopted promoting the integration of driver and vehicle, while staying true to a tradition of continuous sub-system development through innovative thinking and data driven design.

BRAKE: Floating Rotors, Tilton-77 Master Cylinders, Brembo P34G Calipers
BSCD: 70mm bore / 52.3mm stroke / 3-Cylinder /605cc
COOLING: Single side mounted radiator, Temperature dependent fan
DRIVE: Drexler Salisbury
ELECTRONICS: DTA S80, Custom DAQ
ENGINE: Modified Triumph Daytona 675
FR/RR TRACK: 1219mm / 1193mm
FRAME: Steel Tube, 4130
FUEL SYSTEM: EFI
FUEL TYPE: 93
MATERIAL: Alloy Steel, Carbon, Fiberglass
MPD:
MPT:
OLWH: 2298.7mm / 1397mm / 1092.2mm
SUSPENSION: Unequal length A-Arms, Push-rod actuated bell cranks
TIRE: Hoosier R25B
UNIQUE:
WEIGHT: 204 kg
WHEELBASE: 1651mm
Spartan Racing returns in 2013 with SR-5, the car that marks our first half-decade of Formula SAE racing. Our fifth build is the first to focus heavily on testing and verification, and will be the test bench and launch pad for many future refinements. This year, we have added an aerodynamic body package with undertray and diffusers, a fully redundant electropneumatic shift system, traction control, and launch control. Despite these additions, we have largely maintained the philosophy of building racecars with simplified components and assemblies that are easy to maintain, and with a polished fit and finish. We look forward to friendly competition with SR-5, and another successful five years of Formula SAE.

**BRAKE:** Wilwood GP-200 caliper, Tilton 77 MC, slotted steel outboard rotors  
**BSCD:** 67mm bore / 42.5mm stroke / 4cyl / 599cc  
**COOLING:** Two core cross-flow radiator, 650cfm fan, Davies Craig pump  
**DRIVE:** Chain-driven w/ Honda TRX differential  
**ELECTRONICS:** DTA S80Pro ECU, AIM EVO 4 DAQ  
**ENGINE:** Honda CBR600 F4i  
**FR/RR TRACK:** 50in front, 48in rear  
**FRAME:** 4130 Chromoly space frame  
**FUEL SYSTEM:** External pump, F4i injectors, F4i rail  
**FUEL TYPE:** 100 Octane Gasoline  
**MATERIAL:** Aermet 340 & Aerogel  
**MPD:** 12,000  
**MPT:** 8,100  
**OLWH:** 106in long, 59in wide, 43in high  
**SUSPENSION:** Double unequal length A-Arm, push-rod actuated spring / damper. Adj. rollbar.  
**TIRE:** Hoosier 18” R25B  
**UNIQUE:** Made with love in Silicon Valley  
**WEIGHT:** 590lb  
**WHEELBASE:** 60in

Wichita State University Formula SAE team, also known as Shocker Racing, will be competing for its 4th year of competition.


**BRAKE:** 4 Wheel Brake Disc  
**BSCD:**  
**COOLING:** Liquid  
**DRIVE:** Chain & Sprocket  
**ELECTRONICS:**  
**ENGINE:** Honda CBR 600RR  
**FR/RR TRACK:**  
**FRAME:** 4130 Steel Frame  
**FUEL SYSTEM:**  
**FUEL TYPE:** 91 Octane  
**MATERIAL:**  
**MPD:**  
**MPT:**  
**OLWH:**  
**SUSPENSION:** Double Unequal Length A-arm, Push Rod Actuated  
**TIRE:**  
**UNIQUE:** Custom Dry Sump, Large Aero Package  
**WEIGHT:**  
**WHEELBASE:**
The Unicamp E-Racing is a young Formula SAE Electric team from Brazil, and this is the second competition in our history. Since this is our first electric prototype, we focused in keeping it simple and reliable in order to finish all the dynamic events.

The car was designed by eight undergraduate students of Mechanical and Electrical Engineering courses, from State University of Campinas, also known as UNICAMP.

