SIEMENS
Ingenuity for life

Aerospace and defense

ANTONOV

Aerospace firm uses NX and Teamcenter to significantly shorten time-to-market for new airlifter

Products

NX, Teamcenter, Fibersim

Business challenges

Develop competitive and low-cost products and aircraft upgrades

Introduce advanced software and hardware production management tools

Establish a PLM system

Deploy end-to-end digital product development

Keys to success

Expeditiously deploy NX and Teamcenter across the design department

Implement a unified hardware and software solution

Integrate NX output with legacy MES

Leverage strong technical support of Siemens PLM Software and OOO Borlas Security Systems

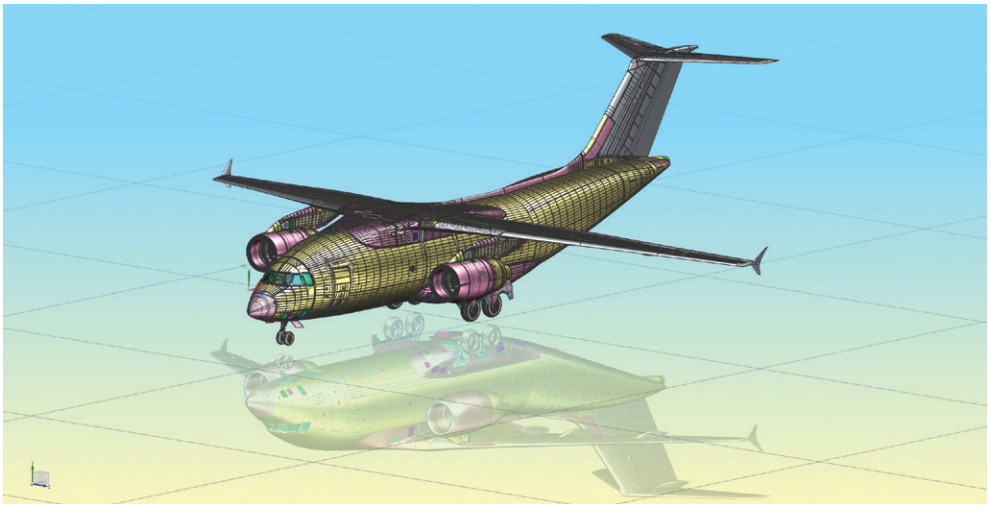
ANTONOV An-178, a world-class aircraft, takes flight only three years after concept with the help of Siemens PLM Software solutions

Choosing the right solution

The ANTONOV® Company (ANTONOV), located in Kiev, Ukraine, designs, manufactures and maintains a variety of aircraft. The company has designed over 100 airliners, airlifters and special-purpose aircraft that have recorded more than 500 world records. The company has developed the iconic Ruslan and Mriya heavy cargo aircraft, which have set 270 world records in carrying capacity.

ANTONOV's primary areas of business include research and development, design, aircraft prototype manufacturing, flight tests and prototype refinement, certification, serial production and aftermarket support.

The company's experts learned about product lifecycle management (PLM) technologies in the late 1990s as they began to cooperate with Airbus. At that time, the company purchased its first PTC CADDS 5 software and OPTEGRA software licenses, and continued to add seats in the subsequent years. In 2004, the company purchased CATIA® software and ENOVIA® software licenses and continued to use them until 2010. However, as the experts monitored PLM market trends, they paid close attention to solutions from Siemens PLM Software, which are widely used in the aerospace industry. The solutions were the best fit for ANTONOV, and paved the way



Results

Shortened time-to-market for the ANTONOV An–178 airlifter

Reduced design documentation development and release efforts

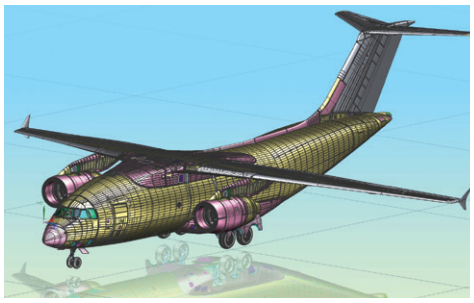
Used 3D modeling to decrease production planning and prototyping time and costs

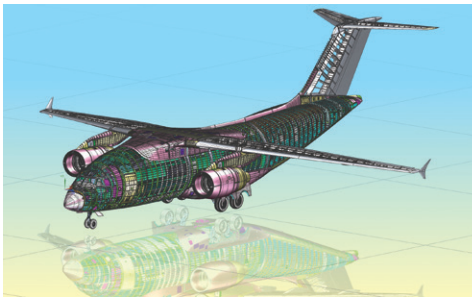
Achieved better product quality with fewer design errors and mismatches

for partnerships with many aerospace and related companies in Russia, Belarus and other countries.

