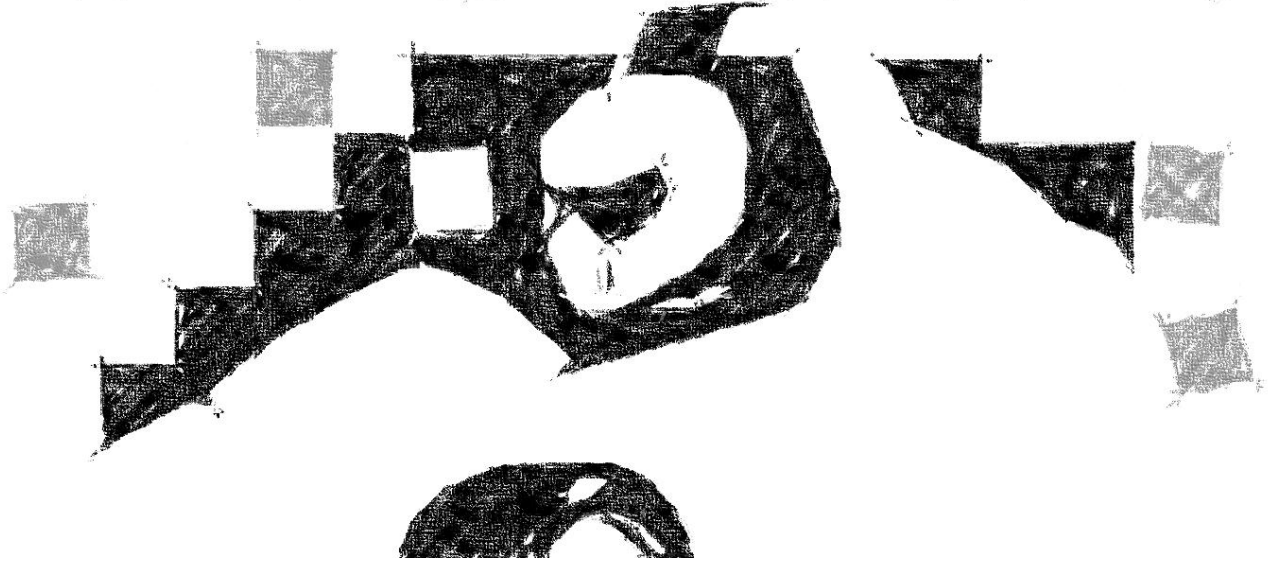


# FORMULA SAE



## 2013 Student Handbook

May 8 – 11, 2013

**SAE** *International*

# TABLE OF CONTENTS

(Information up-to-date as of April 25, 2013)

1. Registered Teams
  - A. Listed Numerically
  - B. Listed Alphabetically
2. Schedule of Events
  - A. Competition Schedule
  - B. Static Event Schedule Times
  - C. Cost Event Queue Schedule
  - D. Design Event Queue Schedule
  - E. Presentation Event Queue Schedule
3. List of Awards
4. Maps
  - A. Map 1 – Overall Site Layout
  - B. Map 2 – Paddock Layout
  - C. Map 3 – Garage Layouts (Registration, Tech and Design)
  - D. Map 5 – Main Tent Layout (Cost and Ceremonies)
  - E. Map 6 – Brake/Noise/Practice Layouts
5. Merchants
  - A. Local Merchants
  - B. Local Restaurants
6. Event Site Operations
  - A. Onsite Contact Information/First Aid/Storm Shelter
  - B. Hospitality Information
  - C. Event Site Quick Review
  - D. Rules for ALL Photographers
  - E. Paddock Patrol Information
  - F. FSAE Restricted Areas & Access Policy
  - G. GM Support Trailer Capabilities
7. Event Descriptions
  - A. Acceleration
  - B. Autocross
  - C. Brake & Noise
  - D. Cost
    - a) Real Case Scenario
  - E. Design
    - a) Design Judge Bios -----Online Only
  - F. Ford Endurance & Fuel Economy
  - G. Fuel & Tilt
  - H. Practice Track
  - I. Presentation
  - J. Skid Pad
  - K. Technical Inspection
    - a) Take A Number Process
    - b) Review for Teams

## REGISTERED TEAM LIST – NUMERICAL

<u>Car#</u>	<u>University Name</u>	<u>State</u>	<u>Country</u>
1	Oregon State University	Oregon	United States
3	Universitat Stuttgart		Germany
5	University of Michigan - Ann Arbor	Michigan	United States
6	Graz University of Technology		Austria
8	Ecole De Technologie Superieure		Canada
<b>9</b>	<b><i>Friedrich-Alexander Univ of Erlangen</i></b>		<b><i>Germany</i></b>
10	University of Wisconsin - Madison	Wisconsin	United States
11	University of Kansas - Lawrence	Kansas	United States
12	University of South Florida	Florida	United States
13	Centro Universitario Da FEI		Brazil
14	Missouri University of Science and Technology	Missouri	United States
15	Michigan State University	Michigan	United States
16	US Naval Academy	Maryland	United States
17	Universidad Simon Bolivar		Venezuela
18	US Air Force Academy	Colorado	United States
19	Columbia University	New York	United States
20	Florida International University	Florida	United States
21	Dalhousie University		Canada
22	North Carolina State University - Raleigh	North Carolina	United States
23	University of Central Florida	Florida	United States
24	Ecole Polytechnique De Montreal		Canada
25	University of Pittsburgh - Pittsburgh	Pennsylvania	United States
26	Queen's University - Ontario Canada		Canada
27	York College of Pennsylvania	Pennsylvania	United States
29	Purdue University - W Lafayette	Indiana	United States
30	Universite Du Quebec-Chicoutimi		Canada
31	University of Toledo	Ohio	United States
32	Brown University	Rhode Island	United States
33	University of Missouri	Missouri	United States
34	Worcester Polytechnic Institute	Massachusetts	United States
35	San Jose State University	California	United States
36	University of Minnesota - Twin Cities	Minnesota	United States
37	Lafayette College	Pennsylvania	United States
38	Oakland University	Michigan	United States
39	Ohio State University	Ohio	United States
40	Kansas State University	Kansas	United States
41	Southern Polytechnic State University	Georgia	United States
42	University of Maryland - College Park	Maryland	United States
43	Northwestern University	Illinois	United States
44	Wayne State University	Michigan	United States
<b>45</b>	<b><i>North Carolina State A &amp; T</i></b>	<b><i>North Carolina</i></b>	<b><i>United States</i></b>
46	West Virginia University	West Virginia	United States
47	University of North Florida	Florida	United States
48	Georgia Institute of Technology	Georgia	United States

49	University of New Hampshire	New Hampshire	United States
50	University of Akron	Ohio	United States
51	Western Washington University	Washington	United States
52	Florida Institute of Technology	Florida	United States
53	Washington University - St Louis	Missouri	United States
54	University of Maine	Maine	United States
55	Western Michigan University	Michigan	United States
56	University of St Thomas	Minnesota	United States
57	University of Illinois - Chicago	Illinois	United States
58	University of Cincinnati	Ohio	United States
59	University of Hartford	Connecticut	United States
60	Vanderbilt University	Tennessee	United States
61	University of Toronto		Canada
62	Ryerson University		Canada
63	Cooper Union	New York	United States
64	Louisiana State University	Louisiana	United States
65	Rensselaer Polytechnic Institute	New York	United States
66	South Dakota School of Mines & Technology	South Dakota	United States
67	Carnegie Mellon University	Pennsylvania	United States
68	Universite Du Quebec a Trois-Rivieres		Canada
69	Lakehead University		Canada
70	Wichita State University	Kansas	United States
71	Saginaw Valley State University	Michigan	United States
72	Cegep du Vieux - Montreal		Canada
73	Universite Laval		Canada
74	University of Illinois - Urbana Champaign	Illinois	United States
75	Ferris State University	Michigan	United States
76	University of Michigan - Dearborn	Michigan	United States
77	Rutgers University	New Jersey	United States
78	University of Windsor		Canada
79	Auburn University	Alabama	United States
80	Texas Tech University	Texas	United States
81	Georgia Southern University	Georgia	United States
82	Universidad Central de Venezuela		Venezuela
83	Colorado State University	Colorado	United States
84	Cornell University	New York	United States
85	National University of Singapore		Singapore
86	University of Manitoba		Canada
87	Tennessee Tech University	Tennessee	United States
88	Villanova University	Pennsylvania	United States
89	Florida Atlantic University	Florida	United States
90	Arizona State University - Tempe	Arizona	United States
91	McGill University		Canada
92	Virginia Tech	Virginia	United States
93	Kookmin University		South Korea
94	Portland State University	Oregon	United States
95	Penn State University - University Park	Pennsylvania	United States

96	Temple University	Pennsylvania	United States
97	Rochester Institute of Technology	New York	United States
98	University of Alabama - Tuscaloosa	Alabama	United States
99	University of Western Ontario		Canada
100	Clemson University	South Carolina	United States
101	Kettering University	Michigan	United States
102	Northern Illinois University	Illinois	United States
103	University of Florida	Florida	United States
104	Stevens Institute of Technology	New Jersey	United States
105	University of North Carolina - Charlotte	North Carolina	United States
106	University of Waterloo		Canada
107	University of Connecticut	Connecticut	United States
108	Mississippi State University	Mississippi	United States
109	Old Dominion University	Virginia	United States
110	Kumoh National Institute of Technology		South Korea
111	Bradley University	Illinois	United States
112	North Dakota State University	North Dakota	United States
113	Duke University	North Carolina	United States
<del>114</del>	<del>Lehigh University</del>	<del>Pennsylvania</del>	<del>United States</del>
115	University of Ontario Institute of Technology		Canada
<del>116</del>	<del>Washington State University</del>	<del>Washington</del>	<del>United States</del>
<del>117</del>	<del>Universidad Nacional Experimental Polite</del>		<del>Venezuela</del>
118	Tallinn University of Technology		Estonia
119	Lawrence Technological University	Michigan	United States
<del>120</del>	<del>Rose-Hulman Institute of Technology</del>	<del>Indiana</del>	<del>United States</del>
121	RWTH Aachen Tech University		Germany
122	Seoul National University of Science & Technology		South Korea
123	University of Minnesota-Duluth	Minnesota	United States
124	Universidad Autonoma Estado Mexico		Mexico
125	Carleton University		Canada
126	University of Evansville	Indiana	United States
128	Oklahoma State University	Oklahoma	United States

## REGISTERED TEAM LIST – ALPHABETICAL

<u>Car#</u>	<u>University Name</u>	<u>State</u>	<u>Country</u>
90	Arizona State University - Tempe	Arizona	United States
79	Auburn University	Alabama	United States
111	Bradley University	Illinois	United States
32	Brown University	Rhode Island	United States
125	Carleton University		Canada
67	Carnegie Mellon University	Pennsylvania	United States
72	Cegep du Vieux - Montreal		Canada
13	Centro Universitario Da FEI		Brazil
100	Clemson University	South Carolina	United States
83	Colorado State University	Colorado	United States
19	Columbia University	New York	United States
63	Cooper Union	New York	United States
84	Cornell University	New York	United States
21	Dalhousie University		Canada
113	Duke University	North Carolina	United States
8	Ecole De Technologie Superieure		Canada
24	Ecole Polytechnique De Montreal		Canada
75	Ferris State University	Michigan	United States
89	Florida Atlantic University	Florida	United States
52	Florida Institute of Technology	Florida	United States
20	Florida International University	Florida	United States
<b>9</b>	<b><i>Friedrich-Alexander Univ of Erlangen</i></b>		<b><i>Germany</i></b>
48	Georgia Institute of Technology	Georgia	United States
81	Georgia Southern University	Georgia	United States
6	Graz University of Technology		Austria
40	Kansas State University	Kansas	United States
101	Kettering University	Michigan	United States
93	Kookmin University		South Korea
110	Kumoh National Institute of Technology		South Korea
37	Lafayette College	Pennsylvania	United States
69	Lakehead University		Canada
119	Lawrence Technological University	Michigan	United States
<b>114</b>	<b><i>Lehigh University</i></b>	<b><i>Pennsylvania</i></b>	<b><i>United States</i></b>
64	Louisiana State University	Louisiana	United States
91	McGill University		Canada
15	Michigan State University	Michigan	United States
108	Mississippi State University	Mississippi	United States
14	Missouri University of Science and Technology	Missouri	United States
85	National University of Singapore		Singapore
<b>45</b>	<b><i>North Carolina State A &amp; T</i></b>	<b><i>North Carolina</i></b>	<b><i>United States</i></b>
22	North Carolina State University - Raleigh	North Carolina	United States
112	North Dakota State University	North Dakota	United States
102	Northern Illinois University	Illinois	United States

43	Northwestern University	Illinois	United States
38	Oakland University	Michigan	United States
39	Ohio State University	Ohio	United States
128	Oklahoma State University	Oklahoma	United States
109	Old Dominion University	Virginia	United States
1	Oregon State University	Oregon	United States
95	Penn State University - University Park	Pennsylvania	United States
94	Portland State University	Oregon	United States
29	Purdue University - W Lafayette	Indiana	United States
26	Queen's University - Ontario Canada		Canada
65	Rensselaer Polytechnic Institute	New York	United States
97	Rochester Institute of Technology	New York	United States
<b>120</b>	<b><i>Rose-Hulman-Institute-of-Technology</i></b>	<b><i>Indiana</i></b>	<b><i>United States</i></b>
77	Rutgers University	New Jersey	United States
121	RWTH Aachen Tech University		Germany
62	Ryerson University		Canada
71	Saginaw Valley State University	Michigan	United States
35	San Jose State University	California	United States
122	Seoul National University of Science & Technology		South Korea
66	South Dakota School of Mines & Technology	South Dakota	United States
41	Southern Polytechnic State University	Georgia	United States
104	Stevens Institute of Technology	New Jersey	United States
118	Tallinn University of Technology		Estonia
96	Temple University	Pennsylvania	United States
87	Tennessee Tech University	Tennessee	United States
80	Texas Tech University	Texas	United States
124	Universidad Autonoma Estado Mexico		Mexico
82	Universidad Central de Venezuela		Venezuela
<b>117</b>	<b><i>Universidad Nacional Experimental Polite</i></b>		<b><i>Venezuela</i></b>
17	Universidad Simon Bolivar		Venezuela
3	Universitat Stuttgart		Germany
68	Universite Du Quebec a Trois-Rivieres		Canada
30	Universite Du Quebec-Chicoutimi		Canada
73	Universite Laval		Canada
50	University of Akron	Ohio	United States
98	University of Alabama - Tuscaloosa	Alabama	United States
23	University of Central Florida	Florida	United States
58	University of Cincinnati	Ohio	United States
107	University of Connecticut	Connecticut	United States
126	University of Evansville	Indiana	United States
103	University of Florida	Florida	United States
59	University of Hartford	Connecticut	United States
57	University of Illinois - Chicago	Illinois	United States
74	University of Illinois - Urbana Champaign	Illinois	United States
11	University of Kansas - Lawrence	Kansas	United States

54	University of Maine	Maine	United States
86	University of Manitoba		Canada
42	University of Maryland - College Park	Maryland	United States
5	University of Michigan - Ann Arbor	Michigan	United States
76	University of Michigan - Dearborn	Michigan	United States
36	University of Minnesota - Twin Cities	Minnesota	United States
123	University of Minnesota-Duluth	Minnesota	United States
33	University of Missouri	Missouri	United States
49	University of New Hampshire	New Hampshire	United States
105	University of North Carolina - Charlotte	North Carolina	United States
47	University of North Florida	Florida	United States
115	University of Ontario Institute of Technology		Canada
25	University of Pittsburgh - Pittsburgh	Pennsylvania	United States
12	University of South Florida	Florida	United States
56	University of St Thomas	Minnesota	United States
31	University of Toledo	Ohio	United States
61	University of Toronto		Canada
106	University of Waterloo		Canada
99	University of Western Ontario		Canada
78	University of Windsor		Canada
10	University of Wisconsin - Madison	Wisconsin	United States
18	US Air Force Academy	Colorado	United States
16	US Naval Academy	Maryland	United States
60	Vanderbilt University	Tennessee	United States
88	Villanova University	Pennsylvania	United States
92	Virginia Tech	Virginia	United States
<b>H6</b>	<b><i>Washington State University</i></b>	<b><i>Washington</i></b>	<b><i>United States</i></b>
53	Washington University - St Louis	Missouri	United States
44	Wayne State University	Michigan	United States
46	West Virginia University	West Virginia	United States
55	Western Michigan University	Michigan	United States
51	Western Washington University	Washington	United States
70	Wichita State University	Kansas	United States
34	Worcester Polytechnic Institute	Massachusetts	United States
27	York College of Pennsylvania	Pennsylvania	United States

**2013 FORMULA SAE COMPETITION SCHEDULE**  
**4/5/13; SUBJECT TO CHANGE**

<b>Daily Operations</b>	
<b>MIS Site Open:</b>	Wed. - Th. 7:30 a.m. - 7:30 p.m. Fri. 7:30 a.m. - 8:30 p.m. Sat. 7:00 a.m. - 10:30 p.m.
<b>Student Registration (Garage 1):</b>	Wed. – Fri. 8:00a.m. – 4:30 p.m. <i>Sat. All students will be registered as spectators</i>
<b>Tech Inspection (Garage 2):</b>	<b>Wed. 10:00 a.m. Tech “Take-A-Number” Opens</b> Wed. Noon – 7:00 p.m. (no new cars after 6 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)
<b>Scales (Garage 1 drive thru):</b>	Wed. 3:00 p.m. – 7:00 p.m. Th. 8:00 a.m. – 4:00 p.m. Fri. 7:30 a.m. - Noon (for “cornering”)
<b>Tilt/Noise/Brake:</b> Sponsored by Continental	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.
<b>Fuel Station:</b>	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.
<b>Practice Area:</b> Sponsored by Continental	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.
<ul style="list-style-type: none"> <li>NOTE: Cars must complete all 4 parts of tech by 5:30 p.m. Friday to qualify for Endurance.</li> <li>30 minute notice is required for all appointments, which can be booked through the announcer in Main Tent.</li> </ul>	

<b>TUESDAY, MAY 7</b>		<b>Location</b>
6:30 – 9:30 p.m.	Early Registration	Super 8 Motel (155 Wamplers Lake Road, Brooklyn, MI; M-50 & Wamplers Lake Rd.)
<b>WEDNESDAY, MAY 8</b>		<b>Location</b>
10:00 a.m.	Tech Inspection “Take-a-Number” Opens	Garage 2
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
6:00 p.m. – 8:00 p.m.	Maplesoft Invitation-Only Reception	Champions’ Club
6:20 p.m. – 7:20 p.m.	Ford Powertrain Career Discussion – Students Welcome	Main Tent
7:30 p.m.	Official Closing of the Site	
8:00 p.m.	EVERYONE MUST BE OFF SITE	
<b>THURSDAY, MAY 9 (all times preceded by “~” are approximate)</b>		<b>Location</b>
8:00 a.m.	Drivers Meeting (Brake & Practice) - MANDATORY	Main Tent
8:30 a.m. – 5:30 p.m.	Design Event - Sponsored by Bosch - 1 <sup>st</sup> Round Judging Open	Garage 3
9:00 a.m. – 5:00 p.m.	Cost Judging Open	Main Tent
9:00 a.m. – 5:00 p.m.	Presentation Judging Open	MIS Suites
Noon - 1:00 p.m.	Lunch Break	Main Tent
~2:00 p.m. – 3:30 p.m.	First Autocross Course Walk (weather permitting)	Track
5:00 p.m.	Push Bar Finalist teams announced (up to 5 teams)	Main Tent
5:00 p.m.	Staging for Panoramic Photo (weather permitting)	West of Garage 3
6:00 p.m.	Drivers Meeting (All Dynamic Events) - MANDATORY	Main Tent
<b>5:30 p.m. – 8:30 p.m.</b>	<b>Design Judges Meeting - Judges only</b>	<b>Off Site</b>
7:30 p.m.	Official Closing of the Site	

8:00 p.m.	EVERYONE MUST BE OFF SITE	
~9:00 p.m.	Design Finalist announced online	<a href="http://www.sae.org">www.sae.org</a> and <a href="http://www.fsae.com">www.fsae.com</a>
<b>FRIDAY, MAY 10 (all times preceded by “~” are approximate)</b>		
<b>8:30 a.m.</b>	<b>Course Crew Briefing - Acceleration and Skid Pad</b>	<b>Track</b>
9:00 a.m. – 12:30 a.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)	Garage 3
9:30 a.m.	Presentation Seminar	Main Tent
12:30 p.m.	Lunch Break	Main Tent
~1:30 p.m. – 1:50 p.m.	First Autocross Course Walk (course set-up depending)	Track
<b>1:35 p.m.</b>	<b>Course Crew Briefing – Autocross</b>	<b>Track</b>
2:00 p.m. – 5:00 p.m.	Autocross Event Open	Track
~5:30 p.m. – 8:30 p.m.	Design Finals - Sponsored by Bosch	Garage 3
~7:00 p.m.	Award Ceremony 1 - Sponsored by General Motors	Main Tent
7:30 p.m.	Official Closing of the Site	
9:00 p.m.	EVERYONE MUST BE OFF SITE	
<b>SATURDAY, MAY 11 (all times preceded by “~” are approximate)</b>		
7:00 a.m. – 8:00 a.m.	Endurance Course Walk	Track
<b>8:30 a.m.</b>	<b>Endurance Course Crew Briefing</b>	<b>Track</b>
~8:30 a.m.	Top 3 Teams Design Finalists Announced	
~9:00 a.m. – 2:00 p.m.	Design Feedback for Finalists not Top 3, by appointment	Garage 3
9:00 a.m.	Ford Endurance/Fuel Efficiency Event Open – Group 1 Only	Track
~12:00 p.m.	Ford 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
<b>1:30 p.m.</b>	<b>Course Crew back on track</b>	<b>Track</b>
~1:35 p.m.	Ford Endurance/Fuel Efficiency Event Open – Group 2 Only	Track
~4:00 p.m.	Ford Endurance/Fuel Efficiency Gate Closes for Group 2	Track
~6:00 pm	Public Design Review of Top 3 Finalists	Garage 3
~7:00 p.m.	Presentation Highlights	Main Tent
~8:00 p.m.	Final Awards Ceremony Sponsored by General Motors	Main Tent
10:30 p.m.	Official Closing of the Site	
11:00 p.m.	EVERYONE MUST BE OFF SITE All Teams and Transporters Must Exit	
<b>SUNDAY, MAY 12</b>		
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, May 13, 2013.
- 2) No Access During Dynamic Events - Teams may enter the site with their rigs/trailers/panel trucks ONLY when there are **no** Dynamic Events running.
- 3) Push Bar Comp. - Judging in scale bay as cars are weighed. Winner announced at Friday Award Ceremony.
- 4) Medical Services - There will not be a First Aid Station on site. EMS will provide any/all medical attention.
- 5) Overnight Removal - Overnight removal of vehicles is allowed, but tech must first pull Part 1 of your tech sticker.
- 6) Removing Cars - All teams not shipping cars must remove vehicles, etc. from the site not later than 2:00 p.m. Sunday, May 12, 2013.
- 7) Shipping Cars - Teams shipping cars **must** have them picked up and removed from MIS by 10:00 a.m. Monday, May 13, 2013.
- 8) FM Audio - Announcements can be heard via FM radio (Frequency will be posted in G1 at event).
- 9) 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.

10) F1 in Schools High School Engineering Competition - Event will be held Friday & Saturday, May 10 & 11 in the Michigan Room, ground level of South Suites. FSAE participants are invited to observe this competition from 11 a.m. - 12:30 p.m. & 1:00 -5:00 p.m. Friday; and 9:00 – 11:00 a.m. Saturday.

