

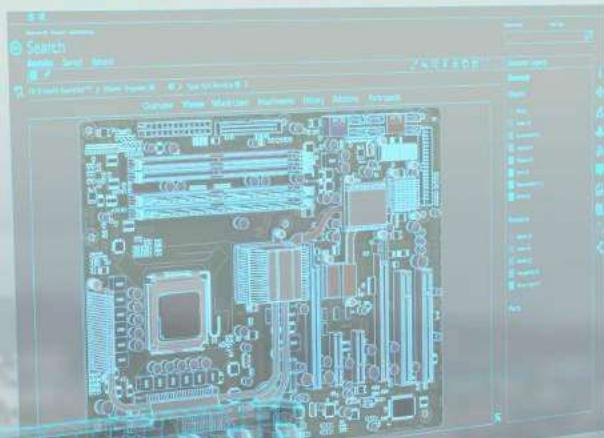
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Tecnomatix

Digital manufacturing solutions empowering
manufacturers to realize innovation

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Smarter decisions maximizing overall production efficiency



Shifting business factors such as the demand for environmentally-friendly products, more sustainable production and increasingly competitive global markets require companies to constantly adapt and improve their business strategies. Launching faster, getting more from their capital investments and delivering quality products are always at the core of growth and prosperity even in demanding economic times.

In the past, innovative products were enough to succeed, but in today's world of unprecedented cost and regulatory pressures, successful manufacturers know they must leverage production capacity as a strategic advantage not simply as the cost of doing business.

By innovating across their entire lifecycle, manufacturers realize a two-fold gain as they strive to build the right product and build the product right. These manufacturers are increasing productivity, optimizing more flexible capacity and more effectively leveraging capital investments by:

- Enhancing the visibility of process innovation across their enterprise
- Increasing speed to market by leveraging engineering assets in synchronization with manufacturing deliverables
- Capitalizing on emerging market opportunities with proven production flexibility
- Driving sustainable profitability through the continuous optimization of manufacturing resources and capital investments
- Reducing cost by implementing more sustainable production strategies

Leading companies leverage digital manufacturing in their product lifecycle because they know that the economic success of innovative products hinges on the performance of their manufacturing operations.

Introducing Tecnomatix



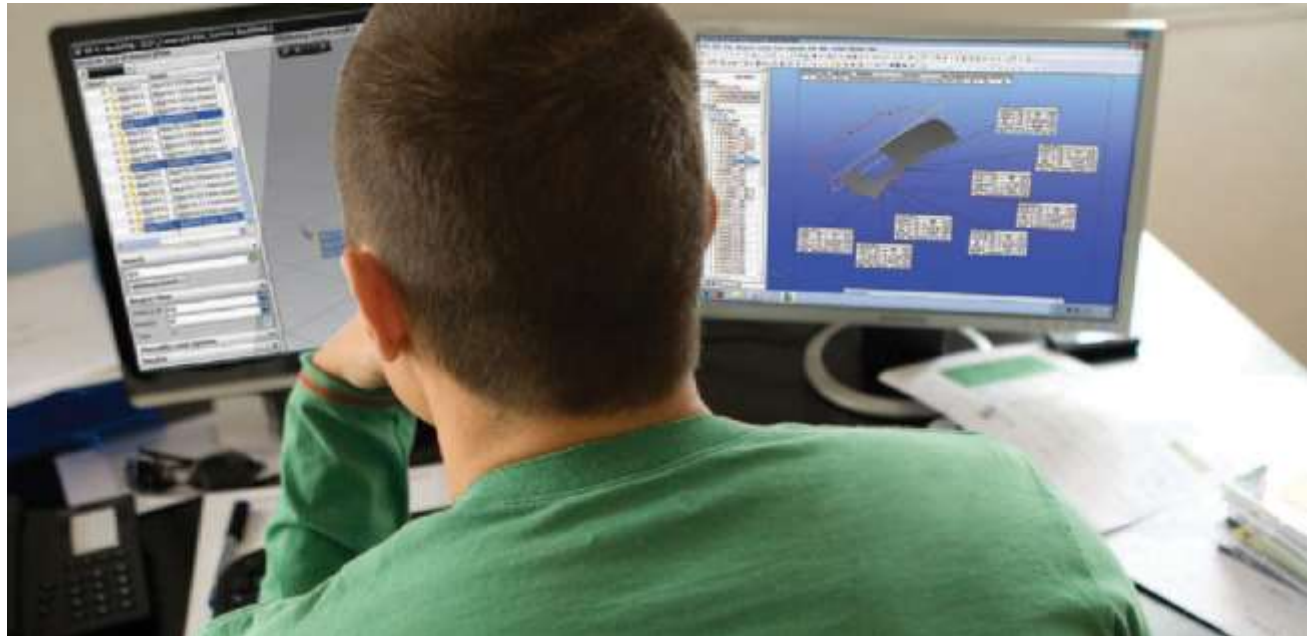
Tecnomatix bridges the gap between product design and product delivery.

