

ACADEMIC

Bielefeld University of Applied Sciences and Arts

Providing students with holistic design engineering skills and preparing them for engineering software environments

Products

NX, Teamcenter

Business challenges

Provide the industry with future design engineers

Teach students to find design strategies first

Educate engineers capable of working under stress from deadlines

Keys to success

Reverse the traditional course sequence

Employ problem-based learning

Use agile design methods

Use NX for design work and NC program generation

Use the Siemens Xcelerator Academy to teach NX skills

Leverage Teamcenter for course organization

Results

Provided students with holistic design engineering skills

Prepared students for future engineering software environments

Empowered future engineers to tackle industrial challenges

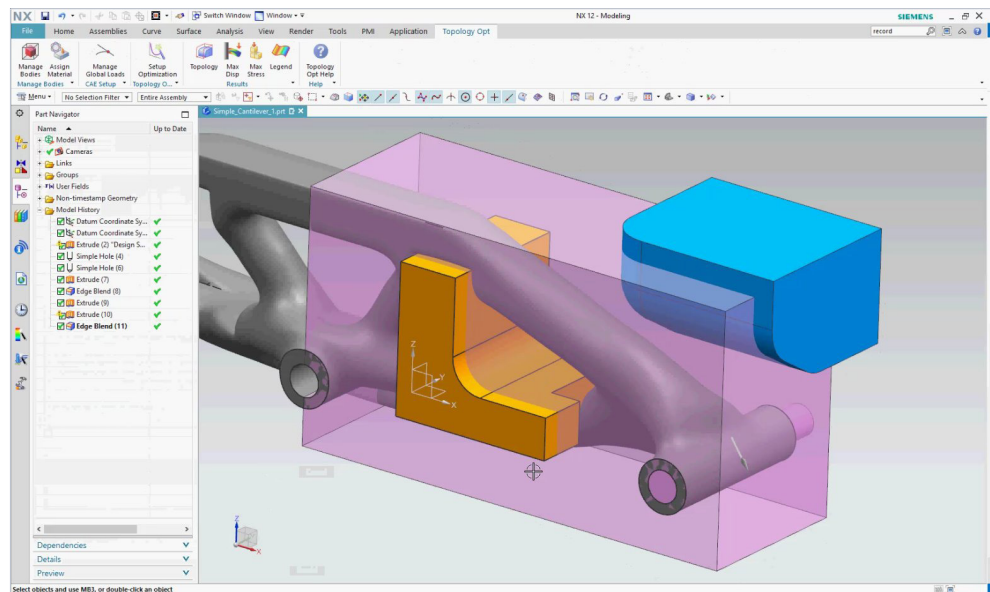
HSBI uses NX and Teamcenter to educate future design engineers with difficult but fun problem-based projects

Engineering the future

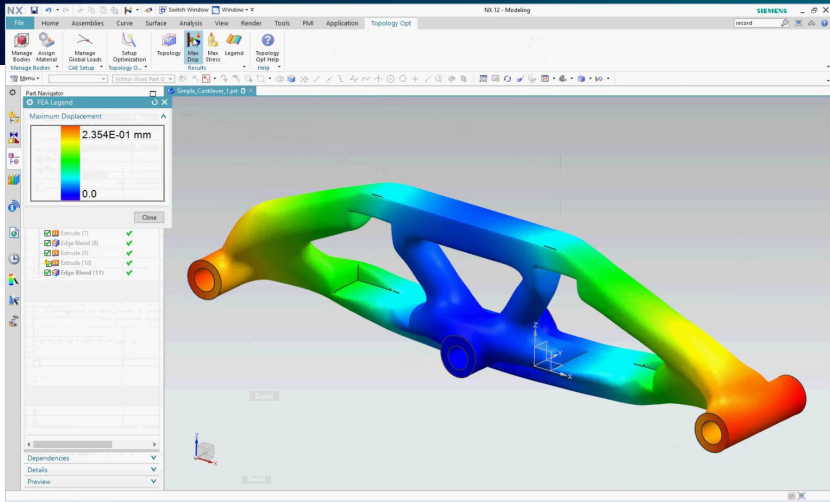
From energy transition and skilled labor shortages to geopolitical disruption and fragile supply chains, all industries are facing tremendous challenges. The East Westphalia-Lippe (OWL) region in central Germany is home to many globally leading industrial automation equipment manufacturers. Organized in the Intelligent

Technical Systems OWL cluster, they design solutions for intelligent products and processes, enabling companies across the globe to tackle these challenges and improve sustainability.

Within this framework, more than 1,000 scientists at the universities and research institutions in the region engage in interdisciplinary academic research on topics such as artificial intelligence (AI), industrial automation and systems engineering for future solutions. They also educate the engineers who will be working in these areas.



Using NX for design tasks gives HSBI lecturers the opportunity to dig into various aspects without having to train students on more than one software environment.



“NX is an immensely rich software suite that provides me with a wealth of opportunities to dig into various aspects of design engineering without needing to switch between environments. Since we do not lose time training students on multiple software, this helps me prepare my students for various tasks.”

