

Powering Precision: How Rolls-Royce Power Systems Modernized Its Engineering Processes

Rolls-Royce’s Power Systems division, a global leader in propulsion and energy systems, has long been synonymous with engineering excellence. Headquartered in Friedrichshafen, Germany, the division of U.K.’s technology group Rolls-Royce delivers powerful and reliable propulsion and energy systems, based on both gas and diesel engines, as well as electrified hybrid systems under its mtu brand.

These clean and technologically advanced solutions serve customers in the marine and infrastructure sectors worldwide, including the largest yachts, the strongest tugboats and the biggest land vehicles. The company also provides energy for some of the world’s most important mission-critical applications through advanced solutions such as microgrids and battery energy storage systems.

As the complexity of its products and global operations grew, Rolls-Royce recognized the need for a transformative approach for this division to engineering and manufacturing.

CHALLENGES

- Increased market demands and need for real-time global collaboration
- Insufficient Product Data Management (PDM) system for the scale and complexity of operations
- Need to translate a single EBOM into accurate MBOMs across global locations
- Increasingly complex products



Improved time to market and reduced rework



Enhanced traceability and audit readiness



Simplified and aligned global EBOM and MBOM creation for supply chain efficiency

CHALLENGE: BRIDGING DESIGN AND DELIVERY

The organization faced mounting pressures from increasing market demands and the need for real-time global collaboration across the enterprise. Its legacy Product Data Management (PDM) system was no longer sufficient to support the scale and complexity of its operations.

“We were using a Product Data Management system, but it couldn’t keep pace with industry speed or requirements,” explained Daniel Damson, Chief of Product Lifecycle Management for Rolls-Royce. “We needed a more dynamic approach - one that connects engineering data and teams directly to downstream manufacturing and assembly. At the same time, we wanted to enable seamless cross-functional collaboration, orchestrate processes from start to finish, and maintain full traceability across the product lifecycle.”

Furthermore, translating a single Engineering BOM (EBOM) into multiple, accurate MBOMs for the several manufacturing plants e.g. in US, India and Asia required sophisticated coordination and integration to maintain consistency, traceability, and efficiency across their supply chain.

Another factor driving the need for change was the growing complexity of the products. Today, software plays a central role in controlling, optimizing, and defining product functionality. This evolution has turned products into dynamic solutions where features can be added, improved and customized with almost endless different combinations of features, depending on customer requirements.

“We come from a background of diesel engines and mechanics and have moved to becoming a solution provider, engineering systems and automation for sophisticated and increasingly complex products,” said Ralf Depfenhart, Head of PLM Strategy for the entire group of Rolls-Royce. “Software has become much more part of our overall products, not just the electronics. To manage this all together with all the variations and customizations from customers required a more holistic approach.”

SOLUTION: ONE THREAD, ONE TRUTH

As part of its digital transformation program, Rolls-Royce decided to adopt a digital thread strategy for its Power Systems division to create a continuous, integrated flow of data across its global engineering and manufacturing teams. This would enable the company to eliminate silos, streamline collaboration, and link EBOMs with MBOMs and BoP and ensure that all stakeholders, from design teams in India to assembly plants in Europe and the US, could work from a single source of truth. Real-time accessibility to authoritative product data would help to improve traceability, reduce any manual errors, and enable faster, more informed decision-making across departments.

“We knew we needed to streamline collaboration between our geographically dispersed teams, automate the propagation of design changes, and contextualize our data so we could respond to customer specifications, reduce our time-to-market, enhance product quality, and help drive innovation at scale,” said Damson.

Following a benchmark of vendors, including its existing PDM provider, Rolls-Royce Power Systems selected PTC as its digital transformation partner. The decision was driven by PTC’s integrated approach to Product Lifecycle Management (PLM) and CAD, and its ability to support seamless collaboration across the product lifecycle.

The company had been using Creo as its CAD system of choice since the mid-1990s and wanted to ensure the seamless integration and easy adoption of a new PLM system. They also valued PTC’s user-centric approach, which minimized disruption during implementation.

“The collaboration between the CAD system and PLM system is very important,” added Depfenhart. “PTC had the seamless flow between Windchill and Creo, as well as easy integration with SAP for our ERP system. We liked the fact that we could limit the impact on the users and only change what was necessary, as the majority of our users were already familiar with Creo.”

Rolls-Royce Power Systems implemented Windchill with support from PTC and third-party partners in 2016, emphasizing robust organizational change management (OCM) to ensure adoption.

“We ensured we had strong OCM in place to explain new capabilities, benefits, and educate and listen to users,” Depfenhart added. “We maintain this same OCM approach today.”

The company also leveraged PTC RV&S for requirements management and compliance and plans to transition to Codebeamer to enable AI-driven insights and modernize Application Lifecycle Management (ALM) within the next two years.

Windchill has become the backbone of Rolls-Royce Power Systems’ digital thread, connecting engineering, manufacturing, and procurement. The platform supports over 5,500 users across the organization, with Creo used by more than 400 engineers globally.

“Creating a digital thread has been transformative for us and Windchill is mission-critical for our global production. It doesn’t just connect our data, it reshapes how we think, collaborate, and innovate,” said Damson.

2016 Windchill implementation	Creo + Windchill Connected CAD and PLM	SAP ERP integration
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RESULTS: A SEAMLESS DIGITAL BACKBONE

Rolls-Royce Power Systems has successfully modernized its engineering and manufacturing operations, building a scalable unified digital thread across the enterprise that supports innovation and global collaboration.

The adoption of PTC solutions has enabled Rolls-Royce Power Systems to streamline its engineering and manufacturing operations and improve data accuracy. In a single instance Windchill provides product data, accessible in real time, ensuring consistency across teams worldwide.

"Everyone is working with the right version and same releases to define the entire product from start to finish," Depfenhart said. "There are literally billions of possible product configurations, and we need to respond quickly. Windchill provides a single source of truth for our product data globally. Manufacturing, purchasing, assembly, and engineering are all super streamlined, allowing us to accelerate our time to market."

The integration with Creo allows for seamless collaboration using both 2D and 3D data, while Windchill's connection to SAP's ERP system enables efficient parts ordering through the company's global supply chain.

"We've streamlined change management and configuration control, reduced rework, and enhanced traceability and audit readiness," added Damson. "Compliance, traceability and audits are easier and stress-free thanks to our centralized data. The reuse of product data for certifications has eliminated duplication, and real-time collaboration has improved responsiveness."

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LOOKING AHEAD: SCALING THE DIGITAL THREAD

The division's digital transformation journey is ongoing. The company plans to expand configuration management in Windchill, integrate MCAD and ECAD domains, and extend the digital thread across the full product lifecycle.

"We're exploring how we can use Codebeamer across the business for requirements management and perhaps link it with ServiceMax for internal testing, validation and verification of new products," said Damson.

The company is also looking to integrate Windchill with its sales configuration system to support configure-to-order and engineer-to-order models moving forward.

"As we develop more towards customer-specific solutions, we need close collaboration between our sales configurator and ERP system," Depfenhart added. "It's an important brick in supporting and delivering our digital thread."

With a clear vision for the future, Rolls-Royce Power Systems continues to lead the way in delivering clean, smart, and reliable power solutions for a rapidly evolving world. By modernizing its engineering processes and streamlining collaboration, the company is driving a future where sustainability meets innovation at every turn.