

## Strategic initiatives build Global Innovation Networks in aerospace and defense industries

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white paper



- ▶ Aerospace and defense companies transform the process of innovation from requirements to retirement through strategic investments that sustain profitable growth and long-term productivity.

► **Strategic initiatives build Global Innovation Networks  
in aerospace and defense industries**

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## **Innovation Networks transform aerospace and defense from requirements to retirement**

*In order to compete, companies in all segments of the aerospace and defense industry must strengthen their ability to increase productivity and production rates with products that meet customer demands as well as economic and regulatory requirements. This is extremely challenging for an industry that is characterized by low volumes, highly complex products with long lifecycles, extended customer relationships, increased competition and global partnerships.*

*According to Aviation Week, “the intensely fierce struggle for competitive advantage [in the aerospace and defense industries] will be won by those who can anticipate change and adapt most successfully to the increasing demands of customers who can easily turn to alternative suppliers.” [Source: July AW: [http://www.aviationnow.com/avnow/news/channel\\_awst\\_story.jsp?id=news/law071006p1.xml](http://www.aviationnow.com/avnow/news/channel_awst_story.jsp?id=news/law071006p1.xml)]*

*It is no longer possible – or practical – for one corporation to develop, design, manufacture, assemble, test and sustain a major aerospace and defense platform or system. Indeed, most aerospace and defense companies have created virtual enterprises. In this paradigm, virtual design teams and globally distributed operating sites must be able to function in highly disciplined, integrated and synchronized value chains.*

*When these models are in place, the goal for OEMs is to strategically share work with their partners as much as possible while concentrating on product assembly, marketing and long-term strategies. The goal for partners and suppliers, on the other hand, is to optimize internal processes while implementing new ways to effectively manage up- or downstream activities. The trend toward strategic sharing of development and manufacturing has greatly magnified the importance of effective and secure value chain collaboration when designing, building and maintaining aerospace and defense products.*

*Aerospace and defense companies also have a huge stake in aftermarket service and support. Unlike most manufacturing companies, the amount of data that needs to be effectively managed actually increases for aerospace and defense companies when products are shipped. Companies in this sector must maintain and enhance complex products with lifecycles of 30 to 50 years, or even longer.*

*The sheer size and complexity of aerospace and defense products cannot be overemphasized. A single advanced military aircraft can have more than a million parts, not to mention numerous embedded mechatronics systems (disparate, multi-discipline subsystems), each of which might be more complicated than the most complex automobile. To digitally integrate the design, production and maintenance of products on such a massive scale requires advanced and robust enterprise-grade solutions that can handle terabytes of information within and outside the enterprise.*

*Many aerospace and defense companies are transforming their businesses by implementing product lifecycle management, or PLM, solutions. Because they focus on the entire lifecycle, these solutions are especially effective at building a foundation for Global Innovation Networks – supporting collaboration across the extended enterprise and centrally managing product-related data and intellectual property (IP). These networks can be implemented in cost-effective stages that deliver ROI at every step of the way. They also support comprehensive portfolio management to ensure that the right product ideas are realized and capitalized on throughout their lifecycles.*

PLM initiatives are most effective when they address specific business challenges. According to leading industry experts, the primary business drivers facing aerospace and defense companies are:

### **Total cost superiority is critical to sustained success**

The emergence of smaller, more agile companies across the globe with impressive IP assets and aerospace and defense expertise has put pressure on all players across the value chain. To successfully compete, companies need to aggressively improve top-line growth by securing new orders and introducing more innovative products. OEMs must be more flexible and adaptable than ever before. Suppliers must fit the needs of collaborators up- and downstream more precisely.

Complex, long-lived products are forcing aerospace and defense companies to re-examine the total cost of ownership from development through extended service lifecycles. Cost reductions in development and manufacturing must be aggressively sought. At the same time, more effective ways to ensure that products can be operated economically for their entire service life must also be incorporated.

