Digital Backbone, Sovereign Edge: MBDA's CAD and PLM Strategy for the Future

MBDA is transforming defense engineering by accelerating development timelines, ensuring sovereign data control, and unifying complex, multinational workflows.

MBDA is a leading multi-national Group developing and manufacturing complex weapons, operating at the forefront of aerospace and defense technology. Trusted to equip armed forces worldwide, MBDA is continuously pushing the boundaries of what's possible, engineering solutions to meet exacting performance and regulatory requirements.

The company is renowned for its engineering excellence, delivering sovereign capabilities to protect national security and enable strategic independence. In response to surging global demand, it is rapidly scaling production while continuing to invest in digital transformation, sustainability and technologies, while working collaboratively to accelerate development, enhance operational efficiency and maintain its position as a trusted partner to governments and defense organizations globally.

In a sector defined by complexity and rigorous regulatory oversight, MBDA's innovation and technical excellence is driven by the need for precision, speed and interoperability across increasingly digital and data-driven environments.

Challenge: The urgency equation – Time, data and product diversity

MBDA's engineering environment is defined by both multiplexity and the need for pace. Its diverse range of products, each with unique performance requirements, regulatory requirements and sovereign data considerations, provide a niche set of challenges. Traditional development timelines, often stretching up to a decade, are simply not viable in a world demanding rapid innovation and delivery.

"A big development program can take ten years. We're trying to cut that by 50 percent. That means rethinking how we design, manufacture and support our products," explained Matt Beaumont, Director of Mechanical Engineering at MBDA.

This acceleration introduces a new set of pressures for MBDA. Defense customers now demand shorter time-to-market, expecting rapid delivery cycles without sacrificing quality or compliance. As MBDA scales its operations and ramps up production, maintaining efficiency across thousands of engineers and support staff becomes critical, making data reuse and scalability essential.

"The reuse of data is key for us," explained Beaumont. "The ability to scale and maintain efficiency is really important and driving the right tools to the right people, having the right data at the right time, is a core part of that."

Operating across multiple nations also requires strict sovereign data control, with sensitive information compartmentalized and synchronized according to national regulations. At the same time, engineering data must integrate seamlessly into manufacturing and customer support environments to ensure precision, consistency and support readiness throughout the product lifecycle.

Another core challenge is the increasing complexity of MBDA's engineering programs. As product diversity expands and performance expectations rise, the company must adopt more advanced techniques to manage intricate systems with tight tolerance and control characteristics. This complexity is compounded by the shorter development cycles and need for cross-functional collaboration across geographically dispersed teams.

MBDA also supports products with decades-long lifespans, requiring consistent through-life engineering and data continuity. Lifecycle traceability is critical, with defense regulations requiring detailed documentation of every design decision, change and approval across multinational programs. At the same time, with sustainability rising on the agenda, MBDA needed to innovate with materials and processes that reduce environmental impact without compromising mission-critical performance.

Solution: Accelerating innovation with a digital backbone

The company had already been using Creo (formerly branded as Pro/Engineer) since 2010, for Mechanical CAD, but recognized the need to integrate CAD with product lifecycle management (PLM) data to deliver a parametrically linked digital ecosystem supporting engineering integration, collaboration and data re-use across European sites.

In 2013, MBDA selected PTC's Windchill as its PLM platform of choice. Windchill has now become a cornerstone of MBDA's digital transformation, directly addressing the company's most pressing challenges across engineering, manufacturing and support.

Known internally as "Matrix," Windchill has become a foundational tool for engineering collaboration, data reuse, manufacturing integration and customer support. Windchill enables MBDA to accelerate its development timelines by supporting rapid design and data reuse, helping to contribute to the challenge of reducing traditional program durations by up to 50 percent.

Its robust data management tools enable MBDA to scale efficiently across thousands of users while maintaining digital continuity across engineering disciplines. Crucially, Windchill supports sovereign data control, facilitating secure, compartmentalized collaboration across national boundaries, which is essential in the defense sector.

"We work at high levels of classification, and we work in a sovereign environment, so the ability for us to be able to share data in a controlled way is really important to us, and the PTC product allows us to do that," Beaumont added.

