



“It’s by far and away the most intuitive piece of CAD software I’ve ever come across”

Autodesk Inventor unleashes engineering talent at the University of Newcastle

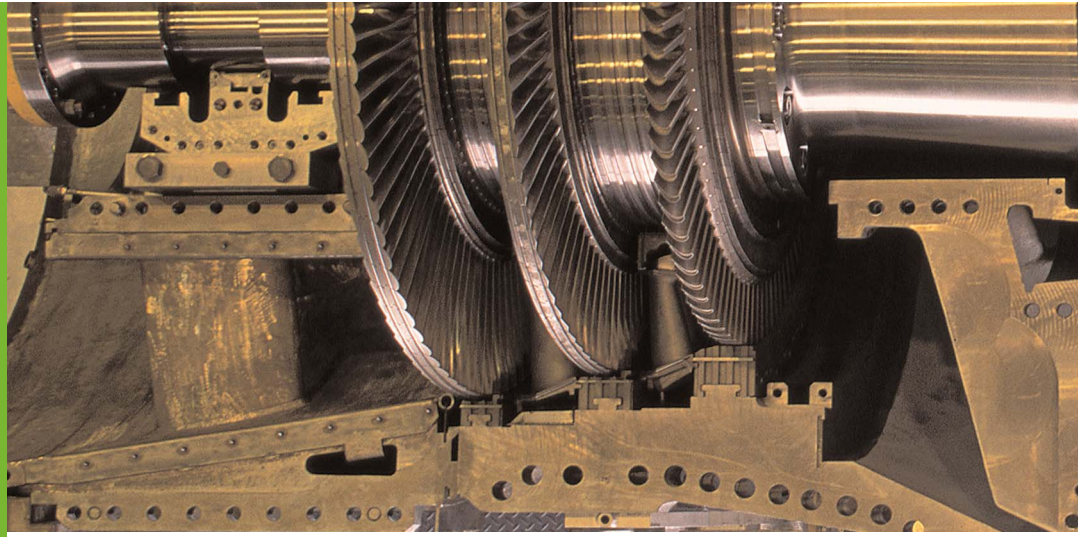
The University of Newcastle’s School of Mechanical and Systems Engineering offers 14 different MEng and BEng degree courses, all of which are accredited by the relevant engineering institutions. The School’s undergraduate intake is around 80 students a year and there are also 40 MSc students who take courses in subjects such as Mechatronics and Microelectronics.

All of the School’s MEng and BEng courses focus on engineering science, covering topics that include Stress Analysis, Dynamics and Control, Fluid Mechanics and Thermodynamics, along with relevant areas of Electrical Engineering, Materials Science, Manufacturing Technology and Engineering Design.

Lecturer, Rob Davidson has seen graduates take up all kinds of roles in

industry, from FEA specialist to Road Simulation for Jaguar and Aero Dynamics Engineer for the Jordan F1 racing team. With such career diversity, Rob believes that CAD should enable development without over-complicating the process: “We’re aiming to provide an education in engineering, not just in technical skills. So we want CAD software to get out of the way and let students concentrate on the engineering.”

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Serving CAD users campus-wide

The University of Newcastle’s computing system is a complex set-up with around 2,000 terminals on campus. While there are some dedicated PC clusters particularly suited to 3D CAD, the software can be used on virtually any machine by a wide range of academics and students, from archaeologists to civil engineers and marine technologists.

When it came to choosing a software supplier, Rob Davidson was among those involved in the selection process: “We did look at other software but Autodesk was the only supplier who could offer an integrated suite across the very large number of different applications, making it the best option for us at the time. Now I think it outstrips the competition on all counts.”

Rob has been using Autodesk Inventor since 2002. He started with version 5.3 and then upgraded to Inventor 7 two years later:

“The seeds for Inventor were sown when we moved from AutoCAD to Mechanical Desktop 4. What a change from all the aggravation of drawing in 2D! And once you’ve worked in 3D, there’s no going back”.

“Inventor was the natural progression from Mechanical Desktop. At the time I didn’t want to switch but I had to look to the future and give students the best tools possible. It was a wrench but I’m pleased I took the decision. It certainly makes the whole design process easier.”

