How do we transform the process of innovation for aerospace and defense?

Siemens PLM Software offers product lifecycle management (PLM) solutions to build the right product and build the product right

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Today's aerospace and defense industry

The aerospace and defense industry is expected to experience continued growth in most segments for the foreseeable future. Both military and commercial customers want to modernize their aging fleets with new and more energy efficient models and extend the useful service life of their existing fleets. The challenges for OEMs and their customers will be to continuously transform their extended supply chains to optimize total productivity while maintaining a highly dynamic and virtual work force.

With this in mind, the value of product lifecycle management (PLM) is fully apparent as a platform for:

- Seamlessly and securely sharing knowledge and best practices across a total value chain
- Capturing best practices and lessons learned that can be leveraged to create new and better product families
- Establishing a single master source of all data and 3D images that can be used to define today's most complex aerospace platforms and synchronize a global virtual network of designers, developers, manufacturing engineers, production specialists and service/ support teams

Siemens PLM Software solutions include industry best practices that enable aerospace companies to manage entire product lifecycles that run from "requirements to retirement."

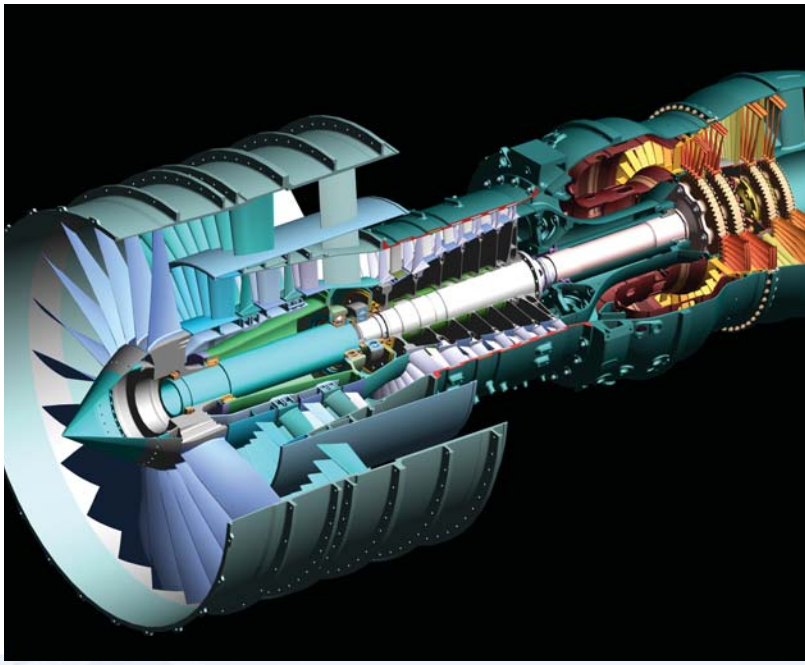
Business challenges

Aerospace and defense companies need to launch fewer completely new aircraft programs in today's business climate. They also are required to respond more effectively to changing production schedules even though they participate in global supply chains comprised of diverse vendors and partners. In addition, prime contractors often compete on newer programs that require them to accept lifecycle performance agreements, which place a premium on total enterprise productivity.

Taken together, these challenges renew the aerospace and defense industry's emphasis on:

- Complex program management
- Virtual environments that synchronize global design/development
- Aligned supply chains that meet dynamic production schedules
- Collapsed development cycles
- Faster manufacturing and assembly times
- Virtual prototyping capable of minimizing physical models, assembly error and design rework
- Faster repair and overhaul cycle times
- Accelerated upgrades and enhancements that boost fleet availability

Aerospace and defense companies must be able to adapt to these challenges to realize sustainable profit and growth. Business success will be determined by their ability to transform legacy IT investments into dynamic, secure and seamless digital environments that can integrate their operations into highly functional global supply chains.



Mastering complexity

Globalization

Most OEMs rely on a partner network and global supply chain to develop, manufacture, assemble and test advanced aerospace and defense products. The ability to coordinate and synchronize a dispersed and diverse lifecycle environment is the key to future competitiveness and long-term success.

