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Answers for industry.

## Tecnomatix digital manufacturing

Digital manufacturing solutions for the automotive industry.

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## Automotive digital manufacturing

### An essential part of a complete PLM strategy

Global competition in the automotive industry presents unique challenges in today's marketplace. Automakers require collaboration across the entire global enterprise to capitalize on emerging markets and to take market share. Do you have the information you need to clearly see new ways to higher productivity, speed and quality?

Siemens PLM Software, the world leader in product lifecycle management (PLM), offers Tecnomatix<sup>®</sup> software, a suite of digital manufacturing solutions that helps you capitalize on these dynamics – before your competition does.

Tecnomatix provides manufacturers with a flexible set of applications interconnected through an open data architecture that manages all the information generated during the automotive product lifecycle. By operating within the same data management environment as product engineering, Tecnomatix enables associativity between all your critical manufacturing data,

including product, process, resources and plant information. Just as importantly, the Tecnomatix solution uses Teamcenter® manufacturing process management software to enable you to manage data from multiple CAD sources, integrate legacy systems and adapt to new technological developments.

Tecnomatix builds a solid knowledge-driven manufacturing foundation for you to increase market share in this global economy. Automotive OEMs throughout the world are leveraging Tecnomatix to improve their Lean Manufacturing and Six Sigma initiatives, reduce operational costs, increase quality and transform their process of innovation to capture the value of PLM.



# Transforming the entire vehicle development process



- Accelerate launch of innovative body systems
- Leverage BOMs to improve build performance
- Increase profitability with optimal quality
- Improve buffering and sequencing efficiency
- Design more effective factories faster
- Collaborate for ensured security and performance
- Synchronize controls and improve visibility

The Tecnomatix automotive solution is designed to align with and improve your entire vehicle development process across all business domains. From powertrain to body-in-white, paint to final assembly and plant layout to supplier and systems management, Tecnomatix delivers quantifiable benefits in program planning, product engineering, manufacturing engineering and plant floor operations.

With thousands of cumulative man-years of expertise in the automotive industry, Siemens understands the challenges OEMs face in improving their operations. That's why we've tailored our Tecnomatix solutions to ensure that you achieve maximum benefits at every phase of your vehicle development process. With complete process solutions for part and assembly process planning, resource management, dies, plant design and optimization, human performance improvement, product quality planning and shop floor communication, Tecnomatix helps make your business decisions smarter, faster and leaner.



## Body – accelerate launch of innovative body systems

Leverage "manufacturing smart" product models and best-practice archetypes to eliminate prototype builds and lower engineering and production costs. For vehicle program managers, trying to balance the tradeoffs between styling, cost and quality, knowledge of manufacturing capability and product serviceability is critical. Through the use of Tecnomatix bestpractice templates and knowledge-driven archetypes, product designers can rapidly analyze new program styling and structural requirements for manufacturability.

Capture best practices: Product structures and planned variants can be evaluated against proven strategies for metal fabrication and assembly through knowledgedriven archetypes to give automakers greater flexibility to build products anywhere within their global operations. Streamline decision-making on carry-over and sourcing strategies, accelerating your body program while ensuring die manufacturing is a less costly and time-consuming process. Leverage information on product features, tolerances and weld points embedded in product definitions. This helps you quickly analyze new designs for formability and ensure that they conform to lean manufacturing processes. With manufacturing intelligence embedded in product models, you can plan processes, tooling and fixtures that more accurately reflect design intent and reduce waste.

In every phase of the body-in-white process, realize significant benefits from fewer concept and pilot builds to lower production ramp-up costs and more.



## Final assembly – leverage BOMs to improve build performance

Improve management of configurable options and streamline processes to create flexible product content and compress order-to-delivery cycles. Being able to quickly configure and produce vehicles with option and variant flexibility is crucial to meeting the demands of the automotive market. The more you can compress order-to-delivery cycles on hot selling vehicles, the greater program profitability and market share you'll achieve.

One key to a successful vehicle program lies in the efficient management of customer configuration options. Program managers need assurance that their assembly capability has the flexibility to adapt to option content scenarios, and final assembly planning has to accommodate a wide variety of supplier base contributions.