In today's global marketplace, innovative products are the price of entry, but rapidly changing demographics and increasing competitive pressures demand process innovation as well. This is why leading manufacturers are increasingly turning to Tecnomatix® digital manufacturing solutions from Siemens Digital Industries Software to make smarter decisions earlier for increasing productivity and agility while lowering costs and gaining a higher return on production investments.

Tecnomatix delivers process innovation by linking all manufacturing disciplines with product engineering, including process engineering and simulation, and production management. The Tecnomatix comprehensive portfolio of digital manufacturing solutions utilizes Teamcenter® software delivering an unmatched product and production integration driving smarter decisions, better products, faster.

Utilizing an open architecture, Siemens delivers world-class solutions through open integrations that reduce deliverable timelines and increase the accuracy of your manufacturing planning efforts. By connecting product, process, resource and plant data, manufacturers are able to leverage a full arsenal of process-oriented capabilities recognized as the leading technology in the digital manufacturing domain.

A key component of a robust PLM strategy, Tecnomatix bridges the gap between product design and product delivery by managing both the design and execution of manufacturing processes in a fully associative data model. Tecnomatix maintains the crucial digital continuity of the product lifecycle, thereby helping manufacturers to bring more innovative products to market faster, as well as to leverage the power of global manufacturing operations, improve production efficiency, maintain quality and boost profitability.



Tecnomatix business value

Change is a reality that we all face. Global trends are the driving force behind new business models with complex relationships at their foundation. Many companies adapt to survive, but leaders are seizing the opportunity to be more flexible, productive and competitive. They are reaping the benefits of a complete PLM strategy that includes Tecnomatix digital manufacturing as a vital component.

Increase speed to market

Tecnomatix solutions optimize the business processes that determine your ability to get to market faster. From product development through delivery, Tecnomatix aligns manufacturing capacity and capability with design intent, thereby reducing long lead-time processes, supporting price premiums, capturing market share and increasing brand value.

Manage complexity

Manufacturing produces orders of magnitude more data than product engineering yet the interrelationships between these two domains are critical for new product development and launch execution. Tecnomatix enables you to leverage product change, updates and dependencies throughout the planning process, resulting in validated manufacturing plans which ensure first-time quality.

Improve productivity

Re-use of best practice processes and the ability to optimize manufacturing lines or systems in a digital environment long before they go into production are key enablers to achieve significant productivity gains in manufacturing. Tecnomatix facilitates these benefits through the Teamcenter single source of product and process knowledge and its ability to manage concurrent lifecycle processes.



Increase re-use and reduce cost

A company's biggest cost center – and that of its supply chain – is manufacturing. This investment goes beyond physical assets, labor and floor space. Manufacturing planning, process analysis, discrete simulation, prototyping and mockups all contribute to your manufacturing investments. By enabling companies to leverage these investments across multiple product programs, Tecnomatix can significantly reduce production costs.

