SIEMENS
Ingenuity for life

Realize your digital transformation now

The Digital Enterprise Suite for Product Manufacturers

siemens.com/digital-enterprise-suite

Embrace the benefits of digital transformation

Digitalization is already changing all areas of life and existing business models. It is enabling the manufacturing industry to implement its product ideas by taking advantage of technology trends such as generative design and intelligent models. Production has become more innovative through additive manufacturing and advanced robotics, and new service models are being developed with the use of cloud solutions and knowledge automation.

Make the most of your journey toward digitalization and Industrie 4.0 today to ensure your competitive edge, with scalable solutions from Siemens. Now is the right time to begin: Become a digital enterprise and stay ahead of your competition.

Manufacturing companies are facing tremendous challenges

Reduce time to market

Manufacturing companies want to get their products to market faster – and at the same time master the increasing complexity of their products and production methods.

Boost flexibility

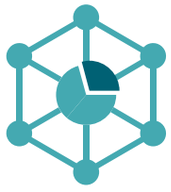
The increasing trend toward individualized products demands precise and flexible manufacturing methods.

Improve quality

Quality is essential if you want satisfied customers – and digitalization lets you begin manufacturing at top quality right away.

Boost efficiency

In today's world, not only does the product have to be sustainable and environmentally friendly; energy-efficient production has become an increasingly important competitive advantage.



Develop new business models

Many products and production facilities generate data, and having the capacity to record and evaluate it means you can develop new, data-based business models.

Increase security

Multi-level security measures to counter cyber-attacks are necessary to protect a company's intellectual property, both now and into the future.

In the fast lane with digitalization

30 %
shorter development time

Time to market of
16
months instead of 30

3 times
more cars produced

Maintaining high quality standards while significantly reducing the time to market sounds like the dream of all automotive manufacturers – but it has already been achieved by Maserati with its Ghibli sports car.

Digitalization and comprehensive, integrated manufacturing solutions from Siemens enabled Maserati to shorten development time by an impressive 30 percent and reduce Ghibli's time to market from 30 to just 16 months.

The production facility was equipped with Siemens software and automation solutions that were a perfect match throughout the entire value chain, from product design to services.

"NX and Teamcenter allow us to perform analyses which until recently could only be carried out physically, through the creation of prototypes."

Luca Soriato, Product Development,
Vehicle Integration and Validation, Maserati S.p.A.

More information

Digital twin guarantees success

30 %

shorter engineering time

Increased flexibility

Consistent, end-to-end digitalization thanks to the digital twin

Companies that build machines for the pharmaceutical industry must meet the highest demands for security, reliability, and quality. Bausch + Ströbel relies on consistent, end-to-end digitalization to deliver highly specialized systems and to meet the growing demand for standardized machines with high flexibility and short delivery times.

The German machine builder uses digital twins of its machines and has started basing development on a mechatronic concept. The individual development teams at Bausch + Ströbel have now been restructured as interdisciplinary units that work jointly and simultaneously on the same project.

