

SIEMENS

Ingenuity for life

Education

Norwegian University

NTNU realizes a seamless system for cutting-edge research and education

Products

NX, Teamcenter

Business challenges

Achieve a seamless system for cutting-edge research and education

Continuously set the highest standards for tomorrow's top researchers and engineers

Demonstrate real-world innovation

Keys to success

NX for design, analysis (including process optimization), manufacturing and other key functions

Teamcenter for efficient capturing, storage and re-use of knowledge

Web-based training

A common communication tool between both programs and departments

High values embedded in a problem-solving teaching approach

NX helps set the standards for tomorrow's engineers

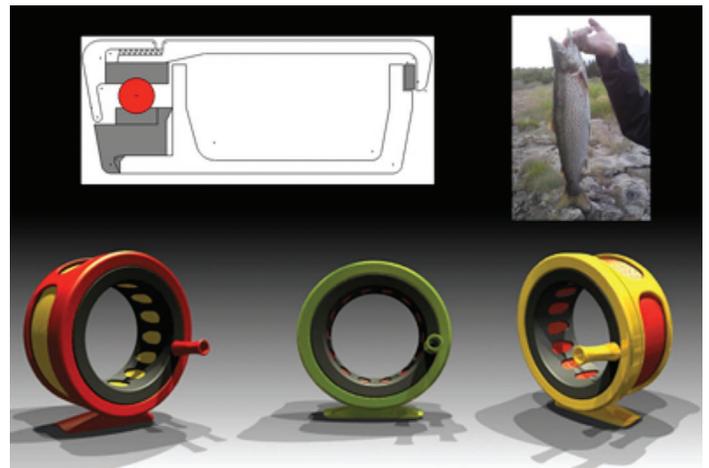
Focus on technology and science

The Norwegian University of Science and Technology (NTNU) is the primary institution for the education of engineers and scientists in Norway. In addition to technology and science, NTNU offers a comprehensive curriculum featuring social sciences, teaching, arts and humanities, medicine, architecture and fine art.

NTNU provides creative academic programs with far-reaching social and economic impact, both domestic and abroad. The oil industry – both offshore and onshore – represents an important focus at NTNU. With sustainable development at the forefront of many industrial activities today, NTNU is exploring radical ways to achieve more ecologically desirable development.

Fostering high values, radical innovation

The objective of NTNU is to create engineers who are prepared to make an immediate and productive contribution in their endeavors. This includes providing an academic setting that fosters the highest values across commercial, cultural, community, aesthetic and environmental undertakings. NTNU's motto, "The Creating



With NX, IPM students designed these fishing reels.

University," says a lot about the spirit that inspires the university.

While the university's standards are high, its goals are even higher. For example, the university encourages groundbreaking teaching, research and artistic activities, promoting radical innovation in delivering value-added products more than supporting traditional incremental improvements.

Computer-aided design (CAD), computer-aided engineering (CAE), computer-aided manufacturing (CAM) and other advanced technologies are essential to achieving the university's goals.

According to Professor Terje Rølvåg, Department of Engineering Design and

Results

Key teaching and research methods integrated with digital product development and PLM technologies

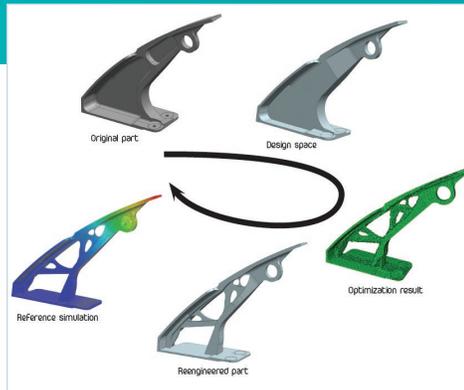
Easy access to 3D CAD/CAE/CAM data across the university

More focus on actual research and construction, and less on hypothetical programs

Improved best practices, reduced administration

ISO certification

New patents, products and entrepreneurship, as well as new processes in leading companies



The topology optimization process.

Materials (IPM) at NTNU, “The risk involved in radical innovation is high, but we want to apply high-end CAD/CAE/CAM tools to generate knowledge in the fuzzy front-end of product development, where the right decisions lead to high customer value and competitive edge.”

