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Siemens Digital Industries Software

Using PLM to enhance development of machinery and industrial products

White paper

The management teams of machinery and industrial product manufacturers can assess the potential impact of product lifecycle management (PLM) technology by exploring the specific impact on five core business processes. These include bidding, order-to-delivery, installation and commissioning, in-service and support, and new product development and introduction.

Contents

Executive summary

European engineers created the technologies and built the machines that started the Industrial Revolution 250 years ago. Since then, machinery and industrial products have been used to power dramatic economic progress and transform the world. In fact, recent events such as the introduction of Industry 4.0 by the Fraunhofer Institute and the German government showcase the enormous potential of the industrial machinery industry.

This document is for management teams of machinery and industrial product companies and is designed to help them assess the potential business impact of product lifecycle management technology on their enterprise. It covers the business environment, and discusses the contribution of PLM in the five business processes that are central to adding customer value for machinery and industrial product companies.

For machinery manufacturers, efficiently creating, communicating and managing product-related information is key to finding and implementing initiatives to deliver responsiveness, efficiency and new business.

PLM provides a flexible, managed environment for information creation, sharing and use. This enables multidisciplinary teams to automate activities, work together and execute tasks in parallel, leading to cost and lead-time reductions, as well as results that are right first time. With PLM, your products can be used as a path to partnering, innovation, industry leadership and revenue growth.

How do companies respond to the immense pressure from newly industrialized nations and other strategic challenges?

Manufacturing of machinery and industrial products is an industry that is under pressure. The pace of development is rapid and sustained, requiring manufacturers to be at the forefront of research and development (R&D). To survive let alone prosper, it is necessary to bring in new materials, integrate new technologies and invest in new concepts. Many companies have a long history of achieving cost control, quality and efficiency initiatives. Lean manufacturing and Six Sigma have become a way of life. Yet profit targets remain difficult to achieve. It is not sufficient to just attain quality, ease-of-use and competitive pricing; success requires new ways to improve efficiency, focus on the customer and win business.

The emergence of new competitors from low-cost, remote regions is just one of a number of substantial challenges machinery manufacturers face every day, including:

Globalization – New competitors introduce new brand values, products and services, and may benefit from lower cost structures. Global customers require consistent products and services worldwide, with options for local and central sales and service support

Demanding customers – Buyers have good information about price, performance and competitive alternatives. Products and services must match specific needs

Product lifecycle management
Product lifecycle management is the term used to describe the information technology environment for product data. PLM is sometimes used in a limited way, namely, to describe just the parts of this environment that manage product data. At Siemens Digital Industries Software, we offer the full scope of PLM technology. This complete, integrated capability is a vital platform for providing the full benefits of PLM. Good data management delivers the right packages of information to the right people. Our PLM ensures that people can open the packages, interrogate the data, extract what they need and make adjustments if appropriate.

Regulatory environments – Specific, auditable procedures together with local and global reporting may be required. In some sectors, regions and countries layer their regulations on top of globally accepted standards

Growth of product complexity – Extensive use of embedded electronics and software is routine. The mechanical engineering of machines may be the dominant aspect of their physical presence, but their value depends on the integration of mechanical and other technologies

In the past, leadership in capabilities such as quality, ease-of-use and competitive cost created a competitive advantage. These capabilities remain essential, but are no longer sufficient to ensure success. Management teams must identify, launch and execute new business initiatives to become more efficient and customer-centric while fending off competition and creating value for customers.

Many expectations
Customers expect new machines and equipment to provide:

- Lower costs and higher performance
- Unattended operation, improved energy consumption, higher yields and better throughput
- Integration with other machines and systems
- Remote operation/performance tuning/ maintenance
- Efficient, robust adherence to regulations
- Safety, environment, traceability and maintenance
- Future-proof production
- Roadmaps for upgrades to handle new materials and technology
- More flexible integration with automation systems, including control pathways and data connections for status and performance reports

Better ways to work with machinery suppliers for:

- Supply of spares and service
- Retrofit and upgrade projects
- New machinery configuration, ordering, delivery, commissioning and handover

New commercial relationships
Customers expect to be able to develop a wide range of partnering arrangements. This may involve contractual conditions, such as risk sharing, or it may cover business-model discussions to transform a relationship from customer and supplier to project partners.

Management teams develop and communicate strategies

Figure 1.

To plan business priorities, it is important to understand customer expectations – for some examples, see the panel to the left entitled, "Many expectations."

Mid-size companies face particularly rigorous challenges because they must participate in the value chains of a number of major customers, each imposing different standards and capable of substituting products sourced from international competitors. This can be a complex situation because each customer expects individual attention, makes unique demands on function, performance, price and schedules, and seeks to develop partnering relationships to share risk on future projects.

To seize the opportunities created by customer demands, a machinery manufacturer's management team (see figure 1) must constantly review their company's business performance, identify suitable adjustments to strategies and launch well-defined initiatives supported by appropriate organizational changes, targets and resources.

