UNH Precision Racing - Formula SAE Team
2009 - Car #86

The Formula SAE competition is an annual event sponsored by the Society of Automotive Engineers where students from all around the world work to conceive, design, fabricate, and compete with a scaled down version of a Formula style racecar. The car is designed with the amateur, weekend motorsport enthusiast in mind. The car is designed for high performance acceleration, braking, and handling. The car must be low in cost, easy to maintain, and reliable to fit a weekend enthusiast’s time and budget constraints. Its marketability is enhanced by factors such as aesthetics, comfort and use of common parts.

Suspension:
A suspension simulation program called WinGeo was used to iterate the location of the suspension points. By simulating the suspension movement, we were able to minimize roll center migration and determine the motion ratio between the wheel and shocks. Critical components were also subjected to finite element analysis to be sure they would not fail during operation.

Aerodynamics:
The bodywork of Car 86 is designed for function and form. Large side pods and external cooling ducts on top of the pod allow more airflow and higher cooling capacity for the radiator and engine. The nose cone is designed to reduce drag and the conduction heat due to sharp edges perpendicular to airflow. To the right are two screenshots of the 3D model testing done using SolidWorks FloXpress. The bottom graph is data collected from wind tunnel tests showing Drag vs. Speed.

The controls team creates the driver interface for the car. Excel and MathCAD programs were used to simulate static and dynamic conditions of braking. All the components designed undergo a long process of computer testing, (including finite element analysis) and are compared to actual lab experiments.

Engine and Drive Train:
All the air flowing into the engine must pass through a single 20mm diameter air restrictor. SolidWorks FloXpress was used to optimize flow through the restrictor and intake to allow sufficient flow for the rest of the engine components. The housing was analyzed with ProMechanica to ensure it would not fail under any condition.

Electrical:
The electrical portion of Car 86 was designed with the driver in mind. The data to change is simple, yet valued information that consists of vehicle data acquisition, traction control, and an intuitive gauge cluster. All wiring was done done, as to minimize weight and increase the reliability of the system.

The bodywork of Car 86 was designed using ProEngineer and SolidWorks. The frame was designed using Pro-Engineer and the car’s frame was assembled with 6061-T6 Aluminum. The bodywork of Car 86 is designed to be visually pleasing and easy to maintain. The bodywork is designed to reduce drag and the conduction heat due to sharp edges perpendicular to airflow. To the right are two screenshots of the 3D model testing done using SolidWorks FloXpress. The bottom graph is data collected from wind tunnel tests showing Drag vs. Speed.