

University of Applied Sciences and Arts Hannover

Education Case Study





Challenge

To simulate the process for cost-effectively digitally capturing and documenting a vast number of pressed plants.

Solution

The University of Applied Sciences and Arts in Hannover uses DELMIA V6 for Academia to calculate and simulate the entire process, including ergonomic analysis.

Benefits

Process modeling with DELMIA makes it possible to test process feasibility and workflows, as well as understand what workers are likely to experience during the actual digitization process.

Helping to digitize the earth's flora with DELMIA Version 6 for Academia

"Herbar Digital" (digital herbarium) is the name of one of the more unusual projects conducted by the University of Applied Sciences and Arts in Hannover (FHH). It involves creating a photo-realistic digital representation of herbarium pressings (pressed and dried plants or plant parts) so that botanical institutes and museums around the world can access them. The University uses DELMIA Version 6 to calculate and simulate the entire process, including ergonomic analysis.

With more than 500 million manually prepared herbarium pressings in existence worldwide, digitizing them represents a major challenge. In addition to the staggering number of specimens, dried plants are very fragile. Skilled workers are required to correctly handle the sheets of paper upon which the plant parts are pressed.

Based on the extensive knowledge gained by working on projects for a variety of industries, the FHH embarked on an ambitious program to develop a complete simulated process model of this digitization process that includes the human-operated input station and the automatic digital processing activity. In order to optimize the real-life plant digitization process, various industrial production workflows were analyzed in depth beforehand. One objective was to reduce the cost of capturing each individual page from its current level of \$20 down to \$2.

An efficient process in 20 seconds

Since the end of 2011, the FHH has been using a new camera that digitizes the herbarium pressings and stores them in two seconds. The ergonomics of the operator's tasks and surroundings had to be analyzed. To be cost effective, the University calculated that the entire workflow, including loading and unloading, must not take more than 20 seconds.

"This challenging project is currently being implemented in collaboration with industrial partners," says Professor August Potthast, Head of the Digitale Fabrik Laboratory. "One of them is Dassault Systèmes. Its DELMIA Version 6 technology is essential to calculating and simulating the most optimum solution, which includes the ergonomics related to the worker's movements," he explains.

The research project uses DELMIA Version 6 Ergonomics as well as "Methods-Time Measurement" (MTM). This measurement method takes into account factors such as the time spent on a specific step and ergonomic considerations such as the reach envelope, reach conditions and movement pathways. The entire process workflow is then simulated and verified using DELMIA V6.

The end-to-end digitization process begins once the barcode of a herbarium pressing has been scanned. The entire process workflow is then launched automatically and the amount of time required to complete the operation can be calculated. One of the requirements was to synchronize the operation of the special computer numerical control (CNC) rotary table with the camera. DELMIA was used to virtually simulate the CNC rotary table so as to test the feasibility, workflows and simulate worker movements throughout the entire process.

Experiences that respond to today's realities

"Digital manikins move like in reality in DELMIA V6," says Prof. Potthast. "In addition, they are distinguished by different genders, populations and anthropometry in an immersive 3D environment. This allows us to take into consideration gender-specific differences. It helps us reproduce, in a virtual context, what each group is likely to experience during the actual digitization process. The issue of ergonomics takes on an entirely new dimension."



With Rapid Upper Limb Assessment (RULA) analysis, work-related upper limb disorder risks can be checked with DELMIA's ergonomics capabilities using variables such as weight, distance and movement frequency. While the CNC rotary table was set up, DELMIA was used to effectively map and simulate all of the requirements with a 3D human model. This allowed the research team to very quickly design the workflow for an efficient digitization "in series" and to simultaneously customize the workstation to satisfy individual requirements. By incorporating health and safety standards into the virtual model it was possible to design the most comfortable workstation, which has a positive impact on operator productivity.

"V6 for Academia" is an integral part of the university curricula

At the FHH, the V6 for Academia solutions are an integral part of the educational offering. "Part of our teaching strategy is to emphasize the advantages of collaborative engineering or the ability to work on the same product data from various locations in a networked manner. These, as well as the simple representation of process workflows and model links, are just some of the advantages of Version 6," explains Prof. Potthast. "Version 6 also provides an excellent platform for our research work, such as RULA analysis of physical exertion in all kinds of postures and movement sequences. Students also use other DELMIA solutions such as DELMIA Manufacturing for a number of industrial projects during their studies."

Part of the University of Hannover's strategy is to offer its students online courses through an efficient e-learning program. The e-learning offering provided by 3DS University supports this strategy. The University selected 3DS partner CENIT because of its experience with Version 6 and DELMIA. CENIT was responsible for the implementation and training of the 3DS applications.

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Professor August Potthast, Head of the Digitale Fabrik Laboratory, University of Applied Sciences and Arts Hannover

"Dassault Systèmes and its DELMIA Version 6 technology is essential to calculating and simulating the most optimum solution that will be implemented, which includes the ergonomic considerations related to worker movements."

Professor August Potthast, Head of the Digitale Fabrik Laboratory, University of Applied Sciences and Arts Hannover





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