### **The industry structure is changing**

Industry consolidation, compressed time-to-market and the need to increase productivity and efficiency at all stages of the product lifecycle are forcing aerospace and defense companies to focus on infrastructure with an emphasis on interoperability, connectivity and support for spiral development with portfolio management. Super-integrators are emerging, driving outsourcing of development and manufacturing to strategic partners and suppliers worldwide. In fact, the ability to collaborate seamlessly with strategic partners is crucial to winning new programs and bringing innovative products to market.

### **Regulatory and environmental compliance must be sustained over decades**

The risks of non-compliance with industry and governmental regulations can be especially high for both commercial and military aviation companies. A proliferation of regulatory and environmental compliance issues has become increasingly challenging in recent years. Sarbanes-Oxley in the US and adherence to OEM standards remain important. In addition, aerospace and defense companies must comply with Contract Data Requirements List/Subcontract Data Requirements List (CDRL/SDRL), ITAR (International Traffic in Arms Regulations), RFID (Radio Frequency Identification Device), UID (Unique Identification) and an array of specifications and industry standards.

To address unique business challenges, growing numbers of aerospace and defense companies are turning to the concept of Global Innovation Networks, a transformative business model built on collaboration that fosters innovation and informed decision making at every stage of the product lifecycle. The Global Innovation Network model requires a digital environment that encompasses key contributors from strategic partners, suppliers and customers around the world. By creating Global Innovation Networks, aerospace and defense manufacturers are able to effectively address the business requirements driving top-line growth:

- **Accelerate innovation** – by increasing the yield on product and process innovation to accelerate top-line growth
- **Reduce time-to-market** – through lean processes, a higher yield on designs and faster cycle times
- **Leverage globalization** – through real-time collaboration with global partners and suppliers
- **Optimize resources** – greater efficiency through the product lifecycle and digital product and process validation
- **Ensure compliance** – by incorporating customer and regulatory requirements at all stages of the product lifecycle and by automating the process of documenting compliance

#### **PLM helps set A&D industry benchmarks**

Through carefully planned and implemented PLM initiatives, aerospace and defense companies have achieved an impressive array of benchmarks, including:

1. Lockheed Martin-led JSF Global Coalition: The world's largest global military virtual enterprise
2. Eclipse Aviation, Eclipse 500: Won the 2005 Collier award for A&D Innovation
3. IAI Gulfstream 150/200: Set the General Aviation Benchmark for time-to-market
4. Boeing F/A-18E/F/G Program: Won the 2005 AW & ST Program Excellence Award
5. GE Aircraft Engines: Set the Aircraft Engine Benchmark for time-to-market

According to independent industry analyst firm Forrester Research, Global Innovation Networks represent a new model for product-focused companies that recognizes the new paradigm in which Original Equipment Manufacturers (OEMs) focus on core competencies (essentially the intellectual property behind their product lines) and retain final assembly, test and potentially lifecycle service and support, while partners focus on design and manufacturing.

For aerospace and defense companies, these networks can include partners, suppliers and service providers which must work synergistically as a global virtual enterprise often for 30 to 40 years. Moreover, prime contractors are now being asked to share the load of in-service support with government agencies, commercial airlines and other third-party service providers. For the aerospace and defense industry, Global Innovation Networks are not an option for the major OEMs and their partners and suppliers, but rather they are essential for sustained, profitable growth and long-term productivity.

Global Innovation Networks, Forrester continues, “enable companies to match their global demand for innovation with worldwide sources of talent and capital. Savvy firms make use of Innovation Networks to bring in new ideas and fresh, outside perspectives as a replacement for stale, vertically integrated approaches to innovation. To effectively meet growing innovation demand, firms must join an emerging market model that lets players co-invent with customers, source and market innovations anywhere, and anticipate as well as respond to supply and demand changes.” [Topic Overview: Innovation Networks, December 2005 and Fortune 500 CEOs Embrace Innovation Networks, December 2005. Forrester]

Once companies have identified their top business challenges, they naturally will want to undertake initiatives to ensure they reach their business improvement goals. Companies across many industries are considering initiatives such as:

