

# Delft University of Technology Racing

Academia Case Study



## Challenge

Students at the Netherlands' Delft University of Technology needed to design and build a superior electric car to win the prestigious Formula Student competition.

## Solution

The students used Dassault Systèmes 3DEXPERIENCE technology, including CATIA Version 6 for virtual product design, SIMULIA Abaqus for analysis and simulation and ENOVIA Version 6 for collaboration and data management.

## Benefits

With the 3DEXPERIENCE Platform, TU Delft students made many improvements over their previous model and brought the championship title home along with numerous other awards.

## Global design competition

As a testing ground for the next generation of world-class engineers, Formula Student ranks high. In 2012, 468 universities and colleges from all over the world took part in this challenging and highly competitive event. To participate, students must design, build, test and drive a formula-type racing car as well as create an associated business plan for potential investors. Entries are judged on characteristics such as speed, design, safety, reliability, and cost.

## Repeat winner

Ranked number one and a multiple winner of Formula Student in the past, the Delft University of Technology (DUT) racing team once again repeated history, finishing first in the electric car category of the Formula Student Germany (FSG) race in Hockenheim, Germany. The team, composed of 70 students, competed with an electric-powered vehicle, the DUT12 that they designed and built in their spare time.

For the students, the DUT12 project began in September 2011. The design and 3D mock-up of the vehicle were presented in December of the same year. The car won first place in the 2012 Hockenheim race

for design, cost, overall dynamics, and acceleration, in addition to bringing home the much sought after overall championship title. "During the acceleration event, we pulverized the previous record, clocking only 3.45 seconds over 75 meters from standstill," Richard Kruithof, chief engineer, TU Delft exclaimed. "It was a great moment for the team and proof that our four-wheel drive design was a success."

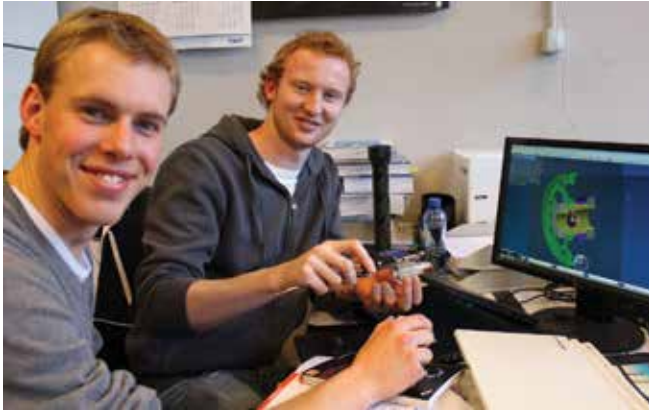
Based on their first model, which was entered in last year's competition, and lessons learned from that race, the students designed and built, from scratch, a new electric car with numerous innovative improvements. They got a boost from the latest versions of Dassault Systèmes' (3DS) 3DEXPERIENCE Platform for the entire development process. "We made numerous improvements to last year's design with the 3DS applications," Richard Kruithof said. "With respect to the car's weight, for example, a lighter car is generally more energy efficient and performs better while accelerating or braking," Kruithof explained. "For electrically powered vehicles, an additional constraint is having to use batteries that are as lightweight as possible," he continued. "This year, the DUT12 weighs only 145 kilograms, over 20 kilograms less than last year's model. We used SIMULIA Abaqus to calculate the excess material that could be removed without sacrificing performance. We relied on CATIA Version 6 for the design of the vehicle in 3D and ENOVIA Version 6 for data management and collaboration between the 70 students involved in the project," he said.

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*"The experience of working with the other students toward a common goal – winning this race – was one of the most rewarding and important aspects of this project for us."*

**Richard Kruithof, chief engineer,  
TU Delft.**



rewarding and important aspects of this project for us. The 3DS applications streamlined collaboration during the design phase of the project and were instrumental in helping us keep track of everyone's progress. We were also able to detect potential design problems early, which saved us a lot of time. As a matter of fact, everything that was not designed in 3D with CATIA eventually ran into problems that we had to spend time correcting, resulting in a much longer assembly phase than expected. With the **3DEXPERIENCE** Platform, we were able to precisely simulate and validate the correct functioning of the car's parts before actual assembly, rendering the entire production process smoother than in previous years," Kruithof said.

### Challenging and educational project

The design project provided participants with a valuable learning experience. A core team of ten students even put their studies on hold for an entire year so that they could dedicate all their time and energy to the project. The other 60 students came from the various disciplines required for the project.

For their efforts, the TU Delft team collected a total of 14 awards in the 2012 editions of the Hockenheim and Silverstone, UK, competitions. With a capacity of 144 hp, separate-wheel drive to perfectly negotiate all bends and turns and a 0-to-100 km/h

acceleration in 2.4 seconds, the students once again proved the superiority of their design. "Now that we have savoured our victory, we look forward to next year's races. The next step is to transmit our know-how to the DUT13 team which will hopefully break more records and bring home the title once again. One thing is for sure, they already have a head start with the DUT12 3D digital mock-up," Kruithof predicted.

### Focus on DUT Racing

DUT Racing is an on-going student project of the Delft University of Technology to design and produce an electric race car every year. The DUT Racing team has participated in the Formula Student competition since 2000, first with combustion cars, and since last year with an electric model. The team won the Hockenheim event in 2008, 2010, 2011 and 2012.

**For more information**  
<http://dutracing.nl>



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