DASSAULT SYSTEMES

SOLIDWORKS

TURKU UNIVERSITY OF APPLIED SCIENCES

CREATING MANUFACTURING SYSTEM MODELS WITH SOLIDWORKS EDUCATION EDITION

Loading station (fully functional)

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Challenge:
Collaborate with local companies, such as Fastems Oy Ab, to provide students with real-world experience in the development of small-scale yet fully functional flexible manufacturing systems for use at trade fairs and international exhibitions worldwide.

Solution:
Implement SOLIDWORKS Education Edition design software, including SOLIDWORKS Simulation analysis, SOLIDWORKS Enterprise PDM product data management, eDrawings design communication, and PhotoView 360 photorealistic rendering solutions.

Benefits:
- Produced first functional scale model of FMS
- Gave students practical application experience
- Received critical input for optimizing educational programs
- Facilitated employment and placement efforts

Turku University of Applied Sciences (TUAS) is a leading scientific institution of higher learning in Finland. Taking its name from the town of Turku where it's located, the university offers opportunities to its 9,500 students and 800 faculty members to gain real-world technology and manufacturing experience. Through the TUAS Future Product Processes research group, students and teachers can participate in actual research and development projects, working with commercial manufacturers. The collaborative partnership provides valuable experience to TUAS students and staff, and produces tangible value for participating companies.

For example, the TUAS Future Product Processes research group worked with Fastems Oy Ab, a manufacturing company in Tampere, Finland, on the development of a fully functional, one-tenth-scale model of a flexible manufacturing system (FMS) for use at trade fairs and international exhibitions. Fastems develops, manufactures, and supplies FMS solutions and robotic cells that automate production processes for metalworking companies. Because Fastems partners with all major machine tool manufacturers, integrating their products into its automation solutions, its partnership with TUAS is extremely beneficial to students, according to TUAS Future Product Processes research group Research Leader Jussi Liikkanen.

"It's very important for us to engage in these kinds of projects with companies to get a picture of what type of engineers and skills businesses are looking for," Liikkanen explains. "It also provides valuable information about how we can adjust our education programs. This project has made it easier for Fastems to find the right employees in the future, because it has given them a great opportunity to meet our students and learn about their skills. The company also gets the opportunity to provide input regarding our education programs and raise its profile and awareness among students."

TUAS utilized SOLIDWORKS® Education Edition design software on the project. TUAS uses SOLIDWORKS in its curriculum, and the fact that Fastems also uses SOLIDWORKS made it the obvious choice. The team leveraged SOLIDWORKS Education Edition design software, including SOLIDWORKS Simulation analysis, SOLIDWORKS Enterprise PDM product data management (PDM), eDrawings® design communication, and PhotoView 360 photorealistic rendering solutions.

OVERCOMING TECHNICAL CHALLENGES

Producing a fully functional scale model of a Fastems FMS required the team to overcome numerous technical challenges involving validation, production, and communication. The project wasn't as simple as just downscaling existing Fastems SOLIDWORKS models to one-tenth their size; it required students to remodel and produce the system's many sheet metal and machined parts. Many of these parts were produced on 3D printers that were created as a result of previous student projects. Students also relied on PhotoView 360 photorealistic rendering and eDrawings design communication tools to facilitate interaction between project management, engineering, and manufacturing teams.

"Fastems' models were used only as the basis for the students' design work," Liikkanen points out. "The visible parts of course had to look exactly like the original system, but the technical inside of the model is very different from the original. The big challenge was not just modeling but developing techniques to make internal systems—for instance, the mechanical elevator and forklift—work properly at such a small scale."

"The FMS prototype project has been challenging, and there have been numerous changes during design. SOLIDWORKS has helped our project be on time. There have been over 20 students working with the project and file-sharing has been easy with EPDM. We also got amazing material for customers with PhotoView."

— Jussi Liikkanen, Research Leader

SIMULATION ENSURES STRENGTH

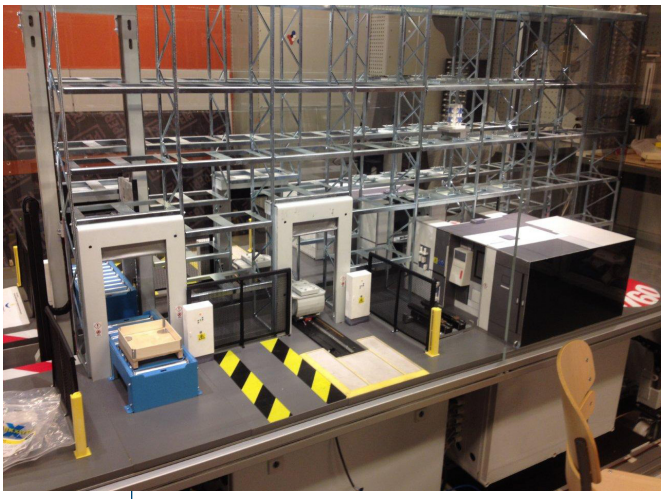
To ensure system performance, the TUAS team used SOLIDWORKS Simulation tools to conduct structural and motion analysis studies. The studies helped to optimize the strength of structural components as well as to accurately simulate the motion of the system's moving parts.

"The reason we have been using simulation this intensively was partly because the structures of the scale model are so small," Liikkanen stresses. "We needed to know if they were solid enough. Furthermore, we needed to analyze the motion of the moving parts to understand their effect on system performance."

MANAGING STUDENT CONTRIBUTIONS WITH EPDM

The TUAS Future Product Processes research group relied on SOLIDWORKS Enterprise PDM (EPDM) software as the organizational backbone for the project. The students were divided into project management, development, and production teams, with the Development Team leveraging SOLIDWORKS tools for mechanical design, simulation, and visualization. "The Development Team used EPDM as its common collaboration tool for accessing project information and communication," Liikkanen notes. "The system ensured that they always had easy access to the data they needed and that the information was always up-to-date."

The students are now developing additional FMS models for Fastems. "Development and production of the new models are much easier because we now have all the SOLIDWORKS models from the first project stored in EPDM and can reuse them, which saves time," Liikkanen says.



3D printed details in FMS

Fastems FMS-scaled model 1:10

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