- Enterprise data management
- New product development
- Systems engineering and mechatronics
- Knowledge and IP management
- Regulatory compliance
- Commonization and re-use
- Production efficiency
- Value chain synchronization

Many aerospace and defense manufacturers have found PLM solutions that focus on product and process innovation to be the ideal platform from which to launch business process improvement initiatives. A comprehensive digital product platform based on PLM offers unprecedented capabilities to global teams by bridging siloed departments and systems and providing a virtual environment for collaboration across the entire protracted lifecycle – from requirements to retirement. PLM enables manufacturers to address their key business initiatives internally, then cost-effectively extend these initiatives to include strategic partners, suppliers and customers in the process of innovation.

Optimum PLM solutions are designed to be implemented in cost-effective stages, systematically enabling key business requirements and providing substantial rewards along the way. Each initiative gives manufacturers the opportunity to establish the PLM framework, best practices and product-related data that will form the core of their Global Innovation Networks and help them transform their process of innovation.

Aerospace and defense manufacturers should start by addressing those business areas that are most critical to their near-term success. As more of these initiatives are undertaken, the PLM platform from which they are launched will grow to support a robust Global Innovation Network.

This paper discusses some specific examples of strategic initiatives that are critical to aerospace and defense companies:

- **Enterprise data management** – Consolidate and contextualize product and process information in ways that directly support specific tasks in a highly secure environment. Organize, manage and secure critical information through a digital backbone robust enough to support a wide range of capabilities across global value chains that include strategic partners as well as hundreds of suppliers
- **New product development** – Link requirements and design options to create an optimum solution that satisfies the performance requirements of the system. Embed market and customer requirements directly into product architectures
- **Systems engineering and mechatronics** – Establish performance and design requirements to drive the systems engineering process. Establish concurrent planning and systems engineering for the whole product, including design and engineering process management, as well as embedded software management, validation and testing and manufacturing
- **Production efficiency** – Integrate product design with process design and production information to maximize production speed, flexibility, performance and quality
- **Value chain synchronization** – Optimize idea exchange and effectively share product and process information among all value chain stakeholders. Synchronize activities up- and downstream and automatically capture data in support of strategic sourcing

Aerospace and defense companies face massive data management challenges that may extend over a 50-year product lifecycle. An enterprise data management initiative is fundamentally a lifecycle strategy for integrating, controlling and managing all of the intellectual property that defines – from both the physical and functional perspectives – all aspects of an aerospace system, platform or product. It aims to bring all relevant information together in a very structured and highly secure way at the data model level, enabling stakeholders across the value chain to access the information they need to make informed decisions.

In the area of 3-D simulation, one complete mock-up of a new airplane could require several terabytes of data including well over a million part positions in order to provide a complete 360-degree view of the product. To share information on this magnitude requires a powerful data management infrastructure with seamless connectivity among disparate systems and data formats. In addition, this infrastructure must be highly secure and scale to meet new requirements. Few aerospace and defense support systems can simultaneously support more than 20,000 users, yet today's value chains may need to support twice that number.

To quickly ramp up to volume production with desirable yields and the right price points, companies need to address the following within an enterprise data management initiative:

### **Data management**

Provide a single, highly secure master source of all configuration management data to support rapid and fully informed decision making. This requires integrating and managing all of the information and knowledge that defines the physical functions of the finished product. When the product includes future service and support initiatives for a fleet of diverse and dispersed aircraft, the data management challenge is magnified.

To support this effort, companies need information-technology support systems robust enough to handle all the right data elements – for example, a history of all the molded plastics required for the interior of an aircraft. Advanced PLM solutions can provide designers with both vertical searches – e.g., search the total build of one airplane – and horizontal searches – e.g., look at all hydraulic systems in a class of aircraft.