**Support Services**

<p><b>GM Machine Trailer:</b> Wed. - Fri. 9:00 a.m. – 5:00 p.m.</p> <p><b>Lincoln Electric Welding:</b> Wed. Noon – 5:00 p.m. Th.-Fri. 8:00 a.m. – 5:00 p.m. Sat. 8:00 a.m. - Noon</p> <p><b>Hoosier:</b> Wed.-Fri. 7:00 a.m. – 5:00 p.m. Sat. 7:00 a.m. – 3:00 p.m.</p>	<p><b>Land &amp; Sea Dyno:</b> Th. Noon – 5:00 p.m.* Fri. 9:00 a.m. – 5:00 p.m.* Sat. 9:00 a.m. 4:00 p.m.* <i>* Hours are tentative and may change.</i></p> <p><b>Kaz Technologies Shock Dyno</b> Wed. 9:00 a.m. – 3:00 p.m. Th. - Sat. 9:00 a.m. – 5:00 p.m.</p>
<p><b>MIS Fire trucks on site:</b> Wed. – Sat. 7:00 a.m. - ~8:00 p.m.</p> <p><b>Ambulance on site:</b> Wed. – Sat. 7:00 a.m. - ~8:00 p.m.</p>	<p><b>Concessions:</b> Wed.-Sat 8:00 a.m. – 6:00 p.m.* <i>* As business dictates. May close earlier if deemed appropriate</i></p> <p><b>SAE Bookstore:</b> Wed. 2:00 p.m. – 6:00 p.m. Th-Fri. 8:00 a.m. – 5:00 p.m. Sat. 8:00 a.m. – Noon</p>

Car #	School Name	Design Bay	Design Time	Cost Bay	Cost Time	Presentation Bay	Presentation Time
1	Oregon State Univ	B	9:30 AM	G	11:30 AM	H	3:00 PM
3	Universitat Stuttgart	G	2:30 PM	B	1:00 PM	A	11:00 AM
5	Univ of Michigan - Ann Arbor	H	8:30 AM	C	11:00 AM	H	2:30 PM
6	Graz Univ of Technology	L	12:30 PM	I	10:30 AM	C	4:00 PM
8	Ecole De Technologie Superieure	D	12:30 PM	C	10:00 AM	D	3:30 PM
10	Univ of Wisconsin - Madison	A	8:30 AM	D	11:00 AM	A	2:30 PM
11	Univ of Kansas - Lawrence	O	2:30 PM	C	1:00 PM	I	11:00 AM
12	Univ of South Florida	E	9:30 AM	J	11:30 AM	B	1:00 PM
13	Centro Universitario Da FEI	C	4:30 PM	H	9:30 AM	I	11:30 AM
14	Missouri University of Science and Tech	K	12:30 PM	F	10:30 AM	B	4:00 PM
15	Michigan State Univ	C	10:30 AM	E	3:00 PM	F	4:30 PM
16	US Naval Academy	I	2:30 PM	D	1:00 PM	C	11:00 AM
17	Universidad Simon Bolivar	D	9:30 AM	G	3:30 PM	A	1:00 PM
18	US Air Force Academy	H	12:30 PM	G	10:30 AM	H	3:30 PM
19	Columbia Univ	J	2:30 PM	I	1:00 PM	D	10:00 AM
20	Florida International Univ	D	3:30 PM	D	1:30 PM	D	10:30 AM
21	Dalhousie Univ	H	10:30 AM	H	3:00 PM	B	9:00 AM
22	North Carolina State Univ - Raleigh	M	2:30 PM	H	1:00 PM	G	11:00 AM
23	Univ of Central Florida	J	12:30 PM	E	10:30 AM	A	4:00 PM
24	Ecole Polytechnique De Montreal	B	2:30 PM	I	11:30 AM	E	10:00 AM
25	Univ of Pittsburgh - Pittsburgh	O	10:30 AM	C	2:00 PM	I	9:00 AM
26	Queen's Univ - Ontario Canada	A	12:30 PM	F	10:00 AM	A	3:30 PM
27	York College of Pa	M	3:30 PM	G	9:00 AM	D	11:30 AM
29	Purdue Univ - W Lafayette	J	10:30 AM	J	3:00 PM	D	9:00 AM
30	Universite Du Quebec-Chicoutimi	C	1:30 PM	I	10:00 AM	I	4:00 PM
31	Univ of Toledo	L	9:30 AM	D	3:30 PM	I	1:00 PM
32	Brown Univ	G	8:30 AM	A	4:00 PM	G	2:30 PM
33	Univ of Missouri	I	9:30 AM	C	2:30 PM	F	1:00 PM
34	Worcester Polytechnic Inst	M	10:30 AM	D	2:00 PM	G	9:00 AM
35	San Jose State University	O	4:30 PM	F	2:00 PM	D	9:00 AM
36	Univ of Minnesota - Twin Cities	B	10:30 AM	B	3:00 PM	E	4:30 PM
37	Lafayette College	I	12:30 PM	B	10:30 AM	I	3:30 PM
38	Oakland University	F	12:30 PM	C	10:30 AM	F	3:30 PM
39	Ohio State Univ	H	3:30 PM	H	1:30 PM	A	10:30 AM
40	Kansas State Univ	I	8:30 AM	H	11:00 AM	I	2:30 PM
41	Southern Polytechnic State Univ	C	12:30 PM	H	10:00 AM	C	3:30 PM
42	Univ of Maryland - College Park	N	3:30 PM	C	9:30 AM	E	11:30 AM
43	Northwestern Univ	O	1:30 PM	E	4:00 PM	C	10:00 AM
44	Wayne State Univ	H	1:30 PM	H	3:30 PM	E	9:30 AM
46	West Virginia Univ	G	4:30 PM	F	9:00 AM	D	1:30 PM
47	Univ of North Florida	K	4:30 PM	G	11:00 AM	H	2:00 PM
48	Georgia Institute of Technology	K	8:30 AM	A	11:30 AM	C	3:00 PM
49	Univ of New Hampshire	G	10:30 AM	C	3:00 PM	A	9:00 AM
50	Univ of Akron	K	10:30 AM	B	2:00 PM	E	9:00 AM
51	Western Washington Univ	G	3:30 PM	G	1:30 PM	G	10:30 AM
52	Florida Inst of Tech	E	12:30 PM	J	10:00 AM	E	3:30 PM
53	Washington Univ - St Louis	D	2:30 PM	B	11:30 AM	G	10:00 AM
54	Univ of Maine	A	9:30 AM	F	11:30 AM	G	3:00 PM
55	Western Michigan Univ	N	1:30 PM	D	4:00 PM	B	10:00 AM
56	Univ of St Thomas	D	4:30 PM	I	9:30 AM	A	1:30 PM
57	Univ of Illinois - Chicago	B	12:30 PM	G	10:00 AM	B	3:30 PM
58	Univ of Cincinnati	A	1:30 PM	A	10:00 AM	G	4:00 PM
59	Univ of Hartford	I	3:30 PM	I	1:30 PM	I	10:30 AM
60	Vanderbilt Univ	E	2:30 PM	D	11:30 AM	H	10:00 AM
61	Univ of Toronto	D	1:30 PM	J	3:30 PM	A	9:30 AM
62	Ryerson Univ	K	1:30 PM	F	4:00 PM	H	9:30 AM
63	Cooper Union	N	4:30 PM	J	9:00 AM	B	2:00 PM
64	Louisiana State Univ	C	3:30 PM	C	1:30 PM	C	10:30 AM
65	Rensselaer Polytechnic Inst	F	1:30 PM	F	3:30 PM	C	9:30 AM
66	South Dakota Sch of Mines & Tech	F	2:30 PM	F	1:00 PM	I	10:00 AM
67	Carnegie Mellon Univ	C	2:30 PM	E	11:30 AM	F	10:00 AM
68	Universite Du Quebec a Trois-Rivieres	O	12:30 PM	J	10:30 AM	F	4:00 PM
69	Lakehead Univ	J	3:30 PM	J	1:30 PM	A	11:30 AM

Car #	School Name	Design Bay	Design Time	Cost Bay	Cost Time	Presentation Bay	Presentation Time
70	Wichita State Univ	A	2:30 PM	B	9:00 AM	D	11:00 AM
71	Saginaw Valley State Univ	C	9:30 AM	H	11:30 AM	I	3:00 PM
72	Cegep du Vieux - Montreal	E	3:30 PM	B	1:30 PM	E	10:30 AM
73	Universite Laval	H	4:30 PM	I	9:00 AM	E	2:00 PM
74	Univ of Illinois - Urbana Champaign	O	8:30 AM	E	10:00 AM	F	3:00 PM
75	Ferris State University	F	4:30 PM	A	9:00 AM	C	1:30 PM
76	Univ of Michigan - Dearborn	G	9:30 AM	B	3:30 PM	D	1:00 PM
77	Rutgers Univ	M	9:30 AM	A	2:00 PM	A	4:30 PM
78	Univ of Windsor	L	3:30 PM	D	9:30 AM	C	11:30 AM
79	Auburn Univ	I	4:30 PM	C	9:00 AM	F	2:00 PM
80	Texas Tech Univ	B	1:30 PM	B	10:00 AM	H	4:00 PM
81	Georgia Southern Univ	J	1:30 PM	A	3:30 PM	G	9:30 AM
82	Universidad Central de Venezuela	K	2:30 PM	J	1:00 PM	E	11:00 AM
83	Colorado State University	L	1:30 PM	G	4:00 PM	I	9:30 AM
84	Cornell Univ	J	9:30 AM	E	2:30 PM	G	1:00 PM
85	National Univ of Singapore	B	8:30 AM	B	11:00 AM	B	2:30 PM
86	Univ of Manitoba	O	3:30 PM	H	2:00 PM	F	11:30 AM
87	Tennessee Tech Univ	A	10:30 AM	A	3:00 PM	D	4:30 PM
88	Villanova Univ	M	8:30 AM	C	11:30 AM	D	3:00 PM
89	Florida Atlantic Univ	F	3:30 PM	F	1:30 PM	F	10:30 AM
90	Arizona State Univ - Tempe	I	1:30 PM	I	3:30 PM	F	9:30 AM
91	McGill Univ	F	8:30 AM	A	11:00 AM	F	2:30 PM
92	Virginia Tech	N	2:30 PM	A	1:00 PM	H	11:00 AM
93	Kookmin Univ	J	8:30 AM	J	11:00 AM	A	3:00 PM
94	Portland State Univ	F	10:30 AM	G	3:00 PM	I	4:30 PM
95	Penn State Univ - University Park	C	8:30 AM	F	11:00 AM	C	2:30 PM
96	Temple Univ	K	3:30 PM	A	9:30 AM	B	11:30 AM
97	Rochester Institute of Technology	E	1:30 PM	E	3:30 PM	B	9:30 AM
98	Univ of Alabama - Tuscaloosa	G	1:30 PM	C	3:30 PM	D	9:30 AM
99	Univ of Western Ontario	N	12:30 PM	A	10:30 AM	E	4:00 PM
100	Clemson Univ	A	3:30 PM	A	1:30 PM	H	10:30 AM
101	Kettering Univ	N	9:30 AM	I	2:00 PM	B	4:30 PM
102	Northern Illinois Univ	E	8:30 AM	E	11:00 AM	E	2:30 PM
103	Univ of Florida	E	10:30 AM	F	3:00 PM	H	4:30 PM
104	Stevens Inst of Tech	H	9:30 AM	D	2:30 PM	E	1:00 PM
105	Univ of North Carolina - Charlotte	D	8:30 AM	I	11:00 AM	D	2:30 PM
106	Univ of Waterloo	N	8:30 AM	H	4:00 PM	F	1:30 PM
107	Univ of Connecticut	F	9:30 AM	A	2:30 PM	C	1:00 PM
108	Mississippi State Univ	O	9:30 AM	J	2:00 PM	C	4:30 PM
109	Old Dominion Univ	B	4:30 PM	G	9:30 AM	H	11:30 AM
110	Kumoh National Institute of Technology	M	12:30 PM	H	10:30 AM	D	4:00 PM
111	Bradley Univ	G	12:30 PM	D	10:30 AM	G	3:30 PM
112	North Dakota State Univ	D	10:30 AM	D	3:00 PM	G	4:30 PM
113	Duke Univ	L	10:30 AM	G	2:00 PM	F	9:00 AM
114	Lehigh Univ	M	4:30 PM	H	9:00 AM	A	2:00 PM
115	Univ of Ontario Institute of Tech	B	3:30 PM	E	1:30 PM	B	10:30 AM
118	Tallinn University of Technology	N	10:30 AM	E	2:00 PM	H	9:00 AM
119	Lawrence Technological Univ	L	8:30 AM	B	4:00 PM	E	1:30 PM
120	Rose Hulman Inst of Tech	J	4:30 PM	E	9:00 AM	G	2:00 PM
121	RWTH Aachen Tech Univ	M	1:30 PM	C	4:00 PM	A	10:00 AM
122	Seoul National Univ of Science & Tech	K	9:30 AM	F	2:30 PM	H	1:00 PM
123	Univ of Minnesota-Duluth	I	10:30 AM	I	3:00 PM	C	9:00 AM
124	Universidad Autonoma Estado Mexico	A	4:30 PM	F	9:30 AM	G	11:30 AM
125	Carleton Univ	E	4:30 PM	J	9:30 AM	B	1:30 PM
126	Univ of Evansville	L	4:30 PM	D	10:00 AM	I	2:00 PM
128	Oklahoma State Univ	H	2:30 PM	E	1:00 PM	B	11:00 AM
131	Saint Louis Univ	L	2:30 PM	G	1:00 PM	F	11:00 AM

## Presentation Event - 9 conf. rooms/suites, each appointment is 1/2 hour long

	<b>A</b>	<b>B</b>	<b>C</b>	<b>D</b>	<b>E</b>	<b>F</b>	<b>G</b>	<b>H</b>	<b>I</b>
	<b>1</b>	<b>2</b>	<b>3</b>	<b>4</b>	<b>5</b>	<b>6</b>	<b>7</b>	<b>8</b>	<b>9</b>
8:30 AM									
9:00 AM	49 - Univ of New Hampshire	21 - Dalhousie Univ	123 - Univ of Minnesota-Duluth	29 - Purdue Univ - W Lafayette	50 - Univ of Akron	113 - Duke Univ	34 - Worcester Polytechnic Inst	118 - Tallinn University of Technology	25 - Univ of Pittsburgh - Pittsburgh
9:30 AM	61 - Univ of Toronto	97 - Rochester Institute of Technology	65 - Rensselaer Polytechnic Inst	98 - Univ of Alabama - Tuscaloosa	44 - Wayne State Univ	90 - Arizona State Univ - Tempe	81 - Georgia Southern Univ	62 - Ryerson Univ	83 - Colorado State University
10:00 AM	121 - RWTH Aachen Tech Univ	55 - Western Michigan Univ	43 - Northwestern Univ	19 - Columbia Univ	24 - Ecole Polytechnique De Montreal	67 - Carnegie Mellon Univ	53 - Washington Univ - St Louis	60 - Vanderbilt Univ	66 - South Dakota Sch of Mines & Tech
10:30 AM	39 - Ohio State Univ	115 - Univ of Ontario Institute of Tech	64 - Louisiana State Univ	20 - Florida International Univ	72 - Cegep du Vieux - Montreal	89 - Florida Atlantic Univ	51 - Western Washington Univ	100 - Clemson Univ	59 - Univ of Hartford
11:00 AM	3 - Universitat Stuttgart	128 - Oklahoma State Univ	16 - US Naval Academy	70 - Wichita State Univ	82 - Universidad Central de Venezuela	131 - Saint Louis Univ	22 - North Carolina State Univ - Raleigh	92 - Virginia Tech	11 - Univ of Kansas - Lawrence
11:30 AM	69 - Lakehead Univ	96 - Temple Univ	78 - Univ of Windsor	27 - York College of Pa	42 - Univ of Maryland - College Park	86 - Univ of Manitoba	124 - Universidad Autonoma Estado Mexico	109 - Old Dominion Univ	13 - Centro Universitario Da FEI

12:00 PM  
12:30 PM  
--- Lunchtime ---

1:00 PM	17 - Universidad Simon Bolivar	12 - Univ of South Florida	107 - Univ of Connecticut	76 - Univ of Michigan - Dearborn	104 - Stevens Inst of Tech	33 - Univ of Missouri	84 - Cornell Univ	122 - Seoul National Univ of Science & Tech	31 - Univ of Toledo
1:30 PM	56 - Univ of St Thomas	125 - Carleton Univ	75 - Ferris State University	46 - West Virginia Univ	119 - Lawrence Technological Univ	106 - Univ of Waterloo	<del>84 - Cornell Univ</del>	<del>National Univ of Science &amp; Tech</del>	<del>31 - Univ of Toledo</del>
2:00 PM	<del>114 - Lough Univ</del>	63 - Cooper Union	35 - San Jose State University	<del>76 - Univ of Michigan - Dearborn</del>	73 - Universite Laval	79 - Auburn Univ	<del>120 - Rose-Hulman Inst of Tech</del>	47 - Univ of North Florida	126 - Univ of Evansville
2:30 PM	10 - Univ of Wisconsin - Madison	85 - National Univ of Singapore	95 - Penn State Univ - University Park	105 - Univ of North Carolina - Charlotte	102 - Northern Illinois Univ	91 - McGill Univ	32 - Brown Univ	5 - Univ of Michigan - Ann Arbor	40 - Kansas State Univ
3:00 PM	93 - Kookmin Univ	<del>63 - Cooper Union</del>	48 - Georgia Institute of Technology	88 - Villanova Univ	<del>102 - Northern Illinois Univ</del>	74 - Univ of Illinois - Urbana Champaign	54 - Univ of Maine	1 - Oregon State Univ	71 - Saginaw Valley State Univ
3:30 PM	26 - Queen's Univ - Ontario Canada	57 - Univ of Illinois - Chicago	41 - Southern Polytechnic State Univ	8 - Ecole De Technologie Supérieure	52 - Florida Inst of Tech	38 - Oakland University	111 - Bradley Univ	18 - US Air Force Academy	37 - Lafayette College
4:00 PM	23 - Univ of Central Florida	14 - Missouri University of Science and Tech	6 - Graz Univ of Technology	110 - Kumoh National Institute of Technology	99 - Univ of Western Ontario	68 - Universite Du Quebec a Trois-Rivieres	58 - Univ of Cincinnati	80 - Texas Tech Univ	30 - Universite Du Quebec-Chicoutimi
4:30 PM	77 - Rutgers Univ	101 - Kettering Univ	108 - Mississippi State Univ	87 - Tennessee Tech Univ	36 - Univ of Minnesota - Twin Cities	15 - Michigan State Univ	112 - North Dakota State Univ	103 - Univ of Florida	94 - Portland State Univ
5:00 PM									
5:30 PM									
6:00 PM									





## **2013 COMPETITION AWARDS**

### **OVERALL**

#### ***Spirit of Excellence Award***

This award recognizes the top ten (10) finishers overall. - \$3000, \$2000, \$1000, trophies

### **STATIC EVENTS**

#### ***Engineering Design Award Sponsored by Bosch***

Top 3 team scores in Design – Trophies plus \$2000, \$1500, \$1000

#### ***SAE Cost Award***

Top 3 team scores in Cost – Trophies

#### ***SAE Presentation Award***

Top 3 team scores in Presentation – Trophies

### **DYNAMIC EVENTS**

#### ***SAE Acceleration Award***

Top 3 team scores in Acceleration - Trophies

#### ***Endurance Award Sponsored by Ford***

Top 3 team scores in Endurance – Trophies plus \$2000, \$1500, \$1000

#### ***Fuel Economy Award Sponsored by Ford***

Top 3 teams that receive best Fuel Economy Score – Trophies

#### ***SAE Skid Pad Award***

Top 3 team scores in Skid Pad - Trophies

#### ***SAE Autocross Award***

Top 3 team scores in Autocross. Trophies plus 8 free tires, 6 free tires, 4 free tires sponsored by Hoosier Tire.

### **SPECIALITY AWARDS**

#### ***Altair Engineering's William R. Adam Engineering Award***

Development of new and innovative design concepts for FSAE racing competition. - \$1000, \$500

#### ***Continental Brake Award***

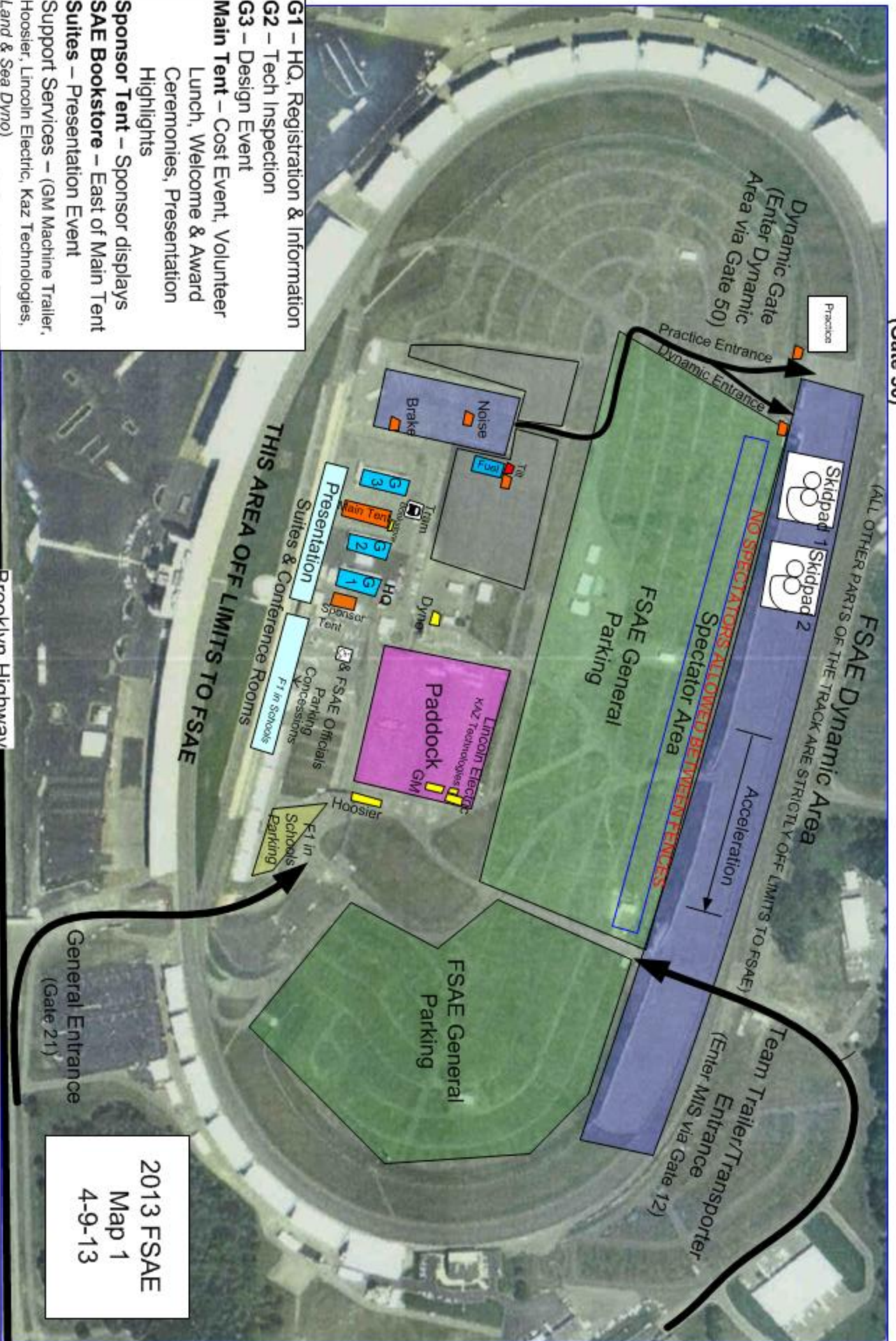
This award is intended to reward the Best in Class Brake design by a team. - \$1000

#### ***The FEV Powertrain Development Award***

This award is intended to reward the top three Formula SAE teams for overall excellence in Powertrain development. - \$2000, \$1000, \$500

#### ***Best Three View Drawing Award***

Best execution of three view drawings submitted with a Design Report – Engineering handbooks



G1 – HQ, Registration & Information

G2 – Tech Inspection

G3 – Design Event

Main Tent – Cost Event, Volunteer

Lunch, Welcome & Award

Ceremonies, Presentation

Highlights

Sponsor Tent – Sponsor displays

SAE Bookstore – East of Main Tent

Suites – Presentation Event

Support Services – (GM Machine Trailer, Hoosier, Lincoln Electric, Kaz Technologies, Land & Sea Dyno)