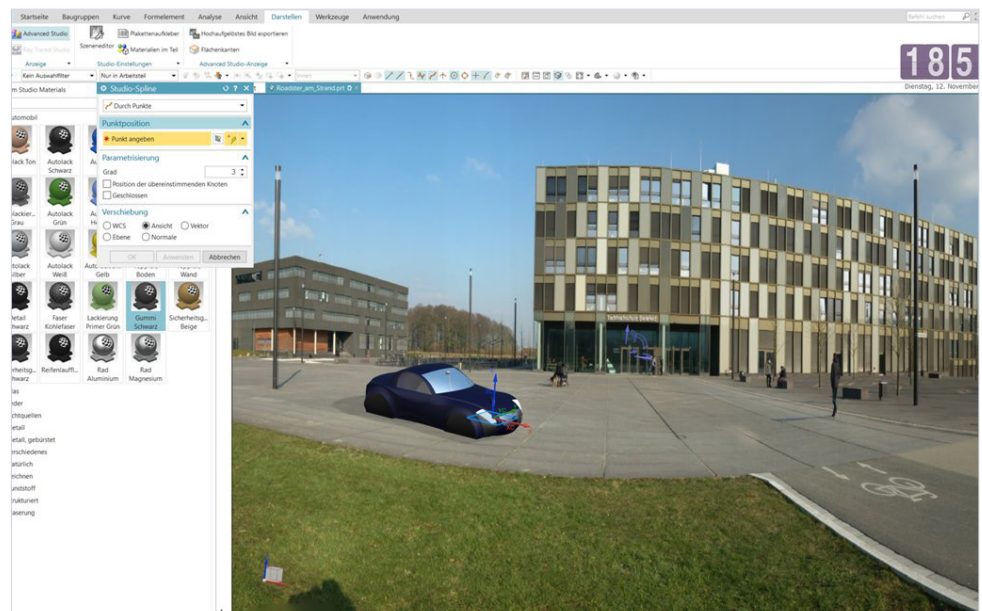
Dr. Jan Robert Ziebart
 Professor of Engineering Design
 Hochschule Bielefeld –
 University of Applied Sciences
 and Arts (HSBI)

In practice-oriented study programs and in cooperation with regional companies and institutions, Hochschule Bielefeld – University of Applied Sciences and Arts (HSBI) qualifies students for professional and executive functions. To improve the education of future engineers, HSBI leverages Siemens Digital Industries Software solutions, including NX™ software and Teamcenter® software, which are part of the Siemens Xcelerator business platform of software, hardware and services.

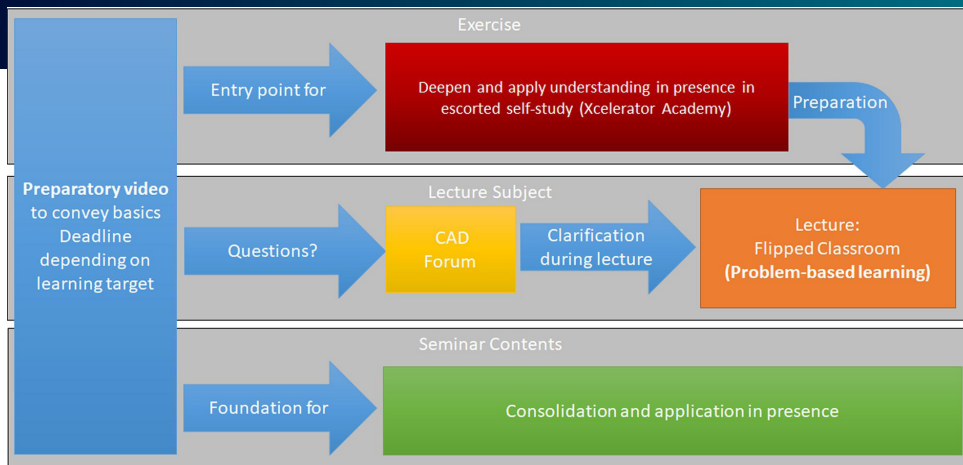
Encouraging project-oriented learning

One teacher leading the way towards educating future engineers at HSBI is Dr. Jan Robert Ziebart, a professor of engineering design and a design engineer with an academic career that started with an apprenticeship as a metalworker and includes many years of practical automotive industry experience. In the HSBI Faculty of Engineering and Mathematics, Ziebart applies innovative methods to teach computer-aided design (CAD). For his industrial engineering bachelor’s degree program, he reversed the traditional course sequence.

Traditionally, students first hear the theory in ex cathedra teaching sessions and later apply this knowledge in practical work. In Ziebart’s flipped classroom concept, they use tutorial videos Ziebart created to gather theoretical knowledge at home. Their learning progress is assessed at intervals during this work. Additionally, they are given tasks that can be done at home, such as designing certain items from scratch. After a week of preparation, they



To introduce students to free-form geometry, they get to design things like a car that they later integrate in a larger 3D environment. The image shows HSBI’s main building in the background.



