

CXOs: Meet your new core competency – digital manufacturing

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white paper



- ▶ Particularly during such uncertain and fast-changing economic times, leaders of manufacturing companies worldwide must minimize company risk and get the most from their investments. This means getting innovative products to market on time to meet peak buyer demand and customer commitments. This paper highlights the business value of digitally managing the entire production process and presents an example system that helps reduce the risk of, and get the most from, this largest of capital investments.

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▶ The economic imperative

Your peers, CEOs and executives of the world's most renowned manufacturing companies tell us that three main questions keep them up at night:

- How do I increase shareholder value?
- Am I making the right investments?
- Am I taking advantage of key business trends, or are they taking advantage of me?

To answer these questions you must identify and focus your investments on core competencies – minimizing the risk in investments you're about to make and getting the most out of investments you've already made.

You need your line of business leaders to effectively re-use knowledge, quickly integrate acquired companies' strengths with your own and adopt best-in-class solutions to specific, critical business problems.

You expect your financial stewards to maximize the return on all key investments, have those investments create value in the shortest possible timeframe and thereby reduce the company's financial risk.

Supporting these mandates, you need your information technologists to invest in and implement decision-making tools that tap existing systems, show a clear return on investment, a quick time-to-value and a low total cost of ownership. Like you, they too must maximize value and minimize risk.

But at the end of the day, all mandates and investments must offer products that your customers want. And key to developing products that your customers want is delivering products when they want them. It's all about getting your product to market on time to meet peak (and perishable) buyer demand. It's about being more demand-driven.

► Manufacturing's importance

You probably know that the most expensive and time-consuming part of your business is manufacturing operations. But did you realize that you risk squandering the competitive advantage in your product designs if delays or cost overruns occur due to inefficient, expensive and unpredictable manufacturing processes? Put another way, the enormous economic hopes and dreams of great product designs rely on the success of your production operations. That's right. Your biggest cost center could also be the weakest link in your ability to please customers! But you can make manufacturing your strength.

By solving critical problems associated with your manufacturing processes, you get more value from prior investments of product design, supplier management and customer relations. The whole of your enterprise effort then becomes greater than the sum of the parts, and your investment in each area is finally maximized.

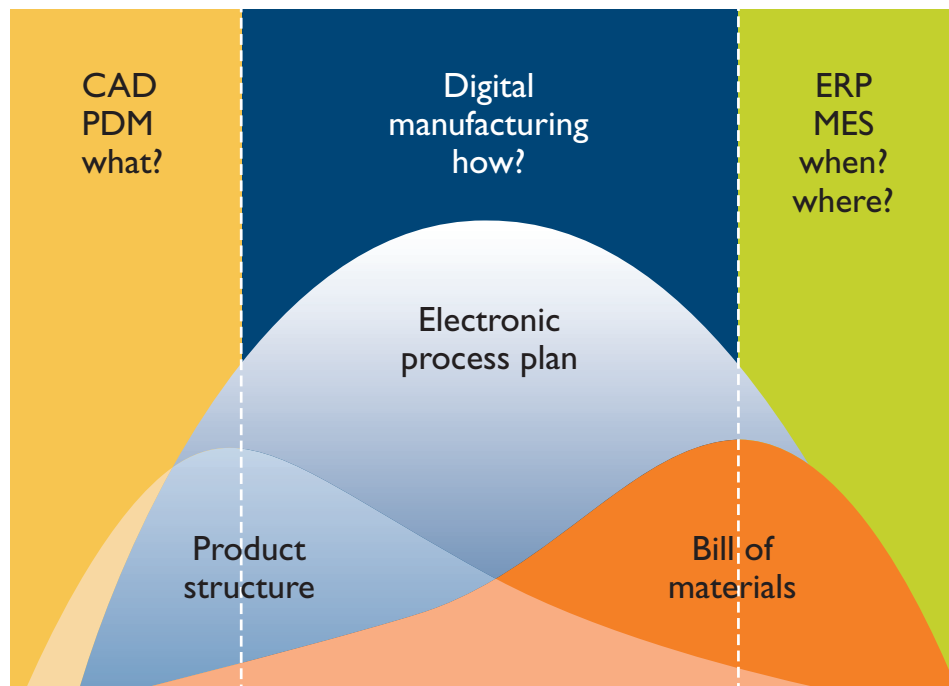
Whether you manufacture products or outsource that function to partners, you need confidence that the product is being built with the quality and timeliness that your customers require. You need manufacturing processes in all of your plants to be better than your competitor's. It's ultimately how your supply chain beats theirs.

