



TEXAS A&M

FORMULA SAE ROLL-OUT

// Monday, March 13, 2017 //

Formula SAE (Society of Automotive Engineers) is an international design competition in which 500 student teams from across the world design, fabricate, test and compete with formula-style racecars.

Texas A&M and Formula SAE

Texas A&M University's Formula SAE is a senior design project within the Department of Mechanical Engineering. The project is driven under the concept of a fictional engineering company – Texas A&M Racing – that develops a racecar for a specific consumer base. Every August, 20–25 senior engineering students begin working on their car and don't stop until the following June when they compete in Lincoln, Nebraska, against 80 other schools from across the country. Texas A&M is one of the few schools that begins each competitive year with a brand new team of students, engineers that have never built a racecar before.

The team is further broken up into five sub-teams:

- **Aerodynamics Team:** responsible for the nosecone, front and rear wings and aerodynamic devices.
- **Chassis Team:** in charge of the frame design, driver ergonomics and all tabs required for assembling the entire car.
- **Electrical/DAQ Team:** responsible for data acquisition and wiring harness.
- **Powertrain Team:** in charge of the engine, power transmission and drive train.
- **Suspension Team:** responsible for the vehicle's suspension, brakes, wheels, tires and steering components.

Each sub-team is responsible for researching, selecting, manufacturing and the testing of their respective components while maintaining constant communication between sub-teams to ensure one cohesive final product. Students that participate gain invaluable experience in communications, management, engineering design and manufacturing – all while delivering a safe, reliable and high-performing vehicle.

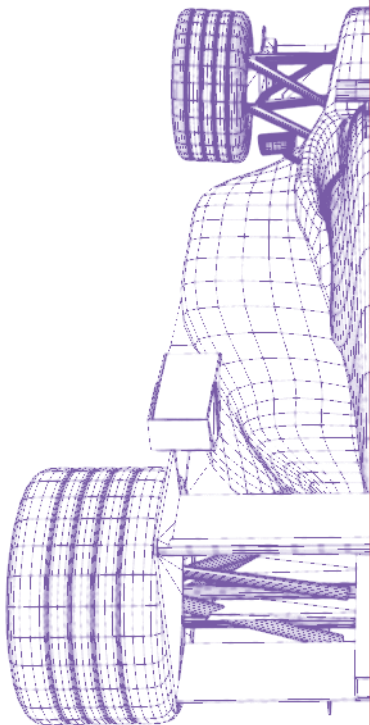
FORMULA SAE ROLL-OUT *(continued)*

The project is broken into three distinct phases:

DESIGN: Students begin the entire process by first designing their vehicle. Each sub-team starts with researching all of the components required for their systems. Based on this research, major decisions are made (such as suspension type, engine selection and frame model) to maximize power, strength, stiffness, down-force and cornering capabilities while minimizing cost and weight. Once these decisions have been made, sub-teams begin designing each component using 3-D modeling software, keeping in mind manufacturability. Eventually, a full car assembly emerges and manufacturing can begin.

MANUFACTURING: Once designed, material is ordered and building begins. Most of the engineers working on this project have had little to no formal training in manufacturing before starting this project. From steel and aluminum welding, CNC milling and carbon fiber layups to drilling, grinding and turning, and everything in between, students must learn the processes as they go. They spend their winter break and the first part of the spring semester building and assembling the car to get it ready for testing. Here they learn exactly what it takes to make a design go from the computer screen to a final, manufactured product.

TESTING & COMPETING: Once the car has been built, the students spend the remaining project time testing and fine tuning the car to get it ready for competition. This phase serves two main purposes. One is to locate potential problem areas with enough time to fix them, and the second is to allow the drivers to practice and provide feedback. Once in Nebraska, the vehicle undergoes an extensive technical inspection before proceeding to the Static and Dynamic Events. The Static Events include a Cost Report, Business Presentation, and Design Judging. Here, the engineers present the cost of each component of the car, provide a marketing strategy for selling the vehicle, present the overall design of the car and defend the choices made between performance, cost, and manufacturability. The Dynamic Events include an Acceleration Test, Skid Pad Test, Autocross Event, Fuel Efficiency, and an Endurance Race. These events exhibit how quickly the car can accelerate and decelerate, the cornering capabilities, fuel efficiency and if the car can be driven at peak performance for an extended period of time. This is where all the months of hard work come to fruition.



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About the Department:

Mechanical engineering is one of 14 departments in the Texas A&M University College of Engineering. Among public institutions in the nation, our undergraduate and graduate programs are each currently ranked 8th according to U.S. News World & Report. Through the curriculum, our department strives to prepare our undergraduate and graduate students for careers in traditional mechanical engineering fields as well as careers in cross-disciplined areas in research, academia and industry.