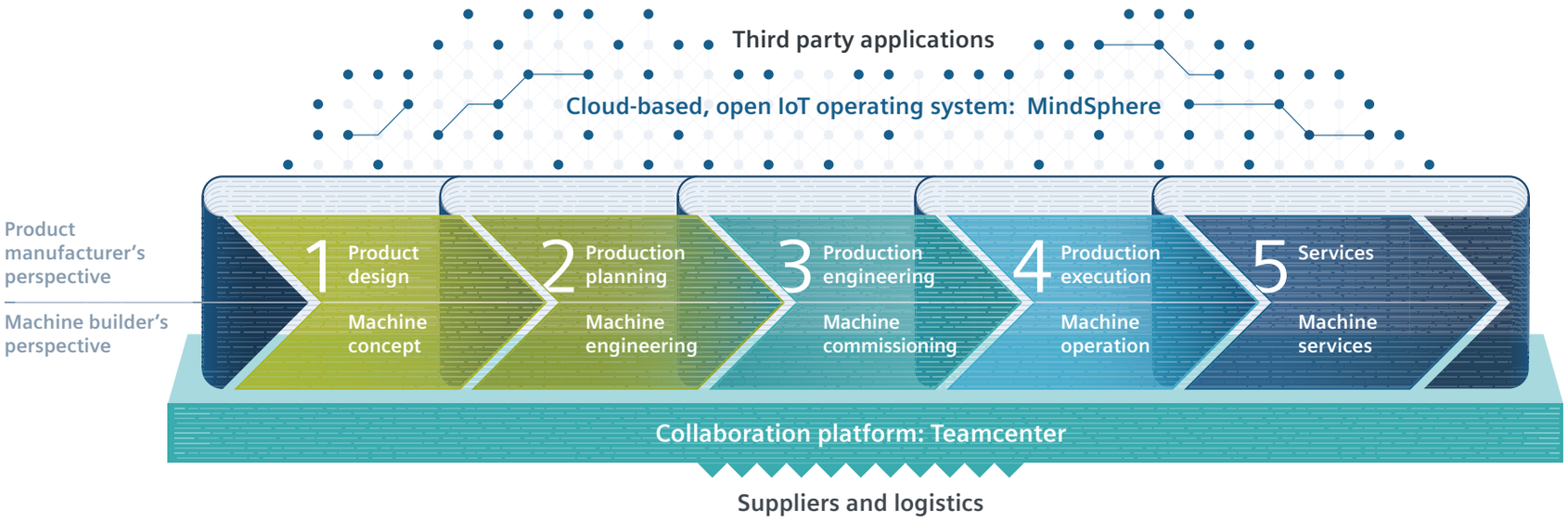
All findings from the simulations and tests using the digital twins of machines are returned to the data pool, which is managed with Teamcenter. This enables virtual commissioning during which flaws can be reliably detected and corrected. Findings and data acquired during operation by the customer are fed back to Bausch + Ströbel so the company has a current, virtual copy of each machine on hand at all times. This is ideal for providing customer service and is a true competitive advantage. A further benefit is the engineering time saved with the TIA Portal: the company expects an increase in efficiency of at least 30 percent by 2020.

More information ↗

“We’ve done digitalization right when the customer comes to us wanting a piece of equipment, and we can configure the unit with the customer within two days at our offices.”

Dr. Hagen Gehringer,
Managing Director of Bausch + Ströbel

A holistic approach



Staying ahead of the competition is no longer just a matter of optimizing individual steps in the value chain. It calls for a holistic approach, and Siemens has developed the ideal portfolio to meet this requirement: The Digital Enterprise Suite consistently and digitally links all phases and process steps, all the way to the suppliers. In each phase, a digital twin is created that feeds back new findings from simulations and tests, which can then be used for continuous optimization. This allows enterprises to begin at any point in their value chain, from product design to service, and extend digitalization gradually in line with their current needs – including existing system solutions.

