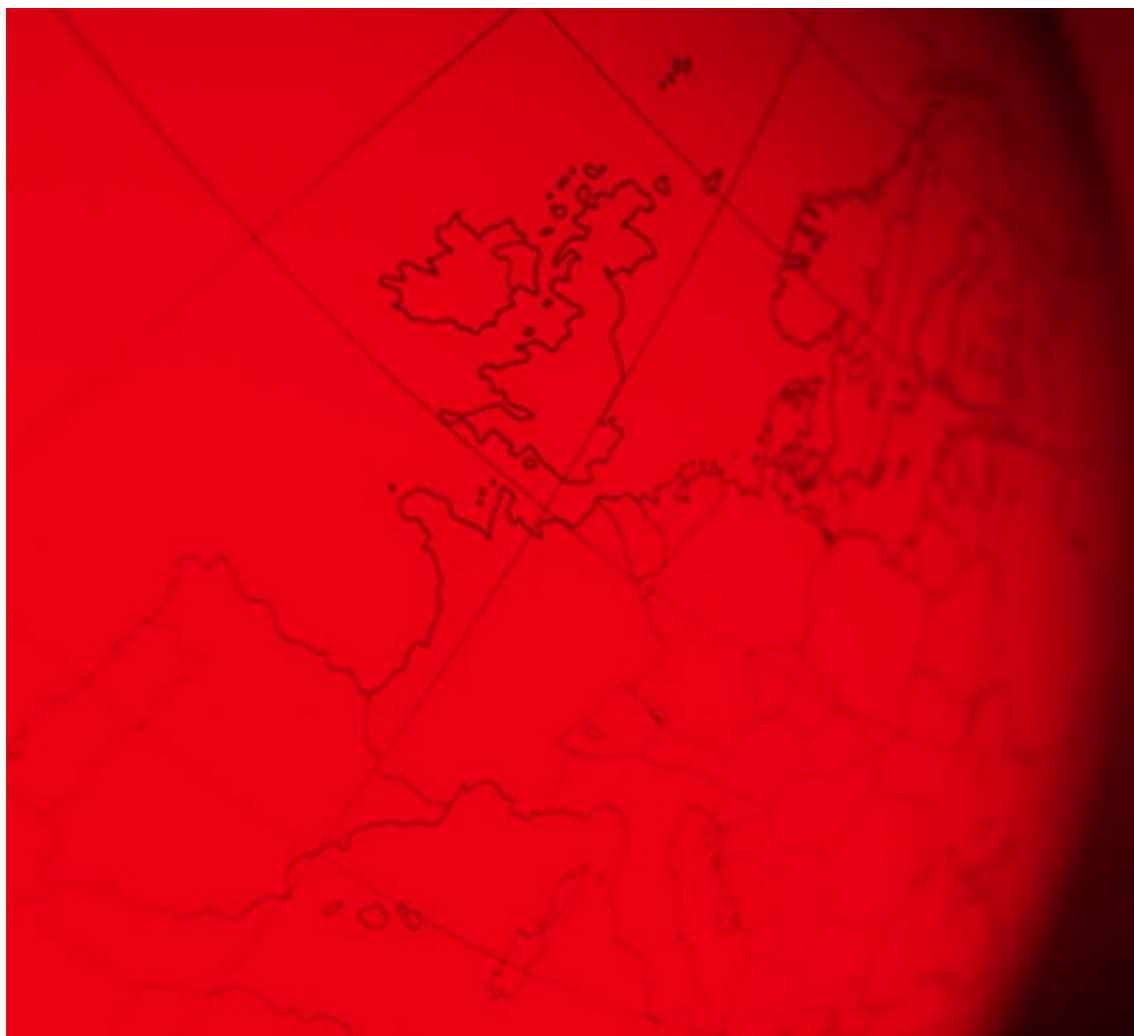


September 2009

Document **J74**

GUIDEBOOK

SIEMENS PLM SOFTWARE FOR AEROSPACE AND DEFENSE



Corporate Headquarters
Nucleus Research Inc.
100 State Street
Boston, MA 02109
Phone: +1 617.720.2000

Nucleus Research Inc.
NucleusResearch.com

TOPICS

Enterprise Applications

THE BOTTOM LINE

Siemens product lifecycle management (PLM) software for the aerospace and defense industries enables companies to better manage complex global supply chains and support product sustainability.