Tecnomatix breaks down the barriers to efficient analysis of long cycle operations in final assembly by managing the key data enablers for configurable option content. Proven production processes, captured as archetypes, can be aligned with product variant and effectivity information to help managers estimate cost and process capability more accurately. This leads to more efficient program execution – and profitability.

Tecnomatix not only manages workflow and assembly sequences but also factors in valuable features such as product and process variants and work time standards. This information helps process engineers to quickly meet throughput, cycle time and cost requirements. Finally, with so much component content added to the vehicle during final assembly, line-side supply is critical. Tecnomatix layout and material flow applications work seamlessly with ergonomic and discrete event simulation tools to ensure that your final assembly processes are tuned for optimal performance.



## Powertrain – increase profitability with optimal quality

Manage variation to improve quality and reduce warranty costs.

Driven by research and development, powertrain lifecycles span several vehicle programs which must be run as efficiently as possible. Years of development, testing and analysis must culminate in split-second process cycles with little variation due to the tight tolerance requirements of parts and assemblies. Production sequencing, machine capability and assembly planning are keys to holding tolerance in the manufacturing environment. Variation in powertrain products causes quality issues and drives warranty costs higher.

With Tecnomatix, R&D can evaluate variants in product structures against production sequencing and machine capability specifications to discern the viability of new technology. They can also evaluate dimensional requirements and improve decision-making on tradeoffs between quality demands and resource capabilities. From casting and fabrication to machining and finishing, hundreds of critical parts must come together in powertrain assembly to function flawlessly in an extreme environment. Tecnomatix manages each piece of data in a proven architecture providing access to critical information such as geometry, tolerances, features and datums. With Tecnomatix real-time data collection loop, your next powertrain program has greater assurance of success in holding tolerance. New technologies, flexible machinery, materials and customer requirements can be analyzed in the context of your production environment while avoiding any impact to production.



## Paint – Improve buffering and sequencing efficiency

Improve sequencing efficiency and optimize plant design to reduce paint operations costs. Paint operations have a unique influence on the overall throughput of your assembly operations. Due to high cycle times and change-over processes, manufacturing has to plan effective batching and sequencing of product flow. Precious floor space is consumed in buffer planning and banking of vehicles into and out of the paint operations area. Add to this the machinery, systems and labor required to maintain environmental controls and recovery systems and paint operations can quickly consume cost in your manufacturing budget.

Tecnomatix provides robust applications that enable industrial engineers to analyze product flow in sequencing and buffering for optimal solutions in scheduling and paint shop layout design. Additionally, Tecnomatix provides tools to analyze paint flow velocity, overspray and product coverage in your paint booth operations, thereby optimizing paint consumption.





## Plant layout – design more effective factories faster

Design more efficient factories faster to improve productivity and reduce time-to-volume.

Plant layout influences the performance of all aspects of the vehicle assembly process. From body and paint to power-train and final assembly, manufacturing, industrial and plant engineers all have a stake in ensuring that facilities contribute to optimal process performance. Plant layout sets the stage for the long-term profitability, process durability and maintainability crucial to meeting program objectives.

Tecnomatix plant design and optimization solutions enable cross-functional teams to collaborate on designing and analyzing factory layout to meet cost and throughput targets. Using intelligent 3D models of every object in your facility – from products, tooling and fixtures to conveyors, mezzanine, cranes, containers and AGVs – you can design your factory faster than you could with 2D CAD drawings. And since these 3D models have embedded object intelligence, they're easier to visualize and more informative than 2D drawings. Beyond the advantages of visualization, Tecnomatix plant layout solutions enable you to optimize your facilities for both efficient line performance and material flow to those lines. Everything from machinery usage, conveyance and donnage to inventory stores, material flow and indirect labor can be tuned to meet your program requirements. Moreover, safety and ergonomics issues can be factored into the design of your operations to minimize risks where machinery and humans interact. The result is that process issues are identified early and costly errors are avoided - before concrete is poured or pilings are driven for the infrastructure.



## Supplier integration – collaborate for ensured security and performance

Improve collaboration with your supplier base to align your program requirements more effectively with their capabilities. In today's intensely competitive market, automotive OEMs must manage growing supply chains with more geographically dispersed suppliers. Much of what was traditionally an OEM activity is now sourced to suppliers who are specialists in their fields. Whether it is design content, product analysis or manufacturing equipment, the supplier community is fully engaged in the vehicle development process. This adds to the complexity of managing your product lifecycle requirements.