For product manufacturers and machine builders

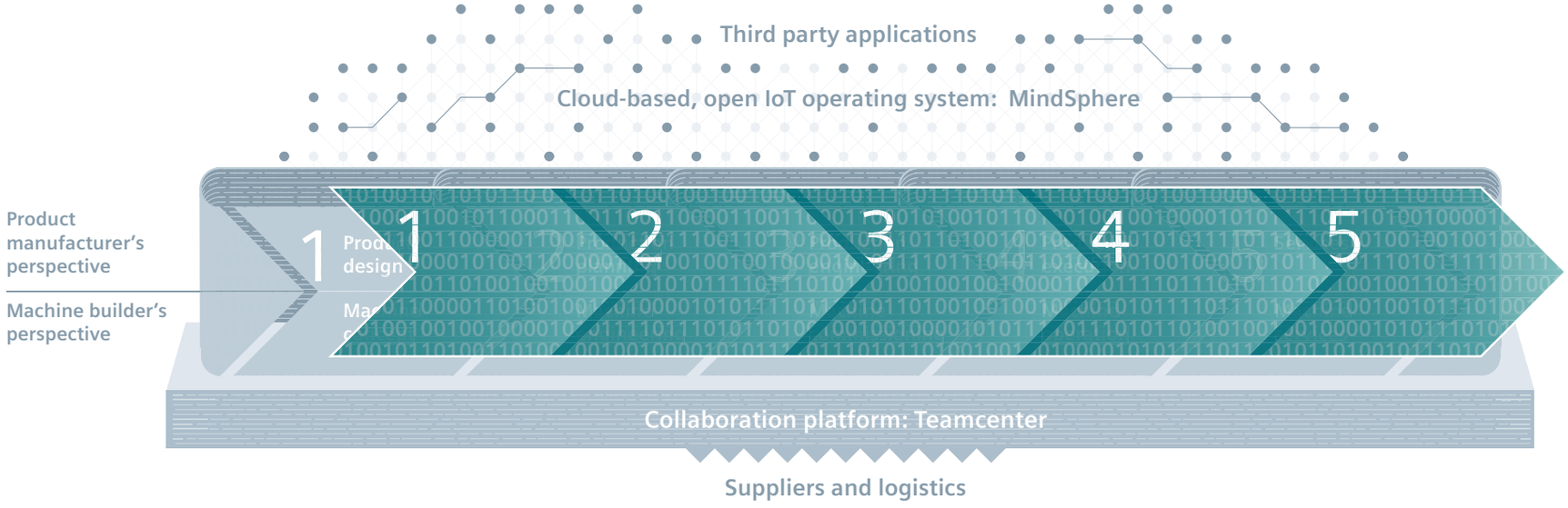
This is our holistic approach throughout the entire value chain, tailored to two target groups that face different challenges: firstly, product manufacturers, whom we support from product design, production planning, engineering, and the production itself through services.

And secondly, machine builders, who benefit from our portfolio during the machine design, engineering, commissioning and operation, as well as from our offering of machine services. Teamcenter guarantees the planning of more efficient, flexible production processes based on a shared collaboration platform and an enterprise-wide data backbone.

MindSphere, the cloud-based, open IoT operating system

MindSphere makes it possible to analyze the performance of manufacturing plants and products and report back all findings to the entire value chain for continuous optimization.

MindSphere collects data from the real world, adding a statistical data model to the analytical model of the digital twin. Comparison of both models can be used for continuous improvements.