For machinery companies, high-priority initiatives tend to depend on product and process information, such as:

- **Initiatives aimed at company responsiveness** – These address synchronization, communication and collaboration between teams, departments, suppliers and partner networks. The product and process information that is correct, consistent and up-to-date, and is made available to the right people in the right context is a vital platform for these initiatives. For example, initiatives to improve profitable contract win rates require estimators, designers and production planners to use consistent information
- **Initiatives aimed at part and process re-use** – Avoiding creation of multiple similar parts and processes is not easy in a machinery company environment. Capable creative people find it easier to reinvent the wheel. To balance this tendency and increase re-use rates, product and process information must be easy to find and include design intent, requirements and

Engineering applications in machinery companies

Machinery companies of all sizes were early adopters of a wide range of IT for engineering. They realized a return on investment (ROI) due to tangible reasons such as enhanced productivity, improved accuracy and fewer errors as well as intangible reasons, such as a more modern image for the company. These quick wins were just the beginning of the story. Engineering applications that focus on tasks performed by individuals and local groups, such as computer-aided design (CAD) and computer-aided manufacturing (CAM), established a platform for better handling of product and process information. These technologies have developed into PLM solutions, with data management, workflow and collaborative capabilities. Now PLM investments enable better visibility, re-use and communication of product and process information, not only for individuals and local groups, but also for the wider community. This allows many additional categories of users, working across all phases of the product lifecycle, to make correct decisions and act quickly because they can rely on the quality and availability of up-to-date product and process information. The result is faster innovation, more re-use of parts and processes, better quality, improved partnering, enhanced operational efficiency and more flexibility.

specifications. Making investments that are used to rationalize design and deliberately create re-usable parts is also required. Initiatives that increase the use of standard and approved parts must include giving the people who specify parts easy ways to search for existing parts that meet the requirement

- **Breakthrough initiatives** – New configurable products, supply chain structures, supplier relationships, sales channel arrangements and service options all depend on product and process information. Fluent handling of this information gives management teams more flexibility to create and run new ways of working to achieve breakthrough results. For example, making it possible for distributor sales representatives to offer interactive visualization and simulation of machinery performance may be the way to break into a new market, and beat competition in existing markets

For successful implementation of these initiatives, companies need information technology (IT) capabilities to manage product and manufacturing process information. Product lifecycle management is the IT environment with products and production processes at its core. PLM strategies and solutions support individuals and collaborative teams in efficiently creating, re-using, communicating and managing product and process information. Using PLM supports digital product development and digital manufacturing, enabling distributed teams to achieve faster cycle times, leading to reduced time-to-market and more product and process innovation.

Companies with high competence in handling product and process information find they can be flexible and efficient in the way they work with customers and suppliers. For these companies, using globally distributed partner networks enables them to achieve speed, quality and low cost in one or more key areas, such as design, production, distribution and service.

"Our product configuration system uses information from our Siemens PLM system and quickly produces 3D visualizations of specific machine configurations. The visualizations help us work with customers to consider alternatives and make sure that everyone understands the discussion."

Bernd Haussmann
Otto Bihler Maschinenfabrik GmbH & Co. KG

Skillful, efficient handling of product and manufacturing process information has a positive impact across the full range of activities of an enterprise and its extended value network of suppliers, distributors, service agents and customers.

The next sections examine the nature of this impact in the core business processes (shown in figure 2) that add value for customers of machinery companies.

Using PLM enhances all of these individual processes. However, an important added value of PLM technology is its capability to allow all these processes to be driven from the same information base. The resulting improvements in communication and efficiency across the entire operation are discussed after we have looked at the individual processes.