In 2011, after completing two pilot projects, ANTONOV, a leading Ukrainian national company, announced it had opted for NX™ software and Teamcenter® software to implement its international cargo aircraft projects, including design and manufacturing of the new ANTONOV 178 (An-178) airlifter. According to ANTONOV's experts, the pilot projects clearly demonstrated the competitive advantages of Siemens PLM Software's solutions, as well as the excellent qualifications of the PLM organization's technical support team.

The major reasons ANTONOV opted for products from Siemens PLM Software included the technology's open architecture, extensive functionality and localization capabilities, availability of a unified information technology (IT) platform, multi-CAD integration capabilities and the flexibility to customize projects to meet a company's specific needs. Siemens PLM Software solutions enable ANTONOV to view its business differently and to change its processes to deliver a better end product.



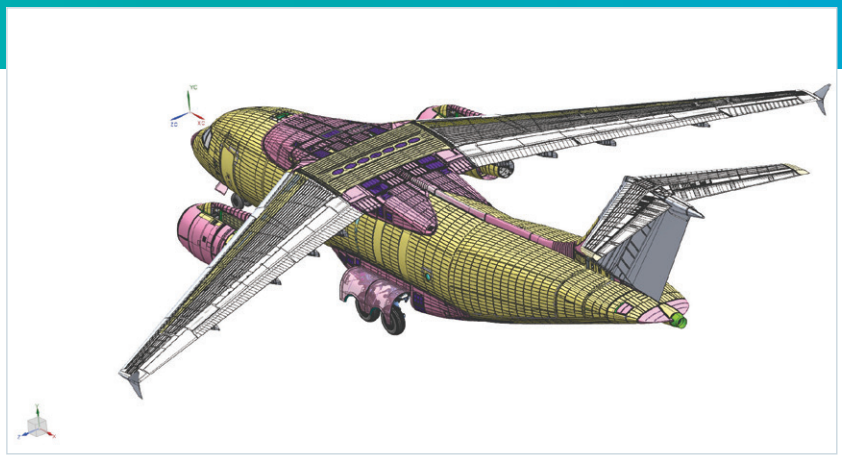


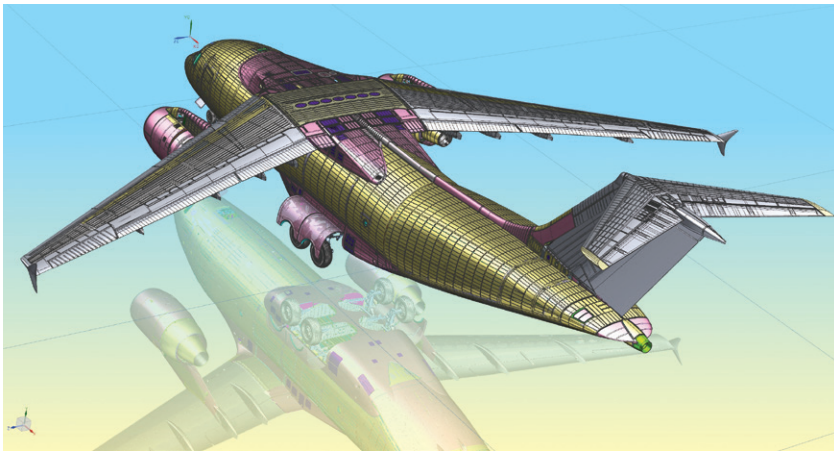
OOO Borlas Security Systems, one of the leading Siemens PLM Software partners in Europe, supported the NX and Teamcenter deployment at ANTONOV. The deployment team included Siemens PLM Software experts. A PLM deployment and development strategy was proposed. The strategy focused on using NX for end-to-end paperless product design and engineering and using Teamcenter for advanced digital design authoring and maintenance, digital design project release at the production planning stage, remote access to workstations, and secure network access to ANTONOV's design and manufacturing data for its sites, partners and suppliers.

