AEROSPACE AND DEFENSE

THE FUTURE OF AEROSPACE & DEFENSE MANUFACTURING:

Meeting Modern Production Challenges with Model-Based Systems Engineering (MBSE)

DASSAULT SYSTEMES | Capgemini

CONTEXT: A CHANGING LANDSCAPE FOR A&D MANUFACTURING

The Aerospace and Defense (A&D) industry is undergoing a profound transformation driven by global geopolitical shifts, rising defense budgets, the push for sustainable aviation, and a need for faster commercial aircraft production. A&D companies now face intense pressure to scale production while maintaining the highest standards of quality, safety, and compliance for increasingly complex, high-criticality products. Current manufacturing capabilities must adapt if the development of new aircraft programs is to continue successfully without having negative economic consequences.

Design and development were once considered the most likely source of solutions to A&D companies' most pressing challenges. Today, as the issues have shifted away from innovation and towards production and delivery, manufacturing has moved up the agenda and become a focus for strategic decision-making for companies in this sector.

Unfortunately, this has also revealed that current production systems are not always up to the task. They are too siloed, too document-centric, and currently designed for less advanced, simpler capabilities. They also lack agility because a lack of access to the right models makes it difficult to run and test potential scenarios. Most worryingly, they are isolated from other parts of the product lifecycle. There is limited continuity between the design and development of new systems, and their manufacture and delivery.

A&D companies need to transform their production operations if they are to meet these challenges. Iterative improvements will not suffice. A new approach is needed to generate the required step change in pace and to enable production systems to cope with the incredible complexity and scale of the new military and civil assets they must build. This has left most A&D companies trying to work out what that new approach needs to be.

KEY DRIVERS OF CHANGE

Increasing Product Complexity:

A&D companies must integrate new materials, advanced sensors, and AI-driven automation into their systems, making production processes more intricate than ever before. The current generation of commercial airliners, designed for lower environmental impact and more efficient travel, are far more complex than those they replace.

Rising Demand for Defense Equipment:

There is increasing urgency for rapid deployment of military assets. Considering recent global conflicts and the current indications that the existing global order is being reshaped, defense manufacturers are under pressure to reduce production lead times and scale-up to accommodate larger orders.

Supply Chain Constraints:

With thousands of components sourced globally, companies are vulnerable to geopolitical instability, material shortages, and logistical disruptions that can destabilize existing commercial networks.

Challenges to business profitability

A lack of advanced planning has led to cost and schedule overruns, affecting short and long term profitability.

WHY MBSE ?

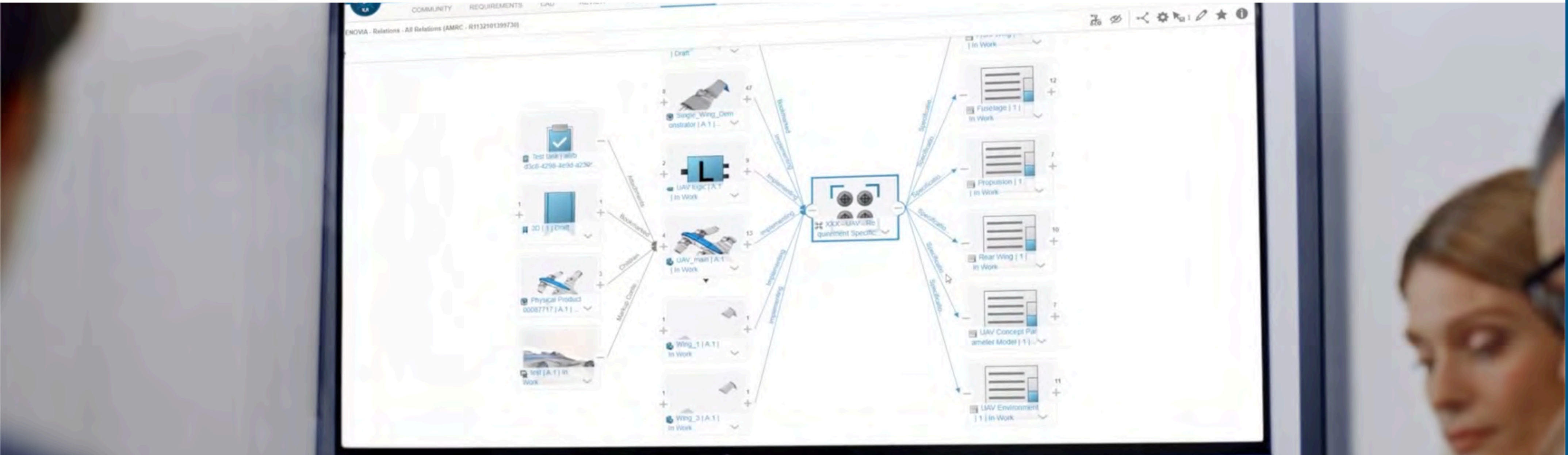
We believe that the way forward should be grounded in the principles of systems engineering—an approach designed to manage and integrate complex systems, especially amid rapid technological advancements. This methodology is particularly crucial for multidisciplinary programs that require a seamless combination of multiple systems, ensuring they function efficiently while maintaining a structured approach to planning and coordination.