2013 FSAAE  
 Map 1  
 4-9-13

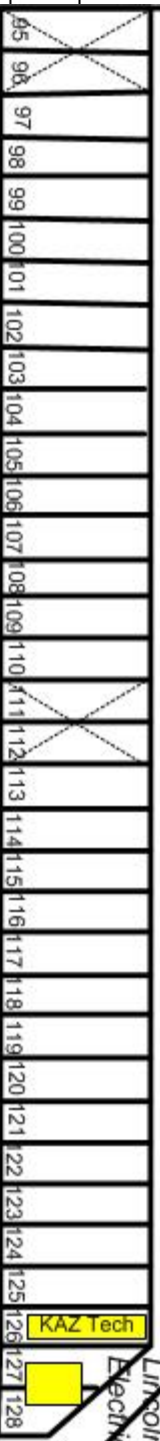
2013 FSAE  
PADDOCK LAYOUT

Map 2  
4-9-13

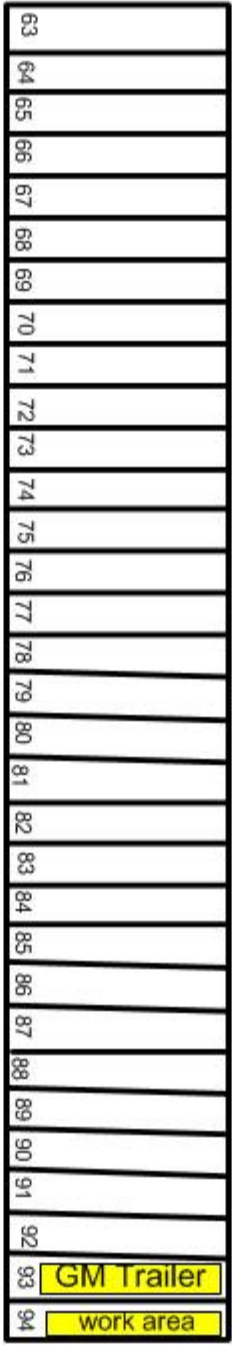
Concourse

Trash Compactor

Lincoln  
Electric



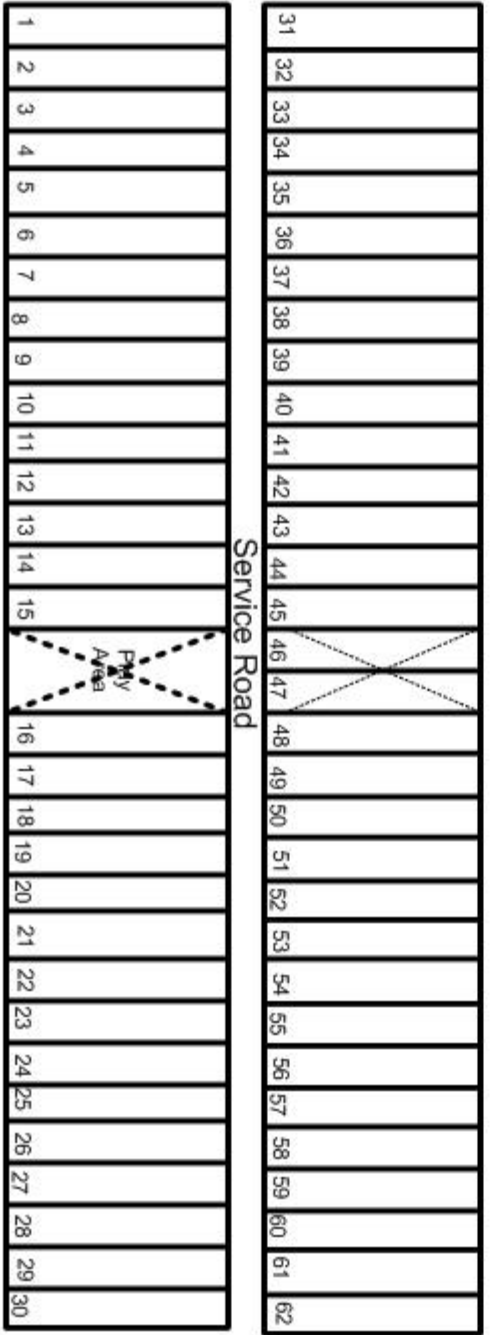
Service Road



Concourse

Entrance/Exit

Service Road

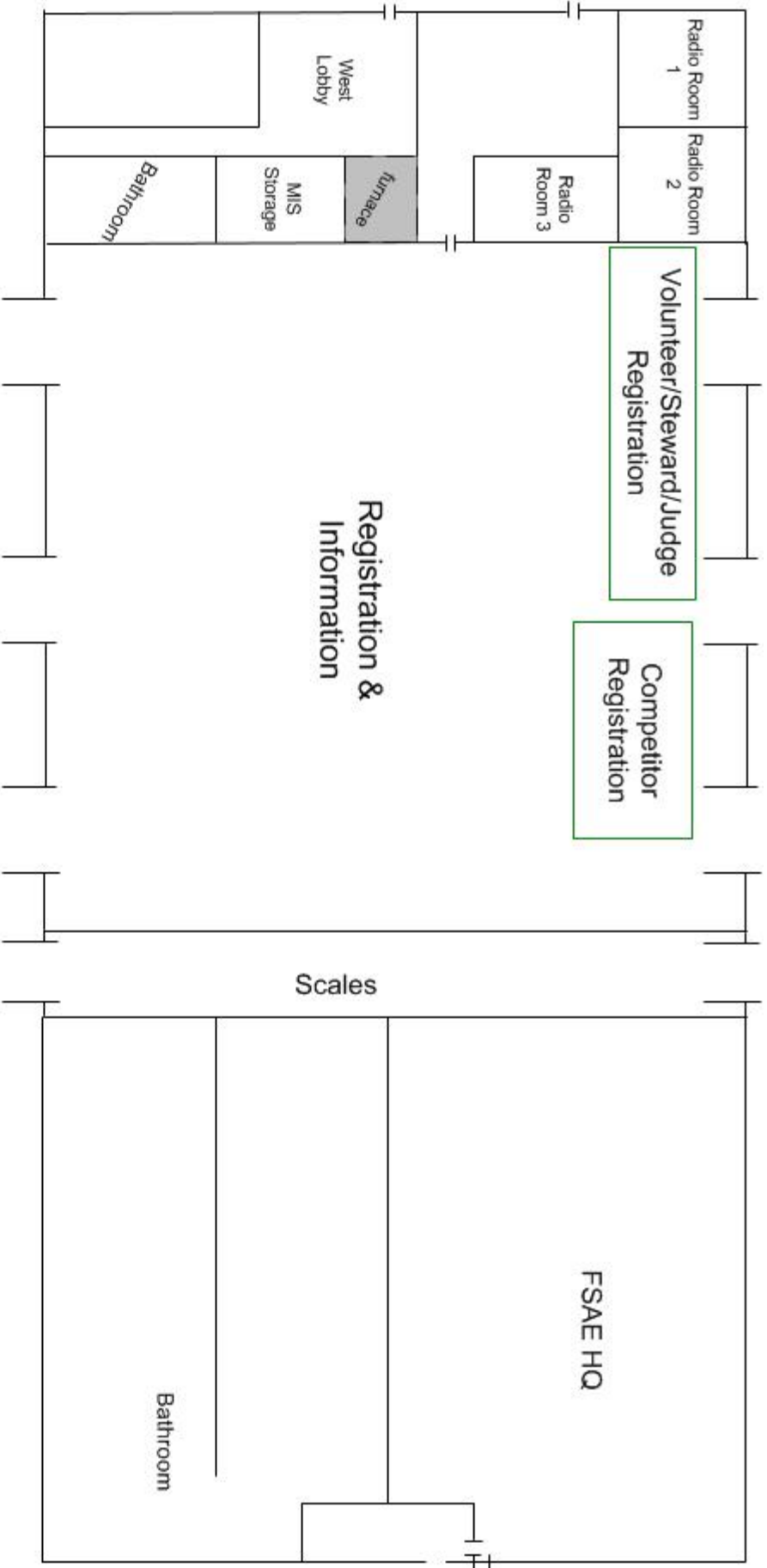


Concourse

Hoosier

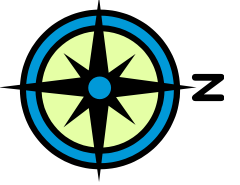
1-94 are 15' x 75'  
95-126 are 15' x 50'.

Entrance/Exit

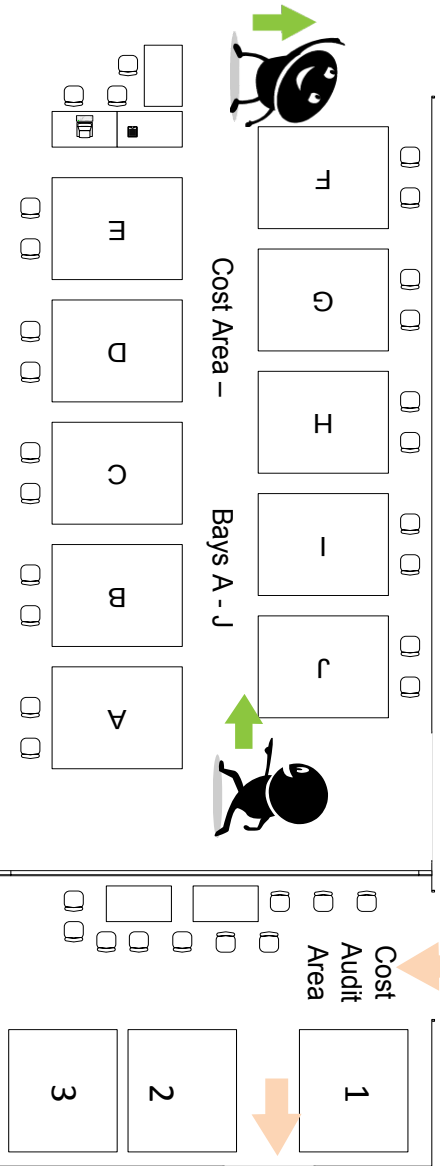


2013 FS&AE  
GARAGE 1  
MAP 4  
1-27-13

Map not to scale



Queuing Area As Needed



Main Tent

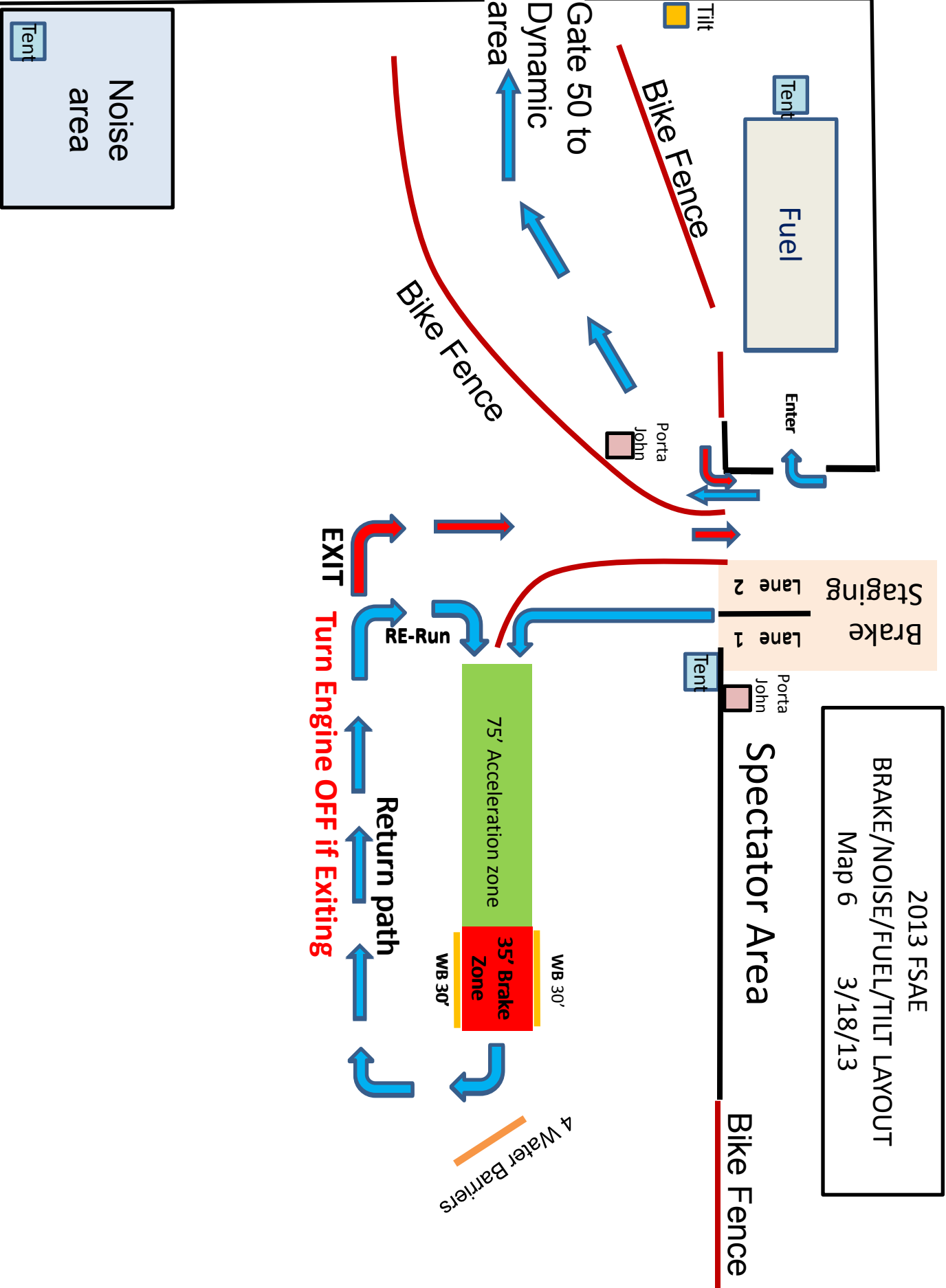
Volunteer  
Food / Lunch

Announcer and Stage

Bookstore



2013 FSAE Main Tent  
Map 5 3/18/13



Fuel

Enter

Tilt

Bike Fence

Gate 50 to

Dynamic area

Bike Fence

Porta John

Brake Lane 1

Staging Lane 2

Spectator Area

Bike Fence

75' Acceleration zone

35' Brake Zone

WB 30'

WB 30'

4 Water Barriers

Return path

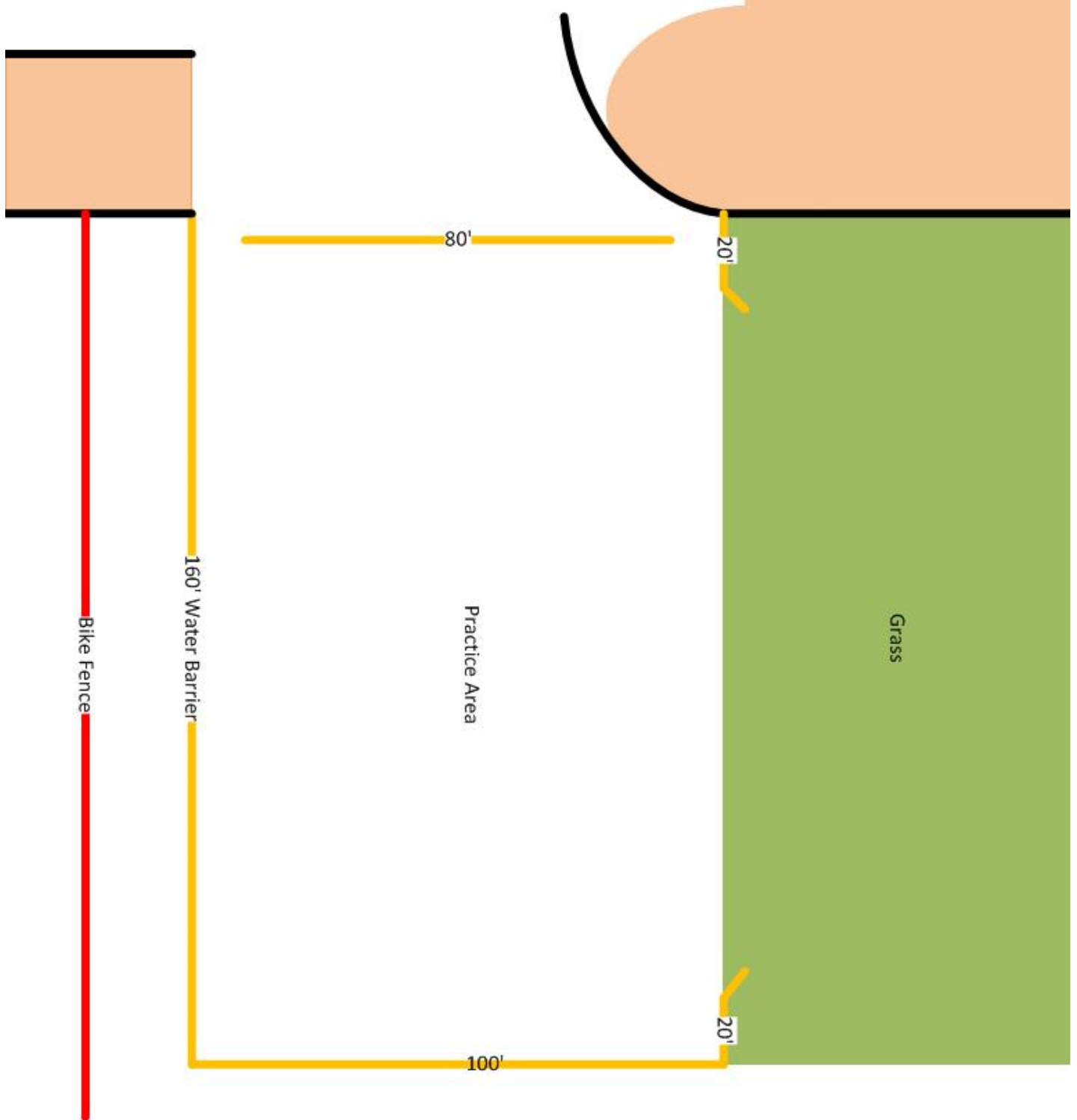
RE-Run

Turn Engine OFF if Exiting

EXIT

Noise area

Tent



2013 FS AE  
PRACTICE  
LAYOUT  
Map 7  
1/27/13

MOTORCYCLE SHOPS, ETC. NEAR BROOKLYN, MICHIGAN

D's Customs

1508 Pringle Ave, Jackson, MI

(517) 788-6880

Category: Motorcycle Repair Shop

Holiday Power Sports

4501 Page Ave, Michigan Center, MI

(517) 764-3600

Category: Motorcycle Repair Shop

JB Customs

4023 West Michigan Ave, Jackson, MI

(517) 787-8730

Category: Motorcycle Repair Shop

Mad Mike's Minis

10190 Bridge Rd, Onsted, MI

(517) 467-2442

Category: Motorcycle Parts Store

Moto1 Cycle & ATV, LLC

9934 West US Highway 223, Adrian, MI

(517) 467-9311

Category: Motorcycle Dealers

Mr. Radiator Auto Service, LLC

4205 Page Ave, Michigan Center, MI

(517) 764-0220

Category: Motorcycle Repair Shop

The Shed

1364 Floyd Ave, Jackson, MI

(517) 499-6468

Category: Motorcycle Repair Shop

Tecumseh Harley-Davidson Shop

8080 Matthews Hwy, Tecumseh, MI

(517) 423-3333

Town & Country Sports Center, Inc.

18665 US 12, Cement City, MI

(517) 547-3333

Category: Motorcycle Dealers

**We strongly recommend calling first to determine if a shop has what you need.**

## RACING SUPPLIES

### **Averill Racing**

632 Ajax Dr.

Madison Heights, MI 48071

(248) 585-9139

M-F 10:00 a.m. – 6:00 p.m.; Sat. 10:00 a.m. – 4:00 p.m.

Location: 1 block North of 12 Mile off John R

Distance from MIS: ~80.5 miles (~1 hour & 27 minutes' drive time)

12623 US-12, Brooklyn, MI 49230 to 632 Ajax Dr Madison Heights, MI 48071

1. Head east on US-12 toward Brooklyn Hwy - 34.0 mi
2. Merge onto I-94 E/US-12 E via the ramp to Detroit. Continue to follow I-94 E - 34.6 mi
3. Take exit 216A to merge onto I-75 N - 10.5 mi
4. Take exit 63 for 12 Mile Rd - 0.3 mi
5. Turn right at W 12 Mile Rd - 0.4 mi
6. Turn left at John R Rd - 0.5 mi
7. Turn left at Ajax Dr. Destination will be on the right - 0.2 mi

### **RJS Racing Equipment, Inc.**

23506 N. John R. Road

Hazel Park, MI 48030

(248) 548-5727

M-F 8:00 a.m. – 4:00 p.m.

Distance from MIS: ~76.5 miles (~1 hour & 22 minutes' drive time)

12623 US-12, Brooklyn, MI 49230 to 23506 John R Rd, Hazel Park, MI 48030

1. Head east on US-12 toward Brooklyn Hwy - 34.0 mi
2. Merge onto I-94 E/US-12 E via the ramp to Detroit. Continue to follow I-94 E - 34.6 mi
3. Take exit 216A to merge onto I-75 N - 7.1 mi
4. Take exit 60 toward John R St/9 Mile Rd - 0.2 mi
5. Merge onto N Chrysler Dr - 0.2 mi
6. Turn right at John R Rd. Destination will be on the right - 0.4 mi

**\*\*Please call first. If you call them, these suppliers may be able to ship the products you need to MIS.**

## LOCAL FIRE EXTINGUISHER SUPPLIERS

Spears Fire and Safety Services, Inc.

287 Jackson Plaza

Ann Arbor, MI

Tel: (734) 663-4133

Spears Fire and Safety Services, Inc.

1116 Wildwood Avenue

Jackson, MI

Tel: (517) 782-8229

**GREAT PLACES TO EAT (UPDATED FROM THE MIS WEB SITE 4/1/13)**

**Adrian**

Alpha Koney Island, 422 N. Main Street 49221	(517) 266-2526
Applebee's Grill, 1396 S. Main Street 49221	(517) 263-3344
Big Boy Restaurant, 126 N. Broad Street, 49221	(517) 265-2000
Brass Lantern, 4366 Evergreen Dr. 49221	(517) 263-0411
Ed Chapulin Restaurant, 118 S. Winter Street 49221	(517) 265-6670
Ed's Main Street Station, 149 N. Main Street 49221	(517) 263-2365
Joe Cool's L.A. Cafe, 4460 Maumee Street 49221	(517) 263-8788
McDonald's 1377 S. Main Street 49221	(517) 265-2370
McDonald's 1235 N. Main Street 49221	(517) 263-5121
Red Lobster, 1420 S. Main Street 49221	(517) 263-3811
Triple D Coffeehouse, 136 E. Maumee Street 49221	(517) 265-9997

**Ann Arbor**

Bennigan's Restaurant, 575 Briarwood Circle 48108	(734) 996-0996
Chop House, 322 S Main Street 48104	(734) 669-8826
Gandy Dancer, 401 Depot 48108	(734) 769-0592
Graham's Restaurant, 610 Hilton Blvd 48108	(734) 761-7800
Olive Garden, 445 E. Eisenhower Pkwy 48108	(734) 663-6875
Weber's Inn & Restaurant 3050 Jackson Road 48108	(734) 665-3636

**Blissfield**

Mystery Dinner Train, Us 223 Depot Street 48228	(888) 467-2451
Hathaway House, 424 W. Adrian Street (US 223) 48228	(517) 486-2141
Lena's Italian Restaurant, 517 E. (US 223) 49228	(517) 486-4385
Main Street Stable & Tavern, 424 W. Adrian Street (US223) 48228 (behind Hathaway House)	(517) 486-2144
McDonald's 511 E. Adrian Street 48228	(517) 486-4177
Subway Sandwiches & Salads, 620 W. Adrian 48228	(517) 486-2060

**Brooklyn**

Big Boy Restaurants, 329 S. Main Street 49230	(517) 592-3212
Old Town, 109 S. Main Street 49230	(517) 592-8007
Hometown Pizza, 193 S. Main Street 49230	(517) 592-3266
Marco 's Pizza & Subs, 145 Wamplers Lake Road 49230	(517) 592-4444
McDonald's 306 S. Main Street 49230	(517) 592-6134
Poppa's Place, 208 S. Main Street 49230	(517) 592-4625
Subway Sandwiches & Salads, 311 S. Main Street 49230	(517) 592-5994
Village Creamery, 140 N. Main 49230	(517) 592-8284

**Cement City**

Artesian Wells Sports Bar 18711 U.S. 12 49233	(517) 547-8777
---	----------------

**Chelsea**

The Common Grill, 112 S. Main Street 48118	(313) 475-0470
--	----------------

**Clark Lake**

The Beach Bar, 3505 Ocean Beach 49234	(517) 529-4211
Eagles Nest, 1200 Eagle Point 49234	(517) 529-9121
In Good Company, 9039 Meridian Road, Clark Lake 49234	(517) 529-9150
Nite Crawlers, 6258 Jefferson Road, Clark Lake 49234	(517) 592-2008

## Clinton

McDonald's 480 W. Michigan Avenue 49236 (517) 456-8700  
Subway, 104 E. Michigan Avenue 49236 (517) 456-7576

## Hudson

McDonald's 503 S. Meridian 49247 (517) 488-8440  
Ole Kountry Kettle, 389 S. Meridian Rd. (US-127) 49247 (517) 448-8240

## Irish Hills

Golden Nugget, 7305 Us Hwy. 12, Onsted 49265 (517) 467-2190  
Harold's Place, 10625 U.S. 12, Brooklyn 49230 (517) 467-2064  
Jerry's Pub, 650 Eagan Hwy, Brooklyn 49230 (517) 467-4700

## Jackson

Applebee's Grill, 1706 W. Michigan Avenue 49202 (517) 783-5700  
Daryl's Downtown 151 W. Michigan Avenue 49201 (517) 782-1895  
Bella Notte Ristorante, 137 W. Michigan Avenue 49201 (517) 782-5727  
Big Boy Restaurants, 1213 N. West Avenue 49202 (517) 787-5566  
Bullinger's 501 Longfellow @ Wildwood 49202 (517) 783-3768  
Cracker Barrel, 2494 Airport Road 49202 (517) 783-5300  
Steak Eatery, 4243 Oaklane 49203 (517) 783-1766  
Finley's 1602 W. Michigan Avenue 49202 (517) 787-7440  
Giglio's Italian Restaurant, 2241 Brooklyn Road 49203 (517) 787-5025  
Ground Round, Jackson Crossing Mall 49202 (517) 782-3330  
Hudson's Grill, 2900 Springport Road 49201 (517) 784-4773  
Hunt Club, 1514 Daniel Street 49202 (517) 782-0375  
Knight's Steak House, 2125 Horton Rd 49201 (517) 783-2777  
Lone Star Steakhouse, 3510 O' Neil Drive 49202 (517) 768-0884  
Old Country Buffet, 1230 Jackson Crossings Blvd 49202 (517) 789-1083  
Olive Garden, 3500 O' Neil Drive 49202 (517) 787-2388  
Outback Steak House, 1501 Boardman Road 49202 (517) 784-7700  
Red Lobster, 2400 Clinton Road 49202 (517) 787-7820  
Steak & Shake, 2655 Airport Road 49202 (517) 841-9390  
Todoroff's Original Coney Island, 1200 W. Parnall Road. 49201 (517) 841-1000  
Whirligig Restaurant, 2000 Holiday Inn Drive 49202 (517) 783-0693  
Yenking Chinese Restaurant, 2100 Holiday Inn Drive 49202 (517) 787-8701

## Lansing

Damon's Grill, 1601 W Lake Lansing Road 48823 (517) 337-4680  
Harper's Restaurant & Brew Pub, 131 Albert Street 48823 (517) 333-4040  
Finley's American Grill, 6300 S. Cedar Street 48911 (517) 882-7530  
Finley's American Grill, 5615 W. Saginaw 48917 (517) 323-4309  
P.F. Chang's China Bistro, 2425 Lake Lansing Road 48912 (517) 267-3383  
The English Inn, 677 S. Michigan Avenue 48827 (800) 858-0598

## Saline

Ruby Tuesday, 1375 E. Michigan Avenue 48176 (734) 429-3873  
Subway, 703 W. Michigan 48176 (734) 429-3267

## Tecumseh

The British Pantry & Tea Garden Cafe, 112 E. Chicago Blvd., (M-50) 49286 (517) 423-7873  
Daily Grind, 139 E. Chicago Blvd. 49286 (517) 424-7463  
Doby's Smokehouse, 111 W. Chicago Blvd., (M-50) 49286 (517) 423-7777  
Evans Street Station, 110 S. Evans Street 49286 (517) 424-5555  
McDonald's 1206 W. Chicago Blvd. 49286 (517) 423-2826  
Subway, 900 W. Chicago Blvd. 49286 (517) 423-3290

## **ON-SITE CONTACT INFORMATION**

G1 will be staffed with volunteers and the Official Announcer will be in the Main Tent at all times that the competition is in progress. Stewards will be supplied with a cellular phone number to contact Kathleen McDonald in case of emergency.