PLM software provides access to a single source of managed knowledge that companies can leverage to totally define and maintain the most complex product structure. In turn, this up-to-date and highly accurate product definition can be used by all members of an extended supply chain across every stage in a complete lifecycle.

Optimization

The cost and risk of developing and fielding new aerospace products can be enormous. To limit both development and production costs and mitigate their related risks, facilities and processes must be optimized from the outset.

Aerospace and defense companies can digitally simulate complete assemblies and processes to avoid the cost of creating physical models. Equally important, companies can optimize process flows before the first bolt is fastened and implement lean practices at the very beginning of a new program. These approaches compress total development cycle time and improve return on investment.

Speed

Accelerating time-to-market while delivering the right product can provide a competitive edge that is crucial to the success of launching new programs, as well as determining a program's ultimate success or failure.

Many of Siemens PLM Software's aerospace and defense customers have established new program launch records by leveraging embedded templates that accelerate implementation, improve team-related skill building and reflect tried and trusted best practices for avoiding predictable delays and potential risks. Siemens PLM Software adopts a partnership approach for complex system implementation to ensure that common goals and shared objectives are in place to drive each program to meet or exceed established expectations.

Sustainability

The aerospace industry is now pushing sustainability to new heights with lifecycles that can span 100 years and performance metrics that drive continuous improvements in availability, reliability and overhaul cycle reduction. PLM software enables OEMs to seamlessly track aircraft or engine "DNA" from concept development to manufacturing, assembly and test and finally through to the complete operating cycle.

With continuous configuration management and real-time field feedback, companies can implement engineering improvements and design enhancements faster and more efficiently, as well as synchronize the supply chain so that parts are available at the right spot at the right time.

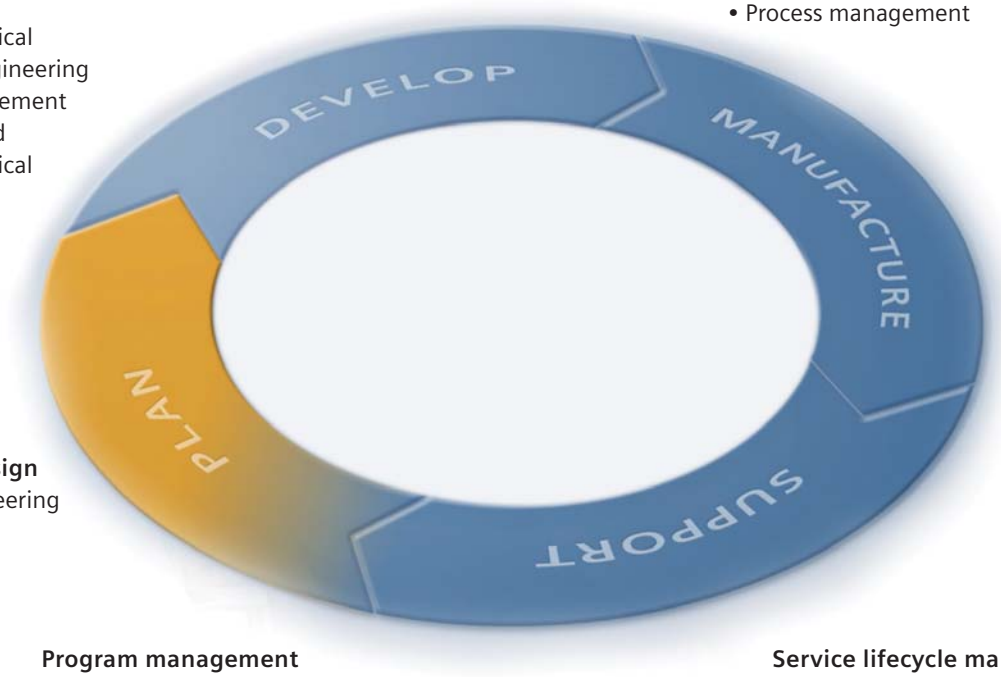
Product lifecycle management for aerospace and defense

Siemens PLM Software's solutions portfolio for aerospace and defense provides a comprehensive suite of tightly integrated modules uniquely qualified to seamlessly and securely manage all phases of a product lifecycle that extends from detailed design and engineering to manufacturing, final assembly and testing.

