SIEMENS
Ingenuity for life

Academic

NHL Stenden

Dutch university of applied science uses Teamcenter, NX and Simcenter to provide students with digitalization skills

Product

Teamcenter, NX, Simcenter

Business challenges

Teach product development and production

Enable students to turn ideas to practical solutions

Collaborate in small teams on real-life assignments from industrial clients

Keys to success

Use Teamcenter for all engineering-related information from day one

Use NX for all design and engineering tasks

Teach students to combine product design, verification and production

Results

Made it easier for teachers to review the students' work

Enabled students to design and build products and the tools required for their production

Empowered students to maximize design and production efficiency

Siemens Digital Industries Software solutions help NHL Stenden prepare students for product development and manufacturing challenges

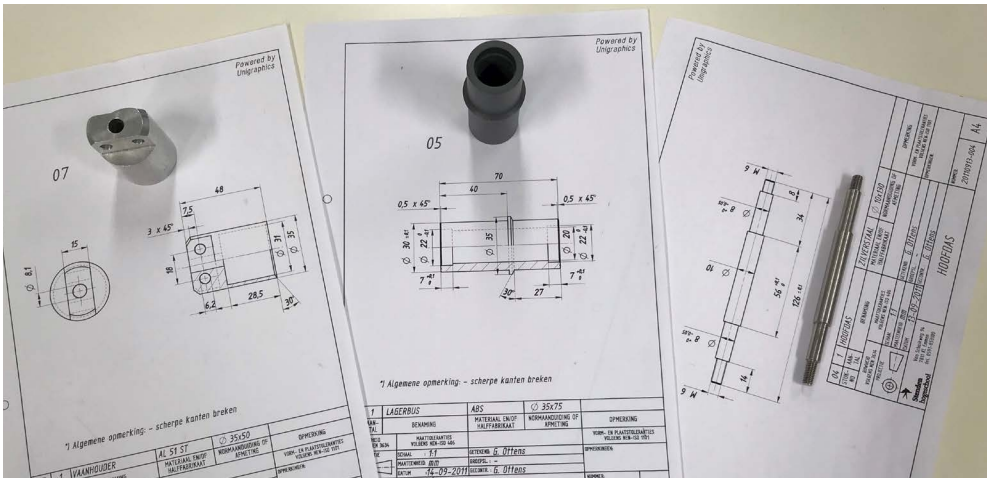
Design-based education

The educational concept of the NHL Stenden University of Applied Sciences based in Emmen, the Netherlands, combines an interdisciplinary approach, with real-world assignments to solve. Practical application of innovative solutions is at the core of this method.

With design-based education (DBE), ideas are turned into practical solutions, often in an international context. This experimental approach places a strong emphasis on the personal development of NHL Stenden students, as they are challenged to voice their opinion and take the initiative. "Students, lecturers and researchers work together in small teams on real-life assignments from industrial clients," says Dr. Ing. Wilbert van den Eijnde, associate lecturer in smart sustainable manufacturing, NHL Stenden. "Together, they test their ideas in practice, to make sure they work as expected." That is why many employers highly value NHL Stenden's education style.

Model-based engineering

The university of applied science is running a center of expertise where students get acquainted with smart production technologies. There, students employ model-based



During their first year at NHL Stenden, mechanical engineering students learn the basics of drawing and modeling. Even at this early stage, they use Teamcenter to store and retrieve all engineering-related information.

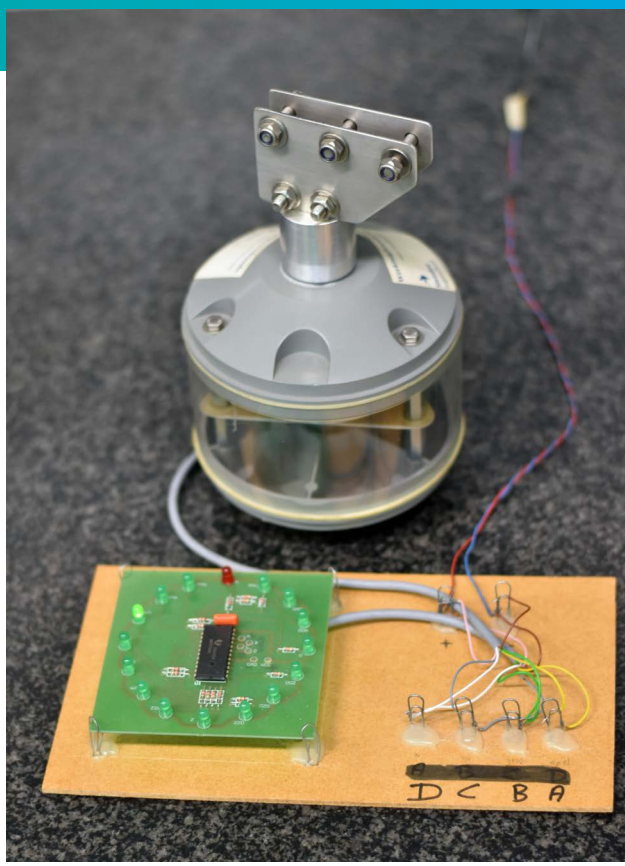
"All Mechanical Engineering students at NHL Stenden are introduced to the PLM system the day they start here. They get Teamcenter accounts before modeling their first designs."