It is preferred that this number be used on site only for emergencies. For all other communication, stewards and event crew should find the nearest event official or Paddock Patrol volunteer with a mobile radio.

**STUDENTS MAY CALL KALEY ZUNDEL @ 412-719-2865  
OR ALLISON HOSTETLER @ 724-766-9420**

### **First Aid**

There will NOT be a First Aid Station onsite. All incidences will be covered by EMS or one of the two supporting fire trucks.

To expedite matters in case of accident or injury after-hours, teams or stewards can simply call 911. Please make sure your team is aware of this.

### **Storm Shelter**

In the event of severe weather, we have been instructed by MIS management to gather inside the tunnels.

FSAE Site Address: Michigan International Speedway  
12626 US-12  
Brooklyn, MI 49230

# HOSPITALITY

## **Parking**

Enter MIS through Gate 21 off Brooklyn Hwy. All parking will be directed by volunteers. Individuals will be directed to the FSAE Parking Area.

## **Registration**

Everyone must sign SAE's and MIS's liability waivers in G1. You will receive your wristband, which must be worn at all times, when you sign the waivers. There will be an early registration session Tuesday, May 8<sup>th</sup> at Super 8 located on Wamplers Road.

## **Lunches on Site**

Teams will be responsible for providing your lunch. Teams may bring food onsite; cook on site as well as long as rules are followed specified in the Paddock Rules document. There will also be concessions onsite.

- ***Honda Sponsored Pizza Lunch – Friday, May10th @ TBD.***

## **Concessions**

Anyone who is interested may purchase food from the concessions area under the suites (south of G1, see site layout). The concession stand prices will range for breakfast: \$3.00-4.00. Lunch will be from: \$3.00-\$6.00 per item. Snacks are \$1.00-5.00. Beverages are \$3.00-\$4.00. The hours are:

Wednesday, May 8-Saturday May 11 7:30 a.m. - ~6:00 p.m.\*

\*If business dictates, concessions may close earlier.

## **FSAE shirts**

SolidWorks is giving free T-shirts to all FSAE Competitors in 2013. Sizes are not guaranteed. There will not be any T-shirts available for purchase this year.

## **FSAE Hats and Event Programs**

Each team member will receive a Formula SAE hat sponsored by SAE International. All teams will receive a total of 10 copies of the event programs.

## **Welcome Ceremony Sponsored by Honda – Main Tent**

In addition to the Captains' Meeting on Wednesday evening (with its emphasis on "do's and do not's"), we are again holding a "Welcome Ceremony" sponsored by Honda R&D Americas. Key players who are present will be introduced. All teams, faculty and any volunteers who are present are welcome to attend. The Honda ceremony starts at 5:30 p.m. There will be prize drawings for teams.

## **General Motors Award Ceremonies – Main Tent**

There will be two award ceremonies in 2013. Families and friends are welcome to attend with the team. The first is scheduled on Friday, May 10th (~ 7:00 p.m.). The awards for the Static Events, the Friday morning Dynamic Events and the Push-bar competition will be presented, as well as some sponsored awards. There will also be a prize drawing for the teams sponsored by SAE International and General Motors.

The second Award Ceremony is scheduled for ~ 8:00 p.m. on Saturday, May 11th. There will be a "Golden Ticket" prize drawing for a free 2014 FSAE Registration by SAE International. General Motors will also be raffling off prizes. The rest of the participating 2013 FSAE sponsors will be announcing and presenting their awards, and the Top Ten teams will receive their trophies.

## **EVENT SITE QUICK REVIEW – ADVICE, EXPECTATIONS AND POLICIES**

**Ask Questions** – If you have a question – ask! If you have any questions about any part of the competition, the schedule, the procedures, the rules or anything else, just ask one of the officials. The first place to bring questions is to the staff in the registration area. Rules questions may be presented to the technical inspectors. If we can't give you an immediate answer, (Confession – We don't know everything!) we know where to find the answer. It all starts with asking and remember, there are no dumb questions.

“Key Volunteers” on the track will be identified with a pink armband. These individuals are deemed as event experts and can be/should be sought after if you have any questions.

**Ask for Help** - If you need help – ask. Ask the officials Announcements requesting parts, tools or assistance can be made by the announcer in the Main Tent.

**Announcements** - Although we have loudspeakers in various parts of the site, FSAE covers a large area and it can be difficult for announcements to be heard everywhere. This is especially true if you're standing close to a running engine. You can help us make sure everyone knows what's being announced by passing the announcements along to your team mates and others teams in your area. This is important and we appreciate your help. Also, the sound system will be FM Broadcasted. We will announce at the Welcome Ceremony and remind teams at Drivers' meetings of what the frequency is. (Frequency will be determined after sound system is set up and tested).

**Be on Time** – The schedule is included in the Student Handbook and posted online. It's your responsibility to be on time.

**Be Careful** – Don't take any chances when working on your car - follow safe working practices. It's not just the pain - getting hurt delays what you're doing. Follow the instructions published on the Paddock Patrol sheet.

**Bring your Documentation** – When you come to tech inspection bring all the documentation and correspondence connected to your (1) SEF submission, (2) Impact Attenuator Data Report and (3) any Rules Questions you submitted. The inspectors do not have this material and you may need it to answer questions about your vehicles design and construction. The inspectors want you to pass tech and pass it easily, but they need your help to make that happen.

**Don't Run** – Running tells people there's an emergency. Don't run unless life or limb is in danger.

**Drivers Meetings** – Attending drivers' meetings is mandatory if you are planning to drive. Check the schedule for times.

**Dynamic/Tech Area Passes** - Each team is issued 4 dynamic area passes. You must have a pass to gain access to the dynamic events area on the back straight. This pass is also used for tech inspection as we limit the number of team members with the car in tech to 4.

**Engine Running in the Paddocks** – You can run your engine in the paddock provided your car has (1) passed tech and (2) is on an adequate stand with the wheels at least 4" off the ground or the wheels have been removed. Please be careful.

**Entering and Exiting the Site** – Trucks can't fit in through the General Entrance (Gate 21) tunnel off Brooklyn Highway. All team member cars are to use main entrance at Gate 21. The formula car transportation trucks must enter in and out through the US 12 (Gate 12) entrance. You will be driving across the track, so on Friday and Saturday the truck entrance will be closed when dynamic events are running. On those days before the events start, at lunch and after they end, you will be able to take trucks in and out by crossing at Gate 12 on the south end of the back straight. (That's on your right if you're in the paddocks and looking toward the back straight.)

**Event Closing Times** – Remember that Acceleration and Skid Pad close at exactly 12:30 p.m. and Autocross closes at 5:00 p.m. Your car must have crossed the starting line by that time or you can't run. We recommend you to get in line early.

**Keep the Officials Informed** – Keep the officials informed if you run into any problems that (1) need our attention or (2) might push your team against a time limit. For example, if you need a quick re-inspection to get to an event before it closes let us know - the inspectors can be ready, but only if you keep us informed.

**Keep your Paddock Clean** – We are responsible for keeping the parts of MIS used for FSAE clean. Trash cans are provided in the paddocks and throughout the FSAE site. If you need trash bags we have them available - just ask at the registration area. Ask the Announcer -- he has a supply of trash bags. **Please keep your paddock clean and make sure it completely clean before your team leaves at the end of the event.** PLEASE DO NOT leave behind any furniture, used tires, etc.

**Photography** - Synopsis – Teams are allowed to have 1 photographer and 1 spotter in the dynamic events area – and only when their car is running. Photographers must register at the dynamic event gate, wear a photographer's vest and have a spotter. See the "2013 Rules for Photographers" in the Student Handbook.

**Push Bar** – You can only move your car if you use the push bar – that's the rule.

**Removing Cars Overnight** – Removing your car from MIS overnight is entirely your decision. If you want to take your car off site you must take it to tech inspection and have an inspector remove part one of the tech sticker. When you return you'll need to have the items you've worked on re-inspected. Re-inspection shouldn't take long.

**Restricted Areas** – At MIS, we are only authorized to use the infield, back straight, garages and certain surrounding facilities. We are not permitted on the other parts of the main oval or the buildings immediately adjacent to the main oval. Please respect these restrictions.

**Security** – Keep your equipment locked up. This is a large site and security can't be everywhere. Don't leave your tools, computers and other equipment lying around where they could be stolen.

**Spectators** – Spectators are welcome to attend FSAE. If you have friends or family who want to see the competition, tell them to enter through the main gate on Brooklyn Highway. Spectators must park in the general parking area, watch for signs, then go to Registration to sign the SAE waiver and receive their wristband. Please note to all spectators closed toed shoes are preferred. No pets allowed; except guide dogs.

**Tech Inspection** – Once you are ready for tech, get a tech number. Bring all your drivers' gear with you. Read "Tech Inspection Review for Teams."

**Translators** – If you have a driver who isn't fluent in English, you must have a translator. Translators must be in the dynamic events area and available to the officials when that driver is on the course. Translators will be issued an additional dynamic area pass. If you need a dynamic area pass for your translator - ask at the registration area.

**Weather** – In May, the local weather can be unpredictable. We encourage you to be prepared for all weather types from sun to rain. Pack long and short sleeve apparel, sun block, coats and comfortable; closed-toe shoes.

## RULES FOR ALL PHOTOGRAPHERS IN THE DYNAMICS AREA

Revised March 28, 2013

SAE recognizes the importance of photographic and video records to teams, students and their universities and we want to give every school the opportunity to have their participation covered by a photographer of their choice. However, the smooth and efficient operation of the on-course events requires that photographers comply with the following rules.

**Synopsis – Teams are allowed to have only 1 photographer and 1 spotter in the dynamic events area – and only when the team’s car is running.**

### General Policies

**Authorization** – SAE staff is solely responsible for authorizing photographers/spotters to enter the dynamic event area. Photographers/spotters must (1) be registered for the competition, (2) sign all required waivers, (3) read any required material, (4) agree that they understand and have no questions regarding the policies and procedures for photographers, and (5) agree to abide by these policies and procedures at the risk of being escorted from the dynamic area.

Photographers/spotters will be issued and must wear “Photographer” vests upon entering the dynamic event area.

Videographers are classified as photographers

Photographers must have photographic equipment – cell phones are **not** cameras.

Photographers and spotters are explicitly restricted to photographic activities.

**Dynamic Events Area** – The “Dynamic Events Area” includes all parts of the site where vehicles are running under power. This includes the (1) noise test area, (2) brake test area, (3) practice track and (4) dynamic event courses and associated staging areas.

**Limit** – Each university is limited to one (1) photographer and one (1) spotter within the dynamic event area at the same time. Additional photographers must remain outside the dynamic event area.

**Access Policy** – Properly credentialed photographers/spotters representing universities may only access the dynamic events area while their teams are actually running in an event. University photographers/spotters will **not** be granted dynamic area access independent of their team.

**Photographer Access Captain** - The “Photographer Access Captain” is responsible for issuing photographer vests and monitoring photographic activities within the dynamic event area. Photographers must obey the instructions of the Access Captain.

**Photographer Vests** – Photographers and spotters will be issued vests at the dynamic area control point. Only a limited number of vests are available and will they will only be issued to photographers for teams that are on, or about to enter, the track. Vests must be returned as soon as your car leaves the event.

**Spotters** - Photographers in the dynamic events area must be accompanied by a spotter at all times. Photographers are responsible for providing their own spotters.

Spotters may not have cameras or take pictures - they are there to spot only. If this guideline is not met, both the spotter and the individual they are supposed to be spotting will be (a) immediately ejected from the dynamic events area and (b) the team’s photographer credentials will be immediately revoked.

The spotter is responsible for monitoring the course at all times and if necessary physically moving the photographer away from dangerous situations. Spotters and photographers must operate as a pair. Spotters must remain within “arms reach” of their photographer at all times.

Any photographer/spotter pair found to be beyond “arms reach” will be (a) immediately ejected from the dynamic events area and (b) the team’s photographer credentials will be immediately revoked.

**Access Period** – Photographers/spotters must enter and exit the dynamic events area along with their team.

**Access Locations** – Photographers must remain in the photographic locations designated by the Photographer Access Captain and the competition officials – and in no other locations. Photographers/spotters must remain standing at all times – sitting or lying down is prohibited.

**Area Control** – At all times photographers/spotters are under the control of the Photographer Access Captain and the Director of Operations. Instructions and commands from Captain, Director or nearest Course Marshal must be followed immediately and without question.

When vehicles are running photographers/spotters may only go beyond the staging area under the direction of the nearest Course Marshal or Dynamic Event Captain. If you enter or leave the track area without permission you will be ejected.

**Check-in** – Photographers/spotters must check-in and check-out with dynamic events gate control.

**Dress Code** - All persons within the dynamic event area must have (1) closed-toe shoes, (2) long pants that reach below the top of the shoes.

**Consequences** – Failure to follow these rules will result in ejection and revocation of the team’s photographer credentials.

**Reminder** – You are responsible for your own safety at all times!

<p><b>Cooperation</b> – We need your help to make photographic access run smoothly. Please return your photographer’s vest as soon as your car is off the course. Other teams want to photograph their cars and the number of vests we can issue is limited. Thanks for your cooperation.</p>
---

## 2013 FSAE PADDOCK PATROL - ACCIDENT AVOIDANCE & RULE SUMMARY

Everyone (participants, volunteers, spectators) at Formula SAE wants to have an accident-free event. The Paddock Patrol has been established to advise teams on potentially unsafe practices in the paddock/pit area. The actual FSAE events are under control of the event captains and the SCCA and are operated in a very safety conscious manner. Some rules and guidelines to remember:

- **Engine Running in the Paddock:** Engines may be run in the paddock provided the car has passed parts 1 and 2 of technical inspection and the following conditions are satisfied (Rule S2.7): The car is on an adequate stand, and (B) The drive wheels are at least 10.2 cm (4 in) off the ground, or the driver wheels have been removed. Note – People may not be underneath the vehicles while engines are running.
- **Driver's Equipment:** Any time the driver is in the cockpit with the engine running, the following approved safety equipment must be worn: helmet, driver's suit, racing gloves, goggles/face shields, racing shoes, and hair covering, if necessary (Rule T14.1 "Equipment Requirements").
- **Vehicle Movement:** Vehicles may not move under their own power anywhere except on the practice or competition tracks. Off-track vehicles must be pushed at a normal walking pace by means of a "Push Bar" (D12.2), with all four (4) wheels on the ground, a team member sitting in the cockpit to steer and brake and with another team member walking beside the car (Rule D12.1.3).
- **Jacking:** When supporting cars off the ground, use strong, sturdy stands that support the vehicle in a stable and secure way. Do not use milk crates, piles of wood, four of the strongest team members, etc.
- **Fires:** No open fires in the paddock including BBQ grills, oxy-acetylene torches, heaters, cigarettes, etc. Electric hot plates and MIG or TIG welding (with gas bottles safely secured) are allowed in your stall. Propane BBQ grills may be used only in the designated area, which is also the smoking area.
- **Fuel and Oil:** No open fuel containers. All fuel containers must be DOT approved. Waste oil, etc. is to be taken to the fuel station for disposal. Once at the race site, the FSAE race cars cannot be fueled except by the Formula SAE-provided fuel at the fuel station. Note: waste fuel/oil may be disposed of at the fuel station.
- **Fire Extinguishers:** Fire extinguishers should be close by the vehicle and readily accessible and all team members must be knowledgeable in their use. A fire extinguisher must accompany the car wherever it is in the paddock or moved to any part of the site. A team member must hold a fire extinguisher ready whenever the car is running in your stall.
- **Vehicle Modifications:** No unapproved modification to the vehicle after it has been through tech inspection. (Rule T1.2)
- **Behavior:** Alcohol, illegal drugs, weapons or other illegal material are prohibited on the event site during the competition. Use of motorcycles, quads, bicycles, skateboards, rollerblades, scooters, or similar person-carrying devices in any part of the competition area (including the paddocks) are prohibited, as are self-propelled pit carts, tool boxes, tire carriers, etc.. (Rules D10.5, D11.6, D11.7)
- **Driving Practice:** Practice is only to take place in the designated areas during designated hours.
- **Tool Use:** Tools are expected to be used safely. Wear safety glasses when cutting, grinding, etc. Wear appropriate eye protection while welding.
- **Trash:** It is the teams' responsibility to keep their paddocks clean throughout the event. There are trash compactors in the paddocks and near the suites. No trash (including broken parts, old furniture, worn out tires or other materials) may be left behind at the end of the event. (Rule D10.7)
- **2013 FSAE Restricted Areas:** Please reference the Restricted Areas document.
- **UNDER NO CIRCUMSTANCES ARE PASSENGER VEHICLES TO BE DRIVEN ON THE TRACK.**  
Exception – crossing the track upon arrival to and departure from MIS is permitted under supervision.

**A special note for drivers:** All drivers should perform a check of critical fasteners and components on their vehicles to assure complete control during the driving events. Fasteners do come loose, parts do fatigue, and occasionally someone forgets to torque a nut – you will be intimately involved if this happens. It is OK to use the kill switch in the event of engine or brake malfunction.

Note: If there is a conflict between this summary of the rules and the complete 2013 Formula SAE rules, the complete rules prevail.

**HAVE FUN – DRIVE SAFE – USE COMMON SENSE**

## 2013 FSAE RESTRICTED AREAS & ACCESS POLICY

**Alumni Activities** – Some teams invite alumni, parents and sponsors to the competition. These visitors are welcome but must comply with the rules that apply to all spectators, sign the liability waivers and be wristbanded.

Any formally organized alumni activities, e.g. meetings, rallies, cook outs, must take place within the relevant team's paddock and under the same rules that apply to the team.

**Dynamic Area & Dynamic Area Access**– At Formula SAE the “dynamic area” is one of the “restricted areas” and is defined as any part of the competition site where cars are running under power. The “dynamic area” includes the following parts of the site:

- Brake test area
- Courses, event queues and surrounding areas
- Dynamometer and surrounding area
- Noise test area
- Practice track

The dynamic area is considered highly restricted and may only be accessed by individuals with the proper credentials: (1) FSAE issued I.D. badge, (2) dynamic area pass and (3) a plastic wristband as follows:

- Competitor - Access limited to times the dynamic area gate is open – Must have a dynamic area pass
- Event Crew **with** Dynamic Area Pass – Access limited to times the dynamic area gate is open -- Must have a dynamic area pass. **Note:** Scorekeeping crew may access the dynamic event site at any time to install timing and scoring equipment.
- Faculty – Access limited to times the dynamic area gate is open – Must have a dynamic area pass. Faculty must use one of their team's passes.
- Judge - Access limited to times the dynamic area gate is open – Must have a dynamic area pass.
- Media – Access limited to times the dynamic area gate is open. Notes (1) Photographers and video crews must have a spotter. (2) Media, photographers, video crews and spotters must have dynamic area passes. (Suzy Zukowski and Steve Daum are responsible for all media access.)
- Official/Organizer - All area access at all times
- Steward - Access limited to times the dynamic area gate is open – Must have a dynamic area pass. Stewards must use one of their team's passes
- VIP – Access limited to times the dynamic area gate is open – Must have a dynamic area pass and be accompanied by staff or a volunteer.

**Dynamic Area Passes** – Access to the dynamic event area is limited to four (4) people per team, including drivers and faculty, and each team is issued four (4) dynamic area passes. To gain access to the dynamic event area team members, including drivers, must wear and display (1) FSAE issued I.D. badge, (2) a dynamic area pass, and (3) a plastic wristband. Team dynamic area passes may be shared with faculty advisors and stewards

Faculty advisors and stewards are **not** issued separate dynamic area passes, but they may use one of the four (4) passes issued to their team.

Official Translators are issued separate dynamic event passes.

Dynamic area passes are also issued to organizers, event crew, judges, staff and other people needing access to the area.

Dynamic area passes are **not** issued to spectators and **may not** be loaned to spectators.

**Paddock** – The “paddock” is the section of the event site where the teams set up their work site and park their transporters. Individual paddock spaces will be assigned by the organizers.

If you are in the paddock, keep in mind that teams may be pushing their vehicles through the aisle ways and power tools may be in use. Be aware of what is going on around you and use common sense.

**Participants** – To be classified as a “participant,” an individual must (1) be at least 18 years of age, (2) have signed the FSAE liability waiver and (3) have been issued a wristband.

Only “participants” have access to the restricted events areas.

**Restricted Area** – The “restricted area” is anywhere teams are likely to be running their vehicle engines.

The dynamic event areas, including the noise test site, the brake test site and the practice area are restricted.

Entry into any restricted area is limited to individuals with the proper wristband.

**Dynamic area entry** - The dynamic events area is considered highly restricted and may only be accessed by people with all of the following: (1) FSAE issued I.D. badge, (2) dynamic area pass and (3) a plastic wristband.

Restricted areas must be separated from the remaining parts of the competition site by a fence or tape/rope area designators.

**Spectators** – Registration staff will make an effort to have all spectators sign the liability waiver. There is no minimum age for spectators, but as a matter of operational policy any spectator under 18 years of age must be accompanied by an adult at all times.

Spectators over 18 years of age who sign the waiver will be issued wristbands.

Spectators less than 18 years of age will **not** be issued wristbands.

Spectators must remain in the parts of the site open to the public.

Spectators are not considered “participants” and **may not** enter the dynamic events area.

**Wristbands** – Wristbands are required to enter any of the FSAE restricted areas.

To receive a wristband a person must (1) be at least 18 years of age and (2) sign the liability waiver.

Individuals under 18 years of age may **not** be issued a wristband and **may not enter any restricted area.**

Wrist band types:

Student, faculty, official, volunteer, sponsor, media, and VIP wristbands – Plastic  
Spectator wristbands - Paper

## GM SUPPORT TRAILER CAPABILITIES

TIG welding- Aluminum & Steel

- done in the trailer or close to the trailer door

MIG welding (light gage only)

Oxy-Acc torches

Lathe & mill for small projects & subject to user knowledge

Band saw

Drill press

Air compressor w/ hand air tools

Cordless drills and other tools

Small supply of nut & bolt and fastening hardware

## ACCELERATION EVENT

**Event Captain:** Bob Goppold  
**Co-Captain:** Steve Balanecki  
**Date:** Friday, May 10, 2013  
**Time:** 9:00 a.m. until 12:30 p.m.  
**Location:** FSAE Dynamic Area

### **Event Concept:**

The objective of the Acceleration Event is to evaluate the vehicle's demonstrated acceleration capability by measuring the elapsed time required for the vehicle to travel a distance of 75 m (246 ft) from a standing start. The event is designed to focus on engine performance and on the suspension's ability to maximize tire grip.

### **Event Format:**

Up to four Acceleration Runs are permitted for each car. Two drivers are allowed per car. Each driver is permitted two Acceleration Runs. Elapsed Time will be recorded for each Acceleration Run. Any penalties will be assessed to the Acceleration Run during which the penalty occurred. The fastest corrected elapsed time (including penalties) of the completed Acceleration Runs will be used to calculate the score for each car.

- **NO Acceleration Runs will be permitted after 12:30 P.M.**
- **NO tools and/or spare parts are permitted in the staging lanes.**
- **NO "traction enhancing" agents are permitted to be used on the tires or track surface.**
- **NO "burnouts" are permitted.**

### **Event Procedure:**

Stage your car in the appropriate Staging Line for either Driver 1 or Driver 2. Cars in the Driver 1 Staging Line will be given priority. Drivers must be properly belted into the car with all required safety equipment properly installed, as directed by the Event Workers, before the car is first in line to start an Acceleration Run. An Event Worker will direct the driver to approach the Start Line. Cars will be staged approximately 0.3m (1 ft) behind the Start Line.

The driver is permitted to start an Acceleration Run only when the Event Worker waves the green flag. Timing will start when any part of the vehicle crosses the Start Line. The Acceleration Run is counted (one of the permitted Acceleration Runs) when any portion of the car crosses the Start Line.

Timing will end when the vehicle crosses the Finish Line located 75 m (246 ft) from the Start Line. The Finish Line is marked with a Checkered Flag.

After a driver's first run, the driver will have the option to immediately take a second run, or leave the staging area to complete his/her second run later during the event. Each car must exit the staging area before changing drivers.

### **Penalties:**

- A two second penalty will be assessed to the Acceleration Run per cone knocked down or out of position.
- A DNF (Did Not Finish) penalty will be assessed to the Acceleration Run for cars that go off course.
- A DNF penalty (forfeit of a permitted Acceleration run) may be assessed to the team for infractions committed in the staging area, start line or return lane.