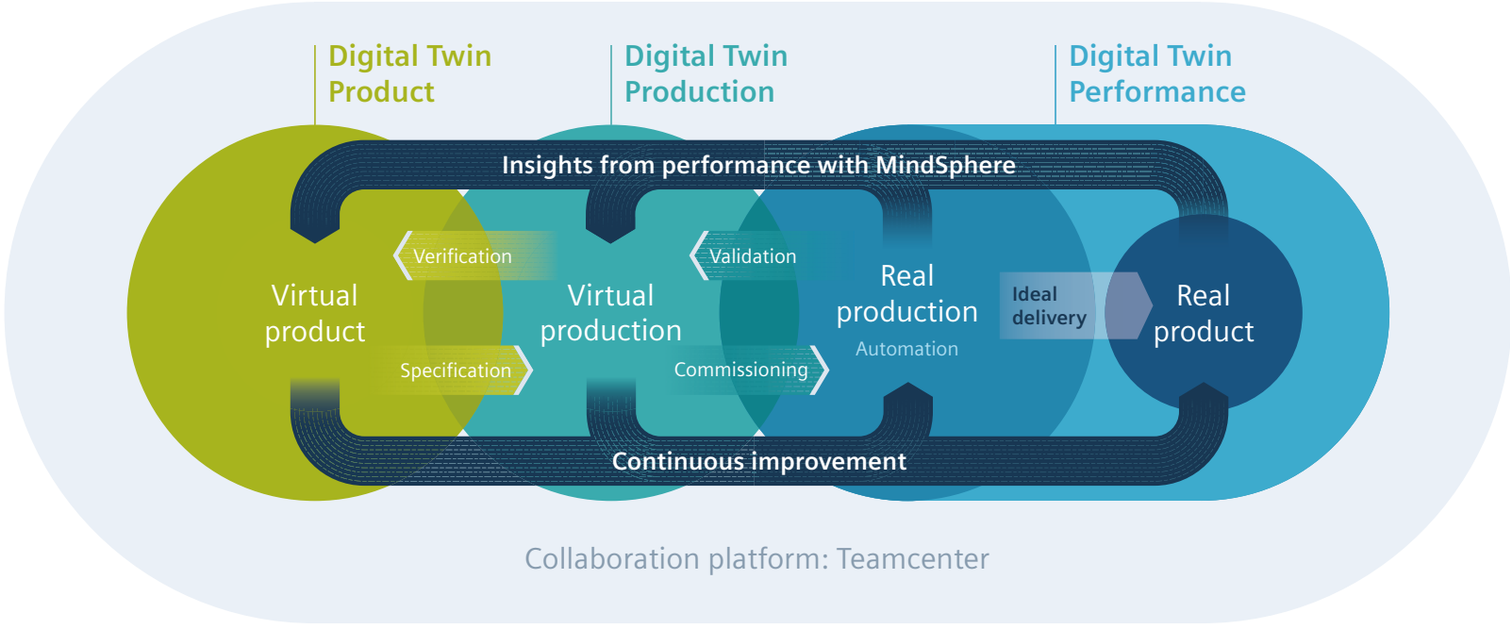
The result of consistent, end-to-end integration and digitalization is a perfect digital copy of the value chain – the digital twin – which enables enterprises to simulate, test, and optimize products and production in a totally virtual world.

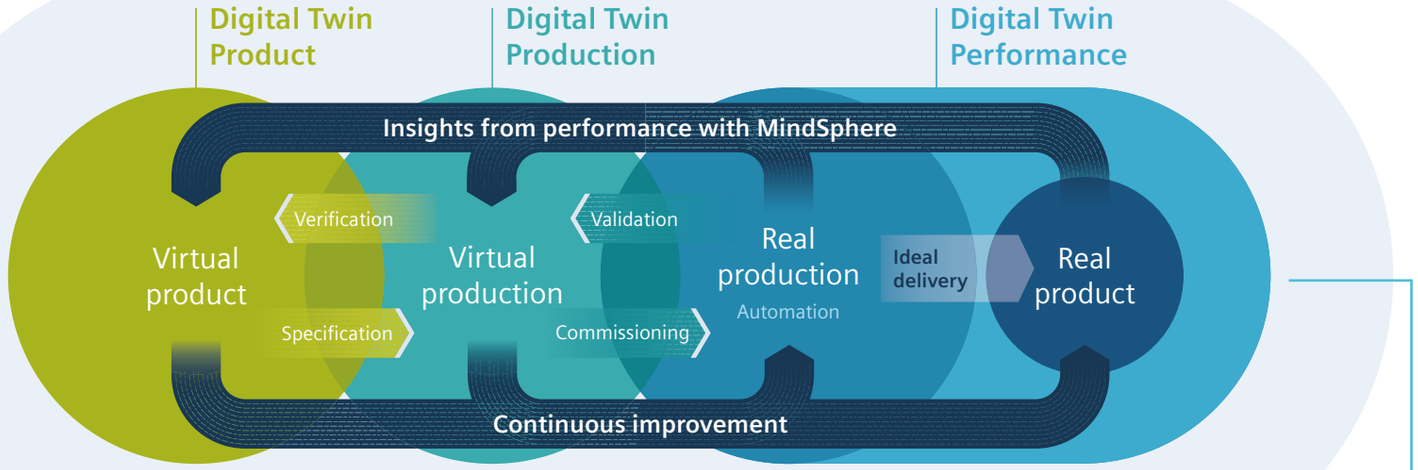