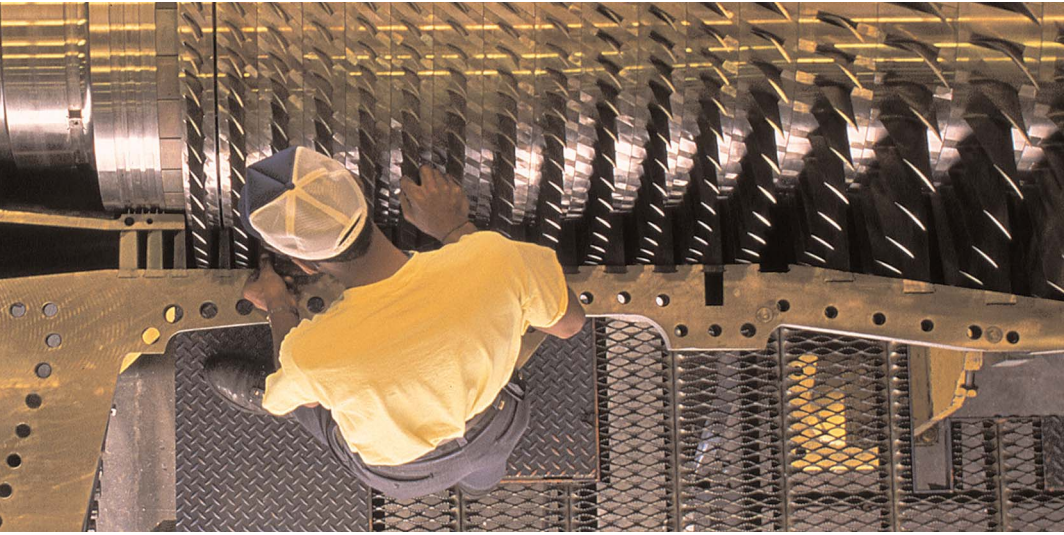
While Inventor has liberated design development, a campus licensing agreement has lifted restrictions on usage: “We have the forerunner of the Autodesk campus agreement with at least 1,200 licenses, of which around 400 are for Inventor. This gives us much more freedom and makes timetabling classes a lot easier.”

Easy-to-use software that streamlines design development

When asked what features of Inventor impress him most, Rob Davidson has no hesitation in naming the software’s intuitive workflow and simplified user interface: “It’s by far and away the most intuitive piece of CAD software I’ve ever come across. The ease with which students pick it up is incredible.”

This advantage is highlighted at the start of each academic year when Rob sets a task for his 80 First Year students: “After giving a quick demo, I ask them to come up with a 3D model of their initials. They’re all completely new to Inventor but by the end of the afternoon every student has created a design, produced 2D views with dimensions and handed in the work.”

“We used to teach AutoCAD and Mechanical Desktop in a similar environment and four of us were run off our feet helping students with the software. This is the third year running



I've introduced Inventor on the first day of term and each year we've stood around with nothing to do as the students get on with their designs. That's a true testimony to Inventor."

Rob is also struck by the way students work through the Inventor tutorials with very few problems: "Our Third Year courses are also taken by Direct Entry students from universities in France, Spain, Germany, Greece and the Far East. Most have used some other CAD system and they take to Inventor like a duck to water. I just give them a demo and a copy of my notes and I rarely have to help them out of any holes."

With simplicity comes rapid design development, as Rob discovered when he was approached for help by another research group from the School: "They were struggling to visualise, model and communicate their ideas for a nano-scale probe. Within an hour or two I'd drawn up their rough sketch and produced several images from a solid model. A couple of days later the group came back euphoric, saying that the graphics had been so convincing that they'd got a research grant to develop their idea. That's the beauty of Inventor – the speed at which you can construct sensible models."

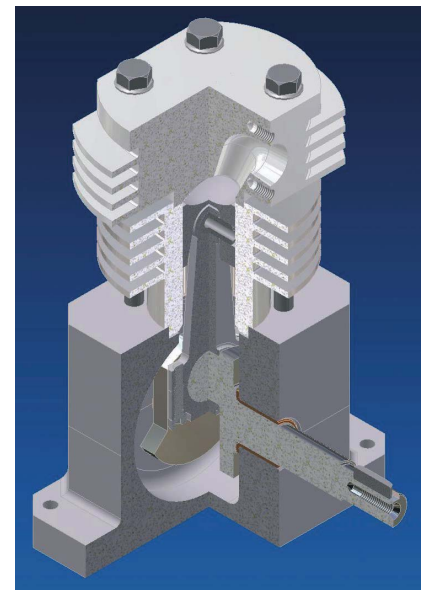
Introducing Inventor 10

One of the key benefits of the campus agreement is that the University automatically receives upgrades to the latest release for installation and deployment at a time of its choosing. Rob Davidson plans to install the Inventor 10 upgrade in the summer. This will give students extra functionality for designing cables, wiring and harnesses, for creating rigid tubing, flexible hose and piping systems, and for importing PCB IDF files.