Applying advanced tools for innovative outcomes

The IPM department at NTNU is using almost every modeling and simulation tool available with NX™ software from Siemens PLM Software. Rølvåg notes that Teamcenter® software, also from Siemens PLM Software, plays a key role in educating the engineering students as well: “For example, we use Teamcenter in the Shell ECO marathon and Formula Student



Using NX, IPM students designed the ColiCot cradle for infants with colic and sleeping problems. The cradle includes a soothing sound system, actuators and sensors for baby comfort and monitoring.

competitions. The outcomes have been excellent.”

In deploying NX and Teamcenter, the university has incorporated product development and PLM technologies across its teaching curriculum and research program activity.

Early learning is initiated through web-based tutorials.

With easy access to NX for CAD/CAE/CAM assignments well-established, including crash modeling and simulation, Teamcenter has become the essential collaboration tool for both the engineering faculty and students. Use of Teamcenter has facilitated the efficient capture,

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Professor Terje Rølvåg
IPM Department
NTNU

“Our students can do things today that were impossible 15 years ago, and create competitive advantage by developing and evaluating products that are more technically advanced.”

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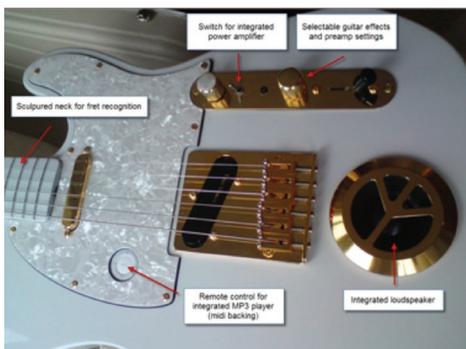
storage and re-use of knowledge, as well as certification by the International Organization of Standardization (ISO). Use of both NX and Teamcenter has also enabled more focus on actual research and construction, and less on hypothetical programs. With economies of scale gained using PLM tools, there have been notable efficiency gains, especially relative to administering the curricula themselves. More importantly, the faculty now has more time to fully develop and exploit an advanced problem-solving teaching approach, which it considers critical in

helping educate the best engineers to address the challenges of innovative and sustainable manufacturing.

“Master studies have indicated that the most successful students are those who use PLM tools in the capturing and re-use of knowledge,” says Rølvåg. He points out that their collaboration skills grow rapidly using PLM: “Students who use product development and lifecycle management technologies, combined with lean principles, often achieve great results during their time at NTNU as well as beyond.”

“Our students get a comprehensive theoretical education and real-world training in advanced engineering tools, enabling them to be creative in developing products. Their skills and work have generated new patents, products and entrepreneurship, as well as new processes in leading companies.”

Professor Terje Rølvåg
IPM Department
NTNU



A guitar with an integrated MP3 player, preamplifier, amplifier and loudspeaker for playback, designed and produced by IPM students using NX.



Design and optimization of composite vehicle frames performed by IPM students using NX.

Solutions/Services

NX

www.siemens.com/nx

Teamcenter

www.siemens.com/teamcenter

Customer's primary business

The Norwegian University of Science and Technology, or Norges Teknisk-Naturvitenskapelige Universitet (NTNU), is a leading international university, educating tomorrow's engineers based on a wide array of fields, with a particular focus on values. With a heritage dating back to 1760, NTNU has approximately 22,000 students, supported by seven faculties and 52 institutes. www.ntnu.no

Customer location

Trondheim
Norway

Partner

Summit Systems

Rølvåg points out, "Our students can do things today that were impossible 15 years ago, and create competitive advantage by developing and evaluating products that are more technically advanced. Our students get a comprehensive theoretical education and real-world training in advanced engineering tools, enabling them to be creative in developing products. Their skills and work have generated new patents, products and entrepreneurship, as well as new processes in leading companies.

"New and groundbreaking tools, such as NX and Teamcenter, are essential to advancing our educational efforts, fostering student innovation and delivering solutions beyond the university," concludes Rølvåg.



EASY ROLLER II, the first 100 percent universal designed plastic wheel chair – created for security applications at airports, MR scanning at hospitals and solving rust problems at swimming pools – was analyzed and optimized by IPM students using NX CAE (www.easyroller.no).

Siemens PLM Software

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