But traditional systems engineering relies heavily on documentation, making it difficult to track changes, collaborate effectively, and ensure accuracy across complex projects. This has made it difficult to apply systems engineering in manufacturing processes so it has rarely been applied in production. Fortunately, as large-scale industrial projects have pushed the boundaries of complexity and scale, **Model-Based Systems Engineering (MBSE)** has emerged as a new way to apply a systems engineering approach, harnessing the benefits of digital technology – and this is highly applicable to manufacturing and production.

MBSE replaces traditional document-centric methods with advanced virtual modelling, allowing engineers to work on a single data and collaboration environment that can simulate, test, and refine complex systems before they are built.

MBSE is already used by Aerospace and Defense design teams, where it offers engineers a way to create virtual twins of complex products and use them to establish digital continuity between multiple design teams in various disciplines. This ensures they are tightly connected throughout the entire development process and can work effectively as a single unit.

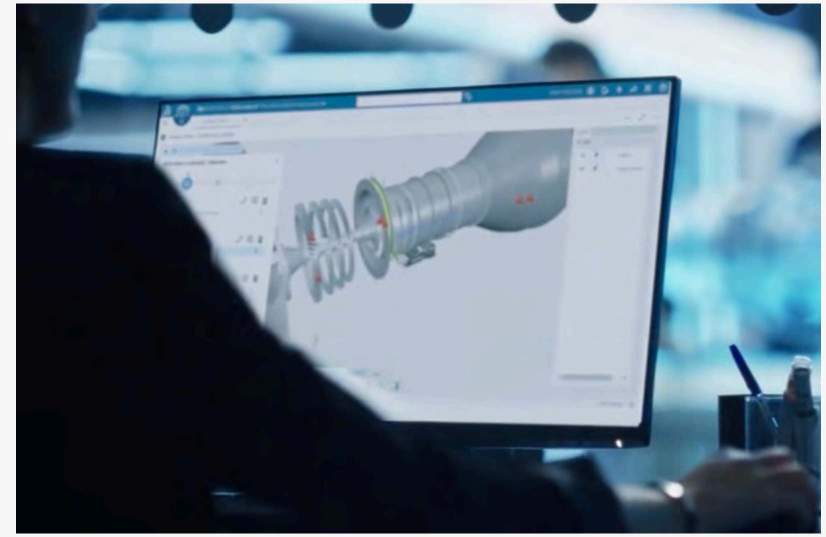
It is only now that MBSE has begun to demonstrate its power in the design phase of programmes that we can see how important it could be in the production environment too. Extending MBSE further along the product lifecycle provides production teams with the same benefits as their design counterparts experience while simultaneously establishing seamless digital continuity between development and production.



This level of digital continuity would support:

- **Real-Time Collaboration**: All team members, supply chain participants, and other stakeholders work from the same digital model, reducing inconsistencies and misinterpretations.
- **Greater Predictability**: Engineers can simulate before implementation, reducing costly rework.
- **Scalability for Complex Systems**: A&D manufacturers can ramp up highly interconnected systems, components and processes without losing visibility or control.

By creating an integrated model that encompasses everything from initial concept design to manufacturing and quality assurance, organizations can ensure a cohesive, end-to-end approach that enhances efficiency and predictability. The result would be a tightly integrated enterprise with different teams working as a single unit, focused on meeting the most pressing challenges Aerospace and Defense companies currently face.



MBSE has already established itself as essential for the design and development of novel A&D systems but as manufacturing emerges as a new strategic opportunity for the sector, extending MBSE into the production process is already yielding similar transformative effects.

BENEFITS

Implementing MBSE across the enterprise in this way can address several key manufacturing challenges for A&D manufacturers:

BRIDGING THE GAP BETWEEN DESIGN & MANUFACTURING

MBSE establishes a digital repository of data and information that acts as the single source of truth for any system, integrating design and manufacturing teams to ensure everyone has access to accurate real-time data. This helps reduce errors, avoid mismatched specifications, and fosters collaboration between engineers and production teams. Additionally, MBSE helps manufacturing teams to adopt a System of Systems (SoS) perspective, providing a holistic view of interconnected production environments that prevents siloed decision-making.

ENHANCING PRODUCTION PLANNING

MBSE enables A&D manufacturers to simulate the entire production process and the associated value network, in a virtual environment, so they can identify inefficiencies, bottlenecks, and conflicts before physical manufacturing begins. By leveraging its predictive capabilities, production teams can use MBSE to test scenarios, optimize resource allocation, and make data-driven decisions. This helps them ensure efficient workforce distribution and streamlined equipment usage.

SUPPORTING COMPLEX SYSTEMS DESIGN

As A&D systems become more complex, often involving thousands of precisely engineered components and multiple advanced technologies, even minor misalignments can cause costly delays or mission-critical failures. MBSE offers a digital-first approach that clearly optimizes the systems architecture, helping system engineers and production teams validate the manufacturability of components, predict assembly issues, and maintain a digital thread that ensures real-time alignment and consistency across teams and facilities.

QUALITY ASSURANCE & TESTING

MBSE integrates quality assurance and testing into the digital engineering process, allowing manufacturers to identify defects and reduce costly rework before production begins. It also standardizes testing protocols, streamlines quality control across global production sites, and simplifies regulatory compliance by maintaining a comprehensive traceable digital record of validation.