At the HSBI faculty of engineering and mathematics, Professor Jan Robert Ziebart uses NX to apply innovative methods to teach CAD, reversing the traditional course sequence.

attend lectures for the first time to ask questions and get guidance for tackling the challenges they have to solve via problem-based learning.

HSBI students mainly use NX software out of the various solutions in the Siemens Xcelerator platform, which is helpful for computer-aided manufacturing (CAM) to create numeric control (NC) programs. "NX is an immensely rich software suite that provides me with a wealth of opportunities to dig into various aspects of design engineering without needing to switch between environments," says Ziebart. "Since we do not lose time training students on multiple software, this helps me prepare them for various tasks."

In addition to the professor's tutorial videos, HSBI students use online tutorials provided in the Siemens Xcelerator Academy as well as third-party software to acquire the skills they require to work with NX. This helps them understand various approaches for performing design work using different software products and enables them to learn how to transition from one to the other.

Benefiting from competitive, problem-based learning

To foster the students' ability to define a strategy and the individual tasks they need to fulfill, the tasks they have to solve in problem-based learning are not too specific. "To introduce students to free-form geometry, for instance, they get to design

"One of my students is using the Mechatronics Concept Designer to simulate the movements of an industrial robot to create a robot program via virtual teaching. They also use NX for CAM, deriving NC programs for machine tools to automate manufacturing the 3D parts they designed."

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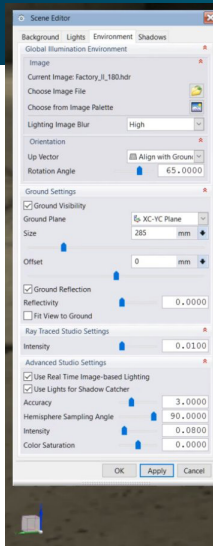
Using Siemens software solutions, we empower our students with difficult and fun tasks to take on these future challenges."

Dr. Jan Robert Ziebart
Professor of Engineering Design
Hochschule Bielefeld – University of Applied Sciences and Arts (HSBI)

generic things like a corkscrew, a bottle cap or a banana,” says Ziebart. “This proves to be very instructive because the geometries of such items did not originate in design processes, so they need to find a design strategy first.”

To design and animate multibody assemblies, the students use Mechatronics Concept Designer™ (MCD) software, which is also part of the Siemens Xcelerator business platform and available within NX. “One of my students is using the Mechatronics Concept Designer to simulate the movements of an industrial robot to create a robot program via virtual teaching,” says Ziebart. “They also use NX for CAM, deriving NC programs for machine tools to automate manufacturing the 3D parts they designed.”

During more advanced course stages, students also use the NX Virtual Reality Environment capabilities to create and review their designs in virtual reality (VR). “I believe that this logical next step after evolving from paper drawings to 2D CAD to 3D CAD will be standard procedure in engineering departments before long,” says Ziebart. “I want my alumni to be firmly familiar with technologies such as immersive design when their future employers introduce them.”



HSBI student teams use NX to tackle competitive tasks. After completing the task, they present their approach and results during a series of judged plenary sessions.

HSBI students tackle these tasks in a competitive manner, forming four teams named after the houses of the Hogwarts school from the Harry Potter franchise. After completing the task, they present their approach and results during a series of judged plenary sessions. “The approach the students chose is at least as important as other aspects,” says Ziebart. “Over several iterations, our students learn to employ agile design methods such as Scrum sprints rather than creating entire designs in one go.” Students also learn that failing has a lot of potential for learning and can turn into long-term success.



Lecturers use Teamcenter to review and comment on the students’ work and to assign tasks, while students use it from day one to acquire and store information.”

Dr. Jan Robert Ziebart
Professor of Engineering Design
Hochschule Bielefeld – University of Applied Sciences and Arts (HSBI)

Solutions/Services

NX
siemens.com/nx
Teamcenter
siemens.com/teamcenter

Customer's primary business

With over 10,000 students in the faculties of design and art, engineering and mathematics, social sciences and the Bielefeld School of Business and Health at three campuses in Bielefeld, Minden and Gütersloh, HSBI is one of the larger universities of applied sciences in Germany.
www.hsbi.de/en

Customer location

Bielefeld
Germany

Managing progress

To manage this project-oriented form of teaching regardless of whether students work from home or at the university, HSBI uses Teamcenter for product lifecycle management (PLM). Students use Teamcenter to acquire and store information as well as to comment on Teammates' designs and to assign tasks. This way, they get acquainted with future-proof engineering information and workflow management.

In addition to the grades they receive for the quality of their approach and solution, student teams collect points in the problem-based lecture concept for timely completion. This prepares students for their later careers, where working under pressure to meet tight deadlines as a team is commonplace. The winning team gets to leave their design in a 3D representation of the world around Hogwarts, also built by a HSBI student.



The winning team gets to leave their design as a 3D representation around a student-built Hogwarts, as displayed here in Professor Ziebart's CAD laboratory.

"The industry is and will always need engineers capable of creating new designs, from ideation to the finished and evaluated product," says Ziebart. "Using Siemens software solutions, we empower our students with difficult and fun tasks to take on these future challenges."

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