We would like to thank all our sponsors, university staff, friends and family for their support!

**Brake**: Stainless steel rotors, Wilwood PS1 calipers and Wilwood master cylinders

**Cooling**: Oil cooled, single aluminum radiator with fans and electric pump

**Drive**: Direct drive with internal differential

**Electronics**: ETAS data acquisition system, WiFi telemetry

**EMC**: LiFePO4 / 5,0kWh

**FR/RR Track**: 1214 / 1194

**Frame**: Full tubular space frame

**Material**: AISI 1020 Steel

**MaxMotorRPM**: 2000 RPM

**MaxSysVolt**: 290V

**MotorCntlr**: Sevcon Gen 4 Size 8

**MotorTyp**: YASA-750 Axial Flux Permanent Magnet Synchronous Motor

**NM**: 1 / Rear / 100kW

**OLWH**: L: 2700mm / W: 1400mm / H: 1250mm

**Suspension**: Double unequal length A-Arm, pull/push rod actuated spring and damper

**Tire**: 20.5 x 7 @ 13 R255 Hoosier

**Trans**: 1:1

**Weight**: F: 160kg / R: 162Kg

**Wheelbase**: 1575mm
The 2013 vehicle design for team IIT Motorsports can best be described as innovative and inspiring. Continuing to improve on last year’s four in-hub geared motor design, the new vehicle now features four direct drive inline motors increasing overall mechanical efficiency. With this four wheel drive powertrain, the team is able to monitor and control the overall power output of each wheel through an electric differential, traction control, and the future possibility of “driving a wheel.” Along with this light weight powertrain package, the vehicle includes carbon composite suspension A-arms and a carbon composite monocoque. This was possible due to the 2012-2013 team’s dedication to explore and learn the mysteries of composite structural analysis and thus engineering their composite chassis to be approximately ten pounds lighter than that of their previous chrome moly tubular space frame. The monocoque also allows infinite mounting points for suspension thus allowing the team to readily redesign its geometry. Considering all these innovations, the team expects to do well at this year’s competition and bring uniqueness and competitiveness to the competition.

**E207**

**Illinois Institute of Technology**

**IIT**

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**E208**

**Ecole Polytechnique De Montreal**

**Formule Électrique de Polytechnique Montréal**

Poly eRacing, previously known as Formule Électrique de Polytechnique Montréal is a rookie Canadian Formula SAE/Student team. The vehicle that is competing this year to Formula SAE Electric has competed at Formula Student Germany in August 2012 after having been shipped in parts, and assembled it on time. Also, our designs are made open source (GNU GPL) on our website. The most noteworthy one is our BMS (named BMSafe) that is now becoming widespread.

This first prototype features two independently driven rear wheel, simple torque vectoring traction control, CAN communication all over the vehicle, inboard rear brake disks, low center of gravity and rod ends in bending!

“[…] done is better than well said” was our motto.

**BRAKE**: Custom iron rotors & aluminum calipers
**COOLING**: Liquid, dual radiators w/ integrated fan and pump
**DRIVE**: In wheel direct drive servo motors
**ELECTRONICS**: dSpace micro autobox
**EMC**: Lithium polymer / 4236Wh
**FR/RR TRACK**: 1168.4mm/1168.4mm (46in/46in)
**FRAME**: Monocoque
**MATERIAL**: 5320-1 cycom, low temp cure Carbon fiber
**MAXMOTORRPM**: 1360 rpm
**MAXSYSVOLT**: 300v
**MOtorcntrlR**: Advanced Motion Control
**MOTORTyp**: DLDV
**NMLMM**: 4 / hub / 80KW
**OLW**: 3642mm long/1362mm wide/1055mm high
**SUSPENSION**: Unequal length, non parallel, double wishbone pullrods
**TIRE**: 18” x 6” 10 - Hoosier R25B
**TRANsRATIOn**: Direct drive
**WEIGHT**: 524 lbs.
**WHEELBASE**: 1530.35mm (60.25 in)