Maximize your production strategy

Many companies are approaching global opportunity with a focus on outsourcing manufacturing. However, outsourced manufacturing relationships often underperform because information is not efficiently communicated.

Siemens provides solutions to transform your manufacturing outsourcing strategy and align resources to capture innovation from every contributor. Visibility into the details of product manufacturing is critical because quality problems and warranty costs can quickly erode profitability and impact customer satisfaction. Tecnomatix fosters quality improvement,

process accountability and compliance throughout your manufacturing process by facilitating full product and process genealogy and traceability for all products, from planning to as-built data requirements.





Tecnomatix advantages

Tecnomatix advantage

Why it matters

Leadership

Tecnomatix is the leading digital manufacturing solution based on technology, market share, industry experience and world-class customers served. Backed by Siemens' leadership in delivery, with over five million Teamcenter users worldwide, Tecnomatix digital manufacturing solutions are built on the most widely deployed PLM solution in the marketplace.

Enterprise-scalable, open lifecycle foundation

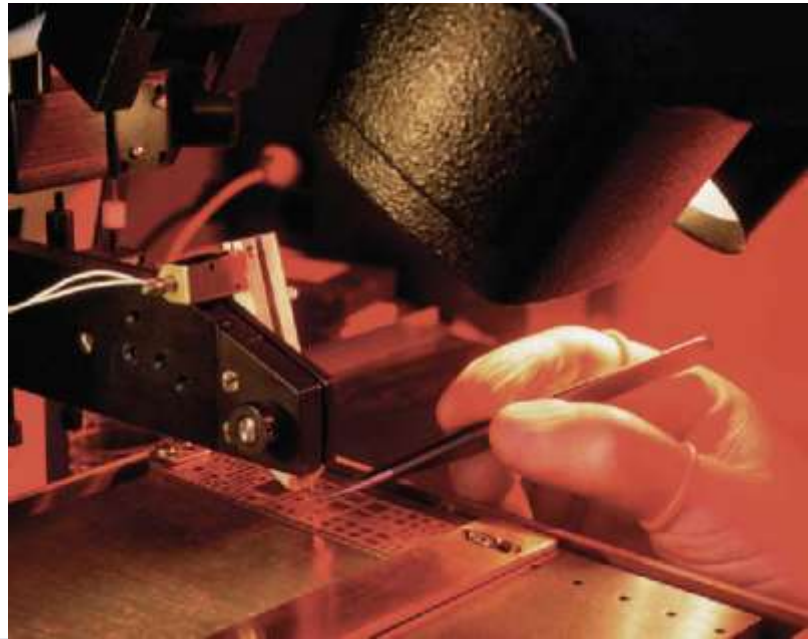
The entire Siemens portfolio is built on an open architecture, enabling Tecnomatix solutions to integrate with any product data management (PDM) system. This flexibility translates into more cost-effective deployments and unparalleled flexibility for integration with other key enterprise systems.

Unparalleled data management and control

The data and process management solution for Tecnomatix provides visibility and process accountability between plant, process, resource and product configurations and collectively supports real-time enforced consistency and reconciliation during change. This reduces confusion and complexity, delineates responsibility and mitigates the risk of rising costs during new product introductions and inevitable changes to the production environment.

Industry-specific value frameworks

Tecnomatix solutions are geared to support and improve processes specific to a variety of industries, including automotive, aerospace, defense, high-tech electronics, consumer products and heavy equipment machinery. Tecnomatix makes it easy for organizations to implement digital manufacturing solutions leveraging their industry's best practices. Within the Tecnomatix knowledge management environment, organizations can readily configure data structures, workflows and business rules to suit their needs.