The platform's integration with Manufacturing Process Management in Windchill, known as the Digital Industrialization Platform within MBDA, also allows seamless flow of engineering data into manufacturing, ensuring design fidelity and production accuracy. 3D models, control characteristics and design intent flow accurately into MBDA's production environments, reducing errors and improving efficiency.

Windchill's control characteristics feature enables model-based inspection workflows, flowing measurement requirements directly to shop floor operators via MES. This ensures precision at the point of manufacture and supports compliance with safety, performance and quality standards.

MBDA is now using Creo to define its products and Windchill to manage its lifecycle, together creating a fully integrated digital ecosystem where engineering, simulation, manufacturing and logistics are connected by a single source of truth. Creo sessions are directly connected to Windchill servers and workspaces, meaning engineers save and retrieve CAD files straight into the PLM environment.

MBDA has also developed a custom interface between Zuken engineering software and Windchill to bridge electronic design workflows into PLM, enabling seamless integration of circuit card and cable assembly data into the digital thread.

The company maintains a common component database hosted in its French PLM environment, which is synchronized daily across all of its national hubs. This allows components to be created once and reused across all countries providing data re-use, obsolescence management and supply chain optimization.

Together, these capabilities make Windchill a strategic enabler for MBDA's digital transformation, operational efficiency and mission-critical delivery.

Results: A digital edge for engineering, manufacturing and customer support at scale

By centralizing product data and enabling structured reuse, Creo and Windchill have helped MBDA dramatically accelerate development timelines, cutting traditional cycles while maintaining precision and compliance. Windchill's robust lifecycle management capabilities ensure full traceability of design decisions, changes and approvals, supporting audit readiness and regulatory alignment across multinational programs.

Windchill's architecture is uniquely suited to MBDA's sovereign data requirements. It enables compartmentalized, secure collaboration across national boundaries, allowing teams to work together while respecting export controls and classification protocols. This has been vital for MBDA's cross-national engineering programs, where synchronized data sharing must be both controlled and agile.

> "Engineering is evolving. We're using more advanced techniques, working to tighter timelines, and delivering more diverse products. Windchill and Creo help us stay ahead. It's part of how we engineer, manufacture and support our products and helping us deliver the future of defense."

Matt Beaumont, Director of Mechanical Engineering at MBDA

The platform also enables MBDA to reuse engineering data across programs, dramatically improving efficiency and reducing duplication. This is especially critical as the company scales its operations and diversifies its product range.

MBDA's workforce has nearly doubled in the past two decades, rising to 18,000+, with technical/engineering functions making up 60 percent of that number. There are around 1,500 active Creo users across multiple nations with Creo providing end-to-end digital continuity.

Leveraging Creo's model-based definition capabilities to push annotated 3D models into Windchill as technical data packages ensures that downstream teams in manufacturing, inspection and logistics can all work from a single digital definition. Through this integration, changes made in Creo automatically cascade across Windchill, allowing engineers to consider the impacts on their downstream outputs, maintaining consistency throughout the product lifecycle.

Windchill also enables secure collaboration and interoperability by providing controlled access for partners in joint ventures and supporting neutral file formats for data sharing across different systems.

Windchill and Creo support MBDA's "design anywhere, make anywhere" strategy, enabling cross-national engineering and manufacturing workflows. For example, subsystems designed in the UK can be manufactured in France, with full digital continuity.

Windchill's interface with SAP and Apriso MES also ensures that engineering definitions can be transformed into manufacturing definitions and flowed directly into production systems. This supports end-to-end traceability and operational readiness.

Likewise, Engineering Bill of Materials (BOMs) created in Windchill are leveraged to generate manufacturing and logistical BOMs, supporting through-life engineering and sustainment. As a result, MBDA has one of the most advanced digital thread implementations in the European aerospace and defense sector, with a complex, multinational ecosystem.

Beyond development and manufacturing, PTC is playing a critical role in MBDA's customer support operations. The logistics team's core capability lies in creating data modules, which characterize subsystems, identify available spares and outline potential repair actions in the event of failures during testing. These modules form part of a broader set of documentation designed to support the user, including illustrated parts catalogues and maintenance schedules.

To enhance this, MBDA is using Arbortext to streamline the creation and delivery of its technical publications, ensuring engineering data flows directly into accurate, reusable documentation for manufacturing, service and defense programs. By embedding Arbortext into their Windchill-driven Digital Industrialization Platform, MBDA ensures that the same authoritative engineering data drives both production and technical publications, strengthening accuracy and service maintenance and reducing lifecycle costs.