- *Logistics data management* – Combine data and definitions on design/build with usage and maintenance logs. This is especially critical for fleets of aircraft and NASA projects. Logistics data management should include sophisticated feedback for future design changes and improvements

## Process management

Link data with processes across the lifecycle. This includes managing all pertinent knowledge relating to product, structure, master model or bill of materials (BOM). It also includes continuing data management throughout aftermarket and maintenance. Fully inform decision makers about trade-offs and available options.

- *Product change management* – All changes to both the physical and functional aspects of the product must be tracked and evaluated across disciplines and throughout the value chain. In addition, the process of gathering timely information to support regulatory compliance should be automatic
- *Process change management* – Manage all processes centering on product structure master models or BOM. Deliver the right information to the right personnel at the right time. A critical factor here is the ability to personalize key information for users so that they see only what is relevant to getting the job done. Since all irrelevant information is filtered out, productivity improves. Likewise, security issues are minimized

## Context management

Establish the right relationships among all data elements (including 3-D data) to ensure that decision support and knowledge management tools are able to quickly find and contextualize relevant product data that could reside in multiple BOMs. Establish mechanisms to consolidate and contextualize BOM data so that all users work from a single version of the truth.

- *Airtight security* – Ensure the highest possible security and flexibility so that key contributors across the value chain have the information they need to get their jobs done, and no more

By seamlessly and rigorously managing knowledge creation, use and re-use, PLM-driven enterprise data management enables program managers to improve multiple aerospace and defense initiatives. Virtual design review can be performed on a 24x7 basis, including the routine exchange of comprehensive 3-D images with full disclosure of engineering data and test results. International coalitions can function as highly centralized enterprises, using enterprise data management to facilitate compliance. Multi-discipline teams can assess a master product structure that provides comprehensive insight into the complete “DNA” of every part, subsystem and system in a major aerospace platform.

## Israel Aircraft Industries (IAI) sets a new A&D industry benchmark

A leading manufacturer of commercial aircraft, Israel Aircraft Industries (IAI) Commercial Aircraft Group implemented a digital design and manufacturing environment using PLM technologies to achieve a “paperless airplane.” With fully automated advanced design/build processes in place, IAI has a collaborative design and manufacturing environment that supports contributors across the value chain. Its PLM system supports ergonomics, improved efficiency, design of manufacturing tools and global sharing of data, including 3-D designs. Digital modeling allows stakeholders to see the aircraft as a whole and eliminates the need for prototyping. Results have included significantly reduced labor costs, minimized engineering changes and shorter time-to-market for a cost-as-designed aircraft. The IAI “Innovation Network” has enabled IAI to launch a completely new family of General Aviation aircraft in 24 months, from start-to-first flight, an aerospace industry benchmark for time-to-market.

In an attempt to accelerate the design process, aerospace and defense companies are reexamining product development's traditional linear flow from design through manufacturing and sales. To ensure demand-driven innovation and achieve cycle time reductions of 60 to 70 percent, a new product development initiative seeks to create a real-time, global, collaborative environment that fully integrates people, processes and systems.

This initiative stresses strategic portfolio management that closely aligns current and future market demands with product development. Key dependencies and leverage points are outlined early in the process so they can be acted upon quickly. As part of normal workflow, the best ideas are tested and validated against real-world market opportunities.

To accelerate the development of new products that meet or exceed customer expectations, aerospace and defense companies need to address the following focus areas within a new product development initiative:

### **Program management**

Control and manage program development team complexities and establish performance measurements and milestones to keep projects on track. Enable all product-related teams to work together effectively regardless of any member's physical location. Establish product configurations that can be managed, tracked and re-used across an entire product lifecycle, as well as across multiple product offerings.

- *Engineering process management* – Synchronize the engineering processes that require participation across the value chain and access to all of the product information users need to get their jobs done. Accelerate product delivery by enabling design teams to seamlessly collaborate with manufacturing teams

### **Product development and engineering**

Develop systems and technologies that embed market and customer requirements directly into product architectures. Feedback mechanisms should extend into aftermarket and maintenance activities.