Siemens product lifecycle management (PLM) software for the aerospace and defense industries includes the Teamcenter platform for end-to-end collaborative PLM; Tecnomatix digital manufacturing applications; and NX computer-aided design, manufacturing, and engineering applications. The software can be deployed to support:

- Asset management
- Service knowledge management
- Configuration management
- Change management
- Maintenance planning
- Maintenance execution
- Material management
- Reporting and analytics
- Records management integration
- Compliance management integration
- Content management integration

THE SITUATION

In the aerospace and defense industry, manufacturers must manage collaboration across global teams to design, produce, and service very complex products or systems. From a PLM perspective, the industry faces some specific challenges:

- The development cycle can often be many years, and the service cycle can be 30 to 50 years — and the product documentation and data must be accessible and accurate to multiple entities and users across the entire product lifecycle.
- To compete, manufacturers must drive innovation and faster time to market while ensuring compliance.
- Manufacturers must also carefully allocate resources to reduce cycle times, maximize factory efficiencies, and avoid costly mockups.
- Finally, aerospace and defense manufacturers are increasingly dependent on global partnerships to design, produce, service, and support their products — meaning the ability to share, collaborate on, and handoff accurate information is critical, both in the initial product design and in future iterations.

Siemens PLM software enables manufacturers to manage distributed global supply chains. Key returns organizations achieve from Siemens PLM software include:

- Increased productivity
- Optimized reuse
- Reduced cycle times
- Reduced supply chain costs
- Mitigated risk and disruption
- Ensured compliance

- Lower cost of service and support

This Guidebook explores best practices, fine-tuning tips, and missteps to avoid for companies to maximize returns from their investment in Siemens PLM Software in the aerospace and defense industries.

BEST PRACTICES

Companies deploying Siemens PLM software maximize return on their investment by leveraging the technology's ability to support complex product lifecycles and service and support programs. Key best practices include leveraging the platform for an integrated digital environment, taking advantage of configuration management capabilities, addressing human factors, and supporting a multi-CAD approach.

Build an integrated environment

Designers and engineers often work in isolated digital environments that include multiple CAD applications and versions and multiple document authoring and management systems. Siemens Teamcenter provides a single environment for sharing and managing information, and the Siemens JT format enables designers across the supply chain to share and view information regardless of the initial authoring application or environment.

The US Department of Defense's integrated digital environment (IDE) initiative's goal is to manage all the intellectual property associated with a vehicle, weapons system, or IT program at the data model level to enable better decision making. Manufacturers can use Siemens PLM software to support a secure, globally distributed IDE that enables users to create, manage, and share information across the product lifecycle.

The biggest benefit from an integrated end-to-end PLM platform like Teamcenter is that it can be used all along the product lifecycle — and users can then leverage existing knowledge from the system to continue to drive innovation and reduce sustainment costs. Making sure all the component design information "lives" in Teamcenter and users know where to find it will drive further collaboration and innovation. As one customer said, *"Before we were translating stuff and one team might be working on version four and another was talking about version two and we were arguing about two revisions. Now we can work on a project en masse with 100 people from all over the world on one problem and they all work on it together."*

An integrated environment can drive greater productivity, reduce the cost of errors, reduce rework, and accelerate time to market.

Effectively deployed, an IDE supported by Siemens PLM software can help reduce aerospace and defense manufacturing cycle times by up to 50 percent.

Address human factors

Identifying and addressing barriers to adoption are keys to the success of any application deployment. When a PLM project will drive process changes and greater collaboration across distributed teams, individual, management, and

structural changes will need to be addressed. There is no one “silver bullet” for ensuring adoption; instead, companies should build a number of efforts into their project plan including:

- Ensuring the IT lead has excellent project management and communication skills.
- Designating one high-level executive as the project champion and let them pick their team of mid-level managers to drive the project.
- Giving mid-level managers opportunities for visibility and leadership so they can “own” the project, both inside and outside the organization.
- Encouraging pilot users to be whistle-blowers as much as champions. If managers encourage negative feedback in the early stages, it can be addressed before a broad population accesses the application. This in turn will drive fewer adoption challenges.
- Not overlooking the need for global teams to meet in person to overcome collaboration barriers, particularly if those teams haven’t worked together before or work for different partner organizations.

Successful adoption of the technology can drive greater innovation through knowledge sharing and collaboration, and greater designer and engineer productivity.

Support a multi-CAD approach

Successful aerospace and defense companies and alliances must rapidly and efficiently form global virtual teams that transcend time zones, borders, and entities. Given the variety of systems and applications that are used to design, edit, and manage product components, a PLM strategy that depends on one or a few CAD applications or versions will limit agility and the ability to cost-effectively support extended service and support. Siemens PLM software and support for the JT format enables organizations to support a multi-CAD format approach to component design.

Organizations whose IDEs are CAD-agnostic can select and manage partners and alliances based on complementary skills, abilities, and cost competitiveness rather than system compatibility. Support for a multi-CAD approach can reduce cycle times, reduce training costs, and reduce the time to start a project because users can use the tools they like rather than having to install and learn a new tool.

Plan for configuration management

Configuration management is the ability to have a single database of record and a single way of authoring and numbering components so users can have generate high-level product configurations, bill of material (BOM) views, and underlying design elements of a product from the same data repository. Teamcenter’s configuration management capabilities are designed to manage the structure and integration of complex products that may include multiple mechanical, electronic, electrical, and software design elements.