Detailed design
- Mechanical design and engineering process management
- Electromechanical design and engineering process management
- Mechanical and electromechanical simulation
- Mechatronics process management

Configuration management
- Change management
- Bill of materials management
- Bill of process management

Manufacturing and production optimization
- Part planning and validation
- Assembly planning and validation
- CAM/CNC optimization
- Plant design and optimization
- Process management



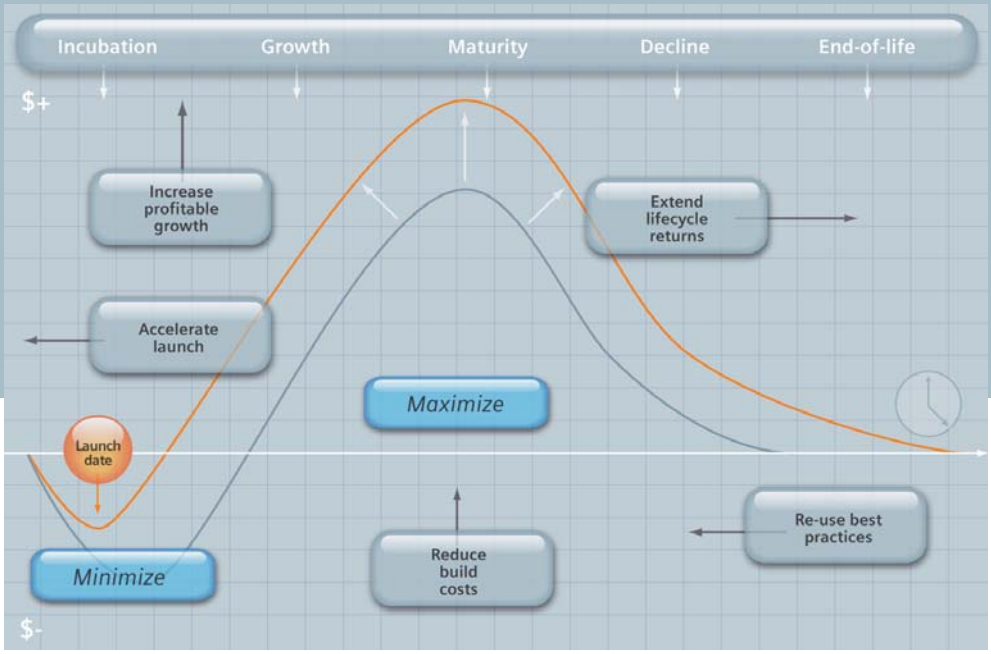
Supply chain management
- Supply chain synchronization
- Supplier relationship management
- Supplier contractual compliance management

Preliminary design
- Systems engineering
- Requirements management
- Modeling and simulation

Program management
- Seamless, secure knowledge management
- Project management
- Reporting and analytics

Fleet performance enhancement
- Health management
- Reporting and analytics
- Performance-based logistics management
- Upgrade/modernization management

Service lifecycle management
- Assembly planning and validation
- Overhaul facility design and optimization
- Supply chain synchronization
- Process management



PLM benefits for aerospace and defense

Accelerate launch

You can use PLM to establish an integrated digital product development environment that enables an extended enterprise to coordinate its design, engineering and manufacturing teams.

One of our OEM customers launched a new general aviation aircraft model in record time with a tightly integrated digital product development environment. The OEM achieved a 17 percent overall reduction in its launch cycle and a proportional reduction in its development costs.

Increase profitable growth

You can use PLM to change the overall performance of a complete business enterprise from development through production and across its service and support network.

After implementing Siemens PLM Software solutions, one major aerospace OEM raised its revenue by 32.6 percent and increased EBITDA by19.6 percent and its EBITDA per employee by 4.1 percent.