- *Product design* – Create a distributed design environment that supports very large model phase development. Enable designers to access more content and view designs in multiple configurations during model development. Large scale models provide 360-degree views of the product throughout its lifecycle

A PLM backbone creates a highly productive product development environment that enables designers to map the product throughout its lifecycle, which often extends throughout ongoing maintenance programs. Platform-based design ensures that aerospace and defense companies maximize part and component re-use across programs.

The various systems and subsystems that make up the final product must be aligned and evaluated as a whole in order to develop an optimal product design that meets performance and design requirements. All physical and functional sub-systems and parts must work together as specified. Maintenance schedules have to be mapped out well in advance.

A full understanding of subsystems and how they can be efficiently manufactured and assembled requires a comprehensive digital environment that transforms raw data into actionable information. Companies have to manage large volumes of data for products that have millions of parts and multiple systems.

- *System modular structure* – Data must be organized and structured so that all physical and functional relationships are visible across the design/build/maintain process. Designers must flexibly manage entire systems (such as hydraulic or electronic systems on airplanes) on a modular level. Final designs of all products and systems should come together seamlessly during assembly
- *Multi-system integration* – Disparate engineering disciplines must be finely synchronized to ensure that complex mechatronics systems with mechanical, electronic or software components are validated and tested as a whole. This ensures that overall requirements are met and finished products are delivered on schedule
- *Requirements management* – Key Performance Parameters as well as budget and schedule constraints must govern the selection of the optimum solution for requirements that often conflict. By tightly linking design options to requirements, the review process and the search for the optimal solution that provides the greatest customer value can be greatly simplified thereby saving time and money at the most critical phase of any program – the initial launch

Advanced PLM systems with mechatronic capabilities can model and analyze interactions among the requirements, subsystems, constraints and components of complex products that can include mechanical, electrical and software elements. These systems allow engineers to rapidly model and evaluate design alternatives to ensure that products are right the first time. Real time decision making takes place in the context of customer needs. Traceability is supported throughout the life of the product.

### **GE Aircraft Engines dramatically streamlines product development**

The world's largest producer of engines for commercial and military planes, GE Aircraft Engines (GEAE) was able to significantly reduce design cycle times by tightly integrating manufacturing and product design. Using an intelligent Master Model and related PLM tools, GEAE dramatically streamlined its new product introduction process. The Master Model provides a single representation of engine configurations and reduces design time by facilitating effective collaboration among design specialists across the value chain. PLM tools improve the management of analyzed data and track the impact of design changes. Design processes have been synchronized and accelerated across a global manufacturing environment. As a result, the company has reduced launch cycle times from 42 to 24 months. The company now is working aggressively to lower the standard to 18 months, an aerospace benchmark for aero-engine development cycle time.

The need for global sourcing, manufacturing, test and assembly places extraordinary pressure on today's aerospace and defense production operations. In order to increase efficiency at all stages of the product lifecycle, companies must integrate all aspects of production, including sourcing, manufacturing planning, manufacturing management and multi-site assembly and testing.

Companies can increase production efficiency by enhancing the visibility of innovative processes across their enterprise and increase profitability through the optimization of manufacturing resources and capital investments. These initiatives aim to accelerate every phase of the product lifecycle, ensuring that products are delivered well within the window of market opportunity.

To rapidly optimize production efficiency, aerospace and defense companies need address the following focus areas:

### **Manufacturing process optimization**

Incorporate production efficiencies from across the value chain into the product design. Establish a digital collaboration environment that enables companies to convey the correct requirements to all participants in design and manufacturing engineering. Ensure that OEMs, CEMs and EMS providers more effectively collaborate on the development of manufacturing processes, and that all key decisions are made early in the process.

### **Manufacturing planning and validation**

Support up-front virtual planning of every aspect of the product and provide built-in feedback mechanisms that automatically deliver as-built data and exceptions back to design teams. At the very beginning of the product development process, designers must be able to virtually plan processes and workflows within factories geographically dispersed across the value chain. Up-front validation prevents product delays and ensures regulatory compliance. Visibility into all aspects of the manufacturing process not only ensures error-free product launches, smooth ramp-up and compliance; it also supports continuous improvement.