Taking advantage of the configuration management structure and functionality enables manufacturers to track, configure, and control all the components of various products. As one user said, *“The heart of it is that the PLM system*

manages the items and the bill of materials (BOM). Teamcenter lets you take that all the way through with a steady-state definition of how you will make it airworthy and get it certified and where all your tooling and work instructions will live."

Take advantage of vertical solutions and standards

Siemens PLM software has evolved over time from a somewhat generic toolkit to a framework and set of services to support the specific needs of aerospace and defense manufacturers including support for International Traffic in Arms Regulations (ITAR) compliance, integrated Contract Data Requirements List (CDRL) and Subcontract Data Requirements List (SDRL) functionality, and support for a number of other specifications and industry standards.

Manufacturers moving from disparate legacy systems to a seamless collaborative environment such as Teamcenter can take advantage of Siemens's investment in customizing the solution for industry demands to drive faster time to deployment, faster product time to market, and reduced compliance costs. Additionally, manufacturers can take advantage of the embedded industry workflows and best practices guidance from Siemens to further optimize their PLM efforts.

FINE TUNING TIPS

As aerospace and defense manufacturers seek to further reduce costs, reduce errors, and accelerate time to market across the global supply chain, the most successful will continue to evolve their PLM sophistication to drive greater benefits. Key areas where fine tuning can deliver incremental returns include extending PLM workflows, leverage PLM to further integrate global partners and suppliers, and look further out the product lifecycle to evaluate opportunities to increase sustainability and reduce service and support costs.

Extend PLM workflows

Once an initial IDE is deployed, organizations can further leverage returns from their investment by leveraging Teamcenter's workflow capabilities to automate and streamline additional product development, testing, delivery, manufacturing, and service and support processes. Greater automation will accelerate processes but also provide valuable data from across the product lifecycle that can be leveraged for new innovations and product iterations.

Leverage global industry partners and suppliers

In the aerospace and defense industry, OEMs are choosing to become more integrators than manufacturers. The more they can streamline handoffs, the more cost effective and competitive they can be. Using Teamcenter to support handoffs and a common version of the truth can streamline collaboration with partners and suppliers. One aerospace manufacturer, for example, has outsourced 8 to 10 percent of their engineering work to an offshore subsidiary and leverages Teamcenter's multisite and multilanguage capabilities to streamline the collaborative design and engineering process.

Evaluate further opportunities for sustainability

Moving forward, the most successful manufacturers will optimize not just development and delivery of solutions but the means to maintain and support them. Feeding inputs from maintenance and support partners back into the design

process can help further improve the sustainability of new products delivered to market and reduce ongoing service and support costs.

MISSTEPS TO AVOID

Companies that watch out for common missteps to avoid such as limited planning; separate treatment of customers, contractors, and suppliers; and using PLM as a generic toolkit can maximize competitiveness and, ultimately, return on investment from PLM.

Don't limit your deployment to one phase of the product lifecycle

Manufacturers that plan, implement, and deploy Siemens PLM software with a vision of the entire product lifecycle find they have fewer challenges in building to design, fewer change orders in the manufacturing process, and lower maintenance and service costs once the product is delivered to the customer. Conversely, companies that silo information from one product lifecycle phase to the next will likely incur greater costs and have less predictability and greater risk across the product's life.

Don't wait until after the contract

Organizations that proactively establish IDEs and build collaborative sites that link data, customers, contractors, and suppliers can more effectively respond to bid requests and dramatically reduce the time needed for data exchange once the contract is awarded. Acceleration of the early program plan phases of a project can have a significant impact on overall time delivery; in some cases, companies with a system in place that have encouraged adoption with partners can cut initial program planning time by more than 50 percent.

Don't treat PLM as a generic toolkit

As PLM has evolved and vendors like Siemens have made investments in particular vertical solutions, aerospace and defense contractors can reap the benefits by leveraging built-in support for standards and best practices — and focus their investment efforts on further competitive differentiation. Although this will likely require some change management initiatives, it can pay off through faster time to market and faster regulatory certification and approvals.

CONCLUSION

Although aerospace and defense is a very mature industry, manufacturers that effectively adopt a PLM strategy that supports the interaction of customers, contractors, suppliers, and service crews in real time can keep their competitive edge. Deployed properly, Siemens PLM software for the aerospace and defense industries can deliver a positive return on investment and support greater incremental returns over time when applied across the overall product lifecycle.

Nucleus Research is a global provider of investigative technology research and advisory services. Building on its unique ROI case study approach, for nearly a decade Nucleus Research has delivered insight and analysis on the true value of technology and strategies for maximizing current investments and exploiting new technology opportunities. For more information or a list of services, visit NucleusResearch.com, call +1-617-720-2000, or e-mail info@NucleusResearch.com.