

The Siemens logo is displayed in a bold, teal, sans-serif font. It is positioned in the upper left corner of the image, which shows a complex industrial manufacturing environment with robotic arms and machinery.

SIEMENS

Ingenuity for life

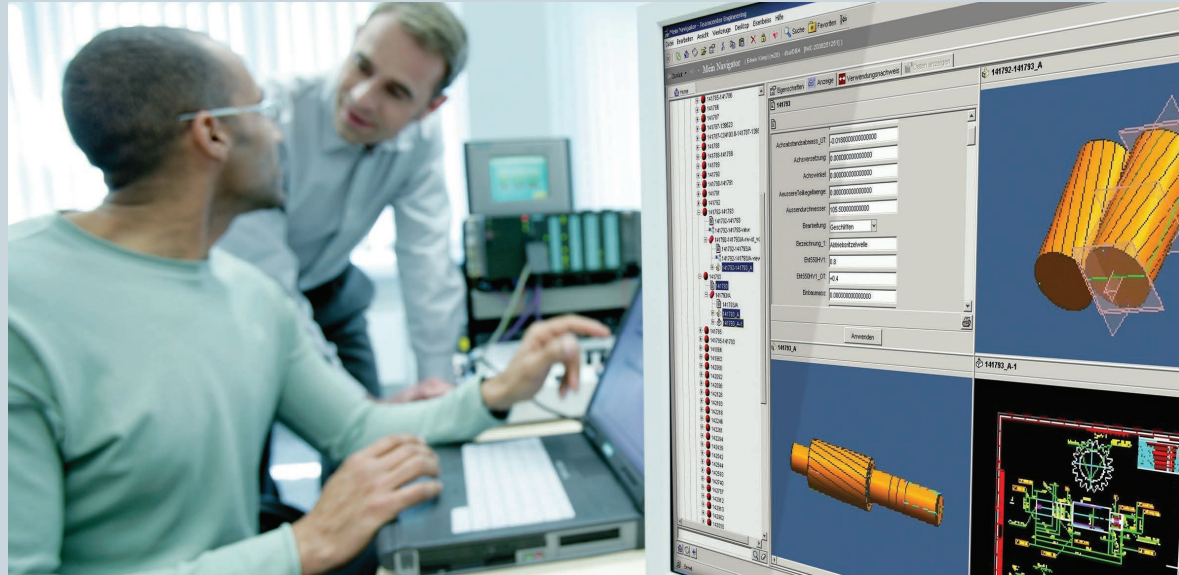
Siemens Digital Industries Software

Industrial machinery

Siemens helps machinery
manufacturers realize innovation

[siemens.com/software](https://www.siemens.com/software)