MBDA is also leveraging the Creo model, using its pictorial and visual definitions of the product alongside support documentation with Windchill providing the logistics BOM. This integration ensures a single source of truth, enabling parametric links between the engineering definition and the logistical definition where necessary. This enables MBDA to build logistical configurations and launch spares packages tailored to customer requirements, ensuring that the necessary materials are available to carry out specific activities.

MBDA's NTIP (New Through-Life Information Platform) program, built on Windchill, is a strategic digital transformation initiative aimed at enhancing lifecycle support and operational efficiency for complex weapon systems. It ensures that MBDA's support teams have access to accurate, up-to-date product data.

The NTIP product serves as a platform to assemble and deliver planned support, while driving toward a full digital flow so that any change in the engineering definition or Creo model automatically cascades through downstream documents and artefacts, maintaining consistency and accuracy across the entire engineering and logistics ecosystem.

Results

- **Accelerated Development Timelines** – Targeting a 50% reduction in traditional 10-year cycles through digital tools and rapid design.
- **Improved Engineering Efficiency** – Reuse of data across programs and different engineering domains reduces duplication and streamlines workflows.
- **Scalable Collaboration Across Teams** – Facilitates seamless collaboration across diverse teams, ensuring consistent engineering standards.
- **Manufacturing Integration** – Seamless flow of engineering data into manufacturing via MPM; interface with SAP and Apriso MES ensures design fidelity.
- **Digital Industrialization Platform** - Seamless data flow from design to production ensures accuracy, efficiency, and reduced errors.
- **End-to-End Lifecycle Management** – Supports through-life engineering with full traceability of design, manufacturing, and support data.
- **Custom Zuken–Windchill Interface** – Bridges electronic design workflows into PLM, integrating circuit card and cable assembly data into the digital thread.
- **Secure Sovereign Collaboration** – Enables compartmentalized sharing of classified data across national boundaries, respecting export controls and national regulations.
- **Multinational Ecosystem Support** – Operates across restricted and secret networks to enable secure cross-national engineering programs.
- **Digital Backbone for MBDA** – Underpins engineering, manufacturing, and support operations across the enterprise.

Looking Ahead: Accelerating tomorrow

MBDA is on a journey to fully adopt the benefits of model-based engineering across its enterprise value chain, ensuring its engineers can 'engineer together' in a digitally connected ecosystem.

The company is also focused on expanding Windchill's role within logistics and support engineering, while enhancing data synchronization across sovereign networks to ensure seamless collaboration. MBDA will also be looking at integrating AI across all of its enterprise systems.

These initiatives support MBDA's ongoing commitment to reducing development timelines and delivering faster through digital acceleration, reinforcing its strategic vision for innovation, technical excellence and agility.

Customer Quick Facts | MBDA

Industry	Defense
Employees	18,000+
Turnover	€4.9 billion
Website	mbda-systems.com
PTC Products	Windchill, Creo, Arbortext

Results

- **Design Anywhere, Make Anywhere** – Supports MBDA's strategy for cross-national workflows with full digital continuity.
- **Strategic Enabler for Innovation** – Aligns with MBDA's goals for agility, precision, and defense digitization.
- **Design Flexibility & Digital Industrialization** – Enables rapid prototyping and manipulation of 3D models to reduce costs and support manufacturing innovation.
- **Integrated Publishing** – Streamlines creation and delivery of technical publications by reusing authoritative engineering data across production and documentation.
- **Robust Support Capabilities (NTIP)** – Built on Windchill, NTIP ensures digital continuity from engineering to sustainment, improving responsiveness and compliance.
- **Model-Based Inspection Workflows** – Control characteristics feature flows measurement requirements directly to shop floor operators via MES, as well as suppliers via purchase orders.
- **Strategic Alignment with Sustainability Goals** – Enables material and process innovation without compromising mission-critical performance.
- **Future-Ready Foundation** – Provides a foundation for further enrichment of MBDA's digital ecosystem to provide even more value to the company's engineering value chain, such as enhanced analytics and AI, standardized file formats for interoperability, and seamless digital metadata flow for end-to-end digital continuity from design through validation.