- *Optimized machine layout* – Ensure that machines, people and processes across the value chain are synchronized and effectively flow to improve overall production efficiency. This should include automatic feedback mechanisms that inform designers of options and trade-offs for current and future designs.

### **Production management**

Monitor and control production by setting performance parameters and establishing feedback mechanisms to support continuous improvement. Ensure launch readiness through improved process analysis, automated BOM and assembly verification, as well as PCB assembly and testing. Establish key performance metrics at the plant or enterprise level, including work in progress, quality management, repair management and overall equipment efficiency.

Designed to capture and manage all plant, process, product and manufacturing resources, PLM systems are ideal backbones for production efficiency initiatives. Through a digital design and manufacturing environment, designers and engineers can visualize the entire system in an integrated way. They can dive into the lowest level of detail for root cause analysis. Wherever possible, designs and parts can be re-used to lower costs and speed product delivery.

Enterprise PLM solutions provide companies with a single source of comprehensive product and manufacturing knowledge that can be leveraged to account for all configuration changes, as well as to track all production results, including options and variants between the engineering BOM and the manufacturing BOM for post-delivery service and support.

### **Eclipse Aviation boosts efficiency by sharing 3-D designs**

Eclipse Aviation implemented a PLM system in large part to get visibility and synchronization into the value chain. Visualizing the shop floor effectively closes the loop between finished goods and product designers. Since every step of the manufacturing process is synchronized along the value chain, assembly time for Eclipse Aviation jets was reduced from months to days. Eclipse Aviation completed full FAA certification in Sept, 2006 in record time by using its PLM system to seamlessly and efficiently share data and 3-D models directly with FAA engineers. The company already has established a new benchmark in affordable personal jet flight which has resulted in a backlog of over 2,500 aircraft and the launching of a new General Aviation Market Segment: the Very Light Jet.

Over the next few years as global demand grows and as aerospace and defense OEMs continue to outsource engineering and manufacturing, companies will need more effective ways to share product and process information among value chain stakeholders. Consequently, value chain synchronization and its related enabling technologies – integration, information exchange, strategic sourcing and collaboration – have become top priorities. The exchange of knowledge and information must be enhanced at every link in the value chain so that the best ideas, assemblies, parts and process data are readily shared.

To ensure optimum levels of value chain collaboration, aerospace and defense companies need to address the following focus areas:

### Supplier relationship management

Blend procurement and sourcing processes more tightly with product development. Identify and align the best partners, then involve them early in the product development process to streamline processes, control costs and contribute to innovation and growth goals. Manage outsourced manufacturing to optimize production efficiency with visibility into production status at every step of the way.

- *Sourcing integration* – Synchronize activities across disciplines and organizations to ensure that the virtual enterprise operates as one coordinated entity from development through manufacturing and service. This is especially critical when sourcing parts or components or when evaluating the capabilities of individual plants

### Value chain integration

Establish strong links among external contributors and stakeholders and internal departments by connecting information systems and processes. Synchronize activities across the product lifecycle – from development to manufacturing and service – through standards-based data exchange. Ensure strict security that allows partners to see only the information they need to get their jobs done.

- *Open information exchange* – Optimize connectivity at the data model level to ensure that the systems and applications used by multiple partners and suppliers work together as one unified system, managing key functions from ideation to on-going maintenance. Securely share contextual information to give each contributor access to the information needed for first-time quality

While it may seem counterintuitive, the fact is PLM solutions might better support value chain synchronization than traditional Supply Chain Management (SCM) solutions. PLM solutions with Web services or Service Oriented Architectures (SOAs) focus more directly on product and process efficiency improvements. By providing a managed development environment with secure access to the latest product information, PLM makes sure that suppliers respond accurately and fully to RFQs. In addition, integrating supplier operations more closely with product development reduces the impact of changes that can quickly erode negotiated pricing and cut into the bottom line.

