Tecnomatix digital manufacturing

Digital manufacturing solutions for the aerospace and defense industry

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Aerospace and defense digital manufacturing

An essential part of a complete PLM strategy
Global sourcing, competitive pressures, leveraged production capacity and speed-to-market – these are just a few of the challenges the aerospace and defense (A&D) industry is facing in today’s global marketplace. Multi-national programs such as the Joint Strike Fighter (JSF), Boeing 787 or Eclipse’s new low-priced jet, present a growing need for better communication, more robust collaborative environments and seamless interoperability between IT systems and geographically disperse teams. Innovative manufacturers already understand the value of a holistic product lifecycle management (PLM) strategy, and acknowledge digital manufacturing as the critical enabler to leverage these challenges as opportunities for profitable growth.

Advancements in technology, materials and processes impact A&D manufacturers due to the extended lifecycle requirements of these products. A large backlog of orders necessitates faster time-to-market and on-time delivery; hence pressure is applied to reduce design and planning duration while assuring quality standards and lowering costs. Surcharge demand for A&D products also dictates improved planning and production execution efficiencies in order to increase production throughput and ensure predictable deliveries.

A&D manufacturers are turning to digital manufacturing solutions in a comprehensive PLM strategy to fully leverage critical business imperatives such as:

• Collaboration – align supply base and sourcing requirements across the extended enterprise to better plan, validate, document, produce and service global A&D processes
• Knowledge management and re-use – capture process knowledge and design intent and drive re-use through configuration-driven planning leveraging best practices and efficiencies in production and maintenance operations
• Lean and Six Sigma – create and validate practices which avoid quality escapes, reduce waste of non-value-added activities, provide full data associativity and integrate across legacy investments
• Throughput efficiency – continuously improve production efficiencies to achieve manufacturing agility and flexibility in a competitive environment
The digital thread is not bypassing the A&D industry! The shape of information technologies to support the aerospace market opportunities is changing as the need for integrated information technology environment and standardization is emerging.

Siemens PLM Software, the world leader in product lifecycle management (PLM), offers Tecnomatix® software, the best-in-class digital manufacturing solution that helps you capitalize on the dynamics of the opportunities in the aerospace market – before your competition.

Tecnomatix provides aerospace manufacturers with a flexible set of applications – interconnected through a manufacturing backbone and integrated with your legacy systems – that manages all the manufacturing information generated during the A&D product lifecycle.

This dedicated solution, tailored for the A&D industry, supports these lifecycle workflows:

- Configuration-driven planning
- Quality and process validation
- Process documentation and technical publication
- Closed-loop production management
- Model-driven service and support

The bottom line is that Tecnomatix builds a solid foundation for you to increase market share in this global economy. A&D companies throughout the world are leveraging Tecnomatix to support their Lean and Six Sigma initiatives, collaborate, re-use knowledge and increase throughput in order to reduce operational costs, increase quality and transform their process of innovation to capture the value of PLM. With a Tecnomatix aerospace solution you can enable your processes to do it right the first time!
Reduce planning duration by capturing and re-using processes and knowledge, and collaborating globally over varying product and process configurations.

As an A&D company you might be experiencing the following impediments in your manufacturing process planning activities:

- Difficulties to track and incorporate frequent engineering changes into process plans
- Complexity of managing varying BOM and process configurations
- Waste of precious engineering time on "administrative" tasks such as data gathering, management and multiple entry
- A "reinventing the wheel" syndrome instead of re-using best practices

These barriers to success have their roots in the disconnection between product and process data, a variety of long standing legacy systems that are detached, as well as limited capabilities to capture organizational intellectual property.

Tecnomatix enables authoring and management of associative manufacturing plans, including product, process, resources, PMI (product manufacturing information) and plant information.

This associativity – efficiently authored in an interactive 3D environment – bridges the traditional gap between product engineers, manufacturing engineers, quality engineers and shop floor personnel, enabling a rapid and accountable change flow-down.

Tecnomatix solutions utilize the power of Teamcenter® software – the world’s leading PLM platform – for managing the manufacturing knowledge, integrating legacy and enterprise systems, re-using upstream data and maintaining business workflows across the lifecycle and the supply chain. This manufacturing backbone, as well as the use of open standards such as JT™ data format, facilitate knowledge and configuration-driven planning, which enables A&D companies to reduce planning efforts and improve efficiency.
Validation of manufacturing concepts in early phases of process design reduces errors and scrap in production, decreases product variability and enables “right-first-time” practices.