**E208**

**BRAKE**: Willwood Dynapro Single calipers; APRacing CP4400-94PR1135E Master cylinders
**COOLING**: Water
**DRIVE**: 2 independant chain
**ELECTRONICS**: 100% self designed, self built
**EMCA**: NMC & graphite/ 9 kWh
**FR/RR TRACK**: 1270/50, 1220/48
**FRAME**: Tubular spaceframe
**MATERIAL**: AISI Steel 4130
**MAXMOTORRPM**: 4378
**MAXSYSVOLT**: 292V
**MOtorcntrlR**: AMK KW60
**MOTORTyp**: AMK DP7-60-10-POW: Permanent magnet synchronous servos
**NMLMM**: 2 / in front and behind rear wheels, inboard / 85 kW
**OLW**: 2725/107, 1704/67, 1331/52
**SUSPENSION**: Double unequal length A-Arm, Push rod actuated horizontally oriented spring
**TIRE**: 13” / 445
**TRANsRATIOn**: 5.88
**WEIGHT**: 1050
**WHEELBASE**: 1625/64
The MFE1 electric prototype will mark the McGill Racing Team’s first venture into the full-electric FSAE competition. For the first time, MRT and the former McGill Hybrid Racing Team have joined forces to produce both a combustion and an electric vehicle.

MFE1 is powered by two, independently driven AC15 motors which feed power through two student-designed bevel-drive gearboxes. Focus has been set on producing a reliable yet competitive vehicle which can be used as a testbed for torque delivery software development.

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**McGill University**

McGill Racing Team

The UWashington Formula Motorsports team, is excited to display our first-ever electric car. Our car features a carbon fiber chassis, integrated CV/hubs, a tightly-packed drivetrain, and a single electric motor operating at 85kW. Iterating chassis, suspension, and driver controls designs from last year, we have significantly decreased the overall weight of the car, and improved the performance and function of already successful systems. The team has spent countless hours testing an tuning for speed, reliability, and success, and is excited to compete in the inaugural Formula SAE Electric competition in Nebraska this year.

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**University of Washington**

UWashington FSAE

**BRAKE**: Brembo/AP, Floating Slotted Disk  
**COOLING**: Single Radiator w/ PWM Fan  
**DRIVE**: Chain  
**ELECTRONICS**: Freescale MCU, Student-Designed Dash and Auxiliary Circuits  
**EMCAC**: LiPo 5.7 kWh  
**FR/RR TRACK**: 1220 / 1168mm  
**FRAME**: Monocoque  
**MATERIAL**: Torray T700  
**MAXMOTORRPM**: 300  
**MAXSYSVOLT**: 275  
**MOTORCNTRLR**: Mission Motors MC600  
**MOTORTYP**: Enstroj Emrax  
**NMLMM**: 1 / Rear / 85 kW  
**OLWH**: 3007 / 1412 / 1130mm  
**SUSPENSION**: Unequal A-Arm Pullrod  
**TIRE**: 13" Hoosier R25B  
**TRANSRATION**: 2.3  
**WEIGHT**: 253kg  
**WHEELBASE**: 1537mm
Viking 54 is the 14th Formula SAE entry from Western Washington University. V54 features the first full steel space frame from WWU in 19 years after a long history of composite chassis. This new chassis design focuses on repositioning the driver to lower CG, reduce frontal area, and reduce the driver’s influence on aerodynamics. A fresh suspension was developed in coordination with the new chassis to more effectively use the tire, increase steering angle, and withstand the high loads necessary. A full aerodynamics kit was developed using Star-CCM+ in coordination with lap simulation and physical testing. The vehicle returns to 13" wheels on Hoosier R25B tires with in house designed and manufactured wheel centers, live centers, uprights, etc. Viking 54 is a fresh slate redesign which we hope can provide a base for continued success from Western Washington University for years to come.

**Western Washington University**

**WWU eRacing**

This year our main goals are lightweight and simple. 4130 Space frame, with 7075 milled uprights. Dual Agni 119R / 6KWh LiFePo4 acting on Torsen Differential.