## AUTOCROSS EVENT

**Event Captain:** Matt Kalmus  
**Event Co-Captain:** Corry Johnson  
**Date:** Friday, May 10, 2013  
**Time:** 2:00 p.m., contingent upon skid pad and acceleration completion time. Event closes at 5:00 p.m.  
**Location:** Dynamic Area  
**Track Length:** Approx. 800 m (2600 ft)

### **The Event:**

The Autocross event is designed to test the car's handling qualities without the hindrance of competing cars. The event has two heats. Each heat has a different driver. A heat is composed of one driver making two runs of the course. The fastest of the runs completed, including penalties, will be used to calculate the team score. Cars that are unable to complete the course with a time within 145% of the fastest car will only be awarded 7.5 points.

### **Penalties:**

- 1) A 2-second penalty for each cone knocked down or out of position (indicated by a chalk square at the base of the cone). All cones in the dynamic area can be scored as penalties. This includes cones before the start line and after the finish line.
- 2) A 20-second penalty for going off course and not re-entering at a point prior to the missed gate.

### **Staging:**

Following the announcement of the start of the event, all cars should begin staging in the first heat line on a first come first served basis. Upon completion of the first heat driver's two runs, a car may either go to the second heat line or back to the paddock for repair and/or adjustments.

- When there are no cars in the first heat line, cars in the second heat line will be allowed to run. Cars that have not run a first heat have precedence over second heat cars. The event may be cancelled or cut short due to weather or time, so it is important to be on time for the first heat. It is encouraged for teams to join the second heat line immediately after completing the first heat.
- At 5:00 p.m., the Autocross Event is scheduled to close, and no additional runs may be made after the closing. Cars in line will not be allowed to run the course after 5:00 p.m. If there are delays in starting the event, rain delays, or extended track closures, the event captain has the discretion to extend the closing time if conditions permit. Please see the Event Captain or listen for announcements for any extensions. We expect Autocross to close at 5:00 p.m. Do not expect this year to be an exception - get in line early! The Autocross Event Captain is the only person that can extend the closing time.

A safety inspection (helmet, belts, kill switch) will be performed before entering the final staging area; each car will be staged 6.0 m (19.7 feet) behind the start timing lights and will accelerate from a standing start.

After a driver's first run, the driver has the option of taking the second run immediately, or leaving the staging area and running later in the heat. A shortcut turn, immediately following the finish line, will allow the driver to proceed directly to the start for a second run. This is called the re-run line. If a driver chooses to not take a re-run, he/she should proceed through the exit.

It is intended that the race be conducted without the hindrance of competing cars. If there is a stopped or slow vehicle ahead, the driver should proceed at a safe distance (3m) around the incident or follow the direction of the

course workers, and then reenter the track to finish the run. Once past the finish line, the shortcut should be taken to go directly to the start line. At this time, the driver will be notified if another run will be allowed. If a slow or stopped vehicle ahead is judged by the track officials to not be a hindrance, a re-run will not be allowed.

A driver's run may be stopped by a track official (indicated by a waving red flag or hand gesture), your car may be directed to complete the track or follow a straight route back to the starting line. This is common when a red flag is shown in the first half of the course. Caution – course workers may also signal your car due to a malfunction (broken suspension, muffler, leaking oil, etc.). If this occurs, the car should be driven off course and brought to a controlled stop as soon as possible. Avoid stopping directly on the course. This limits the amount of oil/water spilled on to the racing surface, preventing long delays.

If a car fails during a driver's first run, vehicle repairs can be made to the car, and the driver can return to complete the second run.

Notes:

- Once the car passes the start timing line, the run has been officially attempted and cannot be re-started. If the car stalls before the triggering the timing lights, it can be pushed back for a re-start. This is only allowed once. If the car demonstrates difficulty in launching, it will need to be pulled away and repaired.
- Please be aware that several cars may be running the course at the same time. Once past the finish line, slow the vehicle and exit in a controlled manner. Do not park the car at the exit of the course; this will cause a traffic back up.
- If time allows, drivers will be allowed to walk the course. Please check the schedule and listen for announcements regarding the timing of walks. Walking will be allowed, time permitting, on both Thursday and Friday shortly before the course opens.

## BRAKE & NOISE TEST EVENT

**Event Captain's:** Noise - Gary Newton  
Noise - Greg McConville  
Brake - Alba Colon  
Brake - Mark Scott

**Dates/Times:** Thursday, May 9, 2013 (Noise) - 9:30 a.m. to 5:00 p.m.  
Thursday, May 9, 2013 (Brake) – 10:00 a.m. to 5:00 p.m.  
Friday, May 10, 2013 (Both) 9:00 a.m. to 5:30 pm

**Location:** Testing is in the Dynamic Testing Area near the Fuel, Tilt, and Noise area.

### **Description:**

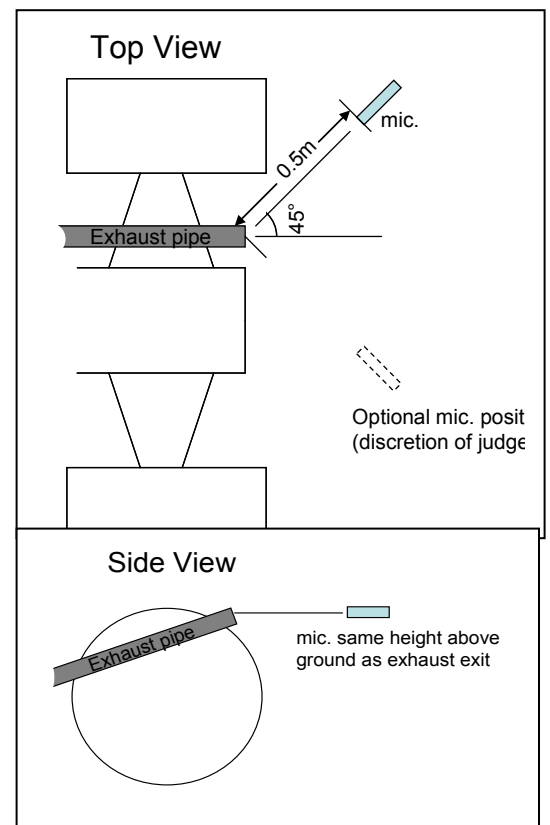
No vehicle is permitted to Noise or Brake testing until it has: a) passed Tech Inspection and, b) passed the Tilt Table Test. Proof of this are the two “tech” stickers, which must be applied to the car. Then teams can proceed to Noise where the noise level will be tested. If passed, a third sticker will be applied to indicate completion. Teams can then proceed to the Brake test for the 4<sup>th</sup> and final tech sticker. Once all four stickers are completed, a vehicle is approved to compete in all dynamic events.

The static sound level test shall occur at a station outside of the Brake Test Area. The vehicle will be placed in the station at a designated point with the engine running and the transmission in neutral. An RPM sweep from idle to the designated test speed for that engine shall be used during the noise evaluation. The designated test speed is approximately  $\frac{3}{4}$  of the maximum engine speed. The sound level meters will be positioned 0.5m from, and level with, each exhaust outlet. The meter will be positioned at an angle of 45 degrees from the outlet in the horizontal plane (see drawings) and be unobstructed.

In the case of dual exhausts, both exhausts will be tested with the loudest one being the basis for judgment. **Sound level shall not exceed 110dBA (margin of error +/- .5dBA). Meters are calibrated and will be checked and verified on-site on a regular basis! The reading of the meter by the official is final and not open for debate.**

**PLEASE NOTE** – If your vehicle does not have a working tachometer, it is the team's responsibility to come to the noise area prepared with ALL necessary tools ready for a tachometer reading (laptops, gauges, etc). The target test speed is set by SAE and is published in advance. Test speeds will be rounded to the nearest 500. It is calculated by taking 2X stroke in mm and dividing it into 914.4X1000. If you have a rev-limiter that interferes with you being able to reach the target test speed, you must disengage it or set it higher.

**ALL TEAMS MUST HIT THE TARGET TEST SPEED – NO EXCEPTIONS!**



## **BRAKE TEST EVENT**

When the vehicle passes noise, it may go to the Brake Event. There, the tech sticker will be awarded if the vehicle meets the brake requirements. Provided no changes have been made to the muffler or exhaust system, teams that pass noise but do not pass brake do not have to go through noise again if they work on the vehicle.

At the Brake Test Area, each driver WILL be instructed on the proper procedure. With the car at the start line of the station, a green flag (or similar signal) should be used to signal the start of each run. The driver must accelerate (typically getting into 2nd gear) until reaching the braking area, which is a box defined by water barriers. Once inside this box, the driver must apply the brakes with enough force to demonstrate full lock-up of all four wheels, the engine must remain running during the complete test.

If the vehicle passes, the person in charge will sign-off the approval form and provide the team with the final “tech” sticker. The vehicle is now free to proceed to the practice track or on to the dynamic events. (The approval forms shall be retained by the brake crew and turned in at the tech tent periodically.)

If the vehicle is unable to pass the brake tests in three attempts, the car must be repaired and then brought back for retest. The vehicle will not be allowed to compete without passing all tests. Note: The vehicle will not be permitted on the practice track without an entire tech sticker; no exceptions.

**Noise level can be measured at any time during the dynamic events.** Penalties may be assessed if the sound level exceeds the mandated maximum, and noise sticker can be removed by officials.

**PLEASE NOTE** – An official will conduct a functional test of the External Master Kill Switch with engine running up and under power as part of the Noise Test Event and / or Brake Test Event.

Also, Operation of Noise Event Area and Brake Testing Event Area in **DAMP** conditions is at the discretion of the Captain of the specific area. See FSAE rules for tire use at specific conditions, Rule #B6.4.1. Also see Part D “Dynamic Event Regulations” Article 2 Weather Conditions and Article 3 Running in Rain for further clarifications.

**Vehicles may be forced to return to this station for re-certification should the officials deem it necessary. Re-certification may be required if work is performed on the vehicle’s braking system or exhaust system, or if the vehicle is involved in an incident that results in vehicle damage.**

**\*\*At all times, drivers must be wearing complete and proper safety equipment and proper safety rules must be maintained in both areas.**

### **Safety Guidelines for the Brake & Noise Areas:**

1. Only one car at a time in Brake or Noise area. Do not allow a second car into the area until the last one has completed its exit.
2. Do not attempt certification of any vehicle without enough workers. Three (3) workers minimum, four (4) preferred at the Brake station. Three (3) workers recommended at Noise station.
3. Never place yourself in the line of travel of any car. Stay well away from the “hot” area.
4. Use hay bales for protection of workers and equipment.
5. Have fire extinguishers handy.
6. Use brooms and oil-dry as needed to keep braking area clean and dry.
7. Any vehicle damage or contact must be reported to the station manager(s).
8. No work will be allowed on the car inside the Brake or Noise areas. Car repairs and work must be performed outside the testing area. Specially marked areas will be set-up for this. Cars can then return to the test area at the discretion of the station manager.

## COST EVENT

**Event Captain:** Susan Zukowski  
**Chief Cost Judge:** Rick Maynard  
**Date:** Thursday, May 9, 2013  
**Location:** MIS (Michigan International Speedway), Brooklyn, MI, Main Tent

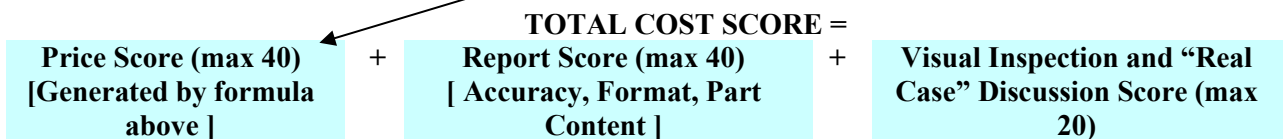
### Overview:

Each team will prepare a report of their car's cost to be evaluated by the cost judges. The concept of the cost event is to obtain an accurate estimate of cost of the car in a limited production. The report is in effect your cost proposal to the senior management of a company to get them to invest in your product line. The more information that you can supply to them, the more professional the look of your materials, the more likely the company may be willing to look at the product. This is the goal of the cost report. Additionally, the teams will also prepare an electronic Bill of Materials using a shared database with standard materials and processes and a detailed process description. This evaluates not only the cost of the car but also the team's ability to prepare an accurate engineering cost estimate and know exactly how the vehicle would be built. The car with the lowest corrected cost and the best report will win the event. The event can be divided in to three separate sections - the cost report, visual inspection, and 'real case scenario' discussion.

### The Cost Report:

The cost report is due into the judges approximately six to seven weeks prior to the event at the venue. Books must be mailed before the postmark deadline or the book will incur a penalty of 10 points per day after that date. The cost report is judged on the basis of the cost of the car and quality of the cost report. The cost of the car is determined by the cost of the parts and fabrication using established manufacturing practices and the application of "Lean Manufacturing" principles. The report will follow the guidelines set forth in the published rules. From this analysis, the judges (in 9 distinct areas of expertise) will determine if all parts and processes were included and if unreasonably low (determined by the experience of the judges) - the judges will add penalties if there are errors, items omitted, or have costs below reasonable estimates – at either standard point(s) deduction or at a rate equal to twice the cost error, whichever is greater. We have eight teams that review each and every book based on their expertise. The costs and penalties will then determine the cost score. The report score will be given based on the quality of the report and its overall presentation. The report score ranges from 0 to 40 points. The price score will be awarded based on the following formula:

$$\text{PRICE SCORE} = \frac{40 * (\text{PMax}) / (\text{Pyour}) - 1}{(\text{PMax}) / (\text{PMin}) - 1}$$



(NOTE: Pyour is the adjusted cost of your team's car with penalties, Pmin is the adjusted cost of the lowest cost car in the competition, PMax is the adjusted cost of the highest cost car in the competition)

### The Visual Inspection and “Real Case” Evaluation:

On the day of the event, the cost event judges will man ten bays with appointments in each bay every half-hour in order to see every competing car. This is to make sure that the parts that are on the vehicle are reported in the cost report and that nothing has been added since the cost report's publication.

The focus of the cost event is the cost of the vehicle, the process of building the vehicle and the components contained therein. At the time of check-in at our event, the designated team representative will randomly draw to determine which of the nine random “real case” scenarios the team will be discussing in detail. These cases will encompass real issues that the team may encounter and how they would handle them in reference to their own team vehicle, systems or parts. The cost judges will also question the students regarding the report, process, and “real case.” This is a critical step in the cost event process. This discussion of the ‘real case’ and the visual inspection on the event day can only help the

student's team. If this appointment is missed, the team will sacrifice the twenty points for this portion of the event. If the team feels that for some reason their appointment time needs to be changed, they will need to contact the event captain to make necessary arrangements.

The time allotted for the appointment on event day is half an hour per team at the designated time for that school. That time can then be broken down as follows.

Check-in:	1 or 2 minutes
Visual Inspection:	4 to 5 minutes
Real Case Scenario Discussion:	20 Minutes

Addenda to the report can be taken into consideration to cover any necessary changes made in the car. **These addenda will only be accepted at the time of registration at the event and must be in the format proscribed by the rules (Appendix C-5).**

In addition to the above, the cars with the lowest costs will be subject to a physical audit to make sure that they included all processes and materials on their vehicle in the cost report. The audits will be held on the same event day but by a separate team of auditors sometime after their initial appointment with the cost area. The adjustments that this team of auditor makes will be included in the final scores as well.

The final scores are tabulated and presented at the end of the judging day to the statisticians and are posted the next morning for the students viewing. Once posted, the scores may be protested for only 30 minutes, after which the scores become final.

**Tips for a Good Cost Report:**

- Follow the rules - put the items and processes where the guidelines tell you to put them.
- Include an eBOM (Electronic Bill of Material) on CD in MS Excel that follows the format of the 2013 FSAE Rules.
- Create the eBOM using the online FSAE Cost Event Database utilizing standard materials, processes and tools.
- No receipts necessary anymore.
- Include any photographs, pictures, drawings, blue prints, etc. in the appropriate sections of the book to help us understand the design processes used in manufacturing the parts.
- If you must - err on the high side rather than cut yourself short.
- Detail any processes or materials not already specified in the standard tables and submit AIR (add item request) to have them added to the standards table if needed.
- Be careful to postmark by deadline, no need to throw away good points by slack timing.
- Carefully consider Make/Buy decisions – these often result in dollars being spent more wisely.

# 2013 FORMULA SAE MICHIGAN AND 2013 FORMULA SAE LINCOLN

## Real Case Scenario

Rule C.3.3.3 states that the third part of the Cost Event will be a “real case” scenario where students will have to respond to a challenge related to cost or manufacturing of the student vehicle.

The real case scenario for this event will be one of the following:

The Cost Judges have reviewed the Cost Report that you have submitted and they have determined that the cost of the \_\_\_\_\_ on your car is substantially higher than expected.

Your task at the event is to present the Cost Judges with your proposals to reduce the cost of the \_\_\_\_\_ on your car by 15%.

The presentation must fulfill the following requirements:

- No longer than 5 minutes
- No handouts or use of electronic devices.
- Must be based on the system on your car.

Flip Chart pages are optional.

Your presentation will be evaluated on:

- The process or methodology(ies) used to develop the proposal(s)
- The alternatives presented
- The credibility of the proposals

The team’s presentation skills will NOT be scored.

Teams competing at both events will discuss a different random choice at each event.

The blanks above will be randomly drawn choices of the following:

**Oil filter  
Brake Balance Bar  
and  
Wheel Hubs**

Rules Committee,  
FSAE.

## DESIGN EVENT

**Chief Design Judge:** Anthony Lyscio  
**Event Captains:** Anthony Lyscio & Bill Riley  
**Judges:** Over 100 Top Automotive & Motorsports Engineers  
**Date:** Thursday, May 9, 2013  
**Location:** Garage G3, Michigan International Speedway, Brooklyn, MI

### **Design Judging Procedure:**

Student competitors must submit Design Report (DR) and Design Spec Sheet (DSS) prior to the competition. These two documents will be used to group the teams as well as provide judges a ‘sneak peak’ at the designs. Teams that do **not** submit both a DR and DSS will be disqualified from the design event and receive zero points. As per the official Formula SAE (FSAE) rules, the DR cannot contain more than four (4) pages of text, must include three pages of vehicle drawings and may include one page of optional material (for a total of eight pages). The DR will not be judged based on length or amount of material. Content of the DR should highlight design goals, processes, and details in engineering terms. The intended audience is that of experienced engineers and while concise, the content should be technical and cover all major vehicle systems highlighting notable features. The DSS is based on a fixed template located on the official FSAE website and contains detailed system and component level specifications.

It is the student competitors’ responsibility to prove to the judges that their vehicle is a first year car. Second year cars are not allowed at FSAE - Michigan. If the structure of the frame is not obviously a completely new design from previous years, then thorough photo documentation should be provided to prove that the car is new as defined by the rules. The judges may deduct up to 30 points if photographic documentation shows that the remaining parts of the vehicle have not been significantly altered or if sufficient new design work has not taken place.

Design judging will start promptly at 8:30 am on Thursday (see schedule). Each time slot will be exactly one hour long with approximately 45 minutes for the judges to review the vehicle with the team members and the remaining time used by the judges to write notes and score the car. Approximately 8-12 cars will be selected for Design Finals. Design Finals will be held Friday evening, May 10th at MIS garage G3 (see schedule). NOTE: Design semi-finals have been eliminated from the 2013 schedule.

Teams will need to arrive early in order to be weighed before Design judging. Cars **must be weighed before Design Judging**. It is recommended that you be weighed at least 30 minutes prior to your design judging time slot. Teams who are late or who miss their slots risk not being judged. This means that if a team finishes getting weighed at 9:40 for a 9:30 time slot, they will have ten minutes less time to be judged. In addition to not being able to earn as many design points, point penalties may also be applied. Separate volunteers will be in charge of timing for the event. In fairness to other student competitors, vehicles will be rolled in and out on schedule. The first round of judging will end at approximately 5:30 pm.

Design judging will consist of 15 groups (queues) of judges. Each queue will have five to seven design judges. This means 15 cars are being judged simultaneously. The judges in each queue will evaluate the following areas: Suspension; Frame / Body / Aero; Powertrain; Cockpit / Controls / Brakes / Safety; Systems Management / Integration; Manufacturability / Serviceability; Aesthetics / Style; & Creativity. Teams should make a point of reviewing the Design Judging Score Sheet on the official FSAE website. The score sheet gives the competitors insight into how they will be judged, as well as giving them a detailed breakdown of each judging category. Each judge has a different area of niche expertise, and will seek out the student team member responsible for that particular area of the car. There will also be roving judges with expertise in the areas of Aerodynamics, Composites Construction, and Electronics Integration. Roving judges bring a higher level of expertise to these difficult areas, as well as help to provide judging consistency between queues. Roving judges are assigned based on DR content. If your car makes use of aero, composites, or electronics, please ensure they are noted in your DR!

Expanded definitions of each area have been provided on the Design Score Sheet, along with space for comments. A design judge from your queue will seek you out on Friday and/or Saturday, in order to return your score sheet,

explain how you received the score you did, as well as provide feedback on your car's design. Since the form is used as a tool by the judges, the values written on the form will possibly not add up to the team's Official Score. The judges are strongly encouraged to make lots of notes and provide written feedback to the participants. Students are encouraged to approach Design Judges on the days following the Design Event to request additional feedback on their designs.

There will be a phone number posted and announced, which students can call in order to schedule an appointment for a debrief session with your Design Judges. The post-event debrief sessions can be very informative and all teams are encouraged to participate.

Each student team should have one representative who is prepared to discuss each of the above areas with each judge individually. This means five or more students. If the judges have to split their time between a single student, lower scores could result according to how much information the judges feel they have received. Students should bring any and all information they feel is relevant (charts, graphs, parts, photos, video, etc.) to support their design efforts. The judges will give more credit (higher Design score) to documented engineering than to word of mouth. Simply showing up with a great car is not good enough. A high emphasis is placed on the student team's ability to Design, Build, Refine & Validate, and Understand your car.

At the conclusion of First Round Design Judging, each queue will pick, approximately one car to send on to Design Finals. The Chief Design Judges, Design Event Captains, and roving judges help assure consistency in this selection. The Design Finalists will be announced later that night. Scores and teams selected for the final Design review will be posted the following day, Friday, around mid-day. The rank order of the top placing (Finalist) teams in Design shall be revealed during the Design Review.

Design Finals will take place Friday evening in Garage G3 (see schedule). Design Finalists will assemble and be ready to judge by the start time indicated on the schedule. There can be only four team members with the vehicle at any time to talk with the judges. Any remaining team members must be outside the immediate judging area. Teams with more than four team members that remain in the judging area will be penalized. Team members may switch places (tag in, tag out) to have the proper systems represented.

On Saturday afternoon in garage G3, the overall Design Event Winner will be announced and judges will briefly review the designs of the top three Design Finalists for the audience. All student competitors are invited and encouraged to come and watch. This public design review clearly identifies what the Design Judges like (and dislike) about a FSAE car. Most students (especially the less experienced teams) find the Design Review information very useful for improving next year's Formula SAE efforts and are encouraged to attend.