FACILITATING CHANGE MANAGEMENT

In A&D production, design and requirement changes are unavoidable due to shifting customer needs, regulations, and supply chain issues. Managing these changes efficiently is key to staying on schedule, maintaining quality, and controlling costs. MBSE simplifies this by updating a unified digital model in real time. This allows manufacturers to simulate and assess impacts before making changes. The result is more informed, data-driven decisions that prevent disruptions and enhance production efficiency.

SUPPLY CHAIN INTEGRATION

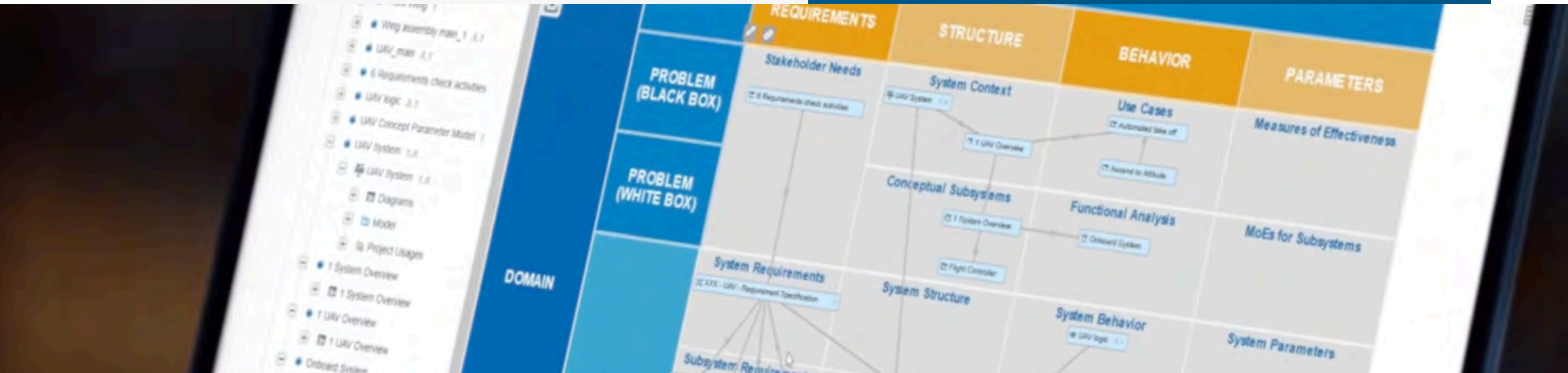
A&D manufacturing depends on complex, multi-tiered supply chains, where timely delivery and precise specifications are crucial to avoiding costly delays. MBSE enhances supply chain integration by linking supplier data directly into the production workflow, enabling virtual fit and performance tests before parts arrive. This helps mitigate risks such as material shortages or shipping delays, before they can impact production.

FASTER PRODUCTION RAMP UP & SCALABILITY

Adhering to delivery schedules for mission-critical capabilities is paramount for A&D programs. Manufacturers are increasingly turning to MBSE to significantly reduce the timeline from initial concept to delivering a functional product to customers. MBSE makes it easier and more efficient to create highly accurate design iterations, enabling earlier entry into production. This approach allows companies to scale up production rates more rapidly and with greater assurance.

COST CONTROL & RISK REDUCTION

All the above drives significant cost savings. By simulating different scenarios and optimizing resource allocation, it helps manufacturers avoid costly delays, and keep production on schedule, minimizing financial risks throughout the product lifecycle.



BARRIERS TO MBSE IMPLEMENTATION

Despite its transformative potential, expanding the use of MBSE into A&D production faces several barriers. These stem largely from the differences between how it is currently used in design and development and how it needs to be used in the production environment, a distinct world offering unique challenges.

In the design stage, systems engineers use MBSE to define systems architecture, requirements, and behavior models, focusing on what is being built. This includes capturing customer needs, exploring solution alternatives, and verifying the systems specifications. In contrast, the production stage shifts the focus to how the product will be built, ensuring that manufacturing systems, assembly processes, tooling, and the supply chain can efficiently and accurately produce the approved design.

This creates several challenges:

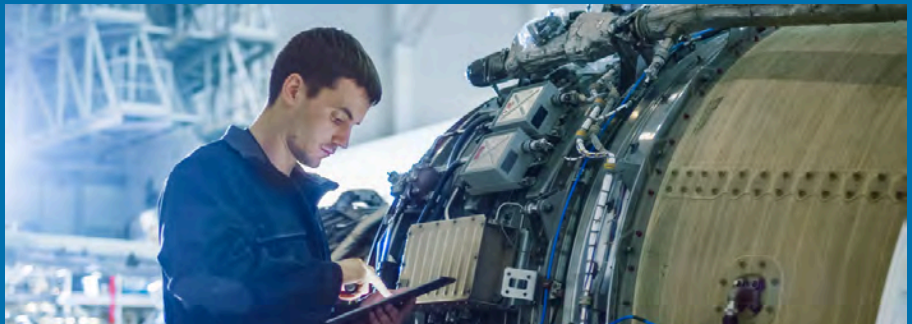
- **Scope** - The amount of digital modelling required increases when MBSE is applied in the production environment. Rather than covering just the product, it now needs to encompass all manufacturing processes, sites, and resources. It is essentially a shift from product modelling to large systems modelling and that comes with a significant step up in scale.
- **Stakeholders and expertise** – MBSE in design is driven by systems engineers, architects, and design engineers. In production it falls to manufacturing and industrial engineers and operational leads. These groups tend to use different toolsets and the latter may not be familiar with the tools required for MBSE implementation. Bridging this knowledge gap is difficult but essential. It requires a level of cross-functional collaboration that is rarely hard-coded into large A&D companies. The culture and the language of the shop floor need to connect with the unfamiliar world of systems engineering. This is not a trivial shift.
- **Timing and data continuity** – Whilst the design stage uses MBSE early to validate concepts and drive development decisions before anything gets built, in production MBSE must be applied continuously and responsively. Production teams must cope with real world variability such as changes in suppliers and machine downtime that are rarely factors during development.