Tecnomatix enables you to coordinate with your suppliers' business processes, leverage their intellectual capital and synchronize program objectives with their capabilities. The entire suite of Tecnomatix digital manufacturing solutions is built on Siemens' Teamcenter manufacturing process management backbone. This globally-scalable technology environment promotes the necessary interaction between OEMs and their supplier community. Whether they're large Tier1 companies or smaller customized solution providers, Tecnomatix integrated open standards simplify collaboration and streamline your requirements and bid processes.





## Control systems – synchronize controls and improve visibility

Improve control system efficiency to reduce ramp-up costs and re-use knowledge to ensure future launch success.



Management and dissemination of timecritical product and process data is crucial to implementing a lean business model. Your system and infrastructure requirements introduce significant cost to the program budget. Like product and process, the IT architecture and related programming have to be included in your data management strategy in order to leverage the benefits of a digital manufacturing investment.

Well conditioned and coded control systems are keys to a smooth operation. You can create the perfect layout, buy the best machinery and employ the best workers, but unless controls, architectures and communication systems are of high quality, your operations won't achieve peak performance. Tecnomatix knowledge management architecture allows the capture and re-use of critical systems programming to reduce ramp-up tryouts and smooth operational parameters for long-term profitability. Tecnomatix knowledge management ensures that systems requirements are validated and synchronized with suppliers. It also helps you analyze control programs and machine operations completeness and operational integrity, saving crucial time during ramp-up. And where problems occur, Tecnomatix enables quick resolution with efficient access to the latest iterations of code. Finally, all of the efficiencies built into the systems for one program can be captured and re-used in subsequent programs, ensuring that your next vehicle launch goes smoothly.



## The Tecnomatix advantage

### Proven knowledge management

Tecnomatix is powered by Teamcenter, the industry's leading product lifecycle management environment. What makes Teamcenter such a valuable digital manufacturing foundation 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 tools and legacy systems. Only Tecnomatix is built on a standards-based Teamcenter manufacturing process management backbone to ensure that these data sources are integrated with the product, process, resource and plant data flowing throughout your PLM process.

In addition, openness is more than just a technological challenge 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**

Automotive manufacturing engineering involves a variety of complex and interconnected activities – from part and assembly process planning to plant design, ergonomics analysis and quality planning. Your digital manufacturing solution must be knowledge-driven, and able to support and streamline all of these activities. Without a solution as robust as Tecnomatix, your manufacturing planning process will not operate at peak efficiency.

#### **Proven success**

Hundreds of automotive OEMs and suppliers throughout the world have implemented Tecnomatix solutions and are achieving such measurable benefits as lower operational costs, faster time-to-volume, higher productivity, reduced inventory and improved quality. Many of these companies report multi-million dollar bottom-line improvements with Tecnomatix solutions provided by Siemens PLM Software.

#### **Siemens Industry Software**

### Headquarters

Granite Park One 5800 Granite Parkway Suite 600 Plano, TX 75024 USA +1 972 987 3000 Fax +1 972 987 3398

### Americas

Granite Park One 5800 Granite Parkway Suite 600 Plano, TX 75024 USA +1 800 498 5351 Fax +1 972 987 3398

### Europe

3 Knoll Road Camberley Surrey GU15 3SY United Kingdom +44 (0) 1276 702000 Fax +44 (0) 1276 702130

#### Asia-Pacific

100 How Ming Street Suite 4301-4302, 43F Two Landmark East Kwun Tong Kowloon Hong Kong +852 2230 3333 Fax +852 2230 3210

#### **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. © 2012 Siemens Product Lifecycle Management Software Inc. All rights reserved. Siemens and the Siemens logo are registered trademarks of Siemens AG. D-Cubed, Femap, Geolus, GO PLM, I-deas, Insight, JT, NX, Parasolid, Solid Edge, Teamcenter, Tecnomatix and Velocity Series are trademarks or registered trademarks of Siemens Product Lifecycle Management Software Inc. or its subsidiaries in the United States and in other countries. All other logos, trademarks, registered trademarks or service marks used herein are the property of their respective holders.

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