## 2013 Formula SAE – Michigan Design Judge Biographies

Anthony (Tony) Lyscio: **Chief Design Judge & Design Event Captain** **Alma Mater:** University of Minnesota: B.M.E.- Mechanical Engineering; Purdue University: M.S.E.- Design Engineering; Indiana University: M.B.A. **Employment History:** General Motors- Camaro Lead Suspension Design Engineer, Vehicle Dynamics Adv. Dev.- Vehicle Dynamics Development, Vehicle Handling Lab- Analysis/Test Engineer, Concept / Advanced Vehicle Integration-Design Engineer. Consultant Race Engineer. **Expertise:** Suspension /Steering / Chassis Design and Development, Data Acquisition, Race Engineering. **Currently resides in:** Ontario **First car:** '69 Camaro. **Favorite race car:** Ford GT40. Proof that revenge can be a very productive emotion. **Judge since:** 2000

William (Bill) Riley: **Design Event Captain** **Alma Mater:** Cornell University: BS and MEng Mechanical Engineering. **Employment History:** Cornell Formula SAE (3 Years), Chassis Team Leader (1 Year). FSAE Rules Committee (9 Years), Ford Motorsports (including assignment with Jaguar Formula 1) and Advanced Engine Engineering (7 Years). General Motors: Combustion and Cylinder Head Design (4 Years). Space Exploration Technologies: Senior Structures Engineer (1 Year). **Expertise:** Chassis Structures, design & analysis. Composites, Composites FEA, Engine Component Design, Combustion. **Currently resides in:** CA **First car:** '84 Mercury Topaz 2-Door GS that went to 230,000 miles. **Favorite race car:** I like them all! **Judge since:** 2008

Ryan Arens: **Alma Mater:** Northern Illinois University: BS and MS in Mechanical Engineering. **Employment History:** Honda R&D Americas **Expertise:** Suspension Design, Tire Development, Overall Vehicle dynamics, Component Design, 5 yrs Formula SAE experience **Currently Resides in:** OH **First car(s):** '91 Honda CRX **Favorite Race Car:** Lotus 99T, Red Bull RB7 **Design Judge since:** 2012

William Attard: **Alma Mater:** University of Melbourne - Australia. BE, BSc, PhD in Mechanical Engineering. **Employment History:** MAHLE Powertrain; Perkins Engineering; Bishop Rotary Valve **Expertise:** Powertrain R&D (combustion, fuels, turbocharging, engine design). **Currently resides in:** MI **First Car:** '80 Holden Commodore. **Favorite Race Car:** VL Commodore Group A Touring Car **Judge since:** 2008: FS-UK, 2009-FSAE-MI

Michael Black, P.E.: **Alma Mater:** Rutgers Mechanical Engineering '90, Licensed Professional Engineer. **Employment History:** Ford Motor Company, 15+ Years Automotive Body and Body Structure Product Design. Military Contractor, Machine Design. Initiated Rutgers FSAE Team '89. FSAE Volunteer since 1995. **Expertise:** Automotive Structures, Metallic Materials, Threaded Fasteners, Chassis Design. **Currently Resides in:** MI **First car:** '72 Merc Colony Park Wagon w/ 429 engine & simulated wood grain side panels. **Favorite Race Car:** McLaren MP4 F1 driven by Ayrton Senna or any car driven by Senna. **Design judge since:** 2000

Dallas Blake: **Alma Mater:** Queen's University BSc: Mechanical Engineering, Oxford Brookes University MSc: Racing Engine Design **Employment History:** 2009 – Present, Polaris Industries Powertrain Division **Expertise:** 2-stroke engine development and calibration, Control systems **Currently resides in:** MN **First Truck:** '91 Ford F250 **Favorite Race Car:** 1966 Ferrari 330 P3 – (First Fuel Injected Ferrari) **Judge since:** 2010

Steve Bollinger, P.E.: **Alma Mater:** University of Missouri – Rolla '77: BS in Mech Engineering, Licensed Professional Engineer. **Employment History:** '77-'96 Carter Carburetor, Auto fuel

systems components and control actuators, '97-'99 CTS, Powertrain control system actuators, '00-'02 EFI Engineering: Forensic Mechanical Engineering, 04-08 Siemens VDO/Continental: Powertrain position sensors, **Expertise:** Engine controls, fuel systems, powertrain components, metal fabrication designs, autocross Prepared car development, prep and competition (5 national championships). **Currently Resides in:** IN. **First Car:** '64 Bel Air 4 door sedan, 6 cylinder auto. **Favorite Race Car:** 1966 Austin Healey Sprite. **Design Judge since:** 2012

James Browne: **Alma Mater:** Lawrence Technological University: BS Mechanical Engineering, MS Mechanical Engineering. **Employment History:** '06-'11 TRW Automotive, Brake Systems Engineering. **Expertise:** Brake Systems **Currently resides in:** MI **First Car:** '87 Oldsmobile 442. **Favorite Race Car:** Shelby Cobra **Judging Since:** 2011

Matt Brown: **Alma Mater:** University of Oklahoma. **Employment History:** Furniture Row Racing '07, Del West Engineering '08-'09, Tesla Motors '10-Present. **Expertise:** Powertrain (Valvetrain, Thermal Management), Aerodynamics. **Currently resides in:** CA **First car:** '79 Plymouth Volare **Favorite Race Car:** Lotus 49B **Judge since:** 2011

John Bucknell: **Alma Mater:** Cleveland State University '95 - BS Mechanical Engineering, University of Michigan '99- MS Systems Engineering. **Employment History:** '11+ SpaceX, '07-'11 GM Advanced Powertrain. '95-'07 Chrysler. **Expertise:** Powertrain systems engineer (architecture, optimization, dyno/vehicle calibration), Chassis engineer (aerodynamic/suspension/brake design & vehicle-level integration) and of course...Rocket Science. **Currently resides in:** CA **First Car:** '78 Plymouth Horizon, 55 bhp and 3spd ATX. **First Street Car I've Built:** A mid-engine 2003 Dodge SRT-4. Full interior and amenities, street legal with 400+ bhp on pump gas, ~2600 lbs, w/ 45/55% weight distribution and to be completed "next month" (for nine years now). **Favorite Race Car (I've Built):** Hardman Racing FBGS Bonneville streamliner. Holds the '09 record of 291.673 mph two-way average, which is a 2010cc four-cylinder turbo pushing 850bhp, with a big wing in the back and spinning the tires past 280mph. FSAE competitor '90-'94. **Judge since:** 2000

John Burford: **Alma Mater:** University of Texas - Arlington. **Employment History:** Altair Engineering '98 – '04, Contractor '04 – '11 with experience in multiple fields: Military, Automotive, Heavy Duty Trucks, and Aerospace. **Expertise:** CAE analyst focusing on Multi-Body Dynamics and Structural Optimization currently working on composite optimization of the Boeing 787 engine nacelles. **Currently resides in:** IN **First Car:** '84 Pontiac Firebird. **Favorite Race Car:** '93 Mazda RX-7. **Judge Since:** 2011

Matt Carson: **Alma Mater:** Virginia Polytechnic Institute and State University: BS Electrical Engineering, MS Mechanical Engineering. **Employment History:** 8 years Joe Gibbs Racing, previously 5 years General Motors. **Expertise:** Engine Engineer (design, development, dyno testing, simulation, FE). **Currently resides in:** NC **First Car:** '82 Mercury Capri. **Favorite Race Car:** Joe Gibbs Racing #11, #18, and #20. **Judge since:** 2008

Marko Cater: **Alma Mater:** Carleton University: BS Mechanical Engineering. Purdue University: MS, Mechanical Engineering. **Employment History:** '07+: Honda R&D Americas, Inc.: Test Engineer, Vehicle Structure Reliability. **Expertise:** Chassis and Suspension Systems. **Currently resides in:** OH **First Car:** '93 VW Gold Turbo Diesel **Favorite Race Car:** Subaru Impreza WRC **Judge since:** 2011

Bill Davidson: **Alma Mater:** Brunel University, London, England: BSc Mechanical Engineering **Employment History:** Ford Motor Co / Visteon (UK & US) 20 yrs, MAHLE Powertrain 5+ yrs **Expertise:** Powertrain mechanical design, calibration and control systems **Currently Resides**

**in:** MI **First Car:** 69 Ford Capri **Favorite Race Car:** 72-74 Ford Capri RS2600 / RS3100  
**Volunteer/Judge Since:** 1995.

Jonathan Denton: **Alma Mater:** Michigan State University, Mechanical Engineering, MBA  
**Employment History:** Robert Bosch, LLC since '05, **Expertise:** Application of electronic control systems for vehicle dynamics **Currently resides in:** MI. **First car:** 1929 Ford Model A Hot-Rod  
**Favorite race car:** Ford GT40. **Design Judge since:** 2013

Mike DeRonne: **Alma Mater:** GMI Engineering Management Institute. **Employment History:**  
'86 - '99 & '01 – present: General Motors. Plant, body structure, motorsports, engine control systems. '99 - '01 Cosworth Technology. Engine calibration.  
**Expertise:** Powertrain calibration with many years focused on diagnostics. A few years as data acquisition expert for GM in the years of growth from Indy cars into all racing.  
**Currently Resides in:** MI. **First car:** '70 Impala that dad got for us as a beater high school car. First car I picked: '75 Monza V8. **Favorite Race Car:** Chevy Intrepid GTP - great era in GTP **Judge since:** 1999.

Drake DeVore: **Alma Mater:** Northern Illinois University: BS Mechanical Engineering.  
**Employment History:** International Truck and Engine (NVH Engineer) – '04-'05, MoTeC Systems East '05 - present. **Expertise:** Electronic fuel injection, data acquisition, engine calibration. **Currently resides in:** NC **First Car:** Pro Street '65 Plymouth Barracuda my father and I built. **Favorite Race Car:** My first FSAE car. **Judge Since:** 2011

Murilo Duarte: **Alma Mater:** Escola de Engenharia de São Carlos - USP (Brasil): BS in Mechanical/Aerospace Engineering, MS Vehicle Dynamics (Ride Simulation) **Employment History:** MSC Software '02 - '04, Ford Motor Co. '04 - '10, Honda R&D '11-'12, Ford Motor Co. '12-present. **Expertise:** Vehicle Dynamics, Suspension Design, Multibody Dynamics Simulation. **Currently resides in:** MI **First Car:** '92 Fiat Uno **Favorite Race Car:** Brabham BT52 **Judge Since:** 2004 (SAE Brazil); 2011 FSAE-Michigan.

Ash Dudding: **Alma Mater:** Virginia Tech: BS Mechanical Engineering, '89. **Employment History:** Volvo Truck Corporation '89-'96. Hendrickson, '96-Current. Currently Director of Engineering for Hendrickson Truck Suspension Systems. **Expertise:** Truck chassis, ride, handling and structural development. Truck suspension component and system development. **Currently Resides in:** IL **First Car:** '72 Fastback Mustang. **Favorite Race Car:** Ford GT 40 (original), Porsche 917, Porsche 962. **Judge since:** 2010

Zack Eakin: **Alma Mater:** Messiah College: BS Mechanical Engineering; Cornell University: MEng Mechanical Engineering **Employment History:** Joined Chip Ganassi Racing in 2006 as part of the Advanced Engineering Group doing development programs for IndyCar, NASCAR, and Grand-Am Series. In 2009 Zack started working on DeltaWing project with Ben Bowlby as a new concept for IndyCar and followed the project as it evolved through running at LeMans & Petit Lemans in 2012. Now self-employed providing engineering services to motorsport customers. **Expertise:** Whole car layout & design; Mechanical, Electrical, & Aerodynamic. **First Car:** '86 Lincoln Town Car. **Favorite Race Car:** The next one?

Chris Efremidis: **Alma Mater:** University of London, UK: BEng Mech Engineering, Cranfield University, UK: MSc Automotive Engineering **Employment History:** Robert Bosch, 13 years between Chassis, Powertrain and Motorsport divisions **Expertise:** Motorsports/Powertrain Engine development for performance and emissions, Chassis system performance development, Motorsport business unit leader **Currently Resides in:** West Bloomfield, MI

**First car(s):** Ford Sierra RS Cosworth **Favorite Race Car:** Peugeot 205 T16 Evo 2 Group B rally car **Design Judge since:** 2013

Nic Evans. **Alma Mater:** University of Oklahoma, BS in Mechanical Engineering. **Employment History:** Toyota Technical Center, Aerodynamics Engineer. **Expertise:** University of Oklahoma Aerodynamics System Designer, developed first servo controlled active aero system in FSAE. **Currently Resides In:** MI. **First Cars:** 1987 GMC S-15 "Iron Duke" and 1986 Chevrolet Camaro Z-28. **Favorite Race Car:** Lotus 78 and McLaren MP4/4. **Design Judge Since:** 2012

David Finch: **Alma Mater:** UCLA, University of Michigan: BS and MS Mechanical Engineering. **Employment History:** President of Raetech Corp. 26 years. **Expertise:** Automotive Research and Product Development (Motorsports) specifically Chassis, Engine and Instrumentation products. David is also an accomplished Motorsports Race Engineer and Driver. Major Motorsports Awards: SCCA-President's Cup, Porsche - Al Holbert Memorial, USRRDC-Mark Donohue Award. **Currently Resides in:** MI **First Car:** '57 Plymouth Belvedere with rusted out front fenders, & blanket which covered holes in rear seat and also used to smother carburetor fires. **Favorite race car:** The Raetech/Porsche 944 with six SCCA GT2 National Championships! **Judge since:** 2006

John Fratello: **Alma Mater:** Virginia Tech: BS and MS in Mechanical Engineering. **Employment History:** '11 to present: Robert Bosch: Stability Control and Traction Control Calibration Engineer. **Expertise:** Vehicle dynamics and simulations, chassis controls, suspensions. **Currently Resides in:** MI **First car:** '93 Ford Taurus **Favorite Race Car:** Lancia Stratos **Design Judge since:** 2013

Tri Gaffney: **Alma Mater:** University of Missouri- Rolla, BS Mechanical Engineering. **Employment History:** General Motors, Vehicle Performance Owner- Driveline **Expertise:** Driveline, & Driveline Actuator Controls. Vehicle Dynamics & Chassis Control Systems. **Currently resides in:** MI **First car:** '88 Fiero GT **Favorite Race Car:** TAG Kart **Judge since:** 2010

Collin Galganski: **Alma Mater:** University of Wisconsin BSME **Employment History:** Husco Automotive '10+ **Expertise:** Chassis and suspension design, Data Acquisition **Currently Resides in:** WI **First car:** Nisan 240SX **Favorite Race Cars:** McLaren MP4/4 **Judge Since:** 2011

Thomas German: **Alma Mater:** The University of Akron: Mechanical Engineering, MIT Sloan: MBA **Employment History:** Penske Racing Technical Director INDYCAR, Penske Racing Technical Director NASCAR, Michael Waltrip Racing, CTO **Expertise:** Motorsports management, race engineering and simulation. **Currently Resides in:** NC **First car(s):** 1969 Chevelle **Favorite Race Car:** Porsche 917 **Design Judge since:** 2012

Judd Glenn: **Alma Mater:** Cornell University: BS in Mechanical Engineering '03. **Employment History:** '04-'12 ECR Engines, '12-Present Delphi Thermal Systems **Expertise:** Race Engine Design and Development, Fuel Injection, Dynos and data acq. **Currently Resides in:** NY **First Car:** '89 Jeep Comanche **Favorite Race Car:** Chevy Corvette Grand-Am Daytona Prototype (helps that I was the program manager for the engine) **Design Judge since:** 2009.

Peter Gibbons: **Alma Mater:** Worcester Polytechnic Institute, Mechanical Engineering - **Employment History:** 2011 to present-Multimatic; 2004-2010-Andretti Autosport: Technical Director; 1992-2004-Newman Haas Racing: Race Engineer, Technical Director; 1988-1991-Penske Racing: Race Engineer - **Expertise:** Vehicle Dynamics, Design, Simulation - **Currently**

**Resides in:** Toronto, Canada **First Car:** 1972 Ford Pinto **Favorite Race Car:** Lotus 78-79.... A Paradigm Shift in Motor Racing...

Doug Gore: **Alma Mater:** New Jersey Institute of Technology: BS in Electrical Engineering Northeastern University: MS in Physics. **Employment History:** '69-'89 RCA Laboratories. Designed and built "widgets" to solve problem for various government agencies. '78-'09 Sr. Technical Editor for Stock Car Racing magazine, Open Wheel Magazine, and Speedway Illustrated. '89-current: Founder and owner of Gore Engineering, a race car engineering services firm. **Expertise:** Over thirty five years experience racing oval tracks as a crew member, team engineer, car builder and a car owner. While I am not a driver, my experience includes racing NASCAR Stock cars, dirt track Sprint Cars, pavement Supermodifieds, and in the Indy 500. Formula SAE Design Judge since '99. **Currently Resides in:** MA **First Car:** '65 Shelby GT 350 **Favorite Race Cars:** On dirt: Sprint Cars. On pavement: Big Block Supermodifieds. **Judge since:** 1995

David Gould: **Alma Mater:** Newbury Grammar School. **Employment History:** Gould Engineering since '94. **Expertise:** Chassis and suspension design, composite & traditional manufacture. **Currently Resides in:** UK **First Car:** Austin Mini. **Favorite Race Car:** Williams FW07 and Red Bull from 2009 on. **Judge since:** 1996

Jerry Grandov: **Alma Mater:** Rutgers University: Physics. **Employment History:** '96+: Shadow Racing Products; '00+: Alcatel-Lucent Bell Laboratories. **Expertise:** Chassis and Suspension Systems, Shock and Weight Jacker Manufacturer. **Currently resides in:** NJ **First Car:** '79 Chrysler Cordoba **Favorite Race Car:** McLaren MP4/4 **Judge since:** 2005

Dipl. Ing. Thomas Hennings: **Alma Mater:** University of Stuttgart: Materials Science and Engineering. **Employment History:** MAHLE GmbH, Inc.: Project Manager. Initiated FSAE Team Rennteam Stuttgart in 2005. **Expertise:** Materials, Composites, Engine Hardware Development, Chassis Design **Currently Resides in:** Stuttgart, Germany **First car(s):** '80 BMW 320 E21 **Favorite Race Car:** Porsche 917/30 Spyder **Design Judge since:** 2013.

Martin Johns: **Alma Mater:** University of Birmingham (UK) Mechanical Engineering. **Employment history:** Retired: 12 years General Motors - 26 years Goodyear Tire and Rubber Co. **Expertise:** Steering, suspension & chassis design and development; Subjective and objective ride and handling evaluation; Vehicle and tire dynamics by computer modeling, lab K&C and F&M measurements and instrumented test. **Currently resides in:** OH **First car:** Fairthorpe Electron Minor (really) **Favorite Race Car:** Tiga SC84 S2000 - it still fits me **Judge since:** 2005

Bob Jones: **Alma Mater:** MSME Carnegie Mellon , BSME North Dakota State. **Employment:** Cooper Standard CAE Manager: specialize in non-linear FEA. Ford Chassis Technical Specialist: Designed rear chassis architectures for IRS Explorer, Expedition, & Flex. **First Car:** built a V8 Vega. **Current:** '97 Eagle Talon. **Favorite race car:** to quote Chuck Yeager: "newer the better. " **Design Judge** since 2006.

Edward M. Kasprzak: **Alma Mater:** University at Buffalo, SUNY: BS, MS and PhD in Mechanical Engineering. **Employment History:** '96+: Milliken Research Associates, Inc.; '02+ Course Instructor and '07+ Adjunct Assistant Professor: Dept. of Mechanical & Aerospace Engineering, University at Buffalo; '04+ Co-founder and co-director, **Formula SAE Tire Test Consortium.** **Expertise:** Tire testing and modeling, overall vehicle dynamics, vehicle dynamics simulations, suspensions. **Currently Resides in:** NY **First Car:** '86 Oldsmobile Delta 88 Royale. **Favorite Race Car:** Chaparral 2K. **Judge Since:** 2011

Drew Kessler: **Alma Mater:** Purdue University. **Employment History:** '07+: Penske Racing South, NASCAR Design Engineering. '06-'07: Newman/Haas Racing, design and data engineering. **Expertise:** Chassis and suspension design, structural analysis, testing, and model correlation. **Currently resides in:** NC **First Car:** '88 Dodge Grand Caravan **Favorite Race Car:** Porsche RS Spyder **Judge Since:** 2008

Alan Kulifay: **Alma Mater:** Lawrence Technological University: Mechanical Engineering. **Employment History:** 2005-Present: Joe Gibbs Racing: Design Engineer, 2002-2005 Rieter Automotive: Material Test Lab Manager, NVH Test Engineer. **Expertise:** Chassis and Suspension Component Design and Development, CG and Compliance Prediction and Testing. **Currently Resides In:** NC. **First Car:** 1986 Dodge Ram ½ Ton. **Favorite Race Car:** Chaparral 2E **Design Judge Since:** 2012

John Lankes: **Alma Mater:** Michigan State University: BS Mechanical Engineering. **Employment History:** Design and analysis engineer at Pratt & Miller Engineering & Fabrication, Design engineer at FEV, Fabricator at Rocketsports Racing. **Expertise:** Design engineering/analysis, fabrication. **Currently Resides in:** MI **First car:** '92 Eagle Talon Tsi. **Favorite Race Car:** Porsche 917-30 or the Lola B03/00 Champ Car. **Judge since:** 2010

Kim Lind: **Alma Mater:** University of Michigan Ann Arbor: BS Mechanical Engineering. **Employment History:** General Motors - 25 years; Previously: Michigan Automotive Research Corp - 7 years. **Expertise:** Dyno testing and development; by-wire systems; active suspension systems; AWD systems; vehicle concept development demonstrating turbocharging, supercharging, AWD and DCT technologies; and pre-production vehicle architectures. Raced 9 years in SCCA & was a driving instructor for SCCA driving schools. **Currently Resides in:** MI **First car:** '68 Pontiac Bonneville (small aircraft carrier). **Favorite race car:** My SCCA F-Production MG Midget. **Judge since:** 2010

Gene Lukianov: **Alma Mater:** Worcester Polytechnic Institute, Lawrence Technological University: BS Mechanical Engineering, MS Automotive Engineering. **Employment History:** Currently retired and consulting. Chrysler: 20 years vehicle dynamics tuning, development and analysis. Gabriel Shocks: 7 yrs. shock absorber design, manufacturing and tuning; also automotive brake design and weapons. **Expertise:** Specialist in all aspects of vehicle dynamics: calculations, design, development, tuning and subsystem/component performance. **Currently Resides in:** MI **First car:** '61 Volvo 544. **Favorite race car:** Ford GT40 (THE Original one). **Judge since:** 1999

Kim Lyon: **Alma Mater:** University of Minnesota / Minneapolis: BS Mechanical Engineering, BA Chinese. **Employment History:** '84 – '08 Chrysler Powertrain Engineering, Advanced Engine Systems Senior Specialist, VVT engine development – I4, V6, V8, V10; LeMans LMP 900 engine and chassis systems development; hybrid electric LeMans race car (Patriot Project); Formula One engine, chassis systems, and calibration development-Lamborghini Engineering. **Expertise:** Calibration, data acquisition, software design & coding, engine and chassis dyno testing, turbocharger and auto-manual transmissions development, modeling and simulation. **Currently Resides in:** MI **First car:** '66 Chevy Impala SS (327c.i., 4-speed). **Favorite race car:** Lola T70 coupe, Porsche 962, Nissan GTP, '93 F1 McLaren MP4/8. **Judge since:** 2003

Rick MacGowan: **Alma Mater:** Virginia Tech: BS Mechanical Engineering. **Employment History:** Bridgestone Tire North America – Tire/Vehicle Dynamics: High Speed Tire Uniformity; Penske Racing South – Design Engineer, Test Engineer; Hall of Fame Racing – Lead Engineer; Joe Gibbs Racing – Vehicle Development Group R&D Engineer. **Expertise:** Suspension/Chassis/Brake Design, Data Acquisition & Testing. **Currently resides in:** NC **First car:** '79 Plymouth Horizon **Favorite race car:** '96 Porsche 911 GT1 **Judge since:** 2007

Luca Mantovano: **Alma Mater:** University of Wisconsin - Madison: BS Mechanical Engineering, Business Certificate. **Employment History:** '11-Present: Ford Motor Company - Engine Development Engineer. **Expertise:** Powertrain development (Engine Testing / Design / Simulation). **Currently resides in:** MI **First Car:** '90 Nissan 240SX. **Favorite Race Car:** Ferrari F2004 **FSAE Judge Assistant Since:** 2011

Ian May: **Alma Mater:** SUNY-Buffalo, BS-Mechanical Engineering and Mathematics. **Employment History:** '08+: GM Powertrain - Engine Performance Analyst. **Expertise:** Engine Modeling and Simulation, Combustion, Performance/Optimization, Boosting. **Currently resides in:** MI **First Car:** '96 Subaru Legacy. **Favorite Race Car:** '08 Corvette C6R (GT1). **Judge Since:** 2011

Tobias Michaels: **Alma Mater:** Braunschweig, Institute of Technology, Electrical Engineering. **Employment History:** Head of Electronics, Lions Racing Team Braunschweig '06-'08. Research Engineer, German Aerospace Center '09-'10. Research Engineer, Braunschweig, Institute of Technology '10-Present. Formula Student Germany Executive Committee '09-Present. **Expertise:** Electrics & Electronics, Real-Time Embedded Systems, Data Acquisition. **Currently Resides in:** Braunschweig, Germany. **First car:** '95 BMW 316i Compact E36. **Favorite Race Car:** '92 Williams FW14B. **Design judge since:** 2009.

Doug Milliken: **Alma Mater:** MIT, Mechanical Engineering. **Employment History:** Milliken research Associates (MRA) since '77, also independent consulting. Current host of the FSAE Tire Test Consortium (TTC) Program. **Expertise:** Design, analyze (see "Race Car Vehicle Dynamics"), build, test, repeat. Tire modeling. **Currently resides in:** NY **First car:** 2-seat rear engine project, using Corvair parts (high school project). **Favorite race car:** Maybe the Lotus 11? 143 mph (230 kph) lap at Monza w/1100cc, '56.

Bill Mitchell: **Alma Mater:** California Institute of Technology, Stanford University: BS Mathematics, MS Computer Science. **Employment History:** '83-'88 Motorsports Journalist; '91-'92 Ganassi Indy Car team, data analyst; '93-'97 Roush Trans-Am team, data analyst; '98-Present: Wm. C. Mitchell Software. **Expertise:** Computer programmer dealing with suspension geometry analysis and data analysis. **Currently resides in:** NC **First car:** '61 International Scout. **Favorite race car:** McLaren Can-Am cars. **Judge since:** 1998

Marc Musial: **Alma Mater:** Western Michigan University: B.S. Automotive Engineering. **Employment History:** Started at Chrysler in '91. Moved to Saleen for 1.5 years in '08 and returned to Chrysler in '09. **Expertise:** Engine systems (combustion, Air Flow, Calibration, and dynamometer testing). Technical lecturer and driving instructor. Worked on Chrysler's NASCAR Race Team. **Currently resides in:** MI **First car:** '68 Chrysler Newport that I got from my grandfather. **Favorite race car:** More of a type: North American touring cars or touring cars in general. Door slammer race cars like NASCAR used to be. **Judge since:** 2000.