This means redesigning existing processes to incorporate new feedback loops that ensure any digital models remain in sync with reality. For production teams this is in uncharted territory and presents new risks to consider.

- **Tool integration** – Design teams need MBSE models to interface with a small number of simulation tools. Manufacturing teams need them to interface with a higher number of complex planning and execution tools including logistics models and scheduling systems. Ensuring the high-level system remains effective whilst drilling down into more granular elements of production is not straightforward. The issue here is the level of detail required for manufacturing, which is often much greater in design and development stages. Deciding how much of this detail to include in the MBSE representation is difficult and demands robust integration.

Expanding the use of MBSE from design into production as well is therefore about achieving digital continuity between traditionally siloed phases of work and connecting the abstract world of design systems with the concrete world of factories and tools. Whilst each of the differences above offers its own issues to tackle, together they create one major barrier that is always the hardest to overcome – the need for an organization-wide cultural change. That is a priority when MBSE's success is so dependent on support and engagement from staff who are being asked to undertake a major change in how they do their work and how they interface with other parts of the company.

Production teams are likely to be skeptical about adopting what they perceive as 'engineering models' in their domain or even adopting methodologies that are yet to be established and therefore lack standardized guidance on how they should be applied in their world. And whilst development teams embrace the concept of pioneering new approaches, production teams often prefer to work with proven and familiar concepts. Resistance is therefore commonplace and needs to be overcome to maximize the impact of MBSE implementation.



CRITICAL STEPS FOR SUCCESSFUL MBSE IMPLEMENTATIONS IN A&D PRODUCTION

To overcome these challenges, organizations must follow a structured approach to MBSE expansion that takes account of the differences outlined above. In this section we outline what steps they should take:

1 SECURE HIGH LEVEL EXECUTIVE SPONSORSHIP:

Expanding MBSE beyond design and development certainly requires financial resources for technology adoption, training, and process redesign. But above all it needs strong management support because it is a long-term strategic change to the entire business. A&D leadership teams must set clear expectations that model-based practices are the new norm across *both* engineering and production. MBSE champions or a center of excellence in MBSE should be established to guide the transformation, and the change should be aligned to core business-wide objectives such as financial or time to market targets. This ensures the entire business understands the purpose and make sure everyone is working towards the same goals.

2 ALIGN ENGINEERING AND MANUFACTURING TEAMS:

To reap the benefits of using MBSE to connect design and productionin A&D the workforce on the factory floor must be engaged and supportive. Production teams will undoubtedly need to learn how to use new modelling tools and to trust and use information from system models. A&D companies need to address this by investing in structured training programs to familiarize teams with MBSE methodologies and technologies.

An open and collaborative culture needs to underpin this process and must encourage system and production engineers to work as integrated teams. This might include design and manufacturing personnel working together to iterate new models, or the formulation of entirely new cross functional teams to improve the reuse of previously siloed knowledge. This will break down barriers and encourage information sharing.

3

INTEGRATE DIGITAL TOOLS ACROSS THE LIFECYCLE:

Overcoming technical barriers requires the connection of MBSE tools with the rest of the enterprise IT infrastructure, and those of any relevant partners, suppliers, or customers. The aim is to federate the models and data used in every stage from concept to manufacturing either via a single integrated platform (so that virtual process planning and system design and modelling all live in the same place) or by using well-defined integrations to link individual tools together. Interoperability here is critical - if changes to a model impacts downstream instructions to the factory floor or to testing procedures, those updates should automatically propagate. Where a single platform is not feasible, A&D companies should invest in custom integrations or establish data exchange standards to ensure standardization across domains. Creating new model libraries and establishing clear data governance is also recommended to ensure there is one authoritative single source of truth accessible by all stakeholders.

4

START WITH PILOT PROJECTS AND DEMONSTRATE VALUE QUICKLY:

It is essential to undertake an expansion of MBSE like this in stages, focusing on targeted areas that offer a quick payoff to showcase rapid wins and build confidence among stakeholders. For example, an aerospace manufacturer might start by using MBSE on a particular production subsystem or for modelling a particular manufacturing process that is already recognized as troublesome. Quick wins such as tangibly improving a production station's efficiency can quickly convince sceptics of MBSE's value. It also lays excellent groundwork for quickly scaling up. The downside is that it means maintaining some new and legacy process in a hybrid approach for a short period of time until MBSE is established and fully takes over. That process needs to be gradual, expanding MBSE adoption bit by bit across the relevant parts of the organization to ensure smooth integration across all production.