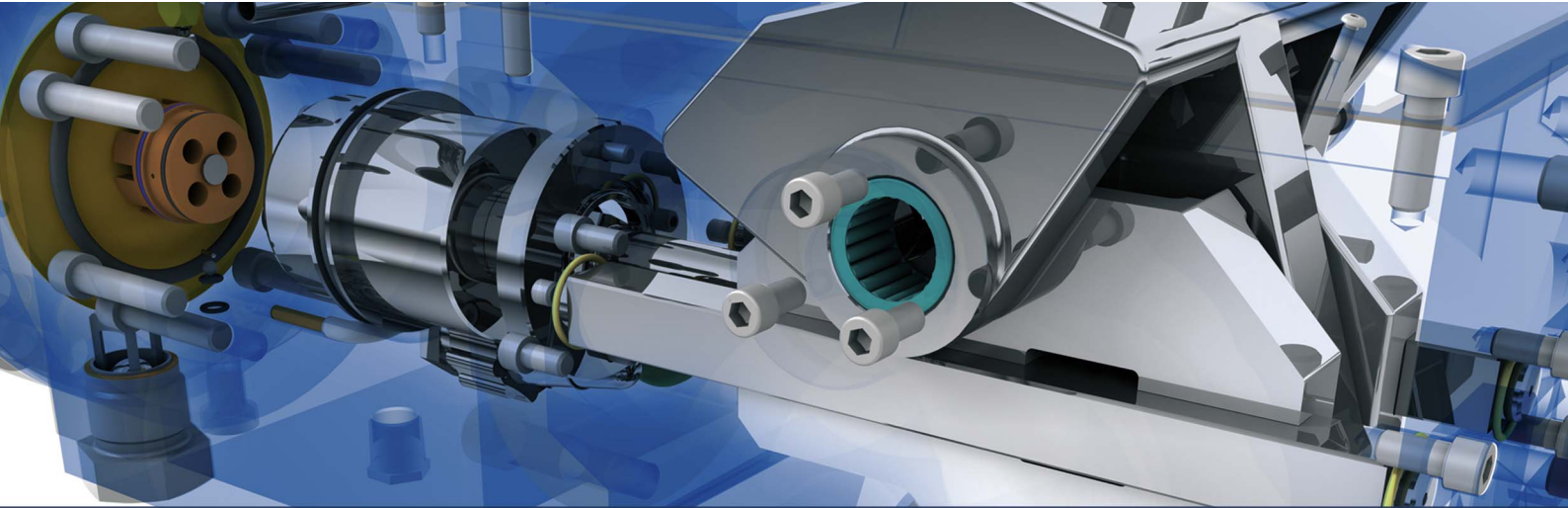
Inventor 10 will also include as an added bonus Autodesk Vault, data management software that helps users to protect work-in-progress and keep tabs on where designs are filed.

The ongoing improvements to Inventor haven't escaped Rob's attention: "The earlier versions were very much the bright-eyed fledglings of what has now become a mature, very reliable, competent tool. Inventor 10 has significantly easier ways of editing solids, and the photorealistic rendering is much better. The inclusion of the Vault drawings repository will be very useful - the students' 'lost file' excuse for late submissions will soon be a thing of the past!"

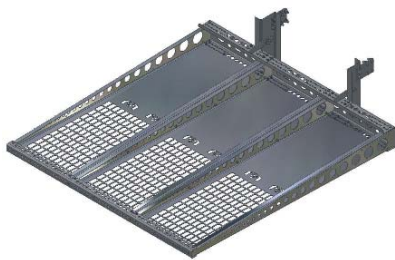
Rob says he'll be teaching Inventor on integrated projects, using the FEA software from ANSYS for stress analysis, along with EdgeCAM, a piece of CNC milling software from the British company, Pathtrace: "You can throw an Inventor model at EdgeCAM and produce the code to drive a milling machine. Again, Inventor makes it easy."



- 3/4 view of 'cadengine' assembly used for teaching Inventor to first year students (they have to draw this)



In 2004 Formula Student attracted entries from 66 universities in 19 different countries



'headboard' to prevent logs crashing into lorry cab during loading (should be vertical)



Inventor model of (nearly complete) 2005 car



2004 Formula Student team and car

Real-world challenges

As well as his work for the University, Rob Davidson also does some commercial design work for a local steel fabricator involved in constructing timber transport equipment for the lorries that work around the forests near Kielder Water, the largest man-made reservoir in Europe: "I have the only commercial copy of Inventor in the University. I find that it makes life a lot easier when I'm developing designs in sheet metal, particularly the adaptivity feature which means that when I change one part, other affected parts are altered accordingly."

To help students make the transition from academia to the commercial world, the School of Mechanical and Systems Engineering enters Formula Student, a competition run by the Institution of Mechanical Engineers in partnership with the Society of Automotive Engineers and the Institution of Electrical Engineers.

Not only do entrants have to design and manufacture a single-seater racing car, they must also find sponsors for their team. As a result, students develop business skills such as project management and marketing as well as fine-tuning their engineering talents.

In 2004 Formula Student attracted entries from 66 universities in 19 different countries, from the UK and mainland Europe to North America, Asia and Australia. Rob is keen to see his students do well in the competition: "It's an excellent engineering project. Last year we used Mechanical Desktop to design the car which finished about half-way up the field – not bad for our first attempt. This year we're using Inventor and we're currently two-thirds of the way through building the car."

Reality of visions

Rob Davidson is a great advocate of Autodesk Inventor. So much so that he's come up with his own take on the Autodesk brand: "Autodesk used to have the motto 'Visions of reality'. Yes, Inventor does genuinely aid this but I'd like to turn it around to 'Reality of visions' because I think Inventor gets out of my way when I'm designing, doing stress analysis and getting products made, ultimately making my visions real."