Tecnomatix advantage

Why it matters

PLM for manufacturing

Other manufacturing planning solutions lack either the application coverage to improve the entire manufacturing cycle or the knowledge management underpinnings to leverage upstream lifecycle information. Tecnomatix is unique because it brings together a comprehensive suite of industry-leading, workflow-based applications covering all of the domains influenced by your manufacturing requirements.

Efficient planning

Tecnomatix leverages the Teamcenter single source of lifecycle knowledge, which creates a foundation you can use to rationalize and leverage engineering assets and optimize/synchronize manufacturing deliverables to reduce complexity and accelerate your take-to-market innovations.

Optimized systems

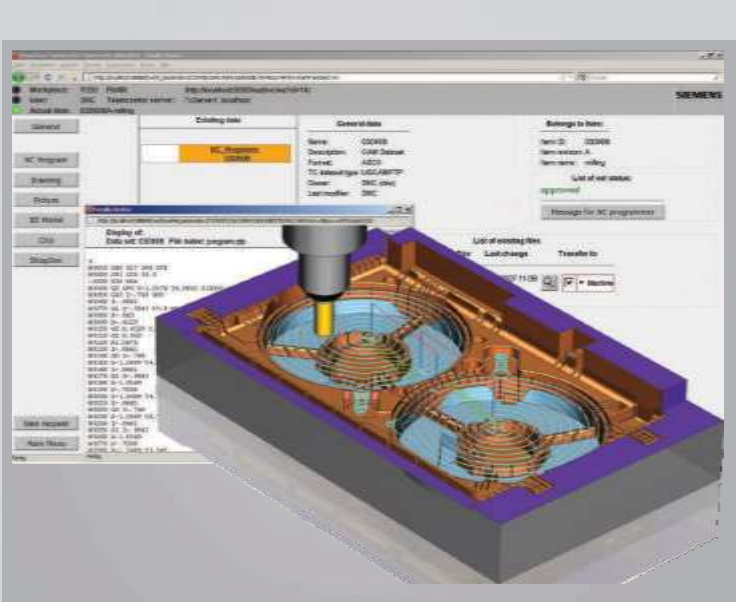
Tecnomatix allows you to tie your factory planning tools together with simulation tools, which in turn facilitates understanding of the true work flow and material flow for a specific factory configuration. This approach enables you to interactively analyze multiple manufacturing processes and layout scenarios, providing an intelligent basis for making informed and smarter decisions.

Proven validation

Optimization is achieved via a managed and shared environment that enables engineers to react rapidly to changes regardless of source. System device behavior and logic can be modeled to allow full, line-level or system-level validation where errors are reduced through dynamic interaction. This capability addresses the need for highly automated and configurable systems to deliver the flexibility that is required to optimize production throughput.

Lifecycle quality

Quality characteristics become an integral element of the product lifecycle generating a competitive advantage through a key business strategy. From design through production, these characteristics are leveraged to reduce manufacturing costs and improve quality, program after program.



Advantages

- Accelerates creation of the part manufacturing plan by as much as 30 percent
- Reduces costs of resources such as tooling through increased standardization
- Supports regulatory compliance with accurate process definition
- Reduces errors and delays on the shop floor by facilitating direct information access

Part Planning and Validation

Tecnomatix Part Planning and Validation enables part manufacturing companies to accurately and efficiently define the manufacturing process plan and directly connect it to production systems. Effectively managing the plan's data is essential to this process. Manufacturing planning teams must be able to easily capture this information, organize it against sequential process steps and provide the shop floor with easy access to its most recent versions.

The Part Planning functionality within this solution enables you to re-use proven manufacturing processes, shortening planning time and ensuring the use of preferred methods and resources on the shop floor. When shop floor personnel and systems access the manufacturing planning data and apply it directly to production, you are also able to reduce errors and delays.