5

DEMAND MBSE THROUGHOUT THE SUPPLY CHAIN:

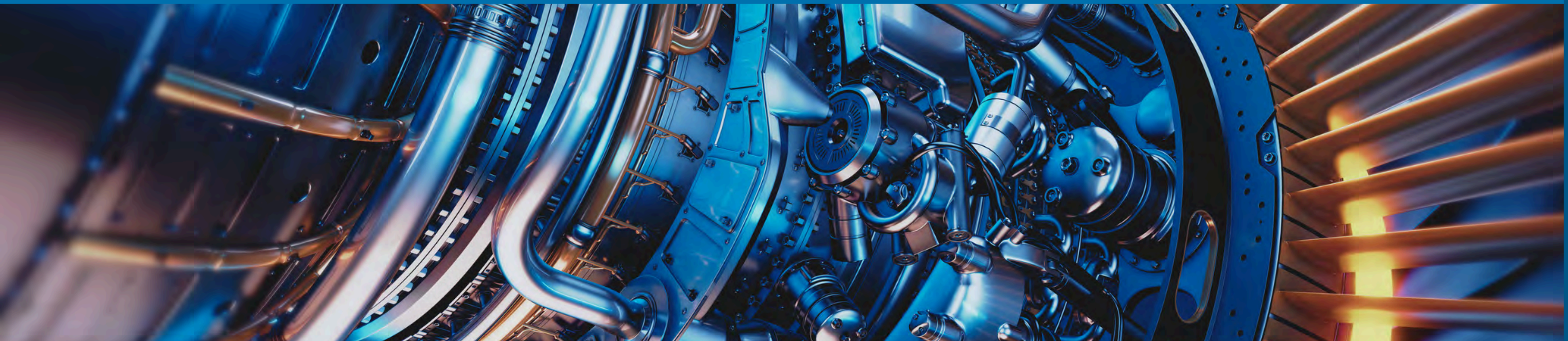
To truly increase MBSE's role in production, some changes will extend beyond the company walls. A&D manufacturers rely on a complex network of suppliers. That network is expanding and becoming more important as what is being built becomes more intricate. MBSE enables prime contractors to get visibility of what their suppliers are doing. This is useful to monitor progress. More importantly, it gives prime contractors the ability to integrate the suppliers' models into their own simulation for greater accuracy and fidelity. A&D primes need to encourage suppliers to embrace MBSE and provide model-based deliverables and participate in the prime's digital ecosystem. This will ensure MBSE permeates production by ensuring all contributing companies adopt the same approach.

6 MAKE CUSTOMERS ACTIVE STAKEHOLDERS IN THE MBSE TRANSFORMATION:

The approach above is a significant change to how production contracts and collaborations are currently managed in this industry. But even some of the sector's largest customers – including the US Department of Defense – are pushing for adoption of MBSE principles in their contracts. Customer engagement at this level is genuinely transformational. It is the purest version of a top-down approach and demonstrates why involving customers in changes to production is essential. But customers mandating MBSE's use is only one element of what this engagement could be. MBSE's ability to model the impact of a multitude of upstream changes and decisions on production processes can transform the dynamic between customer and suppliers. Today, customers are distant from the impact of the decisions they make, which affects their ability to positively influence outcomes. By giving them constant access to real time data about the impact of their decisions on production timeframes, costs, and efficiency, they can work in partnership with A&D manufacturers and adjust specifications and demands to achieve an optimum balance of delivery speed and capability effect.

7 PARTNER WITH INDUSTRY LEADERS:

Everything above demonstrates that implementing MBSE at an enterprise scale in A&D manufacturing requires more than simply deploying a new tool or platform. It demands process transformation across all production systems and often the entire enterprise, as well as systems integration and change management. This is why collaborating with consulting and technology partners who hold niche expertise is an essential part of any MBSE success story.



THE STAGES OF IMPLEMENTING MBSE IN AN AEROSPACE AND DEFENSE COMPANY

Context and Challenges

A major defense contractor, Veltraxis Dynamics*, faces significant challenges ramping up production for a 6th generation stealth fighter – the VTRX-26. The program is under immense pressure due to increased geopolitical tensions, requiring the aircraft to be operational in considerably less than the traditional development time. Historically, Veltraxis has maintained a document-based systems engineering approach. This led to inefficiencies in traceability, collaboration, and iterative design. It has also allowed siloed engineering and manufacturing functions, which has resulted in late-stage design modifications that are disrupting production schedules.

Recognizing the need for transformation, Veltraxis engages with consulting firms Capgemini and Dassault Systèmes to implement Model-Based Systems Engineering (MBSE) across both engineering and manufacturing domains. The goal is to create a continuous digital thread linking design, manufacturing, and supply chain processes.

*Veltraxis Dynamics is a fictional company. Any resemblance to actual organizations or companies is purely coincidental.

Stage 1: Executive Alignment and Strategic Objective Setting

At the outset, the leadership team at Veltraxis Dynamics comes together to discuss the urgency of their transformation. Executives recognize that to meet aggressive timelines and maintain cost efficiency, they must embrace a new approach. Capgemini and Dassault Systèmes lead discussions with senior management, highlighting how MBSE can drive efficiency and mitigate production risks. That conversation helps Veltraxis's leadership understand what trade-offs need to be made to deliver the outcomes they want to achieve and adjust those trade-offs to ensure a suitable balance.