Yuriy Abramov, the deputy chief designer for IT at ANTONOV, explains: "The NX and Teamcenter deployment was intended to drastically reduce design documentation authoring and maintenance efforts, and to cut production planning and new aircraft manufacturing costs. We expected to reduce costs and to make the company more competitive."

Implementation stages

ANTONOV needed to implement the Siemens PLM Software solutions as fast as possible, and concurrently with the An-178 aircraft development process. With the capabilities of NX and Teamcenter, it took only three months from the time of purchasing the licenses to release of the first digital An-178 design project. It is an outstanding achievement that was highly praised by the company experts and partners. As the project progressed, the software deployment was both sequential and concurrent: it went from the design department to prototype manufacturing and serial manufacturing. At the start, consultants from Siemens PLM Software trained a team of instructors to teach the basics to those who had participated in the pilot projects and were engaged users in many different departments.





This instruction enabled more than 1,500 designers, analysts, manufacturing engineers and department managers to master NX and Teamcenter functionality.

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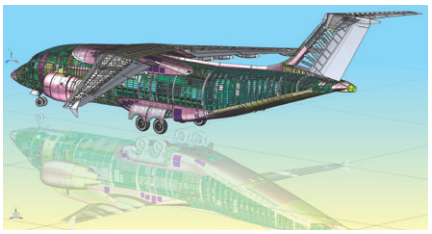
Deputy Chief Designer
Information Technology
ANTONOV Company



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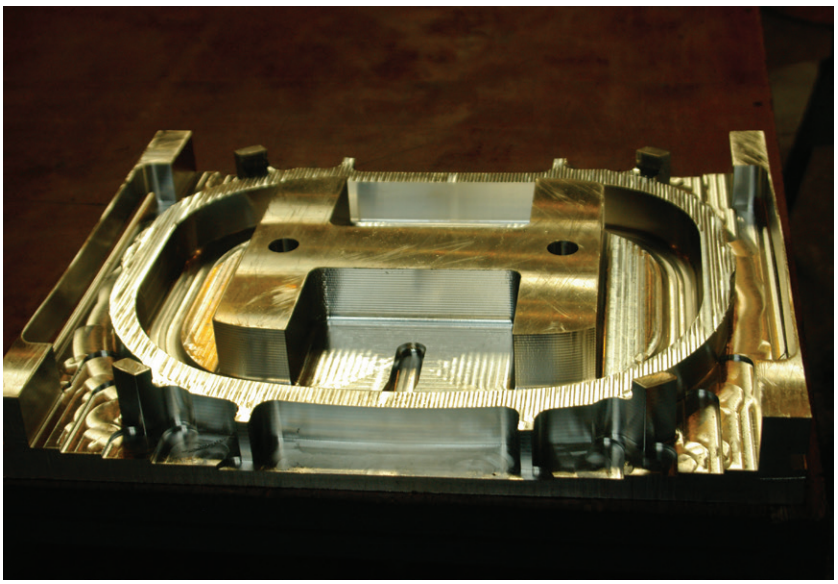
The company has developed its own software application strategy.

It is now possible to generate different product structures, and manage configurations (as-designed, as-built, etc.). NX is routinely used to create models, attributes, design projects, etc., and the data are subsequently converted into maintenance manuals. Furthermore, Teamcenter material libraries, standard and purchased part catalogs and an integrated design data repository have been developed.

Teamcenter is used to support data import from external databases. The approval and signoff processes for design and manufacturing documents have been accelerated.



Teamcenter community releases are used to approve designs for production. At this point, the Teamcenter deployment at the detailed design stage is completed. Meanwhile, Teamcenter Manufacturing, which is used for production planning, is being test driven at the company's serial production facility.

The software implementation began with its core modules. As the process matured, more dedicated tools, such as NX CAE and the Fibersim™ portfolio of software for composites engineering, were introduced to solve specific problems. After the Fibersim pilot project was successfully completed, it was decided to purchase the licenses and required hardware. Since the demand for engineering analysis grew, more NX CAE seats were installed for the analysts. The Siemens PLM Software consultants who supported the project from the very beginning have contributed valuable insight to the gradual expansion of NX and Teamcenter application domains. The consultants keep in touch with ANTONOV's personnel, and provide prompt technical support to the deployment team.