Today's industrial machinery industry

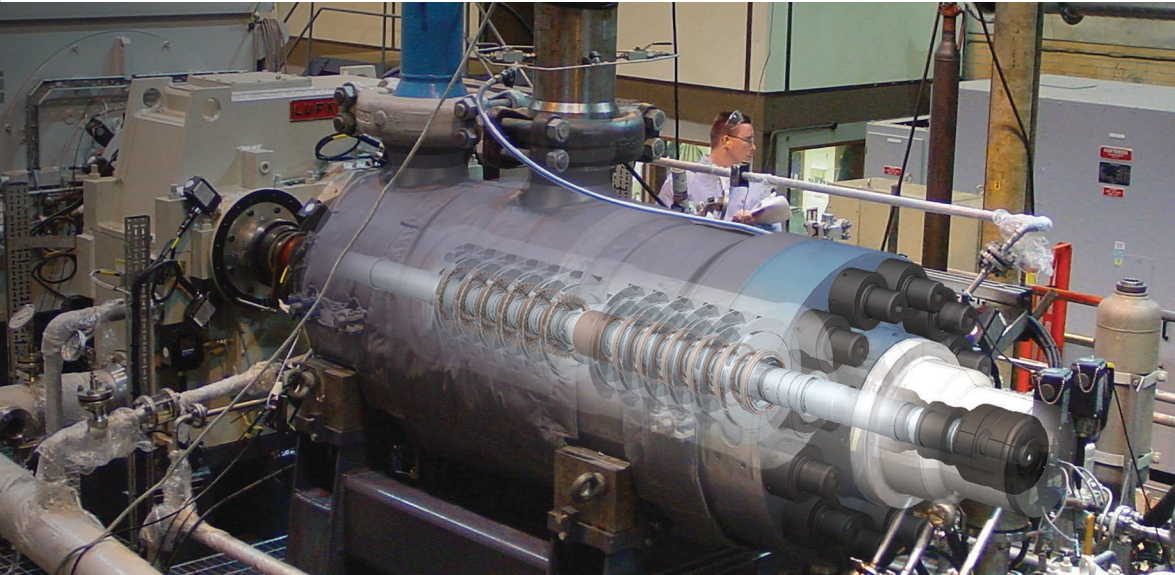


Increasing global competition requires industrial machinery companies like yours to continuously innovate and optimize their products. The need to capture and leverage fresh value-creating ideas from your employees, as well as from your partners, customers and suppliers, extends today's innovation process beyond traditional boundaries.

Innovation has become a core driver of growth, performance and valuation. You need to accelerate product delivery while ensuring a fast and appropriate return on your innovation investments. These goals are compounded by the fact that today's new product development process is comprised of hundreds of decision points and parallel workflows that now take place in a global context.

Siemens Digital Industries Software addresses these realities by providing a product lifecycle management (PLM) platform that enables your company to flourish in this complex business environment, allowing you to build the right products and build your products right.

Business challenges



Industrial machinery manufacturers are constantly challenged to adapt to new circumstances. With the introduction of Industry 4.0, there is an additional challenge: optimizing production when manufacturing with decentralized, autonomous machines that communicate with one another. This adds an entirely new level of technological requirements. Many industrial machinery manufacturers also find themselves facing an increasing number of new requirements, such as the demand for more flexible machines that can be rapidly adapted to new products or formats, as well as for machines that can be easily integrated into existing plants.

In order to meet these demands, industrial machinery manufacturers must:

- Effectively manage design complexity from early-stage virtual machine design to production
- Integrate product design, development and production processes
- Enable complete product information visibility for designers, engineers and suppliers
- Provide closed-loop, rapid-service lifecycle management to customers

Another crucial challenge requires manufacturers to drastically reduce the time it takes to develop new machines, while ensuring that these machines can operate at close to 100 percent uptime.

Equally important, the basis of competition is shifting toward delivering excellence in service and parts management. Given these challenges, the following questions become key business issues:

- How do you ensure profitable growth in a globally competitive environment
- How do you deal with the mounting pressure to improve operational performance while meeting escalating customer requirements
- How do you improve the productivity of your new product development process so it can operate at a faster rate, deliver better and more constant product quality and minimize lifecycle costs