Core processes add value for customers

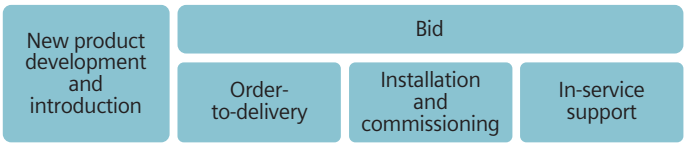
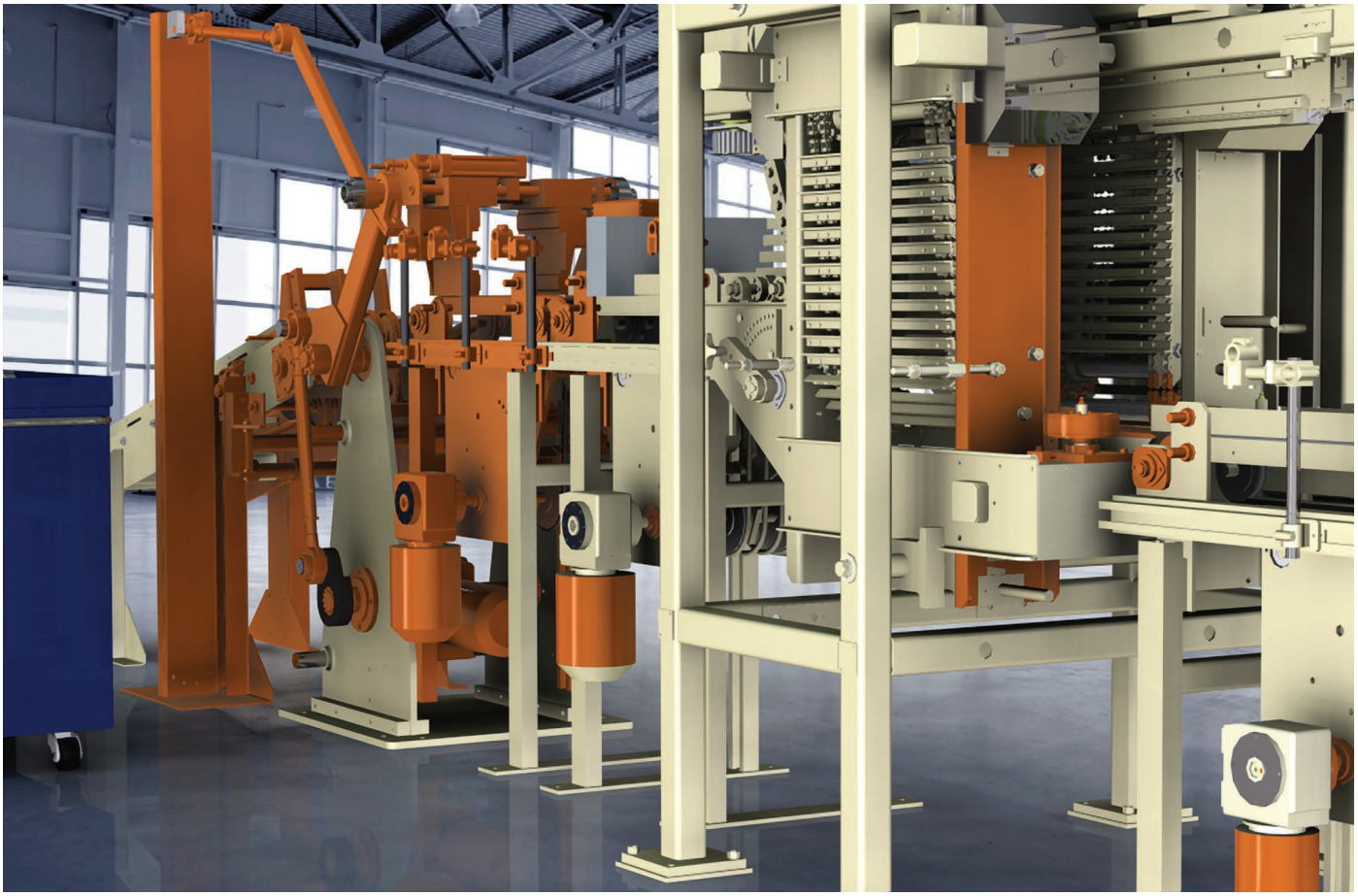


Figure 2.

"By giving suppliers web-based access to selected areas of our Siemens PLM data, we enable them to keep up-to-date with project progress so they can respond quickly and accurately when required."

Walter van Leeuwen
Assembléon Netherlands



The bid process

Quick and accurate proposal delivery is vital. But speed must not introduce errors. Bids must define high-quality machinery that will be made on time and within budget.

In engineer-to-order (ETO) environments that are typical of businesses making large and high-cost machines, the bid process is often a lengthy, complex interaction with the customer. The machinery manufacturer must respond to extensive yet potentially incomplete requirements, specifications and statements of service levels. Sometimes collaboration with both customer and supplier engineering teams is needed to discuss, develop and agree on configurations and design solutions. In parallel, the procurement customer may issue documents such as a request for information (RFI), followed by one or more request for proposal (RFP), each focusing on an independent element of the project. Each response must be correct and consistent with other responses. Ultimately, a request for quotation (RFQ) or invitation to tender (ITT) requires all technical, timescale and commercial conditions to be brought together in a form suitable for a contract.

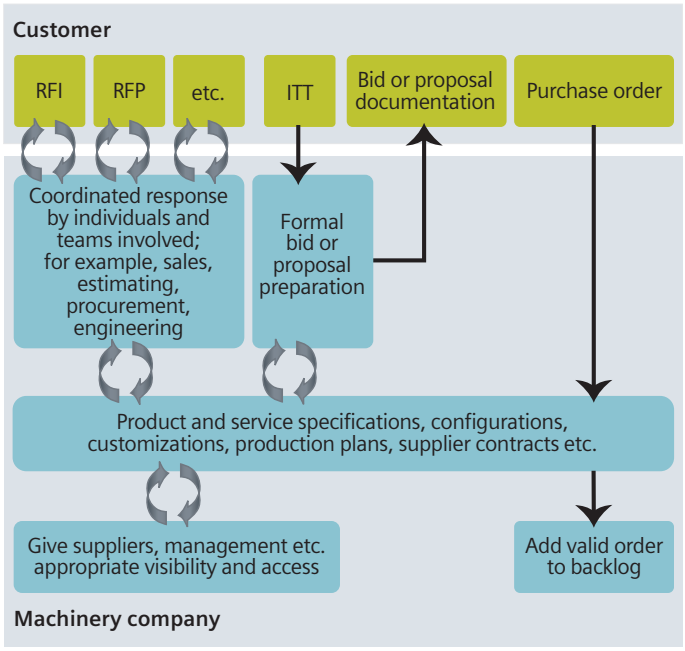
In configure-to-order (CTO) and assemble-to-order (ATO) businesses, the bid process can be very quick. Indeed, a key differentiator for the machinery manufacturer can be the speed with which it is possible to create a complete, consistent technical specification, delivery date and price.

