SAE DETROIT
An SAE International Section

Formula SAE Workshop Abstracts

2015 Rules Changes – This presentation will cover major changes to the 2015 rules for Formula SAE IC and electric cars, and for Formula Hybrid. It will focus on changes that effect the design of cars and some subtleties that might not be very apparent.

AERO – Low speed aerodynamics has been leveraged successfully on racing vehicles to increase performance since the 1960s. Formula SAE allows unpowered aerodynamic devices, and the competitor who understands the interaction of the racing vehicle and the fluid it moves through will maximize the value of the structure added specifically for aerodynamic aid. Topics covered include tire response to normal force, vehicle performance with variable tire normal force and drag, aerofoil design, Reynolds number effects, and FSAE rules regarding aerodynamic devices.

Business Logic Case – This presentation will provide a brief description of the business logic case submission requirements and its intended use. It will cover the basic premise of the business logic case and how it is used by judges for the Design Event, Presentation Event, and Cost Events both before and during the Formula SAE Competition.

Competition Overview – Will introduce students to the lead staff at Formula SAE Michigan, Lincoln, and Formula Hybrid. The presentation will also outline the basic schedule at all three events, and teams will be reminded of how and where to submit their questions about the rules.

Design Considerations – This presentation is intended to provide a high level overview of the design process as applied to Formula SAE with an emphasis on engineering based decisions. The material is presented from the perspective of the chief design judge and shall provide basic philosophies of good design practices, while also noting specific areas where teams commonly fall short. The targeted audience for this session is the novice-intermediate Formula SAE competitor that focuses on foundational aspects of vehicle design and Formula SAE decision-making.

Electrical Design Practices – Designing a good high voltage tractive system is an interdisciplinary challenge that usually is not covered in the classroom. A good tractive system requires both electrical and mechanical engineering techniques. This presentation will cover some design techniques and common problem areas for designing the tractive system in your Formula SAE Electric or Formula Hybrid car. Students will get advice from technical inspectors on how to build a system that is safe, reliable, and inspect-able for their car.

Fasteners-The Basics – This review will cover basic joint and fastener design, and assembly factors that influence reliability. Topics will include basic parameters, joint loads/stresses, the torque tension relationship - controlling factors, variability, the differences between commercial hex head bolts, socket head cap screws, and aerospace bolts; grip length effects, and the loosening mechanism. These factors can be

combined to provide key insight on how to generate and maintain high clamp load for improved fatigue and self-loosening resistance in the design of bolted joints.

Powertrain – This session will provide an opportunity for teams to interface with a seasoned powertrain judge that will provide a focused emphasis on powertrain design and development. It will include a brief presentation that will provide a high level overview for major powertrain considerations touching on fundamentals most relevant to Formula SAE engine performance and development. Time will also be dedicated to fielding questions from student participants. Discussion time shall be largely directed by student initiated questions on engine/powertrain topics in an attempt to best satisfy the specific interests of participants.

Sponsorship Overview – Sponsorship is one of the most important parts of the Formula SAE experience, as without it, programs cannot exist. The sponsorship overview will highlight the keys of attracting and retaining sponsoring partners of your Formula SAE team. We will look at relationship building between your team and your university, areas where your team can provide benefits to partners, and how to cultivate and maintain these relationships.

Suspension and Steering – This session will provide an opportunity for teams to interface with a chassis/suspension design judge allowing a more focused emphasis on suspension and steering design and development. The scope will include the path from the working contact patch to the steering wheel. It will include a presentation that will describe a design and development approach with time being dedicated to field questions from the student participants. Discussion time shall be largely directed by student questions in an attempt to best satisfy the specific interests of participants.

Team Organization – In this presentation students will learn how to start, build, maintain, and make their Formula SAE team successful. It will include a review of membership and recruitment strategies, and a group activity where students will design their own mock Formula SAE team. This presentation will direct students towards high achievement that teams aim for when preparing for the Formula SAE Competition.