



SENIOR DESIGN PROJECT SYNOPSIS – SPRING 2013

DEVELOPMENT OF A FORMULA SAE BODY

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The Florida International University Formula SAE team wanted to build their second prototype vehicle. One of the biggest defects of last year's car was the body built. It was a last minute design and manufacture because of the lack of human power. Also, no analyses were done respecting the study of aerodynamics. Since the majority of our senior group were involved in the development of last year's car, we decided to approach this problem. Therefore, our mission is to develop a body for the new prototype with the proper study and taking into account several factors to present an optimum body model as a final result. These factors include, but are not limited to, weight, cost, drag resistance and aesthetics.

The following project is divided into three phases, *design* (or modeling), *analysis* and *manufacturing*. First, on the *design* stage, a mock-up of the vehicle body and diffuser will be modeled in SolidWorks. Subsequently, several iterations of shapes and sizes will be modeled. Finally, a design is going to be chosen based on the results of phase two. For phase two, *analysis*, several designs are going to be initially tested using SolidWorks as the preferred CAD software due to the convenience of easy availability. Both Finite Elements Analysis (FEA) and Computational Fluid Dynamics (CFD) simulations will be performed to ensure the best performance of the final design chosen based on some previously set goals. For the third stage, *manufacturing*, several molds are going to be machined in sections due to the apparatus limitations on ISO-C1, two pound density foam using a CNC routing machine, then sanded, glued and assembled together and then prepared in order to lay the carbon fiber. Later, after sanding the grooves left by the spraying of tooling gelcoat, several coats of sealer, polishing compound, and other release agents will be used to ensure a smooth mold, which translates to a smooth and pleasant looking part. Subsequently, a HI-UV clear gelcoat is going to be sprayed for shininess and left to dry; the carbon fiber will then be laid onto the molds and saturated with Vinylester resin, the layers will then be removed to reveal the final product. Finally after carefully choosing an optimal design and after the completion of its manufacturing, the physical body will be tested in the FIU WOW wind tunnel.

Another important factor to take into account is funding. First of all, we aimed to minimize personal out-of-pocket expenses. Also, to develop a sponsorship proposal package to approach companies and obtained sponsorship opportunities. Another source of income will be to attend several fundraising events hosted by FIU SAE. The expected product is to be appealing to the eye and to increase the performance of the vehicle. Also, we would like to be able to accommodate the predetermined budget while maintaining a highly competitive level.