Dr. Ing. Wilbert van den Eijnde
Associate Lecturer, Smart Sustainable Manufacturing
NHL Stenden

engineering methods to optimize products for additive manufacturing and to develop robotics and end-of-arm tooling solutions. These typically involve smart system design as well as industrial control and sensor applications. "Because NHL Stenden is situated in an area where plastics processing plays a major role, processing recycled plastics and composites using 3D printers and industrial robots is a main subject in our digital factory," says Ir. Mark van der Staay, research lecturer in smart sustainable manufacturing.

During their first year at NHL Stenden, mechanical engineering students learn the basics of drawing and modeling. Using NX™ software from Siemens Digital Industries Software for computer-aided design (CAD), they then go on to create 3D models. "Our students first create generic models and then add product and manufacturing information (PMI) for dimensioning", says Gerrit Ottens, tool design and construction lecturer at NHL Stenden. "This helps them understand the idea behind model-based engineering."

During all phases, NHL Stenden students work with computer-aided engineering (CAE). They use Simcenter™ Nastran® software within Simcenter 3D, a unified, scalable, open and extensible environment for 3D CAE, for material strength analyses using the finite element method (FEM). As they move on within the university of applied science, they also use Siemens fluid dynamics simulation software, for instance to determine how airplane wings work or to simulate material flow in injection molding. For composite parts design and verification, the students use the Fibersim™ portfolio of software for composites engineering.



The first task in mechanical manufacturing is to build a wind direction sensor. Using NX, they first create a 3D model and then add product and manufacturing information (PMI) for dimensioning.

"With Teamcenter, students comfortably (re)use existing data and create new designs."

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Associate Lecturer, Smart Sustainable Manufacturing
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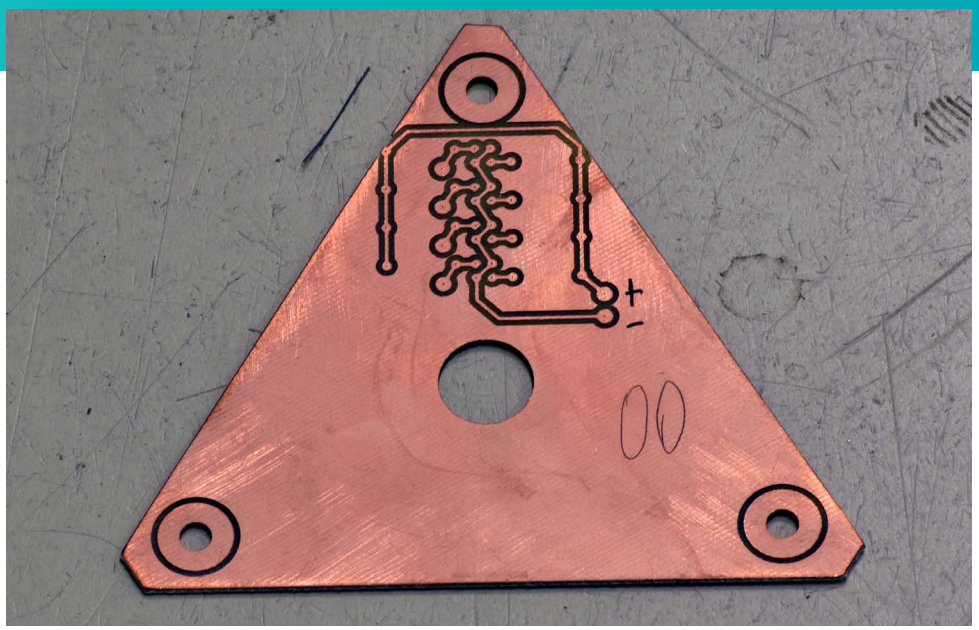


Using NX for computer-aided manufacturing (CAM), the students generate programs for an NC machine tool to cut out the spaces between the conductive paths of a printed circuit board.