Of course, high-volume equipment manufacturers with make-to-stock (MTS) manufacturing may share characteristics with low-volume, high-value machinery companies.

This is because many volume manufacturers win business through a small number of large contracts. In many ways, the bid process for one of these contracts, which may cover hundreds or thousands of equipment units, is similar to the bid process for a single high-cost piece of machinery.

Marketing and sales interactions with customers and prospects lead to formal proposals to supply machinery and associated services to the customer. PLM can help ensure consistent information is given to the customer during the sales engagement. At the same time, PLM gives internal teams easy, managed access to consistent, up-to-date information.

The bid process



In addition to enhancing bid speed and efficiency with product-information handling, using PLM can transform the relationship with the customer during the sales phase. The use of 3D visualization and dynamic simulation of machine operation and performance can be an important differentiator. However, more and more machinery investment decision makers come from the generation that has grown up with 3D graphics. For this group, providing 3D visualization, simulation and performance analysis is an increasingly expected part of the purchasing decision process.

Bidding is not always structured around investment in a new machine. Many bids are related to upgrades of existing machines. In these situations, PLM's capability to link as-maintained updates to as-installed specifications provides the required information base for evaluation and planning of an upgrade project.

The target outcome of the bid process is to receive a customer order at a profitable price with an achievable delivery date. By using PLM to drive creation of configuration rules used in sales order processing, machinery companies can eliminate the need for engineering to check every order. By using PLM to define modular structures for both product and manufacturing processes, machinery companies can offer more bid flexibility and in parallel increase re-use of tried and tested parts and processes.

PLM in the bid process

PLM addresses the bid process needs of ETO companies by combining productivity improvements with better data management. This helps an engineering group interact and collaborate with the customer and suppliers, agreeing on technical requirements. The procurement group defines supplier contracts based on accurate product information, and the sales team can generate accurate bid documentation. For ATO companies, the value of PLM comes from its capability to provide correct material and component information for any machine configuration. This enables sales, procurement and production to base costs, delivery estimates and plans on accurate, shared information. For an MTS company, using PLM capability to aggregate product information across a contract provides a better basis for cost estimates, and keeps sales, procurement, production and distribution teams up-to-date, increasing the probability they will generate profitable responses to changing customer requirements.

The order-to-delivery process

Effective planning and execution of the order-to-delivery process is critical to profitability. For machinery companies, this has traditionally been a scheduling problem because manufacturing process plans are predefined for each product. The scheduling process must combine the predefined manufacturing process plans for all items to be made into an aggregated plan that optimizes the assignment of materials, component parts and production resources to the dynamically changing backlog of orders.

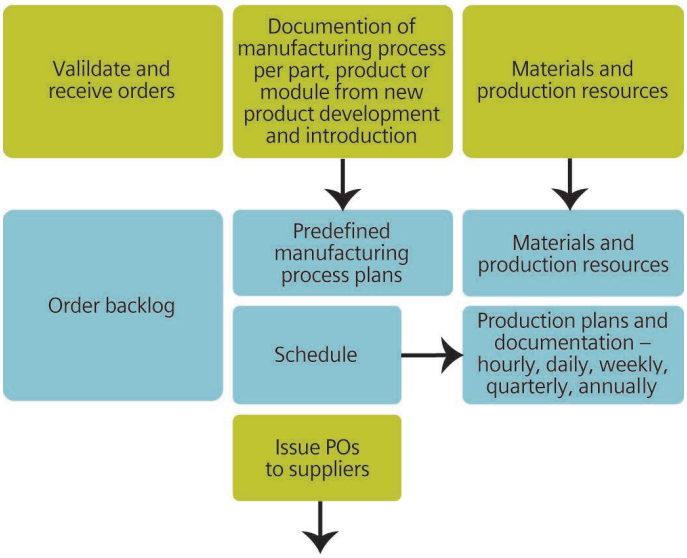
PLM has always been used to play a major role in developing predefined manufacturing process plans. Selecting, designing, specifying and documenting tooling and sequences of manufacturing operations along with planning for the movement of parts around the factory can be a task that is similar in magnitude to product design. This role for PLM is growing because every production technology is becoming more integrated. This means fewer issues can be resolved on the shop floor as engineers must foresee all possibilities and provide correct, well-structured manufacturing documentation and instructions for increasingly customized products. There is also cost and time pressure to reduce the number of prototyping cycles and devote production capacity to customer orders rather than spend time proving out complex manufacturing operations.

The result is transition of production process development from the workshop to the desktop. This involves accurate simulation of manufacturing processes. The simulation models enable manufacturing engineers not only to design and develop manufacturing processes, but also to support production operations. This aspect of digital manufacturing gives management teams more flexibility in planning distributed operations.

Companies are increasingly offering flexible configurations of complex machines based on common platforms and modular options. The result is a very large number of configurations that a customer may order. This makes it very difficult to create manufacturing process plans that can be used to foresee every combination. Some machinery companies are responding by increasing the role of PLM to include assembly of elements of manufacturing process plans for each customer order. By automatically generating manufacturing documentation, you save time and costs.