A cross-functional steering committee is established, bringing together key figures from engineering, manufacturing, and supply chain management. They set clear performance objectives—reducing design iteration cycles, streamlining supplier integration, and improving manufacturing predictability. However, resistance looms. Many within the leadership team have relied on document-driven processes for decades, making it difficult for them to see the immediate value of transitioning to MBSE. The consulting teams work diligently to build a compelling case, demonstrating tangible examples of how MBSE has transformed other industries. By the end of this phase, the leadership team aligns behind a common vision, laying the foundation for a seamless transition.

Stage 2: Establishing a Digital Twin Framework

With executive buy-in secured, the first major step is taken: developing a digital twin framework to bridge the gap between design and production. Rather than overhauling operations all at once, the MBSE initiative is introduced through a pilot project. The chosen testbed is an existing production line slated for retrofitting, allowing the team to experiment with the new approach in a controlled environment.

Engineers and manufacturing planners collaborate to construct a unified system model that integrates both product architecture and industrial system design. Dassault Systèmes provides advanced MBSE toolsets, while Capgemini ensures the seamless integration of these tools into Veltraxis's digital ecosystem. The goal is to establish a framework that not only enables real-time design modifications but also anticipates manufacturing constraints before they become bottlenecks.

Yet, skepticism arises on the factory floor. Operators accustomed to traditional methods question whether virtual twins can truly represent the intricacies of a live production environment. To address these concerns, the consulting teams organize hands-on workshops, allowing personnel to interact with the system in real time. Gradually, apprehension gives way to curiosity, and curiosity turns into engagement as teams begin to see the practical benefits of digital integration.

Stage 3: Cross-Disciplinary Collaboration and Cultural Shift

As the MBSE implementation progresses, it becomes evident that the greatest hurdle is not technological—it is cultural. Veltraxis has long operated in silos, with engineering, manufacturing, and supply chain teams working independently of one another. Breaking down these silos requires a fundamental shift in how the company collaborates.

To facilitate this transformation, Capgemini and Dassault Systèmes introduce structured collaboration models. They conduct interactive workshops, bringing together engineers and production planners to foster real-time co-design practices. Instead of engineering finalizing a design before handing it off to manufacturing, the two disciplines now work in tandem, aligning their decisions from day one.

This transition is not without its challenges. Many within the organization resist the change, preferring the familiar linear approach they have relied on for years. The consulting teams counter this by demonstrating the efficiency gains achieved through early collaboration. As teams begin to see fewer last-minute changes and reduced rework costs, the new mindset starts to take root. What was once viewed as a cumbersome process is now recognized as a streamlined, results-driven methodology.

Stage 4: Implementing an Iterative MBSE Deployment

With the cultural shift gaining momentum, Veltraxis gradually expands MBSE beyond the initial pilot project. The methodology is now applied to additional production lines for the VTRX-26, enabling a holistic transformation across the organization.

Advanced AI-driven tools are introduced to enhance real-time traceability of requirements, ensuring that inconsistencies are detected and resolved early in the design phase. Additionally, the digital twin framework allows teams to simulate production line efficiency before making physical modifications, significantly reducing downtime and costly adjustments.

By adopting an iterative approach, the company is able to balance the need for quick wins with long-term structural change. Each successful iteration builds confidence, further embedding MBSE into the company's operations. Challenges remain, particularly in integrating MBSE tools with legacy enterprise systems, but the progress is undeniable.

Stage 5: Scaling and Continuous Improvement

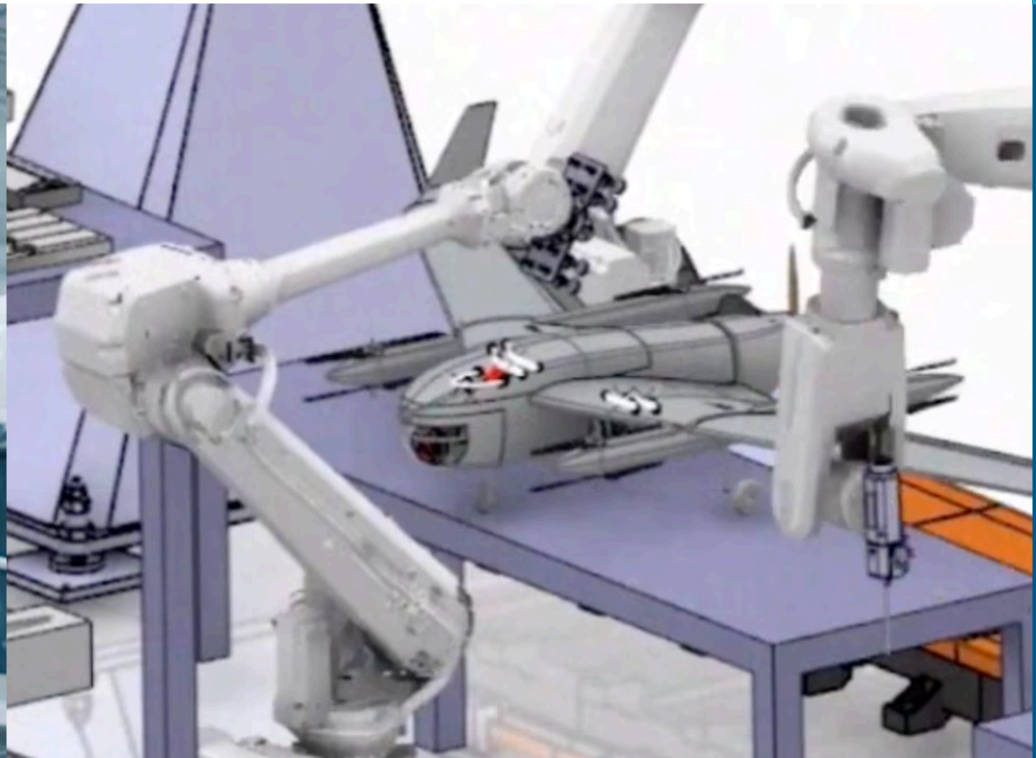
As MBSE becomes ingrained in Veltraxis's operations, the company moves from targeted implementations to an enterprise-wide framework. What began as a pilot project has now evolved into a comprehensive digital transformation. MBSE data is leveraged to predict and prevent supply chain bottlenecks, ensuring uninterrupted production flow. The company adopts a continuous integration model, where new design updates seamlessly incorporate into the manufacturing process without disrupting operations.