Extend lifecycle returns

A prerequisite for launching a major new military aircraft is the creation of a secure global, collaboration network that functions across every stage of a product lifecycle that runs from concept definition through product retirement.

An international coalition selected the Teamcenter® system from Siemens PLM Software to establish a global collaboration network that includes 40 sites in Europe, 96 in the Americas and 4 in Asia. This deployment is the largest and most successful example of secure global collaboration in the aerospace industry; it is expected to last for 100 years.

Re-use best practices

Re-using best practices can enable design and manufac-turing teams to benefit from lessons learned, as well as to minimize risk and accelerate the development of new and more advanced products.

Aero engine OEMs have used our PLM systems to reduce their core engineering development cycle from 60 months to 42 months, and in some instances to 24 months.

Reduce build costs

One of the aerospace industry's key challenges is to reduce the total time required for manufacturing, assembly and accepting testing.

One major OEM optimized its total production operations by digitally simulating all workflows and production operation before a single part was made. This revolutionary advance will enable the OEM to reduce overall total assembly time by 67 percent and ramp up its production rates from one aircraft delivered per month to one aircraft delivered every work day.

Build the right product and build the product right

The successful launch of a new commercial airliner is strongly dependent on a variety of factors including:

- Achieving a significant breakthrough across a combination of critical performance metrics
- Integrating a key set of global tier one partners
- Implementing a manufacturing strategy that incorporates today's most advanced technology
- Adopting a service and support plan that can deliver world class service anywhere, anytime

Detailed design of the Superjet 100 Regional Jet commenced at design centers throughout Russia; the first aircraft flew in May, 2008. Key program suppliers are located in Europe and the United States. The project's PLM-driven extended-enterprise platform integrated and coordinated design, manufacturing and final assembly sites. It also managed the multi-CAD solutions that were used by suppliers in a single master file.
Full certification of the Superjet Regional Jet is expected in 2010. This program is further testimony to the importance of establishing a seamless environment for providing knowledge to participating partners and suppliers from concept development through detailed design, assembly, testing and certification.

Transforming your process of innovation

During 2001, an international coalition of the worlds' leading aircraft and engine developers established a PLM-driven virtual global network to design, launch, produce and sustain a fleet of thousands of advanced military aircraft. The success of this program depended on the successful development of a family of advanced aircraft that would exhibit superior performance and reflect a recurring competitive price and a total operational cost that could be linked to an ever-more challenging set of performance-based logistics metrics.

The global coalition of partners and suppliers designed, built and are currently testing two of the aircraft models; the third model is expected to start testing in 2010. The highly secure, virtual global network that supports this enterprise now includes 140 worldwide sites. More than 6,000 users currently access this network, which is expected to support a workload of up to 20,000 users once the network reaches its full rate of production. In addition, the network provides full ITAR compliance as it handles approximately 70,000 secure communications per week and 1,200 workflows, as well as 28,000 annual product changes.This global virtual enterprise is the first of its kind to cover all phases of the aerospace lifecycle; it is projected to have a lifespan of 100 years. This PLM-driven environment is transforming the way future global aerospace programs will be managed.

Solutions for aerospace and defense

Program management

Today's aerospace and defense programs are extremely complex. Program managers are faced with the traditional pressures of budget, scope and schedule. However, these pressures are becoming more difficult because of:

- Smaller budget allocation
- Engineering complexity
- Global supply chain expansion
- Technology insertion

Aerospace and defense leaders and their customers are embracing new concepts to integrate today's program infrastructure and provide integrated program teams (IPT's) with the ability to share program information in real-time on a global basis.

Siemens PLM Software's solution for managing complex programs enables companies to establish integrated digital environments (IDEs) that address these challenges holistically. For this to be successful, systems engineering must be part of an overall program management strategy coupled with product management technology.

