

Leading the 3D revolution

Sukhoi Civil Aircraft Company is keen to embrace the latest in innovation. It now designs its planes using 3D digital technology from Dassault Systèmes. Amber Stokes reports

Despite taking a serious blow in the 1990s, Russia has made an astonishing resurgence in the aerospace industry in recent years. This almost certainly wouldn't have been possible without the abiding trust in and use of innovative technology by Russian aircraft manufacturer Sukhoi.

Though its heritage may lie in the military world, in the last decade Sukhoi has turned its attention to the civil sector, with a view to not only tap into but also expand this lucrative market. As part of its renewed focus, in 2000, it founded Sukhoi Civil Aircraft Company (SCAC). The subsidiary's sole purpose is to concentrate on the commercial aviation business, covering aircraft design and development, production, marketing, sales and support.

However, with large players such as Bombardier and Embraer already dominant in the industry, particularly the 75-100 seat regional market, SCAC faced stiff competition from the start. "The civil aircraft market is dominated by a few players and for a newcomer such as Sukhoi Civil Aircraft, it is not easy to enter," says Oleg Vinogradov, senior client executive for the aerospace industry at 3D specialist Dassault Systèmes Russia and CIS. "To be successful, a company should be innovative, rely only on best-in-class industry solutions and be very versatile, as tomorrow, customer requirements could differ significantly from the current ones."

In 2007, SCAC launched its Sukhoi Superjet 100 (SSJ100) family of aircraft – the first regional passenger airliner in Russian



aircraft history. SCAC prides itself on the fact that throughout the history of Russian commercial aviation, SSJ100 appears to be the first aircraft ever designed with due consideration of requirements and demands of potential worldwide operators. To achieve this, the company pulled in the expertise of more than 30 globally recognised system and component suppliers. It also decided to take advantage of innovative 3D technology for the digital design of the SSJ100 aircraft. The company chose Dassault Systèmes to deliver its 3DEXPERIENCE Platform. "Dassault Systèmes is a world leader in 3D design software, 3D digital mock-up, and product lifecycle management solutions and has extensive competence in developing industry applications



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Dassault Systèmes

for aerospace companies,” says Vinogradov.

Since its inception in 1981, Dassault Systèmes has sought to make a real impact in 3D innovation and has helped its industrial customers maximise product design and development. First used to design complex shapes, Dassault Systèmes now develops 3D technology that its customers use to design and manufacture products from digital mock-ups. The company believes that this is the future of manufacturing.

“Most of the world’s aerospace and defence companies, including Boeing and Airbus, rely on Dassault Systèmes’ platform to design and produce their aircrafts. Sukhoi Civil Aircraft uses many industry applications from us, including part and assembly design, function-

based parameterisation, redesign work, space allocation for wiring and piping, as well as existing best practices,” Vinogradov adds.

SCAC outlined its goals to Dassault Systèmes so that the right technology could be implemented to achieve the right results. “The highest priority for the company was to build a unique IT-integrated environment and to create a digital mock-up of its twin-jet airliner in a short time,” adds Vinogradov.

SCAC also needed the system to allow for the development of unique and highly complex designs in 3D, as well as to perform engineering analysis, manage specifications and 3D model tolerances, model ergonomics and establish and expand its knowledge database. “All of these features are provided by Dassault Systèmes’

COVER STORY

SUKHOI CIVIL AIRCRAFT COMPANY

3DEXPERIENCE Platform – our choice for supporting sustainable development of the highest quality,” says Danil Bershov, head of information technology directorate at SCAC.

Dassault Systèmes’ 3DEXPERIENCE Platform aims to transform the way companies work by connecting designers, engineers, marketing managers and even consumers. The platform combines collaborative and innovative technology applications to serve the social enterprise of the 21st century, covering all pain points including social and collaboration, information intelligence, content and simulation and 3D modelling. “The 3DEXPERIENCE Platform provides our customers with the ability to develop unique and highly complex designs in 3D, as well as to perform engineering analysis, manage specifications and 3D model tolerances, model ergonomics and establish maintain and expand their program intellectual property,” says Dassault Systèmes’ Vinogradov.

When managing the ergonomics of various construction and maintenance tasks, the designers at SCAC now work with a digital mock-up to enable them to simulate human interactions, which helps identify tight spots or impossibilities even before building the physical prototype. “Sometimes, we do not even need to build a physical mock-up,” says Bershov. “The digital environment is so realistic; it is a perfect alternative when verifying passenger or worker ergonomics. We perform these digital verifications with CATIA. This is reducing new product development time and costs. We are currently implementing a system for the design of wire and cable harnesses in 3D, also using the 3DEXPERIENCE Platform.”

Dassault Systèmes’ virtual, collaborative product development technology CATIA can significantly improve a manufacturer’s ability to complete the design to manufacture processes of advanced structures. It is proving extremely useful in the design of the SSJ100. With CATIA, Dassault Systèmes aims to go far beyond traditional 3D computer aided design software tools to offer a unique digital product experience.