Dan Nugteren: **Alma Mater:** South Dakota State University. **Employment History:** Polaris Industries '01-Present. **Expertise:** Crank train and cylinder head design. **Currently resides in:** MN **First car:** '81 Ford LTD **Favorite Race Car:** anything F1 **Judge since:** 2008

Russ O'Blenes: **Alma Mater:** Worcester Polytechnic Institute. BS Mechanical Engineering? FSAE participant: '89 '90 & '91. **Employment History:** GM: '91 Production, Powertrain group. '93: GM's Racing Department. Currently Manager of GM Racing Powertrain. **Expertise:** Engine simulation & analysis. Many GM race programs including Baja, Pike's Peak, Short Course, NASCAR, Road Racing, NHRA Pro Stock, and FWD Sport Compact. **Currently**

**resides in:** MI **First car:** Manx Dune Buggy **Favorite race car:** Penske/Donohue '69 Trans Am Camaro **Judge since:** 2005

Sean O'Shea: **Alma Mater:** Rutgers University, BS Mechanical Engineering, BA Economics. **Employment History:** '01-'10: BASF Catalysts; Emissions Test Engineer. '01-09 – Co-founder Maximum PSI Performance Fabrication. '10-'12: Rypos Inc.; Sr. Test Engineer. '12+: Bosch Motorsports; Sr. Engineer, Diesel Components and Calibrations. **Expertise:** Diesel Calibrations and Emissions, Component fabrication and testing. Data logging and trackside support. **Currently Resides in:** MI **First Car:** 1976 MGB, (Oil leaking Edition) **Favorite Race Car:** Porsche 917L. **Judge since:** 2013.

Brett Oltmans: **Alma Mater:** Rochester Institute of Technology: Mechanical Engineering with Automotive Focus. **Employment History:** Polaris Industries '96 – current. Ford, 5 yrs. **Expertise:** Dyno calibration, Alternative fuels engine design and calibration, Alternative fuels engine design and calibration, Induction system design, boosted and N.A. **Currently resides in:** MN **First car:** A rusty '71 Datsun 240Z. **Favorite race car:** My ITS Datsun 240Z, car #06. **Judge since:** 2008

Chris Paulsen: **Alma Mater:** Miamisburg High School. **Employment History:** '73-'78: Mechanic / fabricator Sprint Cars and Super Modifieds throughout the west, machinist at ARC Industries building sprint car suspension and drive train components. '78-'81: USAC sprint car and midget mechanic for Mack McClellan, Greg Leffler, Bill Vukovich, and George Snider, USAC and WoO Sprint Car Chief Mechanic for Bruce Walkup, Danny Smith, Roger Rager, and Alan Barr. Indy Car mechanic, Indy 500 with Roger Rager. Nance Speed Equipment, Wichita, KS: designed and built WoO sprint cars for Sammy Swindell which won over 100 races and the '81 & '82 WoO Sprint Car Championships. '81: Started driving sprint cars. '82-'88: Alex Morales Autosports: Indy Car Chief Mechanic/Engineer for cars driven by Pancho Carter, Al Holbert, Johnny Rutherford, and Howdy Holmes. Also drove sprint cars during this time. '89-Present: C&R Racing. Also, Turn Key Indy Car race team operation for hire: Drivers: Johnny Rutherford, Didier Theys, Kevin Cogan, Johnny Parsons, Gordon Johncock, Billy Boat, and PJ Jones. **'09-current: Founded International Motorsports Industry Show (IMIS).** Indiana Motorsports Association: Chairman of the Board. '95-current: Driver: Class 1 and Pro-Truck in the Baja 1000. Technical Writer: National Speed Sport News, Dirt Sports, & Race Tech. **Expertise:** Skilled mechanic, Journeyman Machinist, Race car driver, Chassis & Suspension Design Engineer, Manufacturing Engineer. Race Engineering & Team Management, Winning Indy 500 Chief Mechanic. **Currently resides in:** Indy **First Car:** 1973 Ford Pinto. **Favorite race car(s):** Class 1 and Trophy Trucks (off road), sprint cars, F1 and Indy Cars. **Judge since:** 2003

Charlie Ping: **Alma Mater:** Auburn University BME. **Employment History:** Honda Performance Development 2005-2009: IndyCar and ALMS LMP2 engine simulation, development & calibration, ALMS LMP1 chassis simulation, development & validation. Pratt & Miller Engineering 2010-present: Race Engineer / Strategist, currently Project Manager for Chassis Development (Chevrolet IndyCar program). **Expertise:** Engine development & calibration, vehicle dynamics and simulation, circuit & rig testing. **Currently Resides In:** Michigan. **First Car:** 1970 Ford Maverick. **Favorite Race Car:** The latest LMP1 factory machinery. **Design Judge Since:** 2005 FSAE-A

Jost Pöttner: **Alma Mater:** Braunschweig, Institute of Technology, Mechanical Engineering **Employment History:** '07 Suspension Engineer, Lions Racing Team Braunschweig. '10+ H&D ITAS GmbH, Engine Cooling Department for Volkswagen. '10+ Design Judge; Formula Student Germany. **Expertise:** Thermodynamics, Aerodynamics. **Currently resides in:** Wolfsburg,

Germany. **First Car:** '03 VW Lupo 1.0l 37kW. **Favorite Race Car:** 1993 Williams-Renault FW15 **Design Judge since:** 2010.

Pete Ramanata: **Alma Mater:** Virginia Tech, BS & MS Mechanical Engineering. **Employment History:** 8 years Ford Motor Co, currently: Toyota Racing Development. **Expertise:** Vehicle dynamics, simulation, chassis engineering and development. **Currently resides in:** NC **First car:** '85 Golf GTi 8v. **Favorite race car:** Audi R8 / R10 TDi (phenomenal design, gearbox change in 4 min). **Judge Since:** 2009

Andy Randolph Ph.D.: **Alma Mater:** University of Texas at Austin, Northwestern University, BS Chemical Engineering, MS, Ph.D. Chemical Engineering. **Employment History:** 13 years General Motors, 12 years in NASCAR, current Engine Technical Director for Earnhardt Childress Racing (ECR). **Currently resides in:** NC **Expertise:** Combustion diagnostics, power development. **First car:** Martin. **Favorite race car:** Chaparral (light, agile, powerful). **Judge since:** 2005

David Redszus Ph.D.: **Alma Mater:** Northwestern University: BS Industrial Engineering and Economics, MS Systems Management and Operations Research, PhD Product Development Processes. **Employment History:** Precision AutoResearch (founder, 25 yrs), Over 35 years total (research, engineering services, and specialty products for the motorsports industry). **Expertise:** Technical consultant, engineer, coach, and racer, advanced driving techniques, vehicle design, and engine development. Data analysis techniques and ability to translate complex issues into racer-understandable language. **Currently resides in:** IL **First car:** '70 Porsche 911S Targa. **Favorite race car:** What other than the Porsche 917-30? Or any other car which causes rules-changes ex-post should be a favorite! **Judge since:** 2004

Richard R Reichenbach: **Alma Mater:** Michigan State University, BS Computational Mathematics 2008 **Employment History:** Roush Fenway Racing: Designer / Analyst, Pratt and Miller Engineering: Designer/Analyst, Michigan State FSAE: Suspension Team Lead, Frame Team Lead, 3 yr. Driver **Expertise:** Suspension and Chassis design, Finite Element Analysis **Currently Resides in:** Novi MI **First Cars:** Fiat X1/9, BMW 325ix (E30) **Favorite Race Car:** Fiat X1/9 (Personal 24 hours of LeMons car) **Design Judge Since:** New this year.

David Rimel: **Alma Mater:** Colorado State University: BS Industrial Management; Colorado School of Mines: MS Environmental Science and Engineering **Employment History:** Vehicular emissions research and testing; auto paint spray booth consulting, permitting; auto body shop owner, operator; 30+ years of vehicle repair and restoration; advisor to multiple FSAE/Formula Hybrid teams since 2010 **Expertise:** Automotive body and frame **Currently Resides in:** CO **First Car:** '56 Chevy BelAir w/ 347 (57Pontiac) tri-power **Favorite Race Car:** Well executed FSAE project **Judge Since:** 2012

Tony Roma: **Alma Mater:** LTU (BSME) / Purdue (MSE) **Employment History:** General Motors since '93: Transmission Calibration (4L60e) / Engine Development (Small Block) / Powertrain Integration (Corvette) / Powertrain Program Manger (Cadillac World Challenge Program) / Engineering Group Manager for Vehicle Integration (Cadillac V Series) / Sr Engineering Group Manager for High Performance Vehicle Operations / Camaro Performance Variant Manager (responsible for the ZL1) **Expertise:** Powertrain Integration and Chassis Engineering **Currently resides in:** MI **First Car:** '83 VW Rabbit GTI **Favorite Race Car:** Chaparral 2E **Judge Since:** 1998 (on and off)

Claude Rouelle: **Alma Mater:** Institute Gramme, Belgium: Industrial Engineering MSc. **Employment History:** Founder of Optimum G (race car engineering consulting) '97-current. Past experience includes race engineer for Volvo, Toyota and Alfa Romeo (European Touring

Car Championship, European Rally Championship), French Formula 3 Team Oreca, development engineer AGS Formula One team, Reynard technical representative in Japan, technical advisor for Apomatox Formula 3000 team. Indy Lite series teams, CART teams, endurance, and sprint cars teams. **Expertise:** High performance and race car designer, research and development engineer with over 30 years of experience in design, test and racecar engineering, frequent lecturer at the Ecole Supérieure des Techniques Aéronautiques et de Constructions Automobiles in Paris and UNC-Charlotte. **Currently resides in:** CO **First car:** 15 years old Renault 4 station wagon with a heavy CNG reservoir on the roof. It helped to understand the influence of CG height on weight transfer! **Favorite race car:** The next one we are designing. **Judge since:**

David Russell: **Alma Mater:** Cornell University: BS Mechanical Engineering, MENG Mechanical Engineering. **Employment History:** Ford (vehicle dynamics development: supervisor, manager, tech specialist) 15 yrs. **Expertise:** Ride/handling tuning, CAE tools, objective methods, K&C measurement, expert subjective evaluations, damper tuning (active and passive), EPAS/HPAS tuning, tire development. **Currently resides in:** MI **First car:** '80 Ford Fiesta. **Favorite race car:** Ford GT40. **Judge since:** 1996 **Judge since:** 1996

Luke Sagur: **Alma Mater:** Kettering University: BSc Mechanical Engineering. **Employment History:** TRD since '04 working on vehicle dynamics and simulation projects for Toyota's NASCAR program. Previous work at Pi Research developing and supporting Pi's simulation products. **Expertise:** Vehicle dynamics simulation, data acquisition. **Currently resides in:** NC **First car:** '72 MGB. **Favorite race car:** Porsche '96 GT1 (first "true" race car I worked on). **Judge since:**

Jeff Scheurer: **Alma Mater:** University of Alabama: BS in Mechanical Engineering. **Employment History:** '09+: Honda R&D Americas, Inc. **Expertise:** Automotive seat design. **Currently Resides in:** OH **First Car:** '90 Nissan 300ZX **Favorite Race Car:** Highcroft Racing HPD ARX-01-e LMP1 **Judge since:** 2011

Jason Schwanke: **Alma Mater:** Wisconsin, BS Mechanical Engineering **Employment History:** Robert Bosch LLC - Gasoline Systems Engineer '11-present; PDT 09-'11' **Expertise:** Powertrain control development, system integration, cooling system design **Currently Resides in:** MI **First Car:** '88 GMC Safari (rockin' the van!) **Favorite Race Car:** Lotus 78 **Judge Since:** 2009

Ken Sperry: **Alma Mater:** Highland Park High School. **Employment History:** U.S. Army. General Motors: Chevrolet engineering Tech. Kinsler Fuel Injection, then back to GM: Chevrolet Engineering, Technician Air Flow Development. Engineer, Air Flow Dev. Manager, Inline Engine Dev.; Gas Engines; Hi-Performance Vehicle Operations-Powertrain. Retired G.M.: '07. Consultant, Experimental Engine Development: '08-current. **Expertise:** Air Flow Development of Engine components. Power and supporting engine system development. **Currently resides in:** MI **First car:** '57 Chevy 1500 Businessman's Coupe, 220hp/283, 3 speed, 4.11 axle. **Favorite Race Car:** M8B McLaren (Can Am), Chaparral 2E (Can Am). **Judge since:**

Ron Sperry: **Alma Mater:** General Motors Institute: BS Mechanical Engineering Major studies in Powertrain. **Employment History:** Retired from General Motors after 44 years with experience in production and performance engine design. Production design, after market applications and enhancements of production components, engineering support in performance engine components, Production Release Engineer, V8 group and GM Racing Group supporting the Corvette and NASCAR racing series. Currently working for GM Racing group as a contract employee. **Expertise:** Engine design, component design and

development. **Currently resides in:** MI **First car:** '62 Chevy Impala SS - 409/409. **Favorite race car:** C5R Corvette. **Judge since:**

Salvador Toledo: **Alma Mater:** University of Puerto Rico-Mayaguez, University of Michigan: BS Mechanical Engineering, MS Mechanical Engineering. **Employment History:** 10 years: Ford Motor Company. 1 year: DaimlerChrysler. 3 years: Drag Racing Pit Man. 3 years: Mechanic assistant. **Expertise:** Chassis Engineering. **Currently resides in:** Mexico. **First Car:** '00 Ford Explorer. **Favorite Race Car:** '09 F1 Brawn GP Car, '10 F1 Red Bull Car (former Jaguar team), & Black Beauty (Black convertible Pro-street '65 Stingray, 9.6s in 1988 on gas only) **Judge since:** 2004

Ondrej Tomek: **Alma Mater:** University of Michigan MS Mechanical Engineering, GMI Engineering & Management Institute BS Mechanical Engineering, Acadia University, BSc. **Employment History:** GM Racing(contract employee) **Expertise:** Race engine design, testing, development & simulation **Currently resides in:** Michigan **First Car:** '78 Austin Mini **Favorite Race Car:** Ferrari 250 LM. **Judge Since:** 1995

Dwight Woodbridge: **Alma Mater:** Rensselaer Polytechnic Institute, University of Illinois: MS Engineering Science (Engineering Management), BS Gen'l Engineering (Automotive Engineering/Design). **Employment History:** General Motors – '85 to present, 17 years with GM Racing. **Expertise:** Program Management, vehicle test and development, aerodynamics. **Currently resides in:** MI **First car:** Triumph TR-4. **Favorite race car:** Dakar Hummer H3. 2010 GS Camaro. 1996 Aurora GTS. **Judge since:** 2002

## ENDURANCE TRACK & FUEL EFFICIENCY EVENT

**Event Captain:** Laura Klauser  
**Co-Captain:** Matt Kalmus  
**Date:** Saturday, May 11, 2013  
**Time:** 9:00 am

### **Purpose:**

The goals of the endurance and fuel efficiency event are to test the durability of the vehicles and to determine the fuel efficiency of the vehicles. The dual nature of the event can lead to compromises, while the course layout and 22 km length of the event test the vehicle's durability. **NOTE: NO REPAIRS OR WORK MAY BE PERFORMED ON THE VEHICLE DURING THE EVENT (with the exception of tire changes due to weather conditions).**

### **Description:**

The event is approximately 22 km, with two drivers completing 11 km segments each. No refueling is allowed during the event. Each team is given three minutes to complete the driver change.

The run order for the event will be based primarily on the **Autocross** event. The run order will be slowest to fastest autocross times. If a team did NOT score in the Autocross event, the vehicle will run at the beginning of the Endurance event, with the order based first on the finishing order of the Acceleration event, and then on the finishing order of the Skid Pad event. Teams without a score in any event used to determine the run order will run in the order established by the event captains. Teams must run in the heat they are assigned – morning or afternoon.

If the weather conditions of the prior dynamic events have been variable, a team's **Skid Pad** or **Acceleration** result may be used as a substitute for the team's finish order in the Autocross event.

### **Endurance Procedures:**

In order to compete in the Endurance event, teams must have their three-part tech sticker by 5:30 PM on Friday. Teams who have not successfully passed all parts of tech by 5:30 PM Friday will not be eligible to participate in Endurance on Saturday. Teams who have a sticker pulled have the opportunity to be re-teched on Saturday to regain the sticker; however, cars are only eligible to run Endurance in their scheduled heat (morning or afternoon).

The team must have their **fully fueled** (see Fuel Efficiency Procedures below) vehicle in the staging line at the appointed time with the first driver seat belted in. Only two crew members and the other driver are allowed in the staging area for the vehicles.

When there is a space for the vehicle on the course and the timing/scoring system is set, the first driver will be motioned to the starting line. The person staging the vehicles is not obligated to give teams any advance notice prior to entering the track. An official will perform a safety check of the vehicle and the driver restraint system. The starter will stage the vehicle's front tires on a starting line. When there is an opening on the track the starter will wave a green flag signaling the go-ahead for the driver to start. If the vehicle stalls, the driver **must wait for another green flag** before being allowed on the course. **NOTE: IF THE VEHICLE CANNOT BE RESTARTED WITHOUT EXTERNAL ASSISTANCE, THE CAR WILL BE DEEMED DISABLED AND WILL BE DISQUALIFIED FROM THE EVENT.**

On the last lap of the first driver, a checkered flag will be displayed and the vehicle directed to the driver change area. **It is the driver's responsibility to exit the track; any person directing the car off the course is an additional aid only.** Only three people (including drivers) are allowed in the driver change area at once. After the vehicle arrives in the driver change area, the team has three minutes to get the second driver belted in and rolling out of the driver change area. Only adjustments to fit the second driver may be performed on the vehicle. **No other work is allowed.**

When the second driver is ready, the vehicle should be pushed to the starting line queue. An official will perform a safety check of the vehicle and the driver restraint system. The starter will stage the vehicle's front tires on a

starting line. When there is an opening on the track the starter will wave a green flag signaling the go-ahead for the driver to start. If the vehicle stalls, the driver **must wait for another green flag** before being allowed on the course. **NOTE: IF THE VEHICLE CANNOT BE RESTARTED WITHOUT EXTERNAL ASSISTANCE, THE CAR WILL BE DEEMED DISABLED AND WILL BE DISQUALIFIED FROM THE EVENT.**

Upon completing the last lap with the second driver, the checkered flag will be displayed and the vehicle will exit the course and will be directed to the fueling station. **It is the Driver's responsibility to exit the track, any person directing the car off the course is an additional aid only.** The vehicle is to be pushed to the fueling station where the fuel efficiency will be calculated.

#### Weather Conditions:

- Teams must fit rain tires to their vehicle if the course is declared Wet.
- Teams have the option of dry or rain tires if the course is declared Damp.
- Teams may change tires at any time while their car is in the staging area inside the "hot" area.
- All tire changes after a car has received the green flag to start the event will take place in the driver change area.
- Teams may not perform any work on the vehicle other than the tire change in the driver change area.
- Teams are allowed 10 minutes to change their tires in the driver change area if a Dry track is declared Damp, or if a Dry or Damp track is declared Wet. If the tire change is happening at the same time as a scheduled driver change, the 10 minutes are in addition to the 3 minutes allowed for the driver change.
- Teams are allowed to change their rain tires to dry tires if the course is Dry or Damp. However, this change is not permitted during the driver change, and the time taken to change the tires is included in the team's total time for the event.

The following chart summarizes the possible track condition changes, the team's options, and the time allotted for changes:

Track Condition	Team's Current Tire Choice	Track Declared	Tire Change?	Time Help	Allowed at Driver Change?
Dry	dry	Damp	Optional	10 minutes	Y
Dry	dry	Wet	Mandatory	10 minutes	Y
Damp	dry	Wet	Mandatory	10 minutes	Y
Damp	rain	Wet	---	---	---
Damp	dry	Dry	---	---	---
Damp	rain	Dry	Optional	zero	N
Wet	rain	Damp	Optional	zero	N
Wet	rain	Dry	Optional	zero	N

Example: The track is Dry, and the team is competing on dry tires. If the track is declared Damp, a tire change is optional to the team, 10 minutes is allowed to make the change, and it can be done during the driver change.

#### General Notes:

- The vehicle will be expected to be ready for competition with the first driver at the team's start time. If the endurance event is running late, the vehicle is still expected to be ready when its run order position is reached. If the vehicle is not ready when the official starter motions the vehicle to the starting line, a two minute penalty will be assessed and the team will lose their time slot to run the event. Teams are only allowed to run in their run groups – morning or afternoon. A team schedule to run in the morning may only run in the morning, and vice versa.

- The driver change will be scored as an extra-long lap. It will be assumed by Scoring that the change was completed in the required time (less than 3 minutes) unless notified otherwise. An official will be in the driver change area timing each vehicle and monitoring that no work is done to the vehicle other than the driver change. The official will keep track of each team's time and will notify Scoring if a team has exceeded the three minute limit (from the time the vehicle arrives in the driver change area to the time the vehicle leaves the area). There is no competitive advantage to changing drivers in less than three minutes.
- Tire changes from dry to rain tires will be scored as an extra-long lap. It will be assumed by scoring that the change was completed in the required time (less than 10 minutes) unless notified otherwise. An official will be in the driver change area timing each vehicle and monitoring that no work is done to the vehicle other than the tire change. The official will keep track of each team's time and will notify scoring if a team has exceeded the ten minute limit (from the time the vehicle arrives in the driver change area to the time the vehicle leaves the area). There is no competitive advantage to changing tires in less than ten minutes.
- Tire changes from rain to dry tires will have the time required to change tires added to the team's total time. The time taken to get to, and out of, the driver change area will NOT be added. An official will be in the driver change area timing each vehicle and monitoring that no work is done to the vehicle other than the tire change. The official will keep track of each team's time and will notify scoring of the time required to change tires (from the time the vehicle arrives in the driver change area to the time the vehicle leaves the area).
- No toolboxes will be allowed in the queue area, staging lanes, or driver change area. It is assumed only hand tools would be required to adjust the vehicle for the second driver. In the event of tire changes due to weather conditions, tire changing equipment will also be allowed.
- If the vehicle leaves the course because of a mechanical/electrical problem of any type, the event is considered over for that vehicle and scoring will be notified. The vehicle will NOT be allowed to return to the track.
- If the vehicle contacts a barrier on the course, the event is considered over for that vehicle and Scoring will be notified. The vehicle will NOT be allowed to return to the track.
- The vehicle may be restarted if it stalls on the track, but external assistance is not allowed.
- The driver may pull off the course to have belts re-tightened if necessary, though the additional time for this procedure will be counted.
- The driver may also pull the vehicle off -course to remove any cones that may become trapped; though the additional time will count against the team.
- The lap times for the vehicle will be monitored. If the vehicle is not running within 145% of the fastest lap time run on the course (by the fastest car) the vehicle may be black-flagged and removed from the event. If this occurs with the first driver, the second driver will NOT be allowed to run, as the event will be considered over.

#### **Course Preparation:**

The endurance course will be set up on Thursday afternoon and then Friday evening. Course walking times for the team will be listed on the schedule, weather permitting.

**NO MOTORIZED VEHICLES ARE ALLOWED ON THE COURSE EXCEPT DURING THE EVENT ITSELF. VIOLATORS OF THIS POLICY MAY BE DISQUALIFIED FROM THE EVENT.**

#### **Fuel Efficiency Procedures:**

Calculation of fuel consumption will be made by the fueling officials and will be based upon the weight of the fuel consumed.

The vehicle starts the endurance event after being fueled to the 'full' mark. After completing the event, the vehicle returns to fuel station and is refueled. The weight of the fuel consumed is determined by weighing a fuel container, filling the vehicle to the 'full' mark, and weighing the fuel container again. The weight of the fuel consumed is the difference of the two measurements.

The 'full' mark is a clearly defined scribe line in the filler neck or sight tube as defined by Rule IC2.6.6. The vehicle will be filled to this mark before starting the heat and again upon completion of the endurance event heat.

At the fueling station, it is critical that visibility of the scribe line in the fuel filler neck is very clear. Also, no shaking of the vehicle will be permitted during initial fill (prior to Endurance event) nor final fill (after the Endurance event).

**Note: All vehicles must return for re-fuelling, even after as little as one lap to enable the calculation of the efficiency score.**

## FUEL & TILT TABLE EVENT

<b>Event Captains:</b>	Fuel - Herb Seubert	Tilt – Alba Colon
	Fuel – Mike Thodoroff	Tilt – Vince Bandurski
	Economy – Alba Colon	Tilt – Mark Scott
	Economy – Mark Scott	

<b>Dates/Times:</b>	<b>Fuel Station:</b>	Thursday, May 9, 2013	8:30 a.m. until 5:00 p.m.
		Friday, May 10, 2013	8:00 a.m. until 5:00 p.m.
		Saturday, May 11, 2013	7:30 a.m. until 6:00 p.m.

<b>Tilt Table:</b>	Thursday, May 9, 2013	9:00 a.m. until 5:00 p.m.
	Friday, May 10, 2013	9:00 a.m. to 5:30 p.m.

<b>Location:</b>	<b>Fuel Station:</b>	Next to Tilt across from G3
	<b>Tilt Table:</b>	In between Fuel and Noise

### **Description:**

For the FSAE Michigan competition, the fuel station will provide unleaded racing gasoline (93 and 100 octane) or E85 (ethanol). No other fuel or additives are permitted. All vehicles must indicate with a sticker, the type of fuel on or near the fill pipe (This sticker can be obtained at tech). Note: no vehicle will be provided with fuel until it has passed tech inspection. The first portion of a four-part sticker will be applied in a location near the front of the vehicle upon passing tech.

### **Follow specific safety guidelines while in the fueling area:**

1. Engines must be off; cars are to be pushed to and from fueling.
2. Only the vehicle push crew and the driver are allowed to enter the fueling station.
3. Only the driver, in a driving suit, with vehicle fire extinguisher in hand, is permitted in the area as fuel is dispensed.
4. A permanent line mark must be used to indicate the “full” level. **NO TAPE**
5. Tank is to be filled to this level each time fuel is received.

