Irkutsk State Technical University
Siemens PLM Software solutions help forge innovation and productivity

Business challenges
Improve university’s ranking
Train the next generation of aerospace technology employees and leaders
Enhance partnerships with industry, supporting strategic initiatives and national imperatives
Compete in the world aerospace market with top products and performance

Keys to success
Computer Technology Training Center programs created using NX and Teamcenter R&D projects with industry partners who also use Siemens PLM Software solutions

Results
Awarded National Research University status
ISTU specialists work on high-priority projects, including new MS-21 jet
High demand for ISTU graduates
Effective cooperation with Irkutsk Aviation Plant
Successful R&D contracts with industry

Graduates in high demand due to advanced, real-world aircraft engineering projects using NX and Teamcenter

Honored for innovation
With an enrollment of more than 35,000 students, Irkutsk State Technical University (ISTU) is the largest institution of higher education in eastern Siberia. In April 2010, ISTU was awarded the prestigious status of National Research University. The Russian government bestows this award for a term of ten years. It is based on the results of a competitive evaluation of university programs dedicated to producing human capital for the high-priority fields of science and technology. The competition jury acknowledged ISTU as an established leader in promoting innovative technologies, as well as for using advanced education methods and turning out highly qualified technical graduates.

In 1996, the Computer Technologies Training Center was established on the premises of the ISTU Department of Aircraft Construction and Maintenance. The center’s primary mission is training and continuing education in the areas of computer-aided engineering (CAE) and computer-aided design (CAD), as well as drafting, analysis and manufacturing.

Students learn NX
The Computer Technologies Training Center bases its training program on CAD and product lifecycle management (PLM) solutions from Siemens PLM Software. This software was chosen for a number of reasons. Siemens PLM Software is one of only a few vendors offering a unified solution across the entire product development cycle, with associative links across all elements of the product documentation. In addition, Siemens PLM Software offers engineering analysis tools that cover the full range of analysis methods. This enables virtual simulation and minimizes physical testing.

“Today, 90 percent of Russian aircraft engineering companies use NX software and Teamcenter software from Siemens PLM Software,” says Rashid Akhatov, director of ISTU Institute of Aircraft Machine Building and Transport. “Our chief partner, Irkutsk Aviation Plant, an affiliate of the Irkut Corporation, has been using Siemens solutions since the early 1990s. Since one of our university’s priorities is to bridge the gap between education and real life, we could not afford to overlook these technologies. The Siemens PLM Software training courses were included in our curriculum...
almost immediately after the Irkutsk Aviation Plant deployed the Siemens software."

The ISTU training center uses the design, industrial design, and computer-aided manufacturing (CAM) functionality of NX™ software as well as an interface that links NX to Ansys® software. NX is used for coursework and research and development projects. As part of their coursework, students acquire skills in the use of NX, while modeling aircraft parts and assembly units, creating associative drawings and performing kinematics analyses of various mechanisms.

The training center’s curriculum is constantly evolving. In the early years, students were primarily taught to create digital versions of traditional 2D paper drawings. Now they create 3D digital mockups and tooling with NX that are used to develop manufacturing and assembly processes. NX models also serve as the basis for engineering analysis using the finite element method.

By the third or fourth year of study, ISTU students take an internship at Irkutsk Aviation Plant, where they work either in the Office of the Chief Design Engineer or in various engineering departments. In fact, today all term and graduation projects are developed with regard to the current needs of the plant. Approximately 60 percent of all graduate projects in the field of aircraft and helicopter engineering are created using NX software, which serves as an engineering toolset and as the means for solving research problems. In addition, the Siemens PLM Software solutions serve as the basis for a continuing education program for Irkutsk Aviation Plant engineering personnel who wish to learn NX.

R&D for industry
Another, equally important focus for the training center relates to research and development (R&D) projects performed by the university for Irkutsk Aviation Plant. A number of innovative technologies, developed in the university using the Siemens PLM Software solutions, are currently used in Irkutsk Aviation Plant for aircraft engineering and manufacturing. Training center specialists have already completed more than a dozen R&D projects in conjunction with the staff of the Irkutsk Aviation Plant’s Office of the Chief Design Engineer, and Department of Assembly Tooling Design and Installation.

For example, one of the training center’s projects included creating 3D models from traditional paper documentation and then creating new 2D drawings that would be associative to their 3D models. Then, subsequent changes to the models would automatically be updated in the 2D drawings.

“Today, 90 percent of Russian aircraft engineering companies use NX software and Teamcenter software.”

Rashid Akhatov
Director
ISTU Institute of Aircraft Machine Building and Transport
One of the most significant modeling problems the ISTU experts solved was streamlining the creation process for digital mockups. Thanks to their work, engineers now can design parts using NX with minimum overhead and maximum ease. This was achieved in part by creating a nomenclature for standard structural components used in aircraft engineering. This nomenclature not only helps increase design productivity, but also enhances manageability of the design data. Using this unified modeling approach significantly eases the modeling process and increases efficiency.

Joint projects with the Department of Assembly Tooling Design and Installation include creating 3D models of tools, designing and improving tooling mechanization systems, and developing template-free installation technologies based on the models created with NX. The latter is an outstanding example of the innovation achieved through the university-industry collaboration. This technology allows for the engineering and manufacturing of tools (used for a part assembly) without physical templates. Traditionally, these processes required the use of special templates (gauges, lofts, jigs), which were produced by copying existing forms. In addition to being time-consuming, this method inevitably caused inaccuracies. Using NX, it was possible to eliminate the physical templates and substantially enhance the efficiency and quality of the tooling installation process. ISTU specialists also developed special software for controlling actuator movement during the installation. Use of this special software enables targeted and highly precise tooling placement.

Use of Siemens PLM Software technologies has helped to create a multitude of new opportunities for innovative projects. Among the most significant initiatives is the development of the new jet airliner, Irkt MS-21. The project involves R&D work performed by the ISTU training center specialists and is being implemented as part of the Russian Federal Special Purpose Program for the Development of Civil Aviation Equipment. The new aircraft is being designed in a completely digital environment using Siemens PLM Software solutions.

In the near future, the university plans to expand its curriculum to include training classes on the unified collaboration environment of Teamcenter® software.

“Using Siemens PLM Software products, ISTU has achieved great accomplishments in the areas of student education and scientific research.”

Rashid Akhatov
Director
ISTU Institute of Aircraft Machine Building and Transport

© 2011 Siemens Product Lifecycle Management Software Inc. All rights reserved. Siemens and the Siemens logo are registered trademarks of Siemens AG. D-Cubed, Femap, Geolus, GO PLM, I-deas, Insight, JT, NX, Parasolid, Solid Edge, Teamcenter, Tecnomatix and Velocity Series are trademarks or registered trademarks of Siemens Product Lifecycle Management Software Inc. or its subsidiaries in the United States and in other countries. ANSYS is a registered trademark of ANSYS, Inc. or its subsidiaries in the United States and other countries. All other logos, trademarks, registered trademarks or service marks used herein are the property of their respective holders.