Mastering complexity



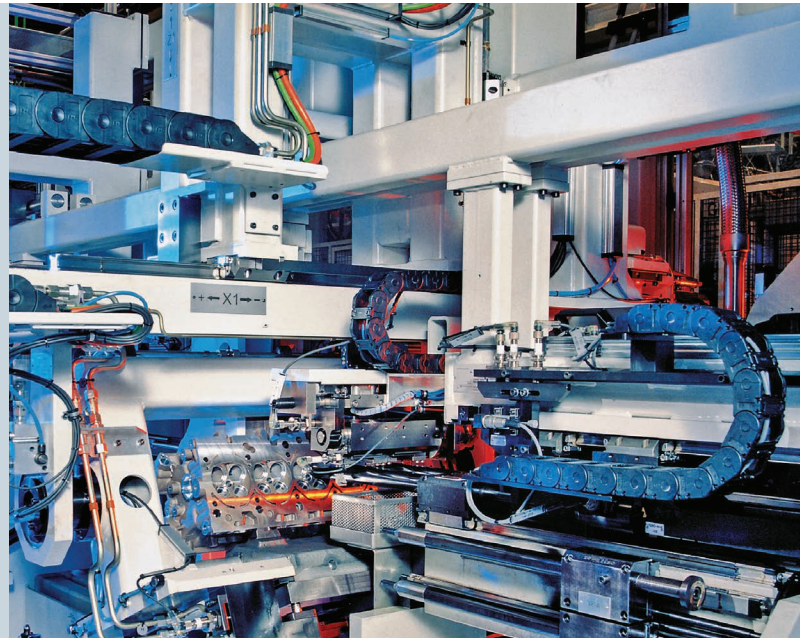
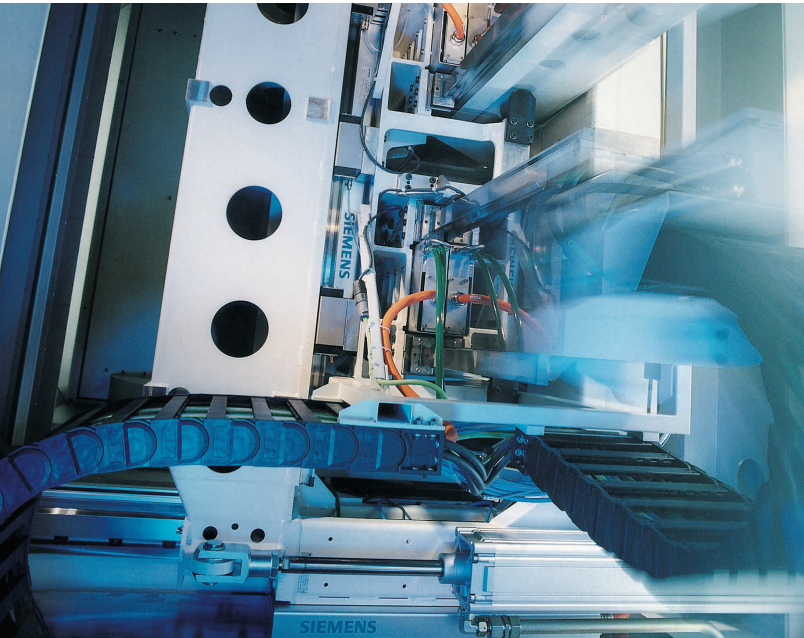
Globalization

New and emerging markets have generated strong consumer demand for manufactured goods, which in turn bolsters the demand for new manufacturing equipment. Industrial machinery manufacturers have responded either by following their customer base to these new markets or by forming new global sales and service partnerships and extended value chains to support these global clients. They also have tried to streamline their operations to provide products that are both high tech and low cost.

Industrial machinery manufacturers need to leverage these global opportunities, while at the same time finding the best way to compete with new global competitors by also leveraging low-cost manufacturing alternatives and adopting agile business practices that can support today's rising configure-to-order, make-to-order and design-anywhere, make-anywhere initiatives.

Optimization

Product innovation involves multiple work processes that require the participation of many disciplines working across organizational boundaries and collaborating with outside vendors to address the needs of targeted global markets. Much smarter configure-to-order and make-to-order processes and solid design-anywhere, make-anywhere solutions are needed. Accurate market alignment and on-time product delivery depend on total visibility into the status of your initiatives, the impact of change and identification of potential bottlenecks before they result in irreparable delays. Optimization of the plan-to-production process is essential for you to manage innovation complexity.