Siemens PLM Software provides IDE solutions with the following capabilities:

- Knowledge visualization to support executive dashboards, collaboration, reporting, reviews, "at-a-glance" program evaluation and the ability to present earned value metrics.
- Knowledge integration to support a single and secure environment that provides all program participants with entitled access to program/product information.
- Knowledge management to ensure that all members of complex program teams and their academia partners have appropriate training, certification and technology expertise needed to replenish today's aging workforce.

Siemens PLM Software's solutions portfolio uniquely integrates project management, systems engineering, requirements management, configuration and change management with digital simulation to optimize concept development and detailed design.

Product development

Today's companies must be able to seamlessly integrate entire design teams so they can develop complex, innovative products and get them to market before the competition. In a global market, design teams face new challenges as they integrate technology, process and people to provide real time access to the ever-changing design characteristics of new systems.

Siemens PLM Software helps companies synchronize data and processes across a complex value chain that includes development, manufacturing partners and the entire supply chain. These solutions facilitate integrated IDEs that enable all participants to work in a multi-CAD environment where complex product structures can be fully shared. These IDEs enable companies to manage the product structure through standard change processes and systems engineering capabilities that account for the program/product's entire lifecycle.

Our PLM-driven IDEs are able to integrate all of the critical disciplines needed to develop high-performance, durable and cost-competitive aerospace and defense systems – as well as speed time-to-market so these disciplines can deliver the right system at the right point in time. In addition, decision makers can leverage our solutions to evaluate tradeoffs necessary for optimizing system-level performance.

Aerospace and defense companies leverage IDEs driven by our PLM solutions to achieve 100-fold reductions in design iteration cycle time, thereby savings hundreds of millions of dollars in development cost while delivering optimum overall system/subsystem performance.

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Solutions for aerospace and defense

Manufacturing

The operation of today's aerospace and defense production facilities has grown increasingly complex with the use of more composite materials, advanced machining technology, global supplier networks and now multiple sites for final assembly and testing. Integrating all of these functions into a cohesive virtual enterprise is crucial to synchronizing the manufacturing process, lowering both its fixed and variable total cost and building the right product the first time and in every subsequent instance.

Siemens PLM Software solutions extend the design of a new product to include a seamless transition into the manufacturing phase of the product lifecycle. Companies can join their best practices for configuration management and systems engineering and their Six Sigma processes for manufacturing in a seamless IDE.

As a result, they are able to incur fewer changes, reduce technology cost and re-use their information assets in a highly secure ITAR-compliant environment from requirements capture through manufacturing.

Our solutions enable companies to link critical manufacturing operations (including suppliers, final assembly and acceptance testing sites) in a single bill of material (BOM) with an engineering-oriented product structure and process workflows. IDEs that use our PLM solutions ensure that the right product is built with the right BOM – and that quality and design/performance requirements are fully satisfied.

Siemens PLM Software's solutions portfolio for aerospace and defense facilitates unprecedented production productivity by integrating operational planning and process optimization with advanced five-axis machining and linking supply chain synchronization with final assembly and acceptance testing.

Service lifecycle management

Aerospace and defense companies that make, own or maintain complex products with a long lifespan require continued maintenance, repair and overhaul (MRO) support of their assets. As a result, performance based logistics (PBL) and service level agreement (SLA) contracts have become a key growth area for many OEMs and service providers.

Traditionally, MRO for complex assets has been sub-contracted to third parties. But today, OEMs recognize the opportunity to generate operational revenues that outstrip initial sales by three to four times – and with a higher margin of profitability. Research indicates that services can potentially represent 40 to 80 percent of a program's profits. By adopting service lifecycle management capabilities, service organizations (within OEM, asset owner or third-party companies) can reduce cost and improve service quality as part of today's drive to improve asset availability and reliability.

Siemens PLM Software provides companies with the opportunity to better manage product sustainment in the same IDE they use to improve product development and manufacturing. These PLM-driven IDEs provide highly secure ITAR-compliant capabilities and configuration management to manage as-delivered product structure and facilitate its re-use.