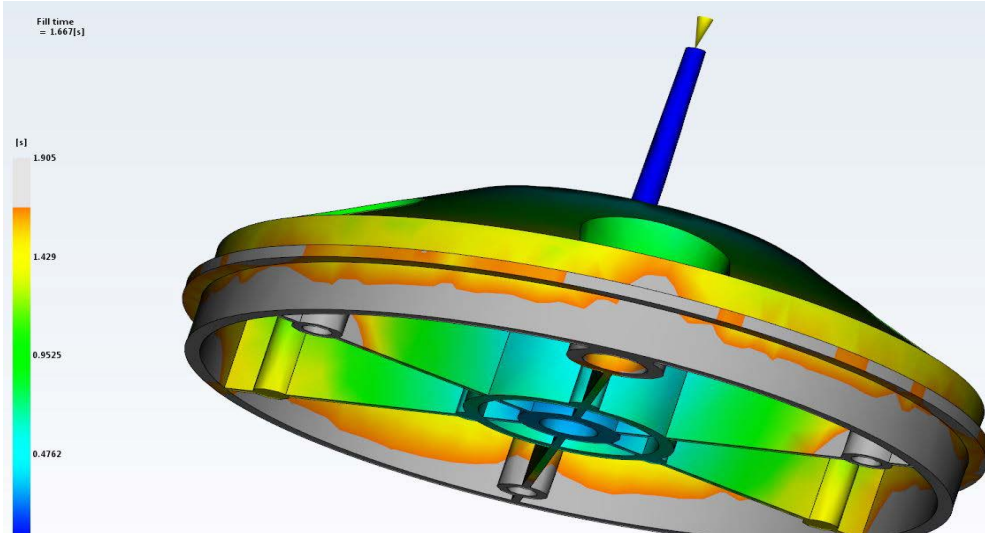
"This supports the student's project implementation efficiency, helping them to become productive faster than most in their later professional lives."

Ir. Mark van der Staay
Research Lecturer, Smart Sustainable Manufacturing
NHL Stenden

Smart production technologies

Using NX for computer-aided manufacturing (CAM), the students learn how to generate programs for numerical control (NC) machine tools. The NC programs are used to produce printed circuit boards (PCBs) by cutting out the spaces between the conductive paths. In the second semester, students use NX to design miniature cars powered by mouse traps or compressed air. They design the wheels for these vehicles using design constraints and applying parameters such as the number of spokes.

In their second year, NHL Stenden students design and produce plastic parts as well as the molds needed for the parts' production on injection molding machines. They first design the parts using NX. They then verify these parts using 3D printing for prototyping. During this activity, they learn how to use NX to optimize part geometry for 3D printing. In the following step, the students re-use the 3D models of the parts produced with NX to design the molds. Using NX CAM, they program the toolpaths and verify these using machining simulation.



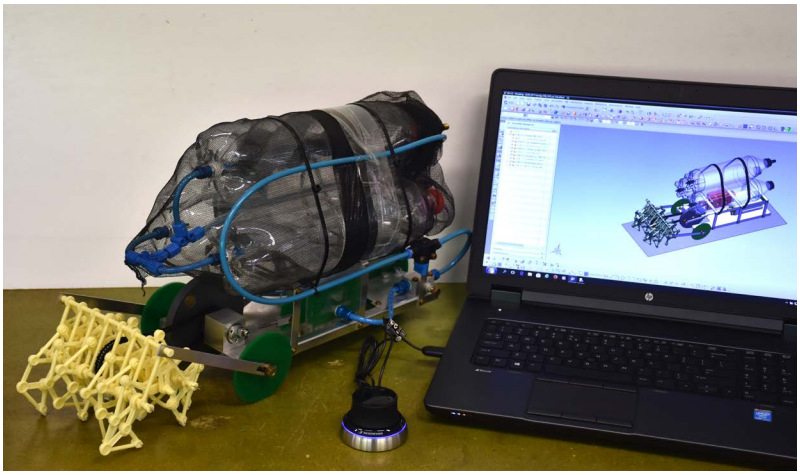
NHL Stenden students use NX to create plastic parts as well as the aluminum molds required to produce them on injection molding machines. They use fluid dynamics simulation software to simulate material flow in injection molding. Their NC programs for mold making on machine tools are fully associative with the models of both the molds and the parts to be produced.

