SIEMENS

Loughborough University

Loughborough University uses NX, Teamcenter and Learning Advantage to help develop skilled and employable engineering graduates

Products
NX, Teamcenter

Business challenges
Create academically challenging and industrially relevant degrees

Provide a stimulating engineering education environment

Meet the standards expected by professional bodies

Keys to success
Integrated CAD/CAM capability

Use of current software and hardware technology

Rich online resource for self-learning

Outstanding teaching practice

Results
Offering a thriving industrial placement program

Working on projects set and supported by industry

Ninety-six percent employed or doing graduate work thanks to outstanding teaching and Siemens PLM Software solutions

Launchpad for engineers of tomorrow
A degree from the Wolfson School of Mechanical and Manufacturing Engineering at Loughborough University opens the door to a fulfilling career. A survey conducted six months after students graduated in 2013 showed that 96 percent of those available for work were either employed full-time or pursuing further academic study. One of the factors behind this high percentage and a major benefit of attending Loughborough University is the opportunity to participate in a 12-month accredited industrial placement. For example, in the academic year 2013/2014, 142 undergraduate students spent one year of monitored, paid training with 91 United Kingdom and international companies.

The Wolfson School is a leader in mechanical and manufacturing engineering education, and is equipped with powerful computers, workshops, laboratories and a dedicated additive manufacturing center. With 1,200 undergraduate and postgraduate students supported by more than 130 academic, technical and administrative staff, it has a reputation for research and innovation as well as strong links to multinational businesses. Robb Doyle, university teacher in the School of Mechanical and
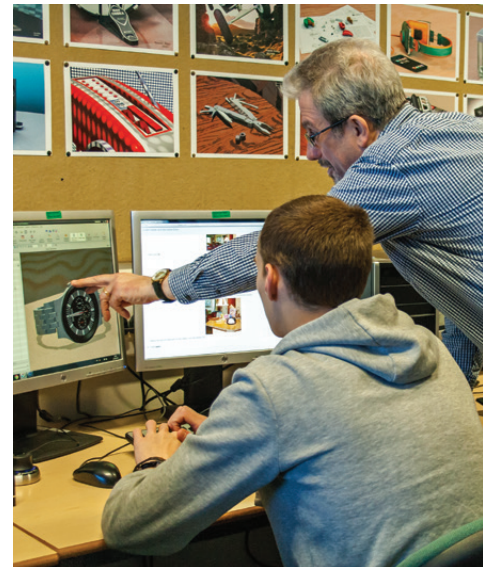
Manufacturing Engineering, says "Our goal is to develop students into young engineers who have the skills to work effectively in industry."

Another key benefit for engineering students at Loughborough University is the chance to learn industry-standard applications by using software from product lifecycle management (PLM) specialist Siemens PLM Software, such as computer-aided design (CAD) and PLM. The Wolfson School has 500 seats of NX™ software and 250 licenses of Teamcenter® software supported by Majenta PLM, a Siemens PLM Software United Kingdom platinum partner.

Results *(continued)*

Delivering skilled, self-motivated graduates that fit the needs of industry, with 96 percent of recent graduates either employed full-time or doing further academic study

Produced four Siemens PLM Software Student Design winners in two years

"We are longstanding users of NX, which we originally chose for its strength in manufacturing."

Robb Doyle
University Teacher
School of Mechanical and Manufacturing Engineering
Loughborough University

Software in action

"We are longstanding users of NX, which we originally chose for its strength in manufacturing," continues Doyle. "Because of our focus on both design and manufacturing, we particularly wanted one interface that we could use throughout the development process. We also aim to give students transferable skills. With an industry-leading application such as NX, we can teach the core principles of CAD, which students can apply to any system they are expected to use."

New students learn how to use NX for modeling in the first semester. In the second semester, they are already working on their own projects, which they have to present using NX. In their second year, students begin to focus on stress analysis with NX CAE (for advanced simulation) coupled with NX CAM (for manufacturing) as they use the software to work on assigned designs. "The intention is to connect simulation with real-life testing so we get students to manufacture and test their own designs," says Doyle. "We find that

this task really underlines the principles of engineering and is valuable preparation for industrial placements."

He notes that when students return to the university for their third year, they are much more mature and able to use NX for advanced surface modeling combined with manufacturing, thus consolidating their knowledge and skills.