The first time the vehicle is fueled, the car must proceed directly (with the engine off) to the tilt table. The vehicle will be placed on the table with the tallest driver aboard fully suited, helmet buckled, gloves and all safety restraints secured. *The vehicle should be oriented on the tilt table where the fuel fill side is placed against the guard of the tilt table and is most likely to create spillage.* The table will then be tilted to an angle of 45 degrees. There must be no fuel (or other fluid) leakage at this angle. If the vehicle passes this test, the angle is increased to 60 degrees. This angle is used to represent a cornering force of 1.5 G’s. If the upper wheels remain on the table the vehicle passes. Some vehicles may lift one wheel. The Event Captain(s) should be consulted if this occurs. The person in charge at the tilt table must sign off on an inspection form, which travels with the car. A second sticker is applied (on the car) next to the first, to indicate passing the tilt table test. The vehicle is now free to proceed to the Brake & Noise area. Should the vehicle fail at either of the two angles, the car must be repaired and re-tested.

**Vehicles may be forced to return to tech inspection for re-certification at the discretion of the fuel station officials. This may be due to inability to provide a consistent fuel fill or due to a safety concern with the functional operation of the fuel system.**

### **Safety Guidelines for the Tilt Area:**

1. Engines off; push the car on and off table. Care must be taken to avoid damage to the vehicle when pushed on and off the tilt table.
2. Affix the safety strap to prevent vehicle from excessive lift while on table. Allow a little slack.
3. Be sure table is clear before raising and especially when lowering. Inform people in area when raising or lowering (e.g. “Coming Down”).
4. Use absorbent material to soak up leaks. (This may be obtained at fuel station).
5. Keep a fire extinguisher handy.

## PRACTICE TRACK AREA

**Event Captains:** Alba Colon  
Mark Scott

**Dates/Times:** Thursday, May 9, 2013 10:00 a.m. until 5:00 p.m.  
Friday, May 10, 2013 9:00 a.m. until 5:30 p.m.  
Saturday, May 11, 2013 8:00 a.m. until 3:00 p.m.

**Location:** The Practice Area is adjacent to the Dynamic Area just to the left at gate 50 (See site map in the Steward's Manual and Registration Package)

### **Description:**

The practice track is a relatively large (100x160 with cone barriers) open test areas designated by the event organizers to provide teams with an opportunity to conduct brief dynamic tests of their vehicle during the available hours of the competition. No vehicle will be permitted to enter the Practice Track unless it has a) passed Tech Inspection, b) passed the Tilt Table Test and c) passed the Brake & Noise Inspection Test. The vehicle will not be permitted on the practice track without the third tech sticker; no exceptions.

Each driver must understand and follow proper driving procedures at this facility. In addition, it must be understood that the Practice Track volunteers and SCCA officials are in control of the facility and adherence to their direction is mandatory.

Only one car at a time will be allowed at the Practice Track. At all times, drivers must be wearing complete and proper safety equipment and proper safety rules must be maintained. Once signaled to begin testing, the driver is free to perform any test maneuvers he or she feels necessary to evaluate the vehicle (within the limits of the track perimeter please.) One SCCA volunteer will be the "official" at the track and coordinate the beginning and end of each team's approximate 5-minute time limit. The official will use green and red flags or some other method of alerting the driver to the beginning and end points.

If during the course of dynamic testing the vehicle sustains some type of damage or **significant mechanical breakdown**, the vehicle will be required to exit the track and make the necessary repairs. The tech inspection sticker may be removed from the vehicle by a Practice Area Official thus requiring an additional Tech Inspection prior to participating in additional dynamic tests or events.

PLEASE NOTE – Operation of the Practice Event Area in **DAMP** conditions is at the discretion of the Captain of the specific area. See FSAE rules for tire use at specific conditions, Rule #B6.4.1 Also see Part D "Dynamic Event Regulations" Article 2 Weather Conditions and Article 3 Running in Rain for further clarifications.

### Safety Guidelines for the Practice Tracks:

1. Only one car at a time is allowed in the Practice Track area. The next car will not be permitted to enter the area until the last one has completed its exit.
2. Three (3) volunteers (preferably four (4)) will be on hand to manage the operation of the Practice Track.
3. Never place yourself in the line of travel of any car. Stay well away from the "hot" areas, always at a safe distance behind the hay bales/barriers.
4. Have fire extinguishers handy.
5. Use brooms and oil-dry as needed to keep the Practice Track clean and dry.
6. Any vehicle damage or contact must be reported to the area (station) manager(s). Additionally, remove the 1st tech sticker and report the car number to tech tent so car can be re-evaluated after repair.
7. Do not permit spectators to sit or lean on the hay bales/barriers surrounding the practice tracks.

## PRESENTATION EVENT

**Event Captain:** Adam Zemke  
**Co-Captain:** Dave Roberts  
**Date:** Thursday, May 9, 2013  
**Location:** MIS Suites

**Presentation Seminar:** Friday, May 10, 2013 at 9:30 AM in Main Tent  
**Presentation Highlights:** Saturday, May 11, 2013 at ~7:00 PM in Main Tent

### **Overview:**

After a year of planning, fabricating, and testing a new, prototype vehicle, each team aspires to sell their vehicle design to a make-believe corporation. The competitors in this event will be judged on their ability to create and deliver a business case that convinces the judges that the team's design best meets the demands of the amateur, weekend competition market, and that it can be profitably manufactured and marketed (see A1.2 in the 2013 Formula SAE rules for notes on Vehicle Design Objectives). The team that makes the best presentation will win the event and score 75 points.

### **The Presentation:**

Competitors are to make a presentation to upper level executives of an imaginary corporation. The presentation should tie together all factors that would influence the marketability, manufacturing feasibility and profitability of their design. It should include an understanding of the marketplace and target customer, and show how their team's design meets the requirements for each.

### **The Event:**

Each competitor will be assigned a 30 minute window and location. This includes the time the judges need to score. Judges may allow a team to begin early, but the completion time (30 minutes) should be strictly enforced. The presentation itself is not to last any longer than ten minutes, at which point the judges will stop any presentations continuing. A question and answer period of up to five minutes will immediately follow, wherein only judges may ask questions and only presenters may answer. The audience (usually team members) may not ask questions or make comments. It is allowable for a presenter to only participate in the question and answer section, however he/she must be a member of the 'presentation group,' as defined by S5.3.2 of the 2013 Formula SAE rules.

A team of two to four judges will grade the competitors. The judges will use the form in Appendix S-6 of the Formula SAE rules for event scoring: "Presentation Judging." This form breaks the scoring down into five equally weighted categories: Content, Organization, Visual Aids, Delivery, and Questions. A perfect score on the judges' form will be 50 points. The judges' combined score may be adjusted because some judging teams may grade, on an average, higher or lower than other judging teams. The competitor's final score will be calculated using the equation defined in the PRESENTATION SCORE section.

In an attempt to encourage commonality amongst static events, the 2013 Formula SAE Rules contain Section 3.1, the Business Logic Case. Presentation Event Judges are asked to use the Business Logic Case to judge whether the given presentation is appropriate for the market and business strategy that the team has identified. See Article 3, Sections S3.1 through S3.3 for a detailed description of the Business Logic Case.

### **Presentation Highlights:**

2011 marked the first year for an addition to the Presentation Event where the three top-scoring teams were required to publicly reprise their presentations. For 2013, the Presentation Highlights remain a non-scored event and will be held (tentatively) at 7:00 PM before the Saturday Awards Ceremony. The expansion of this event is an effort on behalf of the organizers to inspire creativity amongst competitors in subject matter that is typically not engineering curriculum-inclusive.

**PRESENTATION SCORE = 75 \* P<sub>team</sub> / P<sub>max</sub>**

If a team misses their allocated period, the team will receive zero (0) Presentation points.

**Presentation Tips from Previous Experience:**

- 1) Spell-check all visual aids, presentation tools, etc.
- 2) There is no dress code. However, bad first impressions are difficult to remedy.
- 3) Remember that equipment has been known to fail. Copies can be ruined in transit, etc. Consider alternatives in case something should go wrong. Each team is responsible for bringing their team's own equipment. Remember, extension cords can be important and laptop speakers may not project sound very well.
- 4) Have a team member record your presentation and the judges' commentary for your team's future FSAE efforts. Teams are allowed to have as many spectators that will reasonably fit into the presentation room. People not associated with the presenting team are allowed to view presentations only if the presenting school gives their permission before the start of the presentation. This includes news reporters and photographers.
- 5) The most technically knowledgeable person on the team may not be the best person to lead the presentation team. A team may want to choose someone who is a charismatic public speaker.

## SKID PAD EVENT

**Event Captains:** Steve Taylor & Laura Klauser  
**Date:** Friday, May 10, 2013  
**Time:** 9:00 a.m. until 12:30 p.m.  
**Location:** FSAE Dynamic Area

### **Event Concept:**

The goal of the Skid Pad event is to measure the vehicle's maximum cornering capability by measuring the total time required for the vehicle to complete one left hand and one right hand circle. The event is designed to focus on the vehicles suspension design characteristics and tune-ability for maximum lateral grip, and minimize the effect of driver reflexes during transitional maneuvers.

### **Event Format:**

Two drivers are allowed per car; two runs per driver. Each run consists of a driver completing two (2) right-hand laps immediately followed by two (2) left-hand laps of the course. Lap times will be recorded for the second lap of each the right-hand and the left-hand circle (the first lap of each is not timed).

If there are two Skid Pad Courses set up, each team must have two drivers in order to run both courses. Driver 1 will make up to two attempts on Skid Pad 1, and Driver 2 will make up to two attempts on Skid Pad 2. Both drivers MAY NOT run the same course. Times will be disqualified for the second driver in the event of both drivers completing the same course. If there are two Skid Pad courses and a team decides to only have one driver, the driver can only run on one Skid Pad course.

### **Scoring:**

Lap times will be recorded for the second lap of each circle for a given run on the Skid Pad. These times will be averaged together and added to any penalties and used to calculate lateral acceleration for each run. The fastest average time (including penalties) from either driver during any of the four (4) runs will be used to calculate a score for that vehicle.

### **Staging:**

Cars line up in the staging area. The first three cars in line are permitted to run their engines provided the driver is wearing a helmet and securely fastened. A person holding a Green Flag will motion a car to approach the starting line, which is located approximately 20 m (65.62 feet) from the timing line used for scoring. When the starter waves the green flag, the driver will approach the Skid Pad and proceed onto the RIGHT-HAND circle. After completing 2 laps, the driver must continue onto the LEFT-HAND circle and complete two more laps. After completing the second Left-hand lap (the fourth lap in total) the driver will exit the Skid Pad. After a drivers first run, they have the option of immediately taking a second run or leaving the staging area and running later in the day. In order to keep the event running in a timely manner, other teams can run Skid Pad in between a team's first and immediately second run. Each car must exit the staging area before changing drivers.

All cars must complete all Skid Pad runs by 12:30 p.m. There will be NO exceptions.

### **Penalties:**

- 0.25-second penalty per cone knocked down or out of position.
- DNF penalty for cars that go off course.
- DNF for cars that run an incorrect number of laps.

**No toolboxes and/or spare parts will be allowed in the queue area or staging lanes unless deemed necessary for starting the vehicle's engine.**

## TECHNICAL INSPECTION EVENT

### **Officials:**

Chief Technical Inspectors: Mark Muddiman, Jeff Lovell, Matt Johnson

### **Overall Procedure:**

Technical Inspection will be broken down into three (3) parts:

1. Checks of the all the drivers' safety gear and the "rain" tires. (This is where you will get your "take-a-number" for the Vehicle Checks part of Tech Inspection. Bring your Tech Form.)
2. Vehicle Checks, including checks with the tallest driver.
3. Driver Checks (helmet clearance, head restraint, seat belts and egress) for the remaining drivers and Cockpit Template Checks.

### **When:**

The Vehicle Checks portion of Tech Inspection will be open:

- Wednesday, 8<sup>th</sup> May                      From 12:00 p.m. until 7:00 p.m. (No new cars after 6.00 pm)
- Thursday, 9<sup>th</sup> May                         From 9:00 a.m. until 5:00 p.m.
- Friday, 10<sup>th</sup> May                          By appointment. See the announcer in Main Tent.
- Saturday, 11<sup>th</sup> May                        By appointment. See the announcer in Main Tent.

Take-A-Number and the safety gear and rain tire checks will open at 10:00 a.m. on Wednesday. **Teams should NOT line up earlier than 9:45 a.m.** The opening will be announced over the PA.

The checks for additional drivers will open on Thursday morning. If a driver is not at the track by Thursday, the team must contact the Chief of Tech to arrange for an appointment prior to their dynamic event.

### **Where:**

- For the Safety Gear checks, enter garage G2 at the southeast corner.
- For the Vehicle Checks, enter Garage G2 at the southwest corner.
- The checks of the additional drivers will be at the east end of Garage G2.

### **Procedure:**

You must have with you:

- The car
- The Inspection Sheet (Tech Form). Fill in the information in the top section.
- The push bar
- Copies of your Structural Equivalency Form, and if any, your Rules question e-mails
- The tallest driver with his/her full set of safety gear.
- The car on your "dry" tires. **Per Rule B.6.4.1, your dry tires are the ones on the car at Tech Inspection.**
- **The Impact Attenuator that you tested (Rule B.3.21.4)**

**Note: Only four (4) team members will be allowed into the actual Tech Inspection area. All other team members, the Faculty Advisor and other spectators will be required to watch from outside the inspection area. The Dynamic Passes will be used as the "pass" into the inspection area. Team members may rotate in and out of the inspection area as required as long as there are no more than four in the inspection area at any one time.**

When you pass Tech, the first part of the Tech Form will be retained by the Tech Crew and you will be given the first of three (3) parts of the inspection sticker. You should then proceed to the Fuel Station and the Tilt Table. The second and third parts of the sticker will be given at the Tilt Table and the Brake & Noise Test respectively. Only when you have all three parts of the Tech sticker will you be allowed to compete in the dynamic events or run on the practice track.

If you have items that need to be rectified, the Tech form will be returned to you (the team), you will not get your sticker, and you will have to present your car at Tech again.

**(Note: No car will be allowed to run on the chassis dynamometer (if one is available) until it has passed all parts of Technical Inspection and has been issued all three parts of the inspection sticker).**

## **TECHNICAL INSPECTION TAKE-A-NUMBER INSTRUCTIONS - 2013**

So that you do not have to stand or sit out in the rain or the hot sun while waiting to get into Technical Inspection, we will again be using the “Take-a-Number” system.

When your car is ready for Technical Inspection:

- Come to the area of Tech Inspection marked “Safety Gear Checks”.
  - Bring:
    - Bring all items listed under the "DRIVER'S EQUIPMENT" section of Page 1 of the Tech Form, AND
    - Your “rain” tires.
- You do not bring your car at this time.
- Once your safety gear and “rain” tires are approved, you will be given the next available numbered tag.
  - When finished with safety gear checks, you may return to your paddock with your tag and relax.
  - When your number is next, bring your car to the entrance of Technical Inspection.
    - Note: It is a team’s responsibility to keep track of how quickly cars are going into Tech Inspection. So have someone keep an occasional eye on how the numbers are progressing.
  - As you enter Tech Inspection, you **must hand in your numbered tag.**
  - If you miss your turn, you have a 30 minute grace period to present the car for Tech before you have to take another number. The 30 minutes starts from the time the team with the next number goes into Tech Inspection. If you miss this window, you have to return your “old” tag and take a new number.
  - If you (a team) expect to have a time conflict with a Static Event (Design, Cost or Presentation), please be aware that the Static Event has priority. If your vehicle is currently undergoing Technical Inspection, but you need to leave to attend a Static Event, simply inform your Inspector. You will be allowed to remove your vehicle from the Technical Inspection area, and can resume Technical Inspection later.

## 2013 FSAE Technical Inspection - Review for Teams

**Introduction** - The goal of technical inspection is to confirm that your car complies with the requirements and restrictions of the FSAE Rules. The technical inspectors want you to pass tech and will clearly identify any areas of non-compliance that must be corrected.

The inspectors' goal is to thoroughly finish your inspection and to do it as quickly as possible. Your team can make that happen – and make inspection easier on yourselves - by being prepared.

Although inspection of IC and EC vehicles has the same goal the process and sequence of steps are slightly different.

### **Here are some things that will help you prepare for tech:**

**Design Requirement - Visibility** – Remember that everything the inspectors will examine must be visible to the naked eye (Rules T2.5 and S2.2.1). If any component that needs to be inspected is not visible then you will be required to modify your vehicle to make it visible. That requirement applies no matter how difficult or time consuming the modification may be. We advise you to consider visibility when you design your car.

**Self-inspection** – Teams must self-inspect their car and determine that it complies with the Rules before bringing it to tech inspection (Rule S2.3). Use the tech inspection form found on the FSAE website during your self-inspection. If you have a question about how a rule will be interpreted ask yourself the following: (1) what is the purpose of the rule? Every rule has a purpose which should be readily apparent. And (2) is what we've done a "good engineering practice?"

It's each team's responsibility to properly prepare and self-inspect their car. If the inspectors discover a large number of rule violations, or an incomplete self-inspection, then they may suspend their work and send you back to your paddock to make corrections.

We can't stress this enough: use the tech inspection form and do a point-by- point inspection of your car.

**Tech Inspection Schedule** – The technical inspection schedule will be posted on the competition website. Inspection usually opens on the afternoon of the first day and runs through the second, static events, day. Check the schedule for opening and closing times.

Tech inspection is also available on the first day of dynamic events. However, there will be a smaller number of inspectors on-site and you'll need to schedule an appointment before bringing your car. To schedule an inspection on Friday, come to the inspection area. The key is to keep the inspectors informed about your car's status so that they can be prepared when your car's ready for inspection. For example, if you're planning to work late on Thursday and want to be inspected early on Friday, tell the inspectors on Thursday.

Remember – Have your car completed and ready when you come to inspection.

**Inspection Order** – To reduce congestion at technical inspection vehicles may be scheduled for inspection using an inspection number system. Numbers may be released by a "take-a-number" process or pre-assigned. Under the inspection number system all you need to do is to be at tech when your number is called. (It works like the "take a number" system at the deli counter.) Upcoming inspection numbers will be announced over the PA system. However, it also helps to keep an eye on which numbers are being inspected.

Inspection sequence numbers will either be: (1) issued during driver's equipment inspection, or (2) pre-assigned and published on the competition website.

If your car isn't ready when your number is called, you'll lose your position and go to the back of the inspection line.

Check the competition website for the tech number process at your competition.

**No Inspection on Saturday** – Tech inspection ends at 5:00 pm on Friday. Teams that have not finished tech inspection and been awarded all parts of the sticker by that time may not run on Saturday. On Saturday, Tech Inspection is limited to re-inspections ordered by the officials.

**Tech Time** – The initial mechanical inspection of your car will typically take between 45 and 60 minutes. EVs will start the tech process with electrical inspection which will take an additional 45 to 60 minutes.

**Rules Question Documentation** – If your team submitted a rules question and received an interpretation from the Rules Committee, bring copies of both the question and answer with you to technical inspection. Without your copies, the inspectors won't know the Committee's interpretation and will make their own.

**Structural Documentation** – All teams are required to submit a structural document *even if* your frame does not deviate from the rules. Reference: Rule T3.9 - Structural Equivalency Spreadsheet (SES), Rule T3.27 - Composite Space Frames, T3.31 – Monocoque Laminate Test and Rule AF2 - Structural Requirements Certification Form (SRCF).

You **must** bring copies of (1) your complete structural submission with all supporting documents; (2) any approvals received from the officials and (3) any correspondence concerning your documentation. The inspectors may NOT have records of your documentation and won't know what's been approved. It's your responsibility to bring all your documentation.

**Impact Attenuator Test Piece** – Bring the Impact Attenuator Test piece, Rule T3.22.4 “Impact Attenuator Data Requirement.” Also bring copies of your Impact Attenuator Data report and any related correspondence with the officials.

**Monocoque Test Specimens** – Monocoque builders must bring the test pieces required by Rule T3.31 “Monocoque Laminate Testing.”

**Restrictor Check** – During inspection you'll need to disassemble your intake system to allow a no-go gauge to be inserted into the throat of the restrictor. You'll need to bring the tools required for disassembly with you to inspection.

**What to bring to Tech.** - The following items must be brought to tech inspection under Rule S2.4 “Items to be Inspected”:

- Vehicle
- Dry and wet tires
- Driver's equipment including helmets, suits, gloves, eye protection, hair protection equipment, socks, and shoes for all drivers (Note: This includes your wrist restraints.)
- Fire extinguishers
- Push bar
- Structural document copies and supporting documentation or test pieces
- Technical Inspection form
- FSAE Electric – Copy of your ESF submission
- FSAE Electric – Copy of your FMEA submission
- FSAE Electric – The items listed in EV8.3 and EV8.4
- All of your team's drivers

Additionally you'll need:

- Impact attenuator test piece
- Monocoque test specimens – if applicable
- Tools to disassemble any parts of the car that the inspectors want to examine. This includes accessing your restrictor, removing body panels or any parts that are blocking inspection and to allow examination of your EV systems.
- Copies of your team's rules questions and Committee's answers
- Material to record the inspectors' comments

**Driver Egress Test** – The driver egress test, Rule T4.8, is part of technical inspection. Drivers must press the cockpit master switch during the egress test.

**Re-inspection** – If your vehicle doesn't pass tech, the inspectors will identify the items that must be brought into compliance. When you've completed the corrections, the inspectors will examine the items that did not comply. Re-inspections usually take from 2 to 20 minutes depending on the number and complexity of your changes. There may be a separate tech line for re-inspections.

**Inspection Sticker** – The IC technical inspection sticker has 4 parts – 1<sup>st</sup> Mechanical Tech/Scrutineering (Rules Part T), 2<sup>nd</sup> Tilt (Rules T6.7.2 and T8.5), 3<sup>rd</sup> Noise Test (IC3.2) and 4<sup>th</sup> Brake (Rule T7.2).

The EV technical inspection sticker has 5 parts - 1<sup>st</sup> Electrical Tech (Rules Part EV), 2<sup>nd</sup> Mechanical Tech (Rules Part T), 3<sup>rd</sup> – Tilt (Rules T8.5 and T6.7.2), 4<sup>th</sup> Rain Test (Rule EV7.3) and 5<sup>th</sup> Brake (Rule T7.2).

Refer to Rule S2.7 “Inspection Process” for complete details.

**Tilt Table** – After your car has passed the technical inspection part(s) it will be tilted. IC cars must proceed to the fuel station where their tank will be filled. Then proceed to the tilt table where your car will be checked for fluid leaks and stability.

**Noise Test** –For IC cars: After you receive your tilt sticker, proceed to the noise test. If your vehicle doesn't have a tachometer, you'll need to bring a PC to allow the inspectors to monitor your engine RPMs during the test.

For EV Cars: Your Ready-to- Drive sound (Rule EV4.14) will be measured.

**Switch Tests** – The master switch tests are conducted after noise and immediately before the brake test. The tests confirm that your master switches work properly.

**Brake Test** – The brake test is the final step in the inspection process. The test consists of accelerating your car down the test course to the brake point and then slamming on your brakes. All 4 wheels must lock and the car must stop in a reasonably straight line. If you fail to lock you'll have to try again, and possibly make adjustments, until you pass.

**Operating Permission** – Once your car has received all parts of the tech sticker it is allowed to run under power on the practice track and in the dynamic events.

**Sticker Removal** – If the officials believe your car may be out of compliance, they can pull parts of your sticker and send you back for re-inspection. As example, if a hole appears in your muffler you'll lose the noise part of the sticker until your noise will be retested. If a wheel comes off during acceleration, we'll pull the mechanical part of your sticker and you'll have to go back to tech.

**Failures after Inspection** – If your car is involved in an accident or suffers a significant failure it must be re-inspected. As example, if part of your suspension collapses or you hit a barrier, the mechanical part of your sticker will be pulled and you must have your repairs re-inspected. Re-inspections examine only what you've fixed and shouldn't take very long.

**General Comment** – The Technical Inspectors want to assure all competitors that we would like every team to pass tech inspection as quickly and easily as possible. Many inspectors are former competitors and we know the amount of time and effort you have invested in completing your car and preparing it for the competition. Tech takes longer when we have to explain non-compliant items and the process is quicker if everything complies. Please make inspection easy yourselves, and on us, by understanding the rules, pre-inspecting your car and being prepared.

### ***Notes for Rookie Teams***

- 1) *Good Plan - Here's a quote from a very experienced team: "We passed all three parts of tech on our first attempt, because we specifically built the car so it would pass. If you don't pass tech - you can't run your car." Their plan worked, you may want to try it.*
- 2) *Questions - If you have questions: ask. The officials, inspectors, judges and volunteers will be happy to answer your questions. Don't hesitate to ask questions.*
- 3) *Rules Questions – Submit technical questions through [www.fsaeonline.com](http://www.fsaeonline.com) If you are unsure – ask, do not try to guess the answer, you may guess wrong.*
- 4) *Assistance - If you need help: ask. You'll find the other teams at the competition are very willing to provide advice and assistance. The announcer will be happy to make your request over the P.A. system.*
- 5) *Be Prepared - Although there's no limit to the number of times you can take your car back to tech, as a practical matter the quicker you get through the more time you'll have for the other parts of the competition.*
- 6) *Know the Rules - Read the rules again. Understanding the rules is critical to success.*

FSAE Tech Review, Revision 7, February 18, 2013

## Special Thanks to the 2013 Sponsors



### Friends of Formula