A&D companies realize that lifecycle costs have a great impact on their profitability. Quality and reliability are therefore key for their success. Nevertheless, product quality deficiencies and quality escapes are still evident in A&D production and service. These are attributed to a large extent to legacy processes and tools providing inconsistent process quality across the supply chain and an inability to leverage virtual builds and mockup real production scenarios in a virtual environment. As A&D companies are striving to become Lean and Six Sigma organizations, improve their production throughput and reduce production cycle times, process optimization and upfront process validation become essential.

The use of simulation tools as part of digital manufacturing technologies is growing, as the industry catches up with more IT-advanced industries. Tecnomatix provides a comprehensive set of process and machine simulation, validation and optimization tools to ensure flawless program ramp-up and production. Tecnomatix quality solutions enable A&D companies to meet their quality standards by analyzing tolerances and process variation and closing the loop with upstream captured knowledge for continuous improvement. By applying this technology prior to producing physical prototypes, committing to tooling and resources, companies can reduce the costs of changes and significantly improve the quality of their products and processes.

Benefits

Collaboration – Improve product manufacturability and serviceability by providing organization-wide teams with the means to collaborate over product and process optimization

Knowledge re-use – Optimized processes are leveraged across a global innovation network enabling re-use of already validated best practices

Lean and Six Sigma – Advanced simulation tools support “right first time” approach, eliminating rework and scrap waste in production

Quality validation and design for Six Sigma reduces quality escapes

Throughput – Validation and optimization increases efficiency production throughput to meet demand and predictable delivery targets

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The fast pace of the global economy demands mission critical collaboration and synchronization especially in a distributed operational footprint. Siemens’ Tecnomatix digital manufacturing solutions accelerate a transformation to a more agile and flexible enterprise which produces positive results across the manufacturing lifecycle to increase profitability, decrease cost and wasted effort and gain speed-to-market.

Collaboration –
align supply base and sourcing requirements across the extended enterprise because lead-time pressures not only impact new product introduction but depot repair/refurbish operations

Knowledge management and re-use –
model-driven characteristic and configuration management leverages best practices and drives efficiencies in production and maintenance

Lean and Six Sigma –
workflow-based technologies which reduce waste, provide full associativity and integrate across legacy investments enabling data acquisition and analysis

Throughput efficiency –
from product configurations to manufacturing bills of material, process planning to as-built characteristic management, manufacturers must strive for efficiencies in all phases to remain competitive while maintaining quality and reliability standards
Enable lifecycle workflows across the manufacturing planning, execution and maintenance process.

- Configuration-driven planning
- Quality and process validation
- Process documentation and technical publication
- Closed-loop production management
- Model-driven service and support
Ensure availability of up-to-date documentation at production launch and throughout the service life of aircraft and engines, while reducing efforts and duration of introducing configuration-based documentation.

Process documentation plays a significant role in the A&D manufacturing environment: Every step and each change must be well documented, enabling global partners and internal colleagues to accommodate changes quickly, build to the correct document revision, re-use 3D motion sequences at the point of manufacture and service and capture “as-built” and “as-maintained” information for traceability, analysis and status accounting during the life of the product.

Aerospace manufacturers might still be using textual-based instructions instead of leveraging modern media capabilities and going paperless. Additionally, technical publications are being authored manually by accessing information from many different legacy systems, which lead to cumbersome and time-consuming tasks of generating and updating work instructions and technical publications.

The daunting task of generating process documentation is tremendously simplified with the use of Tecnomatix digital manufacturing solutions that leverage 3D product and process information. With Tecnomatix associative documentation solutions, A&D companies can reduce the effort and duration required for generating process documentation, using modern visualization methods inside the documents and eventually provide a buy, build or service package to be shared with external partners and suppliers. Being able to automatically produce documentation from templates enables standardization, accuracy and fast change flowdown.
Integrate your planning and production execution environments to shorten your build cycles, control the production environment and facilitate continuous process improvements efforts.

Global demand and shorter build cycles necessitate a controlled production environment. A&D manufacturers are experiencing great inefficiencies in their production operations: unnecessary scrap and rework of components, inconsistent production quality, product variability, audit and test failures and difficulty to continuously improve production performance. These obstacles are attributed to the lack of visibility and control over manufacturing processes, which in turn yield deviation from manufacturing and design plans and high cost of nonconformance.