The seamless transition between development, manufacturing and service lifecycle management processes ensures a better risk mitigation strategy while giving sustainment teams the reassurance they need to support and service a delivered asset. For retrofit opportunities, PLM-enabled IDEs facilitate closed loop design, manufacturing and support as these multi-discipline teams share and exchange the same product knowledge in an integrated value chain.

Industry advantages with Siemens PLM Software

Scalable

The extended enterprises that support today's aerospace and defense programs are among the largest and most complex in the world. Demonstrated and dependable scalability is a must for any PLM platform that is expected to manage and support this type of demanding enterprise.

For example, the extended enterprise for one of today's most widely known aerospace programs was established to support the development of potentially thousands of aircraft with hundreds of suppliers and a service network with thousands of support personnel. In addition, PLM-driven extended enterprise platforms from Siemens PLM Software currently manage 13 of the 17 largest aerospace programs in the world, which account for more than 70 percent of this installed base.

Open

Siemens PLM Software's solutions address many of the aerospace industry's most demanding challenges. Our PLM-driven enterprise lifecycle platform has the functionality to seamlessly manage complex programs across all lifecycle phases and operations, including being able to incorporate projects assigned to partners and suppliers. Our comprehensive portfolio is uniquely qualified to address the challenges of all phases and operations across an entire product lifecycle that extends from preliminary design, detailed design and engineering to manufacture, production, and service and support.

These special configurations enable aerospace and defense companies to leverage the PLM system by only using those modules that provide the greatest value and impact. In addition, our aerospace solutions include preconfigured interfaces that enable product teams to easily work with other enterprise solutions, as well as neutral protocols to accommodate the use of multiple CAD systems in extended enterprises. These capabilities provide prime contractors with the ultimate in flexibility and adaptability, allowing them to easily work in multi-national programs.

Proven

Speed/time-to-market is a crucial competitive differentiator in the aerospace and defense industry, where the development cycles of highly complex systems can last for more than 10 years and cost billions of dollars.

Siemens PLM Software has proven its performance on the most complex programs, enabling its customers to launch numerous new products in record times with confidence. This sharply contrasts with the experience of our competitors. Our customers have established new benchmarks for time-to-market in the development of general aviation, aero engines, helicopters, commercial airliners and military aircraft. Dependable and predictable product performance, schedule execution and total cost management will be the hallmark of successful aerospace companies in the 21st century.

Flexible

Siemens PLM Software addresses rising aerospace and defense industry challenges by incorporating initiative-specific solutions. Initially, we provided solutions that focused on the challenges of new product development. We are currently rolling out solutions that span the complete aerospace and defense lifecycle from eBOM to mBOM management, as well as providing an as-maintained BOM management solution that facilitates serialized tracking of critical parts and service bulletin introduction tracking and management.

Along with core modules for each phase of the aerospace and defense lifecycle, our newest releases contain an expanded suite of program management features that complement our existing CDRL/SDRL and ITAR core functionality. Many of these features have been developed in close collaboration with key customers across the globe.

Answers for the aerospace and defense industry

Companies that aspire to winning leadership in the aerospace and defense must transform their process of innovation while continuing to grow profitably. Based on the successes of the first decade of the 21st century, it is very clear that today's industry leaders understand the importance of seamlessly and securely managing their product and process knowledge across an extended enterprise that is capable of addressing every stage in the aerospace and defense product lifecycle. These companies – and the programs in which they participate – have compiled an impressive set of awards, records and major accomplishments.

With Siemens PLM Software's proven commitment to addressing the unique challenges of the aerospace and defense industry firmly established, we expect our customers' list of firsts and awards to grow even faster in the future.

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About Siemens PLM Software

Siemens PLM Software, a business unit of the Siemens Industry Automation Division, is a leading global provider of product lifecycle management (PLM) software and services with nearly 6.7 million licensed seats and 63,000 customers worldwide. Headquartered in Plano, Texas, Siemens PLM Software works collaboratively with companies to deliver open solutions that help them turn more ideas into successful products. For more information on Siemens PLM Software products and services, visit *www.siemens.com/plm*.

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