Accurately establish your part manufacturing plan

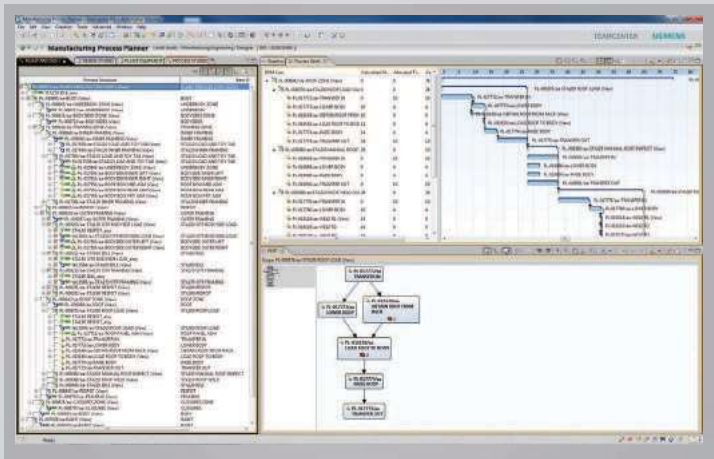
Part Planning and Validation enables you to validate the intended manufacturing method for your parts, as well as define the process and specify the tools you use to make them. Its applications manage data from process authoring software, such as NC programming, process sequencing, resource allocation, and reporting.

Connect manufacturing plans directly to production

In order to optimize part machining processes, plans can be connected to shop floor systems such as DNC (direct numerical control) to provide direct access and transfer of plan data to CNC machines. You can synchronize planning and production operations by enabling access to the single source of machining data and resources.

Maximize productivity

Part Planning and Validation manages all product and related process data to help manufacturing engineers, CNC programmers, tooling managers, machinists and other members of your organization to share information and work as a team. This results in better manufacturing plans and data that is synchronized with the shop floor for maximum production throughput and machine tool utilization.



Advantages

- Reduce manufacturing planning time and associated cost by as much as 40 percent
- Increase transparency into assembly processes and manage the impact of changes
- Enable global engineering to be performed in a collaborative, multi-user environment
- Improve manufacturing productivity by optimizing processes prior to the start of production

Assembly Planning and Validation



Tecnomatix Assembly Planning and Validation helps you to virtually design and evaluate assembly process scenarios and quickly arrive at the best plan for building products. You can synchronize your product and manufacturing requirements and manage a more holistic process-driven design (design for assembly). Make smarter manufacturing decisions by using tools which provide clear visibility to assembly sequences, resources and activity durations. The solution increases your productivity by providing you with the best tools to re-use your proven solutions and best practices. When new processes and technologies are validated and optimized in a virtual environment, you gain the flexibility to check your manufacturing processes without impacting ongoing production.

Plan, optimize and validate your manufacturing processes before you start production

Use a broad range of tools that streamline the process planning workflows, automate nonvalue-added planning tasks and validate the best plan for building products. These tools facilitate process design and sequencing, manufacturing bill of material (mBOM) management, line balancing, time management, 3D plant layout and ergonomic analysis, as well as many other activities.

Take control of your product and production lifecycle

Assembly Planning and Validation connects the manufacturing process lifecycle from process planning and detailed engineering to full production. By connecting all members of the manufacturing value chain into one virtual enterprise, the solution helps manufacturers build the best production strategies.



Advantages

- Provides optimized manufacturing feature distribution and management
- Reduces planning and automation programming time by as much as 40 percent
- Significantly reduces build, test, and installation processes
- Leverages event-based, signal-driven simulation technology to enable virtual commissioning of production systems

Robotics and Automation Planning

Tecnomatix Robotics and Automation Planning enables manufacturers, through a product lifecycle management platform, to virtually develop, simulate, and commission robotic and other automated manufacturing systems from facilities producing dedicated products to mixed-model production facilities with combinations of build variants.

Synchronize changes across domains

Tecnomatix utilizes a 3D collaborative, multi-user environment to increase engineering productivity. Users have live access to all project data, which can be dynamically managed. As data is checked in, automatic updates ensure synchronization of the 3D model and all other related manufacturing process data. This dynamic management of manufacturing process data greatly reduces planning and installation errors.