Limitations of legacy information systems also contribute to the inability to improve performance: Lack of up-to-date visual aids and work instructions, lack of real-time integrated production monitoring systems and mostly paper-based communication are impediments to Lean and Six Sigma processes. Enterprise systems such as ERP and SCM are also limited in their ability to enable product and configuration-driven, closed-loop production management, since the manufacturing planning knowledge is stored in the digital manufacturing repository.

Tecnomatix provides a closed-loop production management solution, enabling A&D companies to easily publish manufacturing plans to the shop floor, control production operations and capture and dashboard “as-built” or “as-maintained” configurations and metrics. This unique offering of an integrated planning and execution environment facilitates production control, traceability, compliance and continuous process improvements. Tecnomatix production management solutions also integrate with your ERP and in-house legacy systems through standard interfaces, thus supplementing your enterprise information technology strategy.
Model-driven service and support

Benefits

Collaboration – Lifecycle processes under a single backbone, enables the after market to leverage upstream data flow to lower costs and improve global communications.

Knowledge re-use – Streamlining assembly and disassembly knowledge enables tracking change history and improving MRO methods.

Lean and Six Sigma – Eliminate waste in service and support activities and improve quality metrics with configuration-based documentation and communication over best practices.

Throughput – Validate maintenance processes to increase efficiency service throughput and efficiencies.

Manage your as-maintained product and manufacturing information, track change history and improve your maintenance procedures to better sustain extended life-cycles of aerospace and defense products.

More than any other industry, the lifecycle of A&D products does not end with their delivery. Years after the launch of new products, their configuration, assembly and disassembly processes and their documentation are applicable. There is, therefore, a need for maintaining BOM information in various configurations; re-using validated service methods and plans; managing technical publications and their audit trail and collaborating over maintenance, repair and overhaul (MRO) activities with partners. Current methods and systems lead to manual processes of maintaining BOM configurations, limited inter-company information re-use and archaic management of paper-based technical publications.

Tecnomatix offers a model-driven service and support solution, enabling A&D companies to systematically generate, validate, manage, maintain and deliver BOM configurations, maintenance practices and service manuals. Leveraging Teamcenter as the manufacturing backbone, Tecnomatix facilitates tracking change history, re-use of global MRO knowledge and efficient generation of service and support documentation. Leveraging validation and optimization solutions for downstream activities such as maintenance, service and overhaul ensures efficient and lean MRO processes, and a significant reduction in the warranty and service costs.

Throughput – Validate maintenance processes to increase efficiency service throughput and efficiencies.
The Tecnomatix advantage

**Proven knowledge management**
Tecnomatix utilizes the power of Teamcenter, the industry’s leading product lifecycle management environment. What makes Teamcenter such a valuable digital manufacturing backbone is that it manages design, manufacturing and production information all in a single system – and that it has delivered proven benefits to a number of leading manufacturers.

**Open foundation, open for business**
A complete digital manufacturing system must be able to accommodate data from multiple CAD applications, best-of-breed third-party enterprise systems and legacy systems. Tecnomatix – built on the Teamcenter manufacturing backbone – ensures that these data sources are integrated with the product, process, resources and plant data and streamlined throughout your PLM process. In addition, openness is more than just a technological benefit at Siemens; it’s a way of doing business. Siemens has organized communities of customers, partners and technology adopters that are dedicated to advancing the principle of open communication for open innovation.

**Comprehensive solutions**
Aerospace manufacturing engineering involves a variety of complex and interconnected activities – from part and assembly process planning to plant design, quality planning and production execution. Your digital manufacturing solution must be able to support and streamline all of these activities. With a solution as robust as Tecnomatix and a vendor as experienced as Siemens, your manufacturing planning process will operate at peak efficiency.

**Proven success**
Aerospace OEMs, suppliers and aircraft engine manufacturers throughout the world have implemented Tecnomatix solutions and are achieving such measurable benefits as lower operational costs, faster time-to-volume, higher productivity and improved quality. Many of these companies report multi-million dollar bottom-line improvements with Tecnomatix solutions provided by Siemens PLM Software.
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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 seven million licensed seats and 71,000 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.