"It is at this stage that we can meaningfully introduce Teamcenter via group work," says Doyle. "We know that we have the correct combination of academic and practical skills because of our industrial partnerships. Teaching is at its strongest in the industrially based projects carried out by groups of students in both the second-year and fourth-year masters programs. Here real-world problems are set, supervised and assessed by industry. Students cope well with solving these problems, and the solutions are frequently implemented by the supporting company."

A showcase for young designers
The high quality of output by students is demonstrated by the fact that, in 2013 and 2014, four first-year engineers won the Siemens PLM Software Student Design Award, a monthly global competition. One of those was William Fazackerley, whose design for a Swiss Army® knife was featured in the Siemens PLM Software Global Image Gallery 2014.

"NX is very intuitive, clean and easy to understand, and since this project I have continued to use it extensively both in realizing the final products in design projects, and in further visualization work," says Fazackerley. "NX underpins a lot of the detail design and manufacturing finalization I carry out as part of my degree."

Alston Cheung, who also won the competition, chose to design a Leatherman Wave® multi-tool. He noted, "During the process of producing the designs in NX, I learnt that attention to detail is crucial to producing a good image, whether modeling or visualizing. Also, a well-organized file naming and sorting system contributes to a smooth workflow. I would recommend NX to another student because it is very intuitive and easy to pick up."

Rob Hartley won the award in his first year for modeling and visualizing a product that would fit in a shoebox. He chose to design a clock.

"One challenge was freeform modeling of the stand for the clock as this had not been taught during tutorials, and learning how to do that has been especially useful," says Hartley. "I used features such as extruding, use of datum planes and mirroring bodies. I also used visualization features extensively, including material editing, advanced and image-based lighting and stage selection."

"I really like the fact that the interactive tutorials are broken down into relatively short sections, so I can pick and choose the ones that I think will be helpful to me."

Alston Cheung
Student
Loughborough University

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Robb Doyle
University Teacher
School of Mechanical and Manufacturing Engineering
Loughborough University

Learning to learn

"It is my responsibility to ensure that stu-
dents are getting the latest technology
and to encourage the concept of self-
learning, particularly as this is such good
preparation for work in industry," com-
ments Doyle. "Learning Advantage pro-
vided by Siemens PLM Software helps to
fulfill both these remits."

Learning Advantage is an online resource
of interactive tutorials that students can
refer to for click-by-click guidance.
Loughborough University has 1,500 sub-
scriptions and Learning Advantage is
embedded in the curriculum. Every stu-
dent workstation has two screens for effi-
cient and effective learning: one for NX
and one for Learning Advantage.

"NX is a comprehensive application, so we
need good-quality training, and part of my
job is to teach students how to use it," says
Doyle. "If I were producing my own materi-
als I would have to spend time updating
them regularly, but the richness of
Learning Advantage frees up my tutorial
time to focus on challenging engineering
problems. When I am teaching advanced
CAD processes such as complex surfaces, I
can teach the fundamentals, set learning
objectives, recommend a specific menu
within Learning Advantage and know that
students can continue to practice outside
of class."

A self-service menu

"I've found the Learning Advantage
resources very helpful," comments
Fazackerley. "We used them extensively in
tutorials when learning the basics; they
give good clarity to so much that NX has
to offer. They're also very useful if you're
struggling to model something, as it's
almost certain that there will be a step-by-
step guide and a tutorial in Learning
Advantage that will give a much-needed
push in the right direction."

Cheung adds, "I really like the fact that the
interactive tutorials are broken down into
relatively short sections, so I can pick and
choose the ones that I think will be helpful
to me. The step-by-step instructions give
very clear guidance, making the proce-
dures easy to understand. The pictures and
screen captures used allow me to know if
I've done something correctly or not,
which I find is very important when learn-
ing new features."

"Learning Advantage was very helpful
when I was first rendering and visualizing
in NX," notes Hartley. "The ability to do
detailed rendering in NX has helped a lot
in projects since then. The step-by-step
teaching of a process can be used along-
side our own modeling processes, or as
part of coursework."

"**Having knowledge in NX has helped me to secure an industrial placement next year, too.**"

Rob Hartley
Student
Loughborough University

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Ready for the real world

Doyle notes, "NX provides a complete toolbox for design-to-manufacturing. It is an industry-standard application that enables students to develop advanced CAD skills and demonstrable employability."

Hartley is clear proof of this: "I would definitely recommend NX to another student. It has extremely wide capabilities and I find it easy and intuitive to use. I have recently learnt how to program tool paths and do simulations with it. Having knowledge in NX has helped me to secure an industrial placement next year, too."