To sustain this momentum, a governance structure is established, ensuring ongoing alignment between product engineering, manufacturing, and external stakeholders. Veltraxis now has the capability to not only respond swiftly to evolving military needs but also to anticipate them proactively. The transformation is complete, and Veltraxis stands as a testament to how MBSE can redefine efficiency in the Aerospace and Defense industry.

Outcomes and Business Impact

The results of the MBSE implementation are striking. The development cycle for the VTRX-26 is reduced by 30%, significantly accelerating time to market. Manufacturing rework costs drop by 40%, thanks to early-stage detection of design issues. Collaboration between development and production teams flourishes, eliminating delays and miscommunications. Most importantly, Veltraxis emerges as a leader in digitally integrated defense manufacturing, capable of adapting to the rapidly changing demands of modern warfare through effective digital continuity between internal teams, external suppliers, and stakeholders within the customer.

Through strategic planning, disciplined execution, and an unwavering commitment to cultural transformation, Veltraxis successfully navigates the complex journey of MBSE implementation, securing its place at the forefront of aerospace innovation.



THE VALUE OF DASSAULT SYSTÈMES & CAPGEMINI'S JOINT APPROACH TO MBSE IMPLEMENTATION

The collaboration between Dassault Systèmes and Capgemini is a game-changer for A&D manufacturers seeking to use MBSE as a tool to achieve true digital continuity across the enterprise. Whilst both organizations offer deep knowledge of the A&D industry, they also bring unique capabilities and can combine them to address the most pressing challenges for A&D companies.

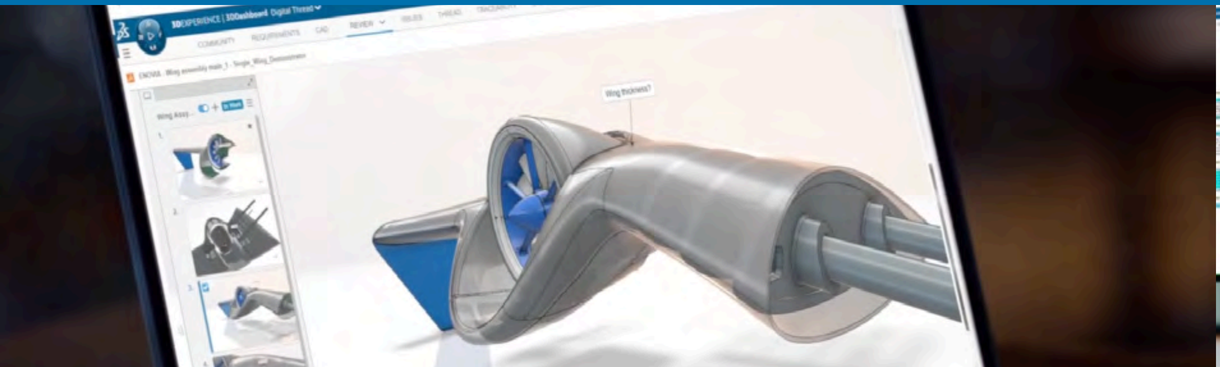
DASSAULT SYSTÈMES: PIONEERS IN DIGITAL TOOLS FOR THE PRACTICAL IMPLEMENTATION OF MBSE

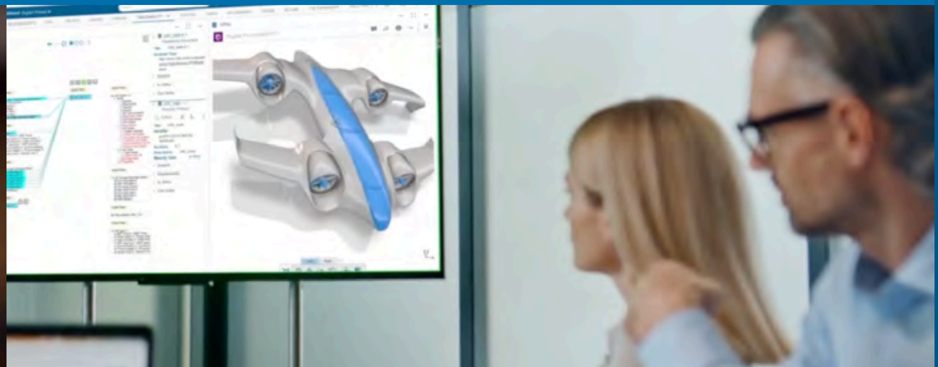
Dassault Systèmes is a leading provider of the digital tools that make up the technological backbone for implementing MBSE. Our technology enables large companies to unlock the full potential of MBSE:

