



15 August 2008

It's virtually car development

15 August, 2008

The design and virtual prototyping capabilities of CAD software is helping in the development of vehicles while promoting careers in engineering in a move to overcome the skills shortage in the manufacturing industry.

Developments in CAD software in recent years are enabling designers to carry out 'digital prototyping' which enables them to validate their designs on screen and therefore minimise the need for physical prototypes. While this is of benefit throughout industry for the development of products, an application by Newcastle University's racing team – Newcastle Racing 5 – gives a good example of the results it can provide.

Each year, the team competes in the Annual International Formula Student Championship at Silverstone – a competition run by the Institution of Mechanical Engineers (IMechE) in partnership with Airbus, Autodesk, Honda Racing F1 Team, Learning Grid, National Instruments, RS Components and Shell. It is designed to promote careers and excellence in engineering, by challenging university students to design, build, develop, market and compete as a team with a small single-seater racing car.

The Newcastle team's project is sponsored by local Autodesk reseller, Imass, which supplies Autodesk solutions to the university as a whole, and gives the team access to the latest software, as well as free licences for student use off-campus.

Digital prototyping

According to the company, the Inventor software provides sophisticated digital prototyping, so that complex, accurate models can be 'built' on screen and viewed in 3D. The resulting digital prototype enables users to validate design and engineering data as they work, minimising the need for physical prototypes and reducing costly engineering changes that might otherwise be discovered after the design has been sent to manufacturing.

Capabilities for the University team include the ability for the various project members, each of whom is responsible for their own part of the car's design, to work concurrently on an up-to-date version of the virtual model. This in turn can be visualised in great, accurate detail, with the knowledge that if one aspect of the design is changed, the knock on effect will be dynamically calculated and redrawn across the model as a whole.

The ability to work concurrently on different aspects of the design has been pivotal to turning the project around so quickly, says Jack Hale, the academic supervisor overseeing the project. He said: "Creating an entire car is a very complicated project. Without Inventor it would have been very difficult. The software enables everyone on the team to see all the same information in one place, on the same model, and to work on their own parts of the project even if this will have a knock-on effect on other aspects of the design. All of this is taken into account automatically."

Of additional benefit was the ability to simulate any component by entering all the material properties, which enabled them to see real colours, texture, stress analysis and the interaction with all the other components. This ensures the finished product will work first time.

He adds: "In the old days, you would have had to go through the long, tedious process of producing costly

prototypes. Now, the first device we produce is the device. The team hasn't had to waste time producing drawings on paper, either. We can simply print them out and send them off, or email them to third parties – for example, the manufacturer laser-cutting the components for the main chassis. This makes it easy to create parts lists ahead of time and order materials, right down to bolts, fixings and fasteners, getting all of these lined up for when they are needed.”

The efficiency gains enabled by Autodesk Inventor meant the team had plenty of time left over for serious testing, it explained.

Helping with skill shortages

Colin Watson, business development director at Imass, recognises the importance of competitions such as this for the manufacturing industry as a whole. He says: “Although we are delighted to be providing our support and sponsorship to the Newcastle University racing team, the rationale behind it is much more practical. Talking to our customers on a daily basis, the one common pain point for them is the major skills shortage in the manufacturing industry.

“This competition is an excellent approach to getting students to unleash their creativity, make manufacturing design exciting – they are able to experience the entire process from concept to final, manufactured product – and importantly intensively use and experiment with real-world software applications.”

He explains that this goes a very long way in preparing the next generation of mechanical designers for the manufacturing world to take even further the UK's long tradition of pioneering and cutting edge design.

[Request more information about this story](#)