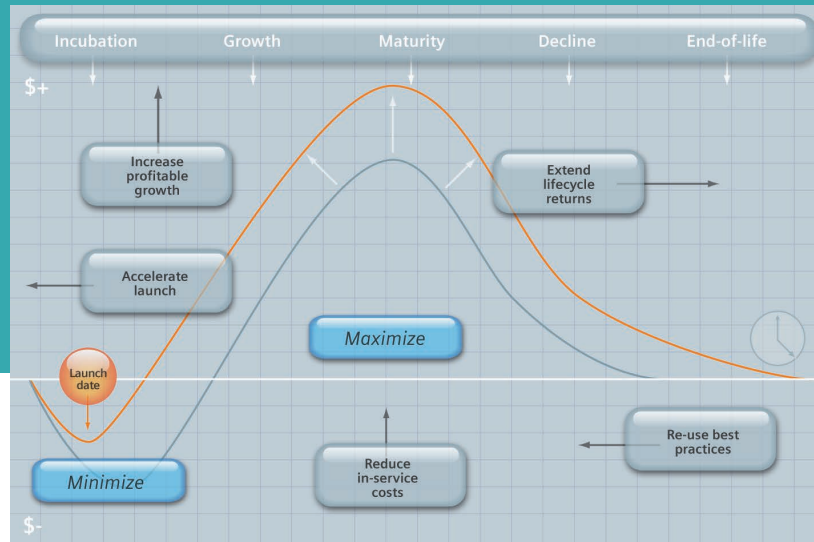
Speed

Constant technology innovation and customer demand for this technology combine to place extra pressure on today's industrial machinery manufacturers. These pressures require manufacturers to add new features and capabilities to their machines at a very rapid pace. Additionally, non-negotiable contracts require manufacturers to deliver their machines precisely on time with no margin for error. These time-to-market requirements and their impact on your cycle times compound the complexity of today's product and production lifecycles.

Sustainability

More than 90 percent of the lifecycle cost of today's machinery comes from running the machine. When you factor this in with the rising cost of energy, it is easy to see how innovative methods for making your machines more energy efficient deliver a significant competitive advantage. Today's manufacturers also want to establish this advantage by reducing the amount of waste (water and grease) that their machines produce. In addition, they try to adopt the best approach for recycling machine components/parts and for complying with today's voluminous government regulations. Finally, it is important to ensure worker safety by incorporating sensors and controls into today's machinery designs. All of these sustainability considerations combine to increase the complexity of the machine design and manufacturing process.

Benefits for industrial machinery manufacturers



Improve decision support

With constant visibility into product and production information, you are able to make smarter decisions across design, manufacturing process planning and commissioning.

Accelerate launch

You can reduce the number of prototypes, effectively manage design complexity and collaboration across your value chain of internal and external stakeholders, and improve your speed to delivery. In addition, you can use a virtual machine to reduce setup time while operating your physical machine.

One of our customers leverages the power of a virtual machine to reduce physical machine setup by 90 percent.

Increase profitable growth

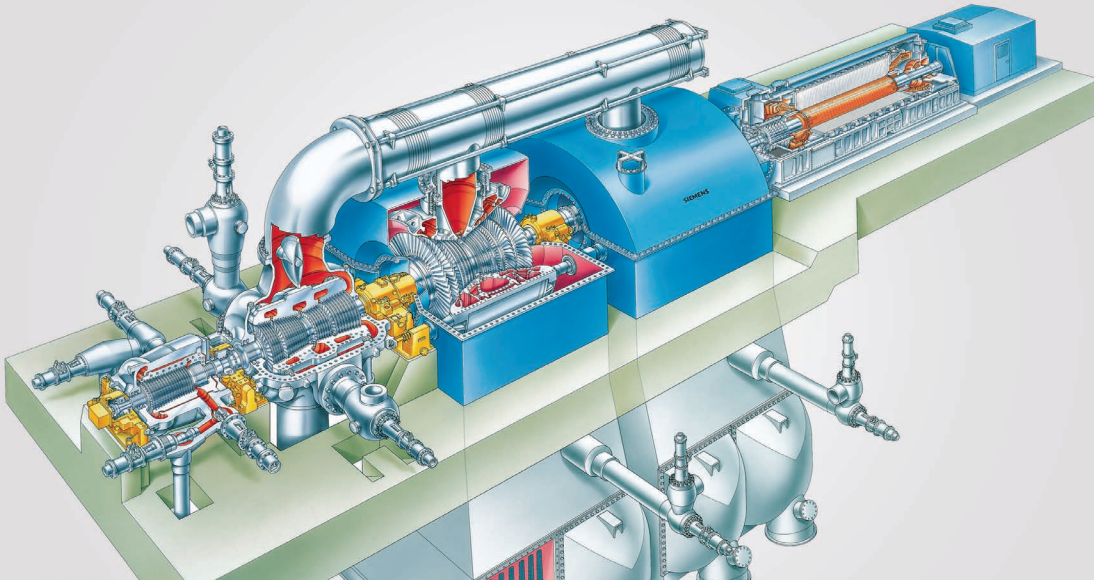
You can deliver high margins from your machines by accelerating launch and establishing higher price points, as well as by reducing prototyping costs and facilitating concurrent global engineering and manufacturing to minimize cost.