Also key, your manufacturing environment must be able to support your business strategy of choice, whether your business focus is product quality, variety, availability or cost – or any combination thereof.

To know where to start, you can first look at the recent past. Ten years ago the drive for business automation pushed manufacturers to invest billions of dollars in separate systems for product design and shop floor automation. These systems have since matured into sophisticated but standard enterprise systems. Now, ten years later, manufacturers have begun investing in a new area to shorten time-to-market, increase quality and lower manufacturing costs.

Manufacturing engineering is a traditionally fragmented, under-funded and under-appreciated role in a manufacturing organization or supply chain. Investment in its information needs specifically is becoming a proven way to overall business excellence.

A renewed recognition of manufacturing engineering's importance to production and to corporate success has spawned a comprehensive, but focused, category of business solution that is a "system of record" for all manufacturing IT. This system allows manufacturing to become your company's core competency.



► The value of digitally managing your manufacturing processes

As more manufacturers migrate to lower labor cost countries, the competitive advantage is evaporating. Therefore, you need to look beyond just “where” they are manufacturing and focus on how they execute manufacturing processes for your next source of competitive advantage. The need for improved manufacturing processes design and execution will become even more acute as product lifecycles become shorter, product models and variants multiply, market prices erode and outsourcing increases. Better manufacturing processes were traditionally neglected at the expense of better product design or better distribution management. From a business perspective, better manufacturing process management is the next focal point for providing a competitive edge, both within an enterprise or across a supply chain.

Digital manufacturing (also known as manufacturing process management or MPM), is a business initiative, enabled by deep production expertise combined with outstanding technology, to manage information that solves manufacturing problems and overcomes anticipated challenges.

Digital manufacturing gives you the agility to achieve earlier volume production and delivery of variant products – the biggest factor in maximizing program revenue and profit.

With digital manufacturing you can develop a manufacturing process in a prototype center and easily transfer that expertise to volume production centers. Clearly this means maximum business flexibility and cost control in the global marketplace.

Digital manufacturing allows manufacturing talent to collaborate in the design of a product to help you anticipate and solve production bottlenecks that prevent you from meeting peak demand with peak output. This means you can start production earlier while reducing the complexity and cost of your products as well as your factories. You can also avoid losing money on inaccurate project bids.

Defining digital manufacturing:

Digital manufacturing can be described in the following ways:

- Digital manufacturing is a combination of software and manufacturing methods that transforms manufacturing processes and manufacturing-related business initiatives. Digital manufacturing results in lower costs, higher revenues and greater profits (and getting much more from production operations, product innovations and trade agreements).
- Digital manufacturing is an essential component of product lifecycle management (PLM) initiatives that supports the design, validation and execution of world-class production processes. Some manufacturers call this effort “process-driven product design”.
- Digital manufacturing is the “system of record” to achieve excellence in manufacturing operations. It fills a common gap (in PLM), between product design and product delivery, by managing both the design and execution of manufacturing processes in a closed loop of continuous improvement.

Beyond process planning, digital manufacturing also optimizes production operations by allowing you to critically compare your process plan to how well you’re actually executing on that plan. This means you can retain and re-use critical “real world” shop floor knowledge of what works and what doesn’t. It also represents a cycle of continuous production improvement enabled by no other technology today.

Earlier production starts, faster ramp-ups and ultimate production flexibility all represent a core competency you can bank on. But just what is a digital manufacturing solution?

Leading manufacturers have already proven that only a complete “system of record,” one that supports production processes from concept to retirement, will solve manufacturing’s fundamental bottlenecks and shortcomings. As such, the digital manufacturing system you select should allow your company to plan, validate and execute manufacturing processes both internally and among trading partners.

Digital manufacturing allows product designers to communicate effectively with manufacturing process engineers, and allows manufacturing process engineers to communicate effectively with shop-floor controllers and line workers. You thereby get the most from investments you’ve already made in product development and production automation initiatives.