Order-to-delivery is the central operational activity for most machinery companies. Creation and maintenance of the optimum production schedule is key to cost control, efficiency and on-time deliveries. Manufacturing strategies such as just-in-time and lean manufacturing help define what the optimum should be in order to achieve best business results. PLM helps machinery companies create the most effective manufacturing process plans and respond quickly to changes in the order backlog.

Order-to-delivery



"We generate a manufacturing documentation package for each machine we build. This used to be quite time consuming. Now, using Siemens Digital Industries Software, we have automated most of this process."

Walter van Leeuwen
Assembléon Netherlands

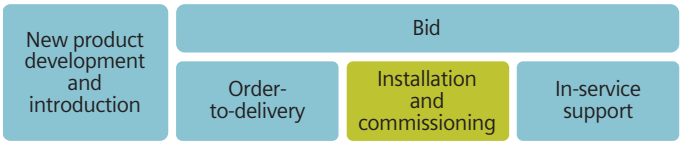
The installation and commissioning process

For machinery companies making large, complex and customized machines, installation and commissioning is a substantial activity with high visibility. Above a certain size and weight, it is not practical to move a complete machine; it has to be disassembled into manageable subassemblies and reassembled at the customer site. Complex machines of any size need calibration and adjustment. Customized machines may need to be integrated with other machines and the local environment of building structures, electricity supplies and data connections. Setup services sold with standard items of equipment can include unpacking, installation, initial test, operator familiarization and training.

For some machinery companies, installation and commissioning extends to include not only in-depth training, but also initialization of customer operational activities; for example, asset management and maintenance. This can involve loading identification and status data into the customer's IT systems. In most cases, installation and commissioning is considered the final step in the manufacturing process; the customer cannot use, and may not pay for the products until this step is successfully completed.

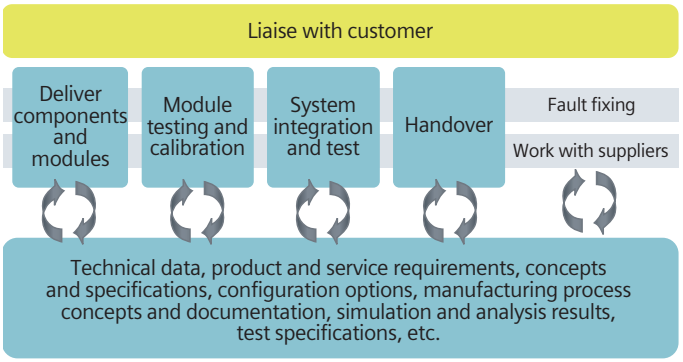
PLM enables you to maintain multiple integrated product structures (for example, as designed, as built) as the starting point. Part identifiers provide easy entry points to these structures (for example, to find information such as revision history, assembly instructions, adjustment procedures or acceptance conditions for an identified part), but sometimes PLM's search capabilities are more useful (for example, an instructor planning maintenance training for hydraulics specialists may need to find all assemblies with hydraulic connectors). Changes, test results and calibration data can be recorded at a component, subassembly and machine level during the installation and commissioning process.

A PLM system can also be used to help coordinate multiple suppliers or specialists. For example, some machines use bought-in subassemblies or controllers that must be set up by the supplier's engineers. Using PLM can help record the configuration and environment of these bought-in modules, and thus maximize the chance that the supplier's people arrive with the right tools to complete the job. To resolve problems, PLM can be used to support immediate collaboration by ensuring everyone involved in a conference works with the same information. Any actions and decisions can be fed into the PLM system for structured handling.



In an example such as a production line, detailed analysis including a site survey is completed during the bid phase, and a prime contractor may coordinate several suppliers. In contrast, for standalone machinery and equipment, delivery by a third party may be sufficient, especially when the product is capable of self-test. PLM provides a consistent view of technical and non-technical information required by installation and commissioning engineers.

Installation and commissioning



Deployment of PLM for installation and commissioning purposes must be sensitive to the customer's requirements. For example, in electronics manufacturing, restricted access to production areas is not unusual; the commercial value of any information about the production process is too great to risk. In extreme cases, the customer will perform all their own installations. More likely, voice and data connections will not be allowed from the vicinity of the production machines. This may require that PLM be used to manage replicated copies of information (on engineers' personal notebook computers), and synchronize updates and additions when the engineer is connected to the machinery manufacturer's network.

The in-service support process

Service functions usually involve direct contact with customers and always have a direct impact on the relationship, so good service is an important contributor to customer satisfaction. In addition to this, service can be a significant revenue stream and a critical source of profit. Product designers need feedback from service engineers to help solve problems and drive development of the next generation of machinery.

To become more customer friendly, many businesses offer extended support services either alongside or bundled with machinery and equipment products. These services may be designed, promoted and sold by the manufacturer, but it is not uncommon for local distributors to deliver the services. In some cases, customers want to use in-house people for service, in which case they need training, spare parts, tools and documentation.