### Lockheed Martin Aeronautics Company creates a value chain spanning more than 30 countries

To deliver to the state-of-the-art F-35 Joint Strike Fighter (JSF), Lightning II, aircraft, Lockheed Martin created a global, virtual design-network and multi-site assembly operation. This tightly integrated environment supports a coalition of strategic partners, plus up to 600 suppliers in a value-chain spread over 30 countries. Program requirements included building more than 3,000 aircraft with three design variants for the US Navy, Air Force and Marines, as well as US allies.

Goals achieved include: 35 percent design and 67 percent build cycle reductions, 70 percent commonality among the aircraft variants, and the lowest sustainment cost for a 30-year fleet life. “We start with a digital design, then we build and assemble the aircraft using that same digital data,” says Larry Mestad, Lockheed’s JSF airframe systems engineering lead. “After that, we deliver and repair the aircraft with the exact same digital information.”


Today, OEMs in the aerospace and defense industry have become assemblers and market strategists, while suppliers are vying to become strategic partners effectively collaborating in an extended value chain. But no matter what role an aerospace or defense company plays, the basic challenge remains the same: the enterprise must find better ways to efficiently manage high volumes of data surrounding highly complex and long-lived products.

When correctly implemented, PLM technologies can create a new business paradigm for aerospace and defense companies, ultimately realizing a Global Innovation Network that truly transforms the way business is conducted worldwide.

To create a sustainable competitive advantage in this complex and constantly evolving environment, aerospace and defense companies must develop new products and solutions that not only satisfy current customer demands, but more importantly define and drive customer expectations in the future. Successfully differentiating through the process of continuous innovation is critical for long-term success. To win in their markets, aerospace and defense companies must:

- Manage knowledge and intellectual property enterprise-wide to optimize resources and control costs
- Speed time-to-market through accelerated new product development
- Manage the entire product through robust systems engineering and mechatronics capabilities
- Facilitate production readiness and design for manufacturability with manufacturing process optimization
- Synchronize value chains and securely disseminate the right information to the right people

By establishing an enterprise-wide digital environment for collaboration and innovation, aerospace and defense companies can manage their product-related ideas more cost-effectively across the value chain and throughout the product lifecycle. An industry-specific suite of PLM applications can be used to integrate all disciplines that participate in new product development – including aeronautical, thermal, electrical, mechanical and software engineering – to optimize system performance, affordability and sustainment.



PLM solutions running on unified data management platforms and featuring industry-specific functionality can effectively manage entire programs in consistent and predictable ways over the long term. The best of these solutions enable companies to transform to a digital manufacturing environment by linking all relevant systems across the value chain at the data model level. This environment makes possible new levels of knowledge management and ensures that timely and accurate information is delivered at the right time to the right decision makers. This same environment can effectively support after-market and maintenance activities for especially long-lived products such as satellites or aircraft carriers.

Manufacturers able to harness the power of their corporate-wide knowledge can innovate far more effectively than their competitors. Global Innovation Networks built on PLM foundations are transforming aerospace and defense enterprises and defense departments across the globe by enabling the seamless flow of – and immediate access to – complete, accurate and synchronized knowledge on systems, platforms and products anywhere and at any time. The challenges facing the aerospace and defense industries have never been greater. Global Innovation Networks will drive growth, productivity and enterprise transformation for the foreseeable future.

### **About Siemens PLM Software**

Siemens PLM Software, a division of Siemens Automation and Drives (A&D), is a leading global provider of product lifecycle management (PLM) software and services with 4.3 million licensed seats and 47,000 customers worldwide.

Headquartered in Plano, Texas, Siemens PLM Software's open enterprise solutions enable a world where organizations and their partners collaborate through Global Innovation Networks to deliver world-class products and services.

For more information on Siemens PLM Software products and services, visit [www.siemens.com/plm](http://www.siemens.com/plm).

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