"I want to emphasize the excellent professionalism of the engineers from Siemens PLM Software and Borlas Security Systems," says Abramov. "They have demonstrated both in-depth knowledge and hands-on experience with advanced aircraft development processes and modern IT."

Some of ANTONOV's departments have had to deal with special problems. One such problem at the first implementation stage was the development of double-curvature surfaces to design an aircraft theoretical outline, and its double-curvature panels. Prompt feedback from the software developers enabled the engineers to achieve the required accuracy on double-curvature surface developments. Based on a request from ANTONOV, Siemens PLM Software quickly created a new algorithm to draw such developments.

In the course of the aircraft design, a strongly functioning team was formed to help with the successful migration to a new platform. Abramov emphasizes, "It points out that a successful implementation of most advanced IT projects depends on a team whose members share common priorities."

Developed in record-breaking time

The result of implementing the latest Siemens PLM Software solutions is the new ANTONOV 178 multipurpose cargo jet, which was developed in record-breaking time in conjunction with partners from 15 countries. The project started in December of 2011 and the maiden flight took place on May 7, 2015.

It is a transport aircraft that can carry 15 to 18 tons of cargo and is intended to replace the obsolete ANTONOV 12 (An-12). The aircraft significantly outperforms its competitors in terms of airspeed, altitude and efficiency. Among its unparalleled features is the ability to carry any pallet loads, including sea containers. It can take off and land on rudimentary airfields. It can fly at speeds of up to 825 kilometers per hour (km/h), with the service ceiling 12 km and the range 5,500 km.

The successful and record-breaking speed of the development of the An-178 proves the great efficiency of Siemens PLM Software solutions for product development, engineering and manufacturing.

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The first deployment stage included the introduction of more than 1,000 workstations. The integrated team of ANTONOV experts and Siemens PLM Software partners facilitated the deployment of core modules, the training of more than 1,500 engineers and the development of more than 100 tutorials. At the company's training center, the ANTONOV serial production facility personnel conducted a test drive of the integrated Teamcenter Manufacturing environment for An-178 production planning.

The introduction of several An-178 product lifecycle management tools has already reduced the program cost, and substantially improved design and aircraft manufacturing quality. At present, ANTONOV is testing different approaches to solving the task of operations documentation preparation based on an electronic model of the An-178 using Teamcenter. And the company is looking for functional opportunities for An-178 aftermarket support to improve its competitiveness. The collaboration with more than 200 partners has become much more efficient.

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Solutions/Services

NX
www.siemens.com/nx

Teamcenter
www.siemens.com/teamcenter

Fibersim
www.siemens.com/plm/fibersim

Customer's primary business

The primary focus of the ANTONOV Company is to develop and modify airlifters and special-purpose aircraft. The firm also develops and manufactures experimental aircraft, upgrades existing fleet, provides maintenance, service life extension, flight and maintenance crew training, and offers international oversized and super heavy air cargo services.
www.antonov.com

Customer location

Kiev
Ukraine

Partner

OOO Borlas Security Systems
borlassecurity.ru

Plans for the future

More advanced technologies are planned. ANTONOV is about to complete the establishment of a unified platform in every department as well as NX and Teamcenter suite deployment at the serial production facility, thus harmonizing standards, procedures, business processes and strategies. To manage the serial production planning data and processes the company is going to deploy Teamcenter Manufacturing and NX CAM, which generates complete numerical control (NC) programs directly from 3D models with no data conversion. The optimized and verified programs will help ANTONOV to increase its machine tools' efficiency and improve production quality. Fibersim will be used to design and manufacture composite parts. A number of other modules may be introduced to be used to manage and schedule projects, and develop electric, hydraulic and other systems. The NX engineering analysis tools will be studied, with plans to use them even more extensively.

"Modern digital technologies for design and maintenance of complicated products is a must now," says Abramov. "It is a prerequisite for the company's integration into the global aerospace industry. Investments in PLM system development help us build world-class aircraft so we can join any international project."

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