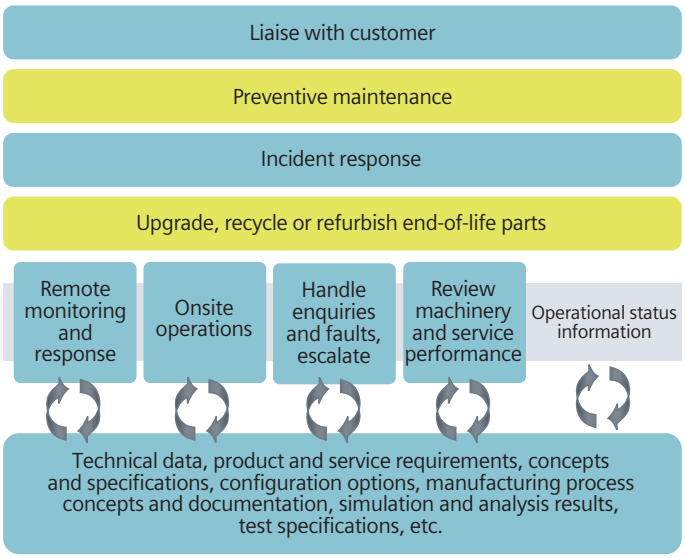
"We are developing new ways for our service department to visualize our machines. We are feeding the production BOM back into PLM to create an as-built model. Service engineers will be confident they are working with a model of the actual machine we built for the customer."

Thomas Vögtle
Machine Factory Berthold Hermle AG

Services range from providing traditional preventive maintenance, spare parts, repairs and upgrades to outsourced operations. Some manufacturers offer pricing based on actual equipment usage, so it becomes essential to deliver high reliability and rapid service response to solve any problem since the customer pays per hour of uptime or per kilogram of output. The possibility of remote access is an important new dimension of service delivery. For example, machines can present their status outputs and control inputs via a web-page; this allows an engineer on the other side of the world to login, and then diagnose faults and tune performance.

Remote access to machinery and equipment has transformed the way service is delivered. Intelligence in machine control systems may detect a problem and raise the alarm at a remote service center. If a remote fix is not possible, then the first time the customer has any knowledge of the problem is when the service engineer arrives with the tools and parts needed to correct the problem. PLM keeps field-service teams up-to-date with the product-related information they need.

In-service support

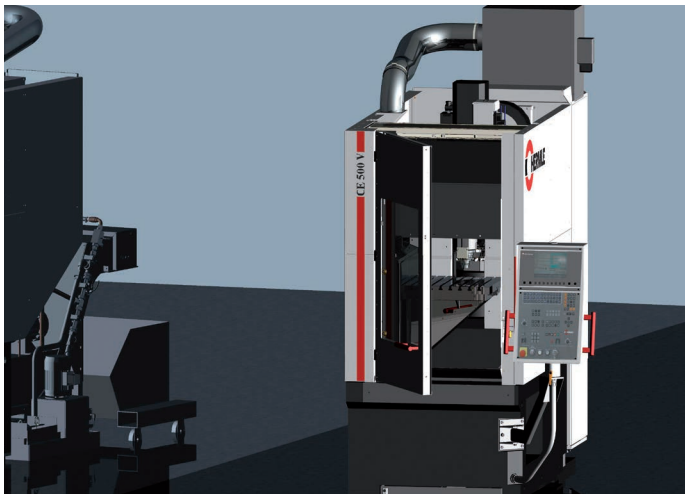


PLM helps service engineers store and retrieve the information they need. In many cases, this is structured information, such as parts lists, maintenance procedures and control software updates. But PLM can also be used to integrate

unstructured information; for example, the image of a faxed fault report. Using these capabilities to build up a full as-maintained history can create insight into the root causes of problems, result in optimum operating conditions and provide the information needed to raise an engineering change request.

There are some environments that are prohibitively expensive for integrating maintenance records, which are needed for regulatory compliance, with as-installed information. So there may be no up-to-date information specifying the current state of, for example, equipment in a chemical processing plant. In this case, PLM support for flexible search and linked information gives service engineers a starting point for creating documentation that defines the machinery and equipment they must adjust or repair.

Workflow and data access control capabilities make PLM a potential foundation for operational solutions ranging from asset management to shift changeover incident notifications and reporting protocols.



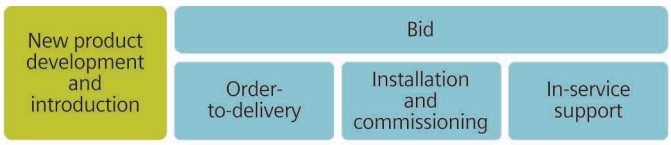
"We have used Siemens Digital Industries Software to automate significant parts of product design and production preparation, which has increased our throughput with reliable consistency and quality. Now our engineers can concentrate on the areas that need human ingenuity."

Jan Axelsson
AB Sandvik Coromant

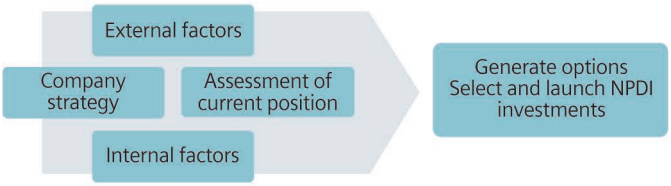
The new product development and introduction process

For machinery companies, new product development and introduction (NPDI) delivers the innovation and differentiation needed for business success. New products and services win market share and provide a basis for future revenue streams. Innovative NPDI must be achieved in an environment that includes more product complexity, reduced time-to-market, shorter product lifecycles and intricate partnering arrangements.