Smarter decisions for greater flexibility

Tecnomatix addresses the requirements for highly automated and configurable systems, such as mixed production scenarios and robot gardens. Engineers are able to make informed decisions when purchasing, modifying, and implementing new or existing technologies without adversely affecting current production.

Reduce physical tryouts

Tecnomatix leverages event-based simulation, specific robot teach pendant programming, and industry standards to construct and validate manufacturing systems, alleviating the dependency on physical tryouts by allowing for the debug and test of manufacturing systems, virtually.

System-level efficiency

Tecnomatix provides automated optimization tools and technology to facilitate evaluation and virtual commissioning at the system level. Users are able to dynamically interact as they construct factory workstations, thereby reducing errors during the planning process. Efficiency is also gained as planning teams optimize resource utilization across the entire manufacturing system.



Advantages

- Reduces factory design time by as much as 50 percent when compared to typical 2D methods
- Increases productivity of existing systems by as much as 20 percent
- Reduces inventories and throughput time by as much as 60 percent through fostering of optimized production strategies
- Facilitates visibility and predictability by sharing 3D layouts across diverse teams

Plant Design and Optimization

Tecnomatix Plant Design and Optimization allows organizations to create factory models faster and ensure that they are operating at peak efficiency before the start of production. By letting engineers see the outcome of plans within virtual plants, organizations can avoid wasting valuable resources fixing problems within their real plants.

Smarter decisions for better factory design

Using 3D factory design and visualization, Tecnomatix offers critical insight into factory design, layout, and installation processes. This is made possible by using “smart objects” that represent all of your factory resources, from conveyors, mezzanines and cranes to containers, AGVs and operators. You can create factory layouts much faster than typical 2D methods by combining 3D layout techniques with these smart objects.

Improve material handling

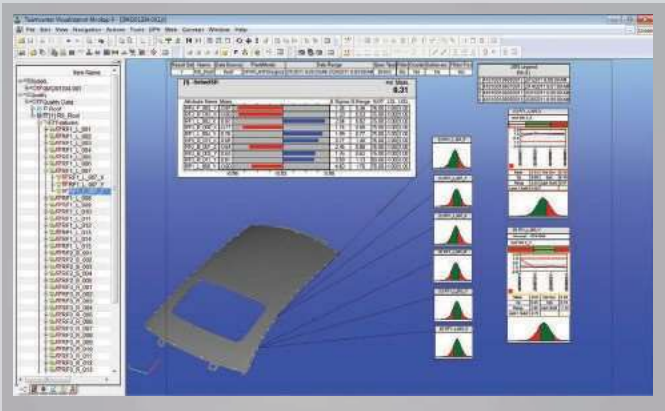
Employing factory logistics analysis and optimization, Tecnomatix drives the productivity of factories based on material flow distances, frequency, and cost. This is accomplished by evaluating and analyzing data, such as part routing information, material storage needs, material handling equipment specifications, and part packaging information, against the factory layout.

Optimize production throughput

By utilizing production throughput simulation, Tecnomatix optimizes the parameters that define production system capabilities. Tecnomatix facilitates this by tying factory layout together with event-driven simulation. This makes it possible to develop and analyze multiple production scenarios quickly, eliminating bottlenecks, improving efficiency and increasing throughput.

Bring diverse teams together

Through collaborative factory design management, Tecnomatix brings diverse teams together through a product life-cycle management platform. Productivity is increased by reducing the nonvalue-added administrative tasks associated with managing and sharing large volumes of facility data.



