



## SENIOR DESIGN PROJECT SYNOPSIS – SPRING 2014

### Development of the 2015 Formula SAE Chassis and Suspension

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**Team 9: Alejandro Diaz, Ricardo Gonzalez, Osvaldo Fernandez, Christian Ramos**

**Faculty Advisor: Dr. Andres Tremante**

The Society of Automotive Engineers (SAE) is an international professional organization that concerns itself with the development of technical standards based on best practices for all industries that concern transportation and propulsion. Aside from this, SAE International also hosts various collegiate design competitions that allows engineering students from across the world to design, manufacture, and compete and learn from each other. The Formula SAE (FSAE) competition, in particular, focuses on a hypothetical situation where the universities are small companies that are seeking to design and manufacture an open wheeled formula racecar geared towards the average weekend racer. Thus, the competition centers around team building and structure, and the main themes are in dealing with engineering challenges such as cost effective design, maximizing vehicle performance while maintaining efficiency, and the communication of ideas. In a global scale, the FSAE competition provides an environment that allow students from universities around the world to foster relationships with each other; thereby exposing a student to a variety of different cultures. Also, the nature of motorsports technology centers around making more power and performance for less, thus favoring designs that are lighter and stronger to reduce fuel consumption and emissions.

The scope of this project concerns with only the design and manufacture of the chassis and suspension for the vehicle that will be FIU's entry in the 2015 competition. In doing so, the first step in the design process is to consider the characteristics of the vehicle that will perform best for the types of courses in the FSAE competition. After this step, performance data for all of the tires available for FSAE will be analyzed in order to select the tire compound that will best match the intended vehicle's characteristics. Afterwards, the suspension geometry and pick up points will be designed in order to best maximize the capabilities of the tire. Finally, the chassis of the vehicle will be designed around these suspension pick up points, and the stiffness of the chassis will be designed with the necessary amount of torsional rigidity to ensure that the suspension performs as intended and that the vehicle's dynamics and handling characteristics are predictable. FEA analysis will be done on all components to validate design before manufacturing.

The manufacturing process will be mostly done using the machines available at the Engineering Center. The tubes for the Chassis will be outsourced for laser notching and bending, but will be welded in house. The suspension tubing will also be purchased and done in house. Funding for this project will mostly come from the sponsorships FIU SAE has attained during the course of the program.

Although the other systems of the FSAE vehicle, i.e. the engine, drivetrain, brakes, etc. are not within the scope of this project, they will be designed alongside the chassis by other members of the FIU SAE team due to the fact that they are integral to the vehicle as a whole.