**California State Poly University - Pomona**

**Cal Poly Pomona**

This year our main goals are lightweight and simple. 4130 Space frame, with 7075 milled uprights. Dual Agni 119R / 6KWh LiFePo4 acting on Torsen Differential.

**E211**

**E212**
The team was founded in 1994 by a group of six mechanical engineers, and is now a team of 36 undergraduate seniors and several volunteers. Team members represent several disciplines including mechanical and electrical engineering, computer science, industrial design, and business.

Jayhawk Motorsports has a long history of success in FSAE competitions with 7 top ten finishes over the past 6 years including 1st place overall at both the 2012 FSAE Lincoln and Formula Hybrid (Electric division) events. For 2013, JMS has designed two new and highly improved racecars, the JMS13c (combustion) and JMS13e (electric), to be top contenders at FSAE competitions.

**BRAKE**: 2-piston Brembo calipers, ductile iron rotors, bespoke master cylinders  
**COOLING**: Single radiator and fan  
**DRIVE**: Chain-drive  
**ELECTRONICS**: Programmed Traction Control  
**EMCAC**: Hayin Lithium Polymer Cells/5.1 kWh combined capacity  
**FR/RR TRACK**: Front: 48 in. (1219 mm), Rear: 46 in. (1168 mm)  
**FRAME**: Carbon fiber monocoque with steel subframe  
**MATERIAL**: Carbon fiber, aluminum, steel, blood, sweat, tears and soul  
**MAXMOTORRPM**: 5000  
**MAXSYSVOLT**: 300 V  
**MOTORCNRCLR**: Rinehart Motion Systems  
**MOTOR**: Emrax LC Standard  
**NMLMM**: 1 rear motor 84 kW  
**OLW**: L: 125in (3185mm), W: 56.25in (1428.75mm), H: 40in (1016mm)  
**SUSPENSION**: Double unequal A-arm pull/push rod actuated spring and damper  
**TIRE**: F: 20.5x7-13, R: 20x7.5-13, R25B Hoosier  
**TRANSRATIO**: 2.29:1  
**WEIGHT**: 585lbs  
**WHEELBASE**: 65 in. (1651mm)
Triton Racing is proud to present TR-13E! With an ambitious one year build cycle and brand new team, we have created a racing machine designed around the driver while emphasizing creativity and innovation. Embracing performance as our main design philosophy we have produced a radically light chassis coupled with an audacious powertrain.

Built entirely by a group of dedicated engineering students, TR-13E boasts a simple yet ingenious design. With the help of accomplished alumni advisors, and generous sponsors TR-13E represents the University of California, San Diego’s return to Formula SAE as well as its debut in the new Formula Electric category. We would like to thank our sponsors for their continued support throughout the year, without which TR-13E would have remained only a dream.

**BRAKE**: Dual Piston Calipers  
**COOLING**: Air  
**DRIVE**: Chain  
**ELECTRONICS**: Elithium Lite  
**EMCAC**: Li-Co / 5.3 kWh  
**FR/RR TRACK**: 46/44 inches  
**FRAME**: Steel  
**MATERIAL**: Chromoly  
**MAXMOTORRPM**: 8000  
**MAXSYSVOLT**: 120v  
**MOTORCNRRLR**: Curtis 1238  
**MOTORTP**: HPEV AC35  
**NMLMM**: 1/rear/50kW  
**OLWH**: 86 inches, 54 inches, 40 inches  
**SUSPENSION**: pullrods/pushrods  
**TIRE**: Hoosier 18.3x10x7.5  
**TRANSRATN**:  
**WEIGHT**: 700 lb  
**WHEELBASE**: 60 inches

The goal of Illini Formula Electric for the 2013 season is to reduce weight and increase reliability. This philosophy manifests itself in every subsystem of the car. The main focus is placed on designing and building a new chassis, drivetrain, and suspension, while modifying and improving last year’s electrical systems. The car’s electrical systems have been streamlined and simplified.