Dassault Systèmes’ solution also taps into the full potential of the Microsoft technology

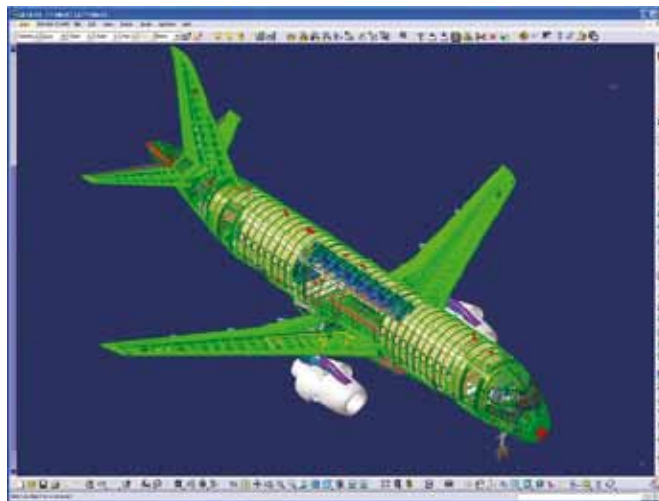


suite and, in doing so, cuts costs and frees up resources by optimising business processes. Microsoft Visual Studio, for example, is used by SCAC as an integrated development environment whereby applications can be personalised and implemented for software integration within the company. At the same time, SCAC uses Microsoft SQL Server to manage all the data that is associated with the SSJ00 project and the many departments and suppliers involved. SQL Server offers high availability, security, manageability, business intelligence and developer tools that empowers companies to gain greater insight from their business information and achieve faster results for a competitive advantage.

Research indicates that global data is growing at an alarming rate and with businesses often not having visibility across the many silos that house this information, this technology can

provide businesses with genuine competitive advantage by allowing them to manage their data properly. The benefits of Dassault Systèmes’ platform don’t end here, though. “Sustainable innovations by Dassault Systèmes allow us to respond promptly to market dynamics and to upgrade our products appropriately by developing, testing and putting into practice successful virtual designs,” says Bershov. “By continuously improving product quality, we improve our competitiveness.”

By using Dassault Systèmes’ 3DEXPERIENCE Platform, SCAC accomplished its goal to create a fully digital model of its aircraft. It can then provide this model its production facilities, which use it for computer numerical control machine tool programming. “The machining centres we work with ensure production of the highest quality and precision. We can assemble the manufactured parts without additional adjustments,” says Bershov.



SCAC is using CATIA to verify digital 3D models. This is significantly reducing product development times and keeping costs to a minimum

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SCAC

For Vinogradov, the benefits SCAC has achieved from this implementation have been impressive. “Sukhoi Civil Aircraft built and implemented an integrated IT environment for design, process engineering and production of its aircraft. This is particularly critical for collaboration with numerous international strategic suppliers such as Snecma or Messier-Bugatti-Dowty,” he says. “It enables the 3D digital model to be accessed and monitored in real time. This means that engineers can find even the slightest discrepancies and correct them as early as possible. The integrated information environment greatly simplifies the detail design definition of the full aircraft, before transferring all data to the production system of SSJ100’s airframe. For example, with documents and drawings available in digital format, paper-based documentation can be reduced to a minimum. As a result of the Dassault Systèmes implementation, Sukhoi Civil Aircraft reduced physical prototyping as well and established seamless integration with suppliers all over the world.”

As well improving processes for SCAC and its partners, according to Vinogradov, the 3DEXPERIENCE also allowed the company to pass on benefits to its customers. “The complete digital model of the aircraft that Sukhoi Civil Aircraft developed with our innovative applications allows the company to pass

numerous benefits to its customers, such as the creation of electronic technical documentation, simplification of service procedures and so on.”

Following the achievements made by this project, SCAC could start delivering the aircraft to its customers in 2011. As of November 2012, eleven airplanes are now operated by Russian and foreign airlines. So far, the SSJ100 has made more than 7,980 flights for a total of more than 15,580 flight hours. The company forecasts demand to reach an impressive total of 5,750 60-120 seat regional jets by 2031. It also plans to supply up to 1,000 SSJ100 aircrafts with various modifications that include a business jet version. All this would have been complicated without the Dassault Systèmes’ 3DEXPERIENCE Platform.

The aerospace industry will continue to experience challenges and technological advances will influence how businesses deal with them. Vinogradov looks forward to working with SCAC in future projects as the company reacts to these changes. “We are deepening our co-operation with SCAC by offering and implementing new solutions in areas such as electrical design,” he says. “Today, we are supporting them as they expand their 3DEXPERIENCE approach within their existing SSJ100 programme so they may achieve superior results and leverage them in future programmes.”