Advantages

- Reduce total cost of quality by nearly 10 percent of revenue
- Decrease root cause analysis time
- Analyze production quality variation against nominal math models
- Automate inspection programming efforts
- Leverages industry standards to reduce dependency on proprietary solutions
- Lowers deployment cost by leveraging your business processes and PLM infrastructure

Quality Management

Tecnomatix Quality Management streamlines the entire quality process by linking quality information with all of your manufacturing and engineering domains through a product lifecycle platform. This enterprise scalable solution delivers the quality knowledge your engineers need to make smarter trade-off decisions, define more efficient inspection strategies and monitor, analyze and fix production issues, faster.

PLM quality foundation

Delivering quality products requires an enterprise effort that must bridge the gap between product design and product delivery by managing product, planning and production activities. Tecnomatix delivers the ability to incorporate quality into these domains making it an integral element of your PLM environment. This ensures a crucial continuity which closes

the gap between design intent and production results. Unique technology delivers a competitive advantage that directly addresses your most pressing quality-related issues in the same PLM environment you use to plan, design, build and deliver quality products to the global marketplace.

Smarter decisions by design

Manufacturers spend millions of dollars every year due to assembly build problems that inevitably lead to a loss of productivity and profitability through rework, repair or scrap. In many cases, over-engineered products place unnecessary cost burdens on production. Powerful dimensional analysis allows you to predict build problems and identify their root causes – before physical parts are made or tooling is built.

This digital approach leverages embedded information allowing your engineers to evaluate dimensional characteristics and the major contributors to production variation well before impacting the shop floor.

Measurement – make it count

Collecting inspection data from production is a cost of doing business, yet most manufacturers never see a return on that investment because the knowledge captured is hard to leverage when it is contained in disconnected systems. Tecnomatix delivers a unique solution which captures as-built measurement information and closes the loop to design through a full association to your lifecycle data model. Real-world information is monitored, analyzed and compared across your production footprint, regardless of location. This interoperability delivers the ability to find problems quicker, fix them faster and share that information across the enterprise.



Advantages

- Reduces raw material inventory
- Increases production efficiency
- Aligns manufacturing processes across the enterprise
- Reduces direct labor cost
- Tracks real-time product yields
- Provides optimum operations visibility

Production Management

If you want a complete picture of your manufacturing lifecycle, as well as the ability to manage your production processes in today's fast paced, distributed world, your company needs real-time access to its production data. Capturing real-time operational data is the only way to measure performance for your planning initiatives. This information is also vital for validating cost estimates for your new product development projects, as well as for mitigating the risks associated with nonconforming products.

Tecnomatix Production Management provides visibility into your as-designed, as-planned, as-built and as-maintained configurations. It extends the PLM footprint to the manufacturing shop floor, enabling accelerated production launch, continuous process improvement, regulatory compliance and increased operational efficiency.

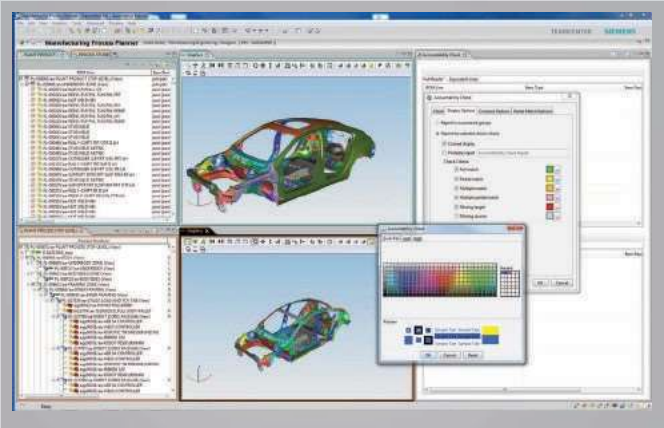
Production Management components work together through your lifecycle processes and incorporate world-class capabilities in two main areas.

Manufacturing Execution Systems (MES)

This model-based system monitors work in process, controls operations and labor and feeds production information to business systems and lifecycle repositories. It also includes extensive quality management functionality. The solution consists of three software suites, focusing on production, development and manufacturing intelligence. It offers a wide range of components for optimal planning, execution, documentation and visualization of production and development processes.