The chassis and suspension have been designed specifically to compete as an electric race car. The new drivetrain system features a planetary gearbox that eliminates the need for an intermediate shaft and allows use of a much lighter, higher rpm motor. Because of the numerous mechanical and electrical changes made, the improvements in performance and efficiency are extensive. This new platform also leaves room for continued advancement and refinement as more funding becomes available.

**BRAKE**: Hyrdraulic System with floating rotors  
**COOLING**: Water Cooling  
**DRIVE**: Mid-motor Rear Wheel Drive  
**ELECTRONICS**: Custom PCBs for controls and HV. Elithion Lithiumate Pro BMS.  
**EMCAC**: Lithium-Ion Cells (5.7KWh)  
**FR/RR TRACK**: 1270mm/1193mm  
**FRAME**: TIG Weld  
**MATERIAL**: 4130 Chromoly  
**MAXMOTORRPM**: 5000  
**MAXSYSVOLT**: 288  
**MOTORCNRRLR**: Continental EPF2-3  
**MOTORTP**: Continental BAS+ 3 Phase AC Induction  
**NMLMM**: 1 / Rear / 53kW  
**OLWH**:  
**SUSPENSION**: Pushrod-actuated unequal length A-arm  
**TIRE**: 20.5" Goodyear D2704 Dry Slicks  
**TRANSRATN**:  
**WEIGHT**: 700 lb  
**WHEELBASE**: 1587mm
Polar Bear Racing’s 2013 Formula Electric model is the pinnacle product of a long and thorough design process focused on maximizing vehicle performance and safety while maintaining a competitive cost and a sustainable footprint. We have done an extensive review of past designs and optimized all parts of the vehicle. We have named her Vienna.

Major design efforts were undertaken by a team of core members. The group focused on team synthesis, attention to detail and proper analytical design and validation.

A special thanks to our Advisors and UMSAE Executive Members for keeping our world organized.

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**University of Michigan - Dearborn**

The University of Michigan-Dearborn Formula Electric project was researched in 2010-11 by graduate students who were active in the successful designs of 2009-2011 UMD FSAE cars, covering the two main systems of Chassis and Powertrain. Carrying through, a new team of 15 members was formed separate from the existing combustion program in an effort to ensure future continuity of each project by allowing for more recruiting, sponsors, and better management of learnings and safe design executions. Keeping with UM-Dearborn’s motto of simple and robust design, this electric car’s chassis is similar to UMD’s last FSAE design iteration in 2011, based on a tubular spaceframe and aluminum subframe concept designed initially for hosting electric car components with a low center of gravity and proper weight distribution. The powertrain is energized by LiFePo batteries, managed by Sevcon Gen4Size4 120V controllers, and propelled by two lightweight pancake type axial flux synchronous electric motors via torque vectoring to each rear wheel. The UM-D Formula Electric Team would like to thank UM-D CECS and IAVS departments, Ford, BorgWarner, Richard Schaum, DTE Energy, Bosch, and Liberty’s Gears.

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**University of Manitoba**

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There is a large group of individuals who make sure the numerous details are completed to make a successful event.

Sae International Staff
- Bob Sechler — Manager, Education Relations
- Steve Daum — Manager, Collegiate Design Series Programs
- Sam Barill — Manager, Collegiate Design Series Programs
- Kaley Zundel — Manager, Collegiate Design Series Programs
- Allison Hostetler — Senior Programs Coordinator
- Amanda Paciorkowski - Collegiate Program Coordinator
- Martha Schanno — Manager, Collegiate Design Series Sponsorship Sales

FsaE Rules Committee (And Technical Document Reviewers)
- Robert Chadwick, Andrew Deakin, Raffaele Fregonese, Fernando Gonzales, Matthew Johnson, Mark Muddiman, Bill Riley, Doug Fraser, Frank Roeseke, Dan Jones, Eric Klang, Michael Black, John Burford, Gerry LaRue, Jean Paul Montant, Dale Soemaz, Jack Sormaz, Brian Zander

Volunteers committed as of May 20th
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