Key to achieving this, and at the core of any true digital manufacturing solution, is an electronic process plan. This plan simultaneously stores and reconciles product design requirements with all resources necessary and available to build the product, and the specific operations that must occur in that build process. It is a total and unambiguous description of manufacturing processes, enabling the sharing of information between the many roles and companies involved in bringing products to market successfully. It is, in effect, the DNA of your manufacturing process expertise.

► The Tecnomatix solution for digital manufacturing

Tecnomatix® software is the Siemens PLM Software offering for digital manufacturing. It is a suite of flexible software solutions that dramatically increases your company's profitability by improving how your products are built. Developed specifically for companies whose success depends on bringing more products to market faster and for less cost, the Tecnomatix solution:

- Gives your team and supply chain partners faster access to key data when needed
- Promotes more efficient collaboration and more informed decision-making
- Enables rapid response to product design changes
- Facilitates the sharing of manufacturing and product design best practices
- Shows the impact of decisions digitally, before you commit physical resources to implementing them
- Ensures that your processes will achieve their anticipated business result

Tecnomatix provides a broad range of applications for manufacturing management of both parts and assemblies. These solutions enable you to:

- Define and verify product assembly sequences
- Create assembly-line layouts
- Simulate specific operations and material flows to optimize the process
- Allocate the required time for each operation
- Verify line performance and perform line balancing
- Analyze product and production costs
- Virtually commission and program production lines using digital planning data
- Execute and continually manage your production process
- Track and trace specific customer orders according to the materials included and the processes they undergo
- Feed back real-time process changes, as executed, into manufacturing process plans

Tying all these capabilities together, Siemens offers an open digital manufacturing data management backbone – Teamcenter® software – that's tightly integrated with Tecnomatix. By providing the information infrastructure for manufacturing data, Teamcenter ensures the effective use of information by all participants across your supply chain, with capabilities for change management, document management, workflow management, process management, resource management and version and product variation management.

Tecnomatix provides a set of interoperable applications that support all phases of your manufacturing cycle (plan, design, validate, execute). These flexible, open applications can be used individually or integrated with the Teamcenter open manufacturing data backbone to improve such critical production activities as:

- Part manufacturing planning
- Assembly process planning
- Resource management
- Plant design and optimization
- Robotics simulation and programming
- Ergonomics and human performance
- Product quality planning
- Production execution and order tracking
- Production automation and shop floor production data collection

Tecnomatix is an integral part of the Siemens suite of solutions. By combining complementary capabilities, Tecnomatix, NX® software and Teamcenter offer companies the most extensive and proven set of capabilities for improving their entire product development process.

▶ Who's benefiting from such a system today?

Success among manufacturers served by digital manufacturing solutions is proven, measurable and numerous. For example:

- Ford creates new cars based on the best use of existing assets and production capabilities
- BMW has over 250 users of MPM software and has reduced new model introduction time six to twelve months
- Airbus plans to save 30 percent of the traditional new airliner introduction time as it builds its “double-decker” A380 model
- Automotive line builder, Tesco Engineering, can provide accurate quotes to OEMs for line building services, allowing both parties to optimally plan their profitable operation and create a more successful supply chain
- Airport logistics specialists, TBA Netherlands, simulates and determines the most effective and efficient routes for people and goods at Schipol airport and others in Europe
- Electronics manufacturing services providers like Sanmina-SCI can perform like a “high-volume” or “high-variety” shop, depending on ever-changing market conditions
- Consumer electronics giant, Philips, has visibility into the quality and regulatory compliance of its suppliers of products where this is critical

Through an electronic process plan, digital manufacturing creates and manages the data required to design processes, validate process scenarios, execute the optimal process and commission process plans – all digitally – before costly changes are made to physical assets, and before unnecessary plants and lines are built. This means total process confidence before moving a single production resource into place... risk reduction.

About Siemens PLM Software

Siemens PLM Software, a business unit of Siemens Industry Sector, is a leading global provider of product lifecycle management (PLM) software and services with 4.6 million licensed seats and 51,000 customers worldwide.

Headquartered in Plano, Texas, Siemens PLM Software's open enterprise solutions enable a world where organizations and their partners collaborate through Global Innovation Networks to deliver world-class products and services. For more information on Siemens PLM Software products and services, visit www.siemens.com/plm.

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