Human Machine Interface (HMI) and Supervisory Control and Data Acquisition (SCADA)

This solution enables you to collect real-time information on plant and equipment status and feed upstream systems, including MES. Siemens' HMI and SCADA products provide comprehensive state-of-the-art tools that empower users with configurable applications that can be tailored specifically to their requirements. Spanning the spectrum of real-time human machine interfaces, supervisory control and data acquisition and industrial information management applications, the versatility of the solution is virtually unlimited.



Advantages

- Increase productivity and support continuous improvement and design-for-manufacturing initiatives
- Enable product and manufacturing teams to work in parallel and make smarter planning decisions
- Synchronize as-designed and as-planned BOMs, helping cross discipline teams to get better visibility of change

Manufacturing Process Management

The Manufacturing Process Management solution in Teamcenter is a set of foundation technologies that enable you to manage your product, as well as process, resource and plant layout knowledge, in a common PLM environment. Built on open standards, this solution helps to streamline your new product design and manufacturing process workflows. A single source of product and process knowledge allows you to efficiently manage your global product design and production activities thereby significantly decreasing your time-to-market and time-to-volume goals.

Get clear visibility to manufacturing decisions, analysis and results

Using a set of powerful data management, 3D visualization and analysis tools you can optimize your manufacturing plans by evaluating various alternatives. An intuitive user interface is designed to help you analyze data from different sources quickly and easily. You can improve your productivity using intelligent search that is fast and only displays the relevant information in the context of your tasks. Generate animated work instructions using 3D PDF technology, which clearly and accurately communicates assembly instructions to the production floor.

Gain the freedom to react to change efficiently

When you have a fully integrated product design and manufacturing department, you are in full control of your product development processes and know the exact impact of change at every step. If change is introduced at any stage of product design or manufacturing you can quickly communicate and reconcile the entire scenario using powerful analysis and validation tools. Through Teamcenter change management, responsible parties are informed and notified so that your organization can make better planning decisions if and when change is introduced.



With its open architecture, Teamcenter manages critical lifecycle data streams including product, process, plant and resource information. Users can visualize and collaborate on this associative data, taking advantage of powerful-workflow control, change management functionality and product variant effectivity.

Tecnomatix manufacturing knowledge management

By industry estimates, manufacturing engineering uses over one hundred times more data than design engineering and involves many disciplines beyond the normal product engineering scope. The benefits of efficiently managing such a vast amount of information are enormous. These benefits motivate world-class manufacturers across the globe to implement digital manufacturing solutions from Tecnomatix. The Tecnomatix manufacturing data model is directly associated with the Teamcenter product data model, providing the single most effective source of lifecycle knowledge available on the market. Teamcenter enables manufacturers to establish digital continuity from start to finish.

Full process visibility enables all manufacturing stakeholders to react more effectively to change, make the right decisions earlier and accelerate their role in the take-to-market process.

A single source of manufacturing knowledge

According to industry reports, manufacturing engineers spend over half their time searching for data. Teamcenter manages all the information defining your products, processes, production resources and plant facilities. This single information source gives users complete confidence that they are working with the correct data in configurations that simplify their job and create more productive business processes.

Understanding the impact of change

Tecnomatix connects product, process, resource and plant information together so that changes to any one facet will ripple through related elements automatically. If a design feature gets changed, the tooling for that feature may also change, as might the plant where the part is machined. Tecnomatix automatically shows you how that single design change influences every other aspect of your manufacturing planning and execution.

About Siemens Digital Industries Software

Siemens Digital Industries Software is driving transformation to enable a digital enterprise where engineering, manufacturing and electronics design meet tomorrow. Our solutions help companies of all sizes create and leverage digital twins that provide organizations with new insights, opportunities and levels of automation to drive innovation.



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