

FAST CHARGE

Italian students overcome many challenges to build an electric car.

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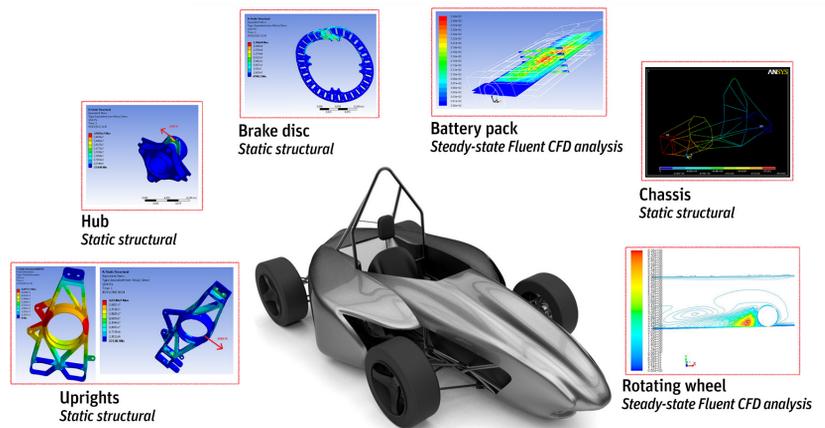
Developing an electric car presented many new (as well as old) challenges for the student team from Sapienza University of Rome. The university team had participated in formula combustion events for many years, but it chose to move to the electric and hybrid division in 2013 and call their team Fast Charge. The name was adopted because the car could be charged with a 43-kW plug-in device developed by the main sponsor, ENEL. The team was tested to develop the lightest and best-possible structurally performing car while conducting trade-offs among a number of factors.

Simulation helped Fast Charge to design the electric car, and 10 of the 20 team members employed ANSYS engineering simulation. They used ANSYS structural tools to design and optimize the steel wireframe chassis, hub, uprights, brake discs, steering system, transmission pulley and battery pack container structure. The team leveraged ANSYS Fluent computational fluid dynamics software to optimize the gap between the battery pack cells by simulating both 2-D and 3-D thermal-fluid behavior. In addition, students designed the electric motor and inverter cooling using Fluent simulations of the open car. By better understanding the car's aerodynamics, they optimized the radiator dimensions and position.

The team accomplished many major goals. It developed a very light and powerful car with an overall weight of 238 kg — a very good result for a steel wireframe electric car. Vehicle dynamic performance was improved by optimizing the chassis stiffness where needed and decreasing unsprung mass weight. Team Fast Charge also reduced the battery pack dimensions as well as the battery pack cooling system's power consumption.



Fast Charge team's electric car



Simulation performed in designing electric car

Although the team was unable to compete in the 2013 event, members learned about motorsport engineering, organizing a team, and using powerful software and tools to understand, design, model, optimize, build, test and drive an electric race car. This is an extraordinary and rare opportunity for an engineering student. ▲

Learning and Making Engineering Fun
Every year, students around the world use simulation in engineering competitions that are not only fun but prepare them for future careers.