NPDI includes research, development, detailed design and analysis of products and manufacturing processes. These were the functions that drove development of the computer-aided technologies that have been improving productivity, accuracy and part re-use for 40 years. Simulation and analysis capabilities increasingly ensure that new designs and variants can be validated and optimized as part of the design process. In fact, entire prototype cycles can be eliminated. This helps increase the number of variants that can be built on one product platform.

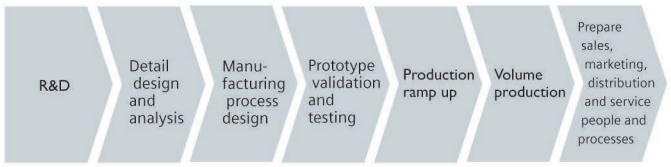


NPDI – strategy

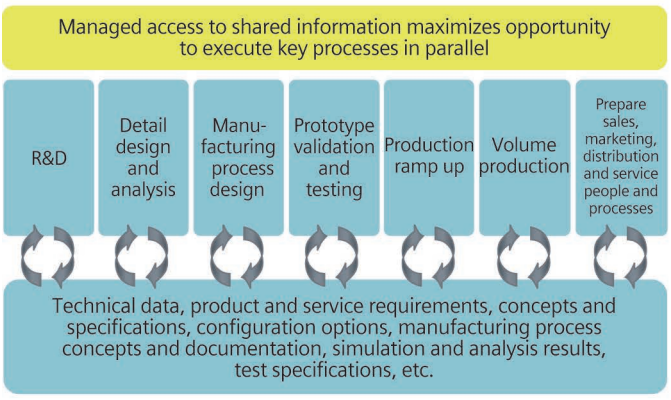


Traditional NPDI – from concept to production

It is easy but wrong to think of NPDI as a sequential series of steps. However, one of the key benefits of PLM in NPDI is the capability to achieve time compression by not only reducing cycle times within each step but also enabling parallel execution of steps.



NPDI with PLM – more collaboration, better innovation, fewer mistakes, more right first time



"For us, it is very important to reduce the lead time between design approval and start of production. By using Siemens Digital Industries Software solutions, we see new possibilities to support this objective, for example, in collaboration between the design team and our global production locations; in simulation to allow specialists to plan and support global production; and to achieve more re-use of parts and processes."

Carl-Olof Wiebensjö
AB Sandvik Coromant

These individual and local group benefits are important to machinery manufacturers. However, further improvements in NPDI will come not only from the capability to develop new ideas, concepts and designs, but also by doing this in a way that facilitates information sharing and collaboration. By integrating design and data management capabilities, PLM encourages and facilitates teamwork and collaboration between the people who put the innovation into NPDI. For machinery companies, this means more modularization, better analysis of the effectiveness of product platforms, multiple development options, more re-use of parts and processes, easier introduction of new materials and technologies; all in parallel with better handling of customer and market requirements.

An important element of successful PLM deployment is use of 3D product representations. Unlike engineering drawings, which can easily be misinterpreted by untrained people, 3D representations can be rendered into pictures and animations that everyone understands. By using 3D representations, work done by design and manufacturing process engineers can deliver value to many other areas of a company; for example, to help identify products, create illustrations for training materials and support sales interactions with customers.

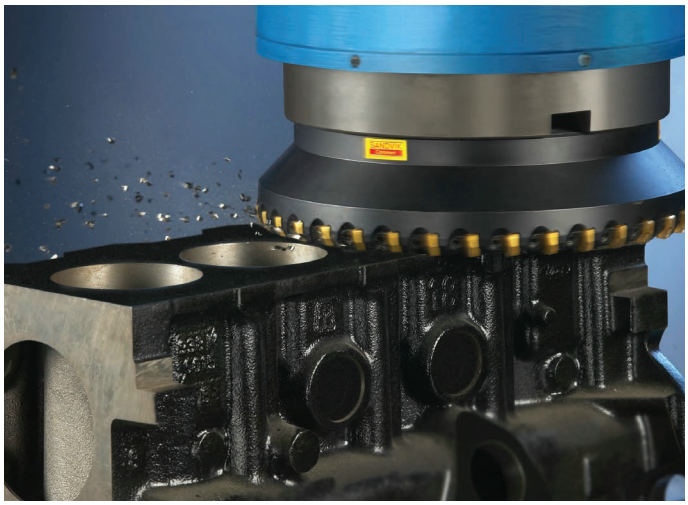
By integrating design and data management environments, working with external suppliers is simplified. For example, product development procedures, such as formal review, system engineering as well as project management methodologies, are easier to implement and less costly to run if suppliers have direct access to appropriate project and product information.

These procedures tend to require more people to look at models and related information. It helps to link unstructured information – for example, meeting minutes and email confirmation of decisions – to the product or project database. Then by giving suppliers and others managed access to the appropriate areas of the database, they can participate as members of the integrated multidisciplinary product or project team. Of course, it is necessary to provide data management capabilities that restrict access to just the relevant and authorized data areas to protect intellectual property.