Once completed, the students store their NC programs electronically to introduce them to NC machine tools, where the components are manufactured using aluminum. “The NC programs are fully associative with the models of both the molds and the parts to produce,” says Ottens. “Using NX for all tasks along the way helps our students to fulfill their future employers’ need for efficiency and to produce error-free designs with a short implementation time.”

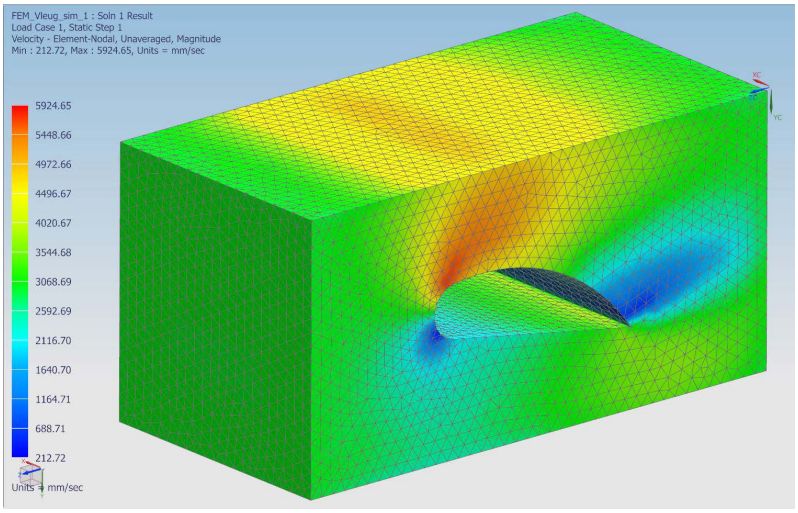
Product lifecycle management included

What really distinguishes NHL Stenden is that product lifecycle management (PLM) is an integral part of the technical education there. The university of applied science uses Teamcenter® software, also from Siemens Digital Industries Software, to store and manage all product-related information. “All Mechanical Engineering students at NHL Stenden are introduced to the PLM system the day they start here”, says van den Eijnde. “They get Teamcenter accounts before modeling their first designs.”

Working in small teams, each student relies on the completeness and validity digital twin they require to complete their parts of the overall task. A Teamcenter link is all that students need to assure that the parts their colleagues have designed can be successfully assembled. “Because they use Teamcenter to store and retrieve all engineering-related information, NHL Stenden students always know where the information is and do not need to spend



In the second semester CAD course, students design, build and test miniature cars powered by mouse traps or compressed air using NX for design work and Teamcenter for data management.



During all phases, NHL Stenden students work with computer-aided engineering (CAE), using Simcenter software for material strength analyses using the finite element method (FEM) and for fluid dynamics simulation, for instance to determine how airplane wings work.

Solutions/Services

Teamcenter
siemens.com/teamcenter

NX
siemens.com/nx

Simcenter
siemens.com/simcenter

Fibersim
siemens.com/fibersim

Academic Partner Program
siemens.com/software/academic

"NHL Stenden students always know where the information is and do not need to spend time searching."

Ir. Mark van der Staay
Research Lecturer smart sustainable manufacturing
NHL Stenden

Customer's primary business

The multi-campus NHL Stenden University of Applied Sciences is an internationally recognized institution that awards accredited degrees. Based at Emmen in the northern part of the Netherlands, it has already successfully educated thousands of Dutch and international students with its Dutch and English-language bachelor and master programs in a variety of subject areas. These range from international hospitality management to international teacher education for primary schools to information technology.
nhlstenden.com

Customer location

Emmen
The Netherlands

Solution Provider Partner

cards PLM Solutions
www.cardsplmsolutions.nl

time searching", says van der Staay. "This supports the student's project implementation efficiency, helping them to become productive faster than most in their later professional lives."

Better organization, more efficient product design and faster production preparation are not the only benefits the comprehensive use of Teamcenter provides. Students and teachers alike benefit from the use of versioning.

"With Teamcenter, our students comfortably (re)use existing data and create new designs", says van den Eijnde. "The software also makes it easy for teachers to review the students' work." Among other things, Teamcenter provides teachers with an opportunity to check the documents for completeness. With Teamcenter, students find it harder to use someone else's work. Teachers can always see who originally created a part. Some of them also use the software for redlining.

NHL Stenden prepares graduates to be real-world ready. Students enter the workforce with strong skills in project management, manufacturability and problem solving, key areas manufacturers identify needed in new hires.

Siemens works with academic partners like NHL Stenden to develop a future-proof workforce through software, curriculum, training and real-world application.

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