A global leader in automation technologies used PLM to significantly improve the speed of its work processes and reduce errors by providing all of its product development stakeholders with continuous access to the latest product information, enabling them to make real-time changes that could be reviewed and audited.

Extend lifecycle returns

PLM enables you to streamline your design process to improve operational performance while adding innovative product content and providing closed-loop service lifecycle management that enables your machines to meet escalating customer requirements for greater productivity, energy efficiency and lower cost of ownership.

Our customers say that PLM provides them with visibility to other ideas and technology platforms that enable them to more quickly refresh their products with unique improvements.



Re-use best practices

You can leverage PLM's knowledge capture and workflow capabilities to ensure that your company's information assets are being re-used as much as possible. As a result, your machines have greater flexibility to adapt to new products or formats, leading to improved productivity and profitability.

By simply enabling its design engineers to select factory-standard components through their computer-aided design (CAD) systems, one of our customers was able to accelerate design time, improve standardization and reduce the capital it tied up in unnecessary stock.

Reduce build costs

You can reduce product costs by minimizing the number of physical prototypes you build and simulating machine behavior and performance during the early stages of product development.

One of our customers removed a significant number of nonvalue-added functions from its lifecycle processes and reduced its product delivery cycle by leveraging PLM to adopt knowledge-driven manufacturing and incorporate proprietary programming know-how into re-usable templates.



Solutions for industrial machinery manufacturers

Global engineering and manufacturing

The strong global consumer demand for manufactured goods has boosted the demand for industrial machinery. When this demand is coupled with the need to leverage global product development and production resources, it is easy to understand the challenge faced by today's machinery builders. To address this challenge, industrial machinery companies need to establish a global engineering and manufacturing platform that enables them to design modular machines and support multiple machine variants.

In many cases, these platforms and variants are being developed by global design and engineering teams and manufactured in multiple plants around the world. These operations need to track project schedules, resource allocations, customer specifications and all of the product/process knowledge that is generated by a distributed value chain. With this requirement in mind, machinery builders and their suppliers are turning to PLM technology as the basis to establishing a flexible collaboration environment that can facilitate global engineering and manufacturing.

PLM platforms are especially useful for extending your product design process by enabling you to perform real-time analysis of the design intent and evaluate it from a production perspective.

Siemens Digital Industries Software provides Teamcenter® software digital lifecycle management solutions to enable you to build collaborative global engineering and manufacturing environments that facilitate:

- Globally distributed product development, which enables widely dispersed team members to work together in a highly-iterative and systematically-managed process



- Flexible manufacturing on a global scale, which enables companies to leverage manufacturing knowledge within the product development process
- Global supplier collaboration, which seamlessly connects suppliers into your lifecycle process without regard to their geographic location
- Virtual machine innovation, which enables product and production teams to visually validate machine performance from both the behavioral and functional perspective





Solutions for industrial machinery manufacturers

Mechatronics

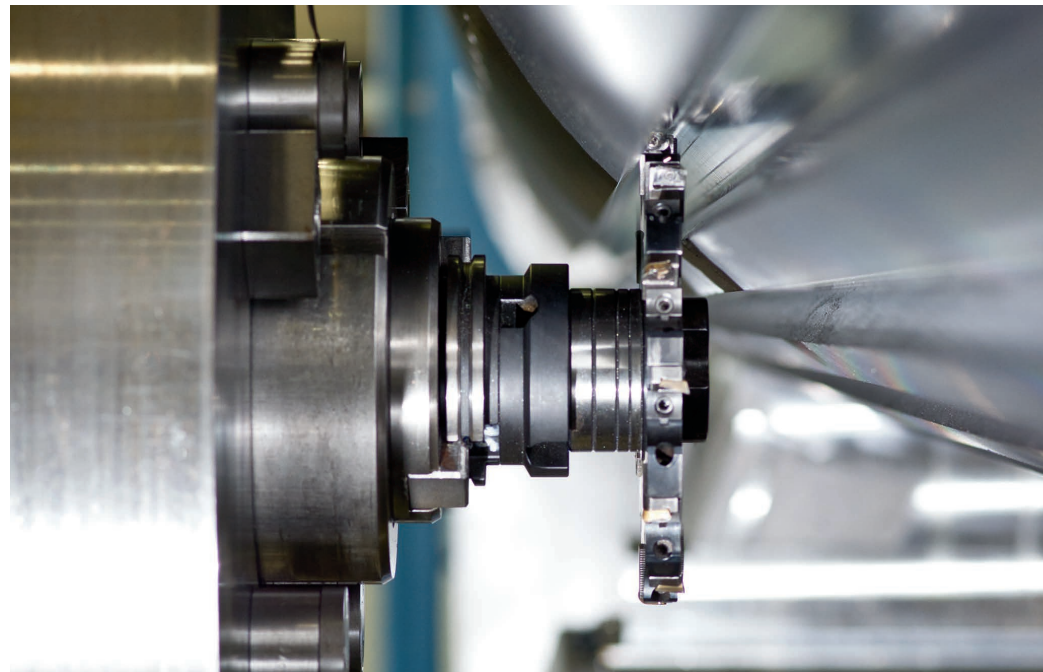
Today's industrial machines are becoming more complex. Systems are more integrated, with a myriad of functions to prevent, track and issue system failure alerts. This trend is causing machine builders to take a holistic approach to design that encompasses systems engineering, as well as electrical, mechanical and software design. A holistic approach requires today's value chains to look at early system layout and system performance through hybrid 2D/3D layouts and digital engineering models.

Siemens Digital Industries Software provides holistic solutions that enable you to realize this integrated process

by communicating design changes throughout your operation's various functional disciplines. PLM facilitates a rich integrated product development environment that addresses the needs of all of these different disciplines with a single source of product and process knowledge. This provides you with the clear transparency and traceability required to inform each discipline about the product and process definition changes that iteratively evolve across the product and production lifecycles. Siemens' holistic mechatronics solutions enable your company to get it right the first time, reduce integration issues, lower the cost of engineering rework and speed up order delivery times.

Digital manufacturing

Siemens provides comprehensive digital manufacturing solutions for machine tool builders, including virtual machines that can be used to assess and validate new machine tool designs. In addition, as an important validation step of the design process, virtual machines can further support the early development of computer numerical control (CNC) cycles and specific operator interface pages on the human-machine interface (HMI). Most importantly, this virtual replica of the machine tool can illustrate how a machine will operate even before it is built.



Siemens' unique combination of technology also provides great value for the end users of the machine tools. The virtual machine can be used for many nonproductive tasks, such as program testing, setup checking and even operator training. Program code can be edited and changes verified right on the virtual machine, saving valuable time on the real machine.

With respect to part manufacturing, Siemens provides Tecnomatix® software digital manufacturing solutions to define and optimize a manufacturing plan that can subsequently be connected for execution on the shop floor.

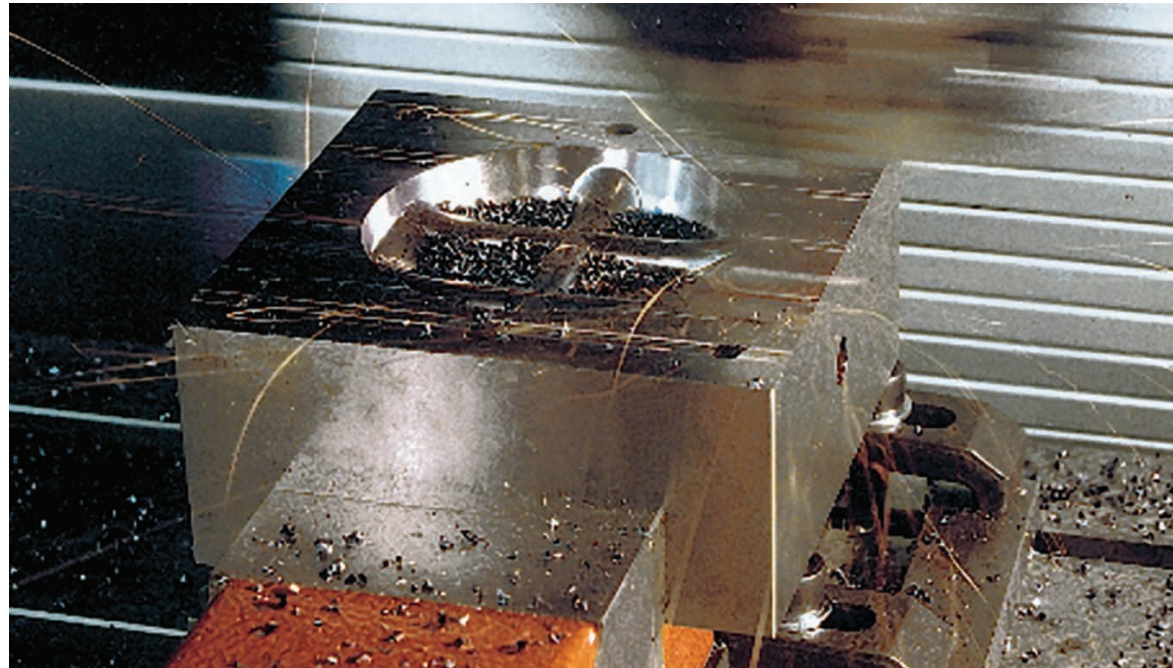
This highly efficient bridge between production planning and the shop floor takes your manufacturing planning and production environments to new levels of efficiency, enabling you to reduce manufacturing cycle times and improve quality. In addition, the electronic delivery and automated entry of machine tool setup information increases confidence that the right manufacturing information and equipment are in the right place at the right time for production.

Serviceability

Seventy percent of a machine's lifecycle costs are incurred during its support. Globalization trends are increasing the need for service centers, hubs and networks for equipment manufacturers

around the world. Sustainability requirements are expected to increase demand for services to refurbish and/or integrate environmental control systems in existing machines.

In addition, during periods of economic decline, manufacturers tend to hold on to aging equipment longer. This practice increases the costs associated with service and maintenance, boosting revenues for service providers. In fact, there is a huge untapped profit potential in noncaptive as well as captive markets. In spite of these trends, most companies are not even close to tapping their business potential.



Teamcenter enables you to drive maintenance, repair and overhaul (MRO) solutions to integrate a machine's product definition, configuration and change history with its maintenance history. This enables service personnel to easily and accurately obtain information they need to perform maintenance planning, maintenance execution, materials management and logistics-records management.

Hardware-in-the-loop

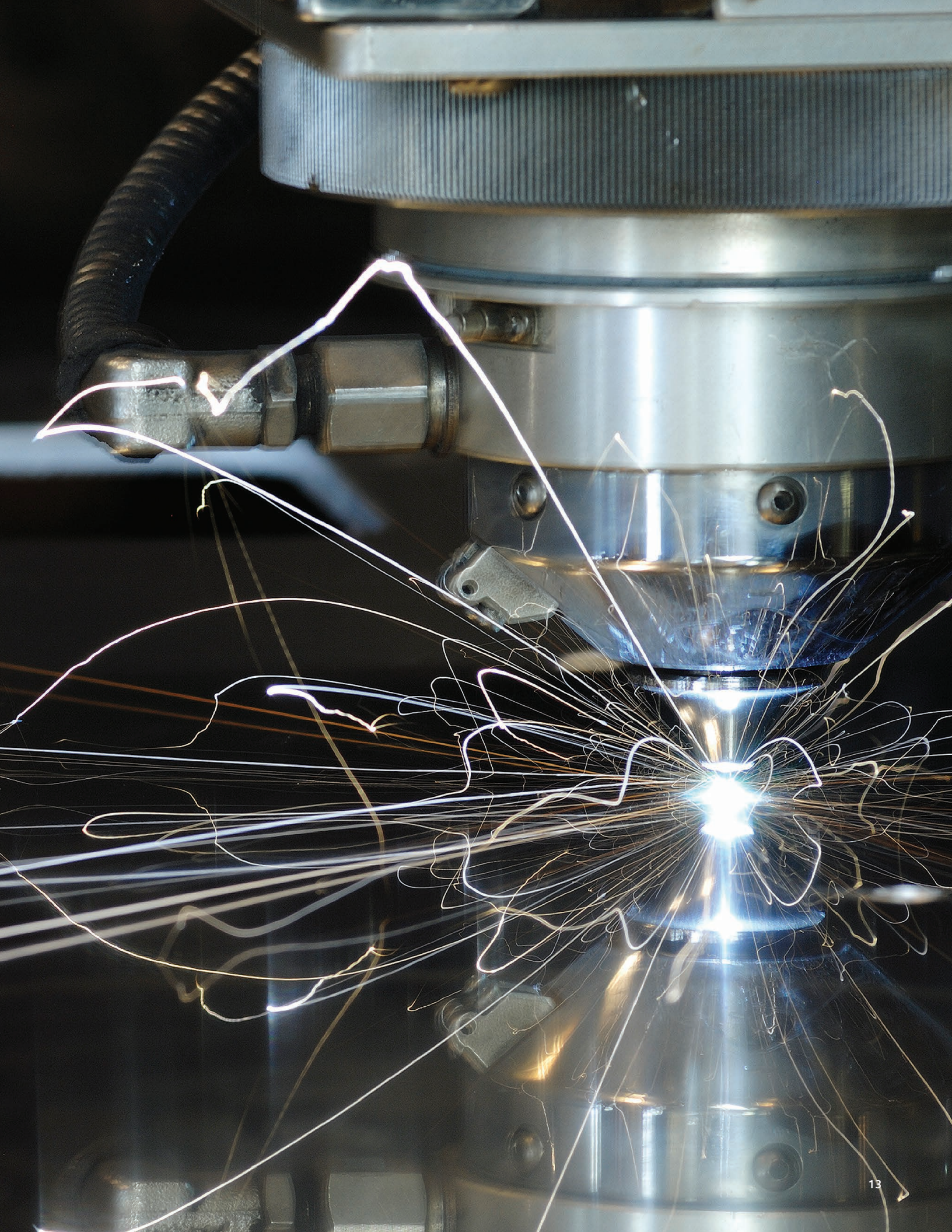
Virtual commissioning can be used to minimize physical testing and/or create expensive prototypes. Machines with embedded mechatronics software are more complicated, so there is a much greater need to test all these disciplines in one integrated system.

Hardware-in-the-loop (HIL) simulation, part of the virtual commissioning process, is a technique that is used to develop and test complex real-time embedded systems. HIL simulation provides an effective platform by adding the complexity of a machine that is being controlled with the test platform.

HIL simulation must include electrical emulation of sensors and actuators. These electrical emulations act as the interface between the machine simulation and the embedded system that is being tested. The value of each electrically-emulated sensor is controlled by the machine simulation and is read by the embedded system that is being tested (feedback).

Likewise, the embedded system that is being tested implements its control algorithms by outputting actuator control signals. Changes in the control signals result in changes to variable values in the machine simulation.

Siemens' solution for virtual commissioning enables manufacturers to fully support hardware-in-the-loop. And in so doing, it drives an integrated end-to-end manufacturing process that includes PLM, manufacturing execution system (MES) and motion controls (MC) technology to support Industry 4.0.





Enabling industrial machinery manufacturers to realize innovation

Siemens is one of the world's largest and most respected companies, operating in more than 200 countries and employing more than 340,000 people. This scope and experience provides Siemens with a unique understanding of the industrial machinery industry's global business requirements. Siemens technologies help bring together product and production lifecycles, facilitating unprecedented speed-to-market for industry-leading companies around the world.

Siemens is helping its customers deliver increasingly complex machinery in a marketplace that requires high reliability, short-order delivery cycles, improved total cost of ownership and lower product development costs. A unified industrial PLM platform that brings the virtual and real worlds together facilitates an efficient bridge between production planning and the shop floor. This bridge delivers strategic advantages by providing innovation capabilities especially tailored for machine tool builders. The connection of the virtual and real world significantly improves cross-discipline collaboration while facilitating better and more accurate finished products. That means faster time-to-market and faster time to full deployment.



Let Siemens Digital Industries Software help you realize innovation in industrial machinery manufacturing. For more information, contact your local sales representative or visit www.siemens.com/plm/machinery.



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. For more information on Siemens Digital Industries Software products and services, visit [siemens.com/software](https://www.siemens.com/software) or follow us on [LinkedIn](#), [Twitter](#), [Facebook](#) and [Instagram](#). Siemens Digital Industries Software – Where today meets tomorrow.

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