As organizations implement this type of access, people in downstream functions such as sales, marketing and manufacturing increasingly demand visibility into what is coming along. This helps them be prepared to start their work at the earliest opportunity independent of any initiative to increase the parallel execution of tasks.

For many machinery companies, the change management processes in NPDI are critical to efficiency and successful partnering. There are conflicting motives here. On one side, reducing and eventually eliminating engineering change orders (ECOs) is an objective, starting with changes that occur after design freeze. However, until that objective is achieved, it is essential to be able to flexibly and efficiently handle changes. That is because machinery tends to be made with a high proportion of parts that are relatively easy to design and manufacture. Also, the impact of regulations tends to affect the entire product rather than individual part characteristics. Of course, there are some difficult parts as well. Using PLM offers configurable change management processes that can be set up to be quick and easy, enabling you to rapidly create, select or change the majority of machine parts.

From requirements management, initial concept and layout to detailed design, analysis and manufacturing process optimization, PLM offers visibility into and control of product and process information. The result is NPDI that is agile, flexible, innovative and fast, helping engineers focus on value-adding activities with better communication, fewer surprises and more decisions that are right first time.



Knowledge capture and design automation

Know-how takes many different forms. For example, does every designer know the consequences of putting a particular tolerance figure on some aspect of a part? The chosen tolerance can have a big impact on the manufacturing process, cycle time, inspection procedure and cost. In a design-for-manufacturing initiative, it is vital to close the loop, and make sure this feedback reaches the design engineer.

Observation of routine tasks and situations can help designers and engineers formulate rules and automate selected steps. In the example above, PLM could help a manufacturing group prepare feedback to be presented to a designer automatically when certain tolerances or combinations of tolerance are detected.

For subassemblies, it is possible to capture rules in the form of procedures and parameterizations that generate detailed designs from a few higher level parameters. This capability can extend to selection and configuration of standard parts, tools, clamps and fixtures as well as generation of programs for numerically controlled (NC) production machines.

These aspects of automation can deliver substantial business benefits, especially by reducing lead times.

Helping machinery manufacturers realize innovation

Transform your digital enterprise and realize innovation

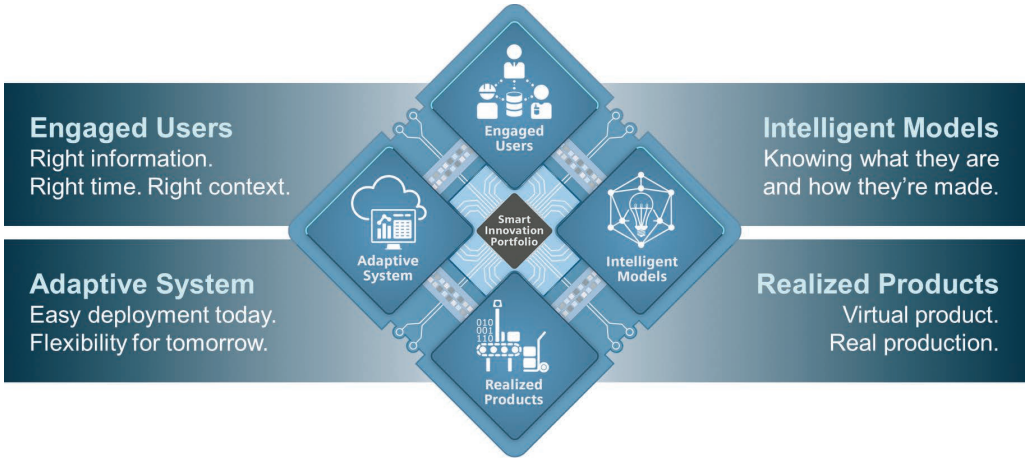
In a world of smart, connected products in which entire markets can vanish with a single innovation, manufacturers must take a new approach to business. Some closely watch how products are being used, and feed data back from product utilization into product ideation and development in order to anticipate trends. But even if you know what to make, you still have to make it.

That's why manufacturing, the realization phase of innovation, is vital in this new era. Manufacturers must weave a digital thread through ideation, realization and utilization. It's not enough to digitize. That just mimics processes digitally for incremental improvement. You have to digitalize. Digitalization makes the digital thread of knowledge a proactive agent in driving your business. With a fully optimized digital enterprise, you are better equipped to initiate or respond to disruptive innovation.

To help you activate digitalization, we're building a Smart Innovation Portfolio that delivers:

- Engaged users who receive the right information at the right time by transforming information so that only what's relevant is delivered in a context suited to each person's role
- Intelligent models that evolve throughout the process with the information necessary to optimize how they are built and perform
- Realized products that achieve business goals through the integration of virtual product definition and real production execution
- An adaptive system that helps you efficiently deploy solutions today while maintaining future flexibility

Siemens AG, our parent company, shares our mission of helping customers thrive in the era of smart innovation. The company's digital enterprise software suite extends digitalization from development and operations through production, and when used in conjunction with the Smart Innovation Portfolio, can help you realize your goals.



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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 or follow us on LinkedIn, Twitter, Facebook and Instagram. Siemens Digital Industries Software – Where today meets tomorrow.

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