3DEXPERIENCE: This is our core platform for MBSE, which integrates a suite of software covering the entire product lifecycle, from initial requirements to manufacturing execution. **3D**EXPERIENCE is a single place where the design, engineering and manufacturing worlds can connect all the different moving parts of complex industrial systems. The platform includes the following capabilities:

- **Digital modelling**:Our digital modelling environment enables system engineers to visualize complex system designs through graphical representations. It creates digital models of any system, bringing together a range of data including requirements, functional architecture, and behavior. It is fully integrated into the **3D**EXPERIENCE platform so any models can access and use other engineering data to enhance collaboration between internal and external teams.
- **Advanced simulation**: **3D**EXPERIENCE enables the testing and validation of complex systems within a virtual environment, thereby reducing the need for physical prototypes.
- **Virtual process planning**: Our platform gives teams the tools to simulate factories and the processes running within them. It can take any system design and model the manufacturing process flow for that design, the factory layout, and even the human tasks required to build everything in the real world. In A&D this is already being used to model existing factories and simulate how they can be repurposed to produce new aircraft innovations.
- **Digital thread**: **3D**EXPERIENCE gives companies a digital thread for their industrial systems – a single unbroken chain of data from one end of the product lifecycle to the other, available for everyone to access and use.

Collectively, these tools empower A&D companies to design smarter, collaborate more effectively, and innovate faster, all while minimizing reliance on physical prototypes by leveraging comprehensive digital simulations.





CAPGEMINI: EXPERTS IN MBSE INTEGRATION & IMPLEMENTATION

Implementing MBSE at the scale required by the A&D community relies on more than deploying digital tools. Capgemini's experience of process transformation, systems integration and change management all ensure that MBSE is not solely an extension of existing software – but a fully realized new way of working that organizations can sustain long-term. Our MBSE capability includes the following expertise:

- **Industry-Specific Experience**: Capgemini has extensive experience in integrating MBSE solutions into the unique operational environments of A&D companies. Projects in this industry are complex and regulated. Our team includes consultants and engineers with deep domain knowledge including familiarity with safety standards and procurement processes. This means we can bridge the gap between generic MBSE methods and the specific needs of any aerospace or defense program.

- **Change Management and Digital Transformation**: Leveraging Dassault Systèmes' market-leading tools requires rethinking workflows, reorganizing teams, and moving away from document-centric processes. Capgemini's expertise in system engineering processes and organizational change means we can support companies making this transition by providing training, cultural change strategies, and structured roadmaps. This might include developing training programs for production teams or embedding our own MBSE experts alongside them until users are self-sufficient.

- **Legacy Integration**: : Large organizations in this sector have many existing digital tools so implementing MBSE successfully often means integrating these into the solution or migrating data. Our team are specialists in systems integration and can help integrate Dassault Systèmes' tools, making sure they talk to other software in the customer's enterprise. They also know how to migrate data from legacy systems, setting up the infrastructure to enable a smooth transition from the old environment to the new one.

- **Supply Chain and Manufacturing Optimization**: Our extensive experience in delivering successful systems integration within large, complex businesses has shown that operational transformation must extend beyond the customer to encompass the entire supply chain. This comprehensive approach ensures that all stakeholders are aligned, processes are optimized, and the full benefits of MBSE are realized. We use our intelligent supply chain solutions to convert traditional supply chains into AI-enabled, data-driven functions that can better support the A&D customer by boosting agility, scalability, and enhanced decision-making capabilities across every part of the production process.

By combining Dassault Systèmes' powerful digital platform and tools, with Capgemini's transformation and integration expertise, and both companies' deep domain experience, A&D companies can benefit from the correct combination of knowledge to unlock the maximum benefits available from the successful expansion of MBSE into the production process.

CONCLUSION

The Aerospace and Defense industry is at a critical juncture, where rapid manufacturing, efficiency, and innovation are essential for maintaining a competitive edge. MBSE offers a transformative solution by bridging the gap between design and production, optimizing resources, and enhancing collaboration.

With Dassault Systèmes and Capgemini's expertise, A&D companies can successfully integrate MBSE into their operations, to achieve the levels of digital continuity required to unlock unprecedented efficiency and agility in the manufacturing process.

As a result, MBSE not only accelerates innovation but also reduces errors, shortens lead times, and ensures regulatory compliance across the supply chain, all while minimizing reliance on physical prototypes.

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ABOUT CAPGEMINI

Capgemini is a global business and technology transformation partner, helping organizations to accelerate their dual transition to a digital and sustainable world, while creating tangible impact for enterprises and society. It is a responsible and diverse group of 340,000 team members in more than 50 countries. With its strong over 55-year heritage, Capgemini is trusted by its clients to unlock the value of technology to address the entire breadth of their business needs. It delivers end to end services and solutions leveraging strengths from strategy and design to engineering, all fueled by its market leading capabilities in AI, generative AI, cloud and data, combined with its deep industry expertise and partner ecosystem. The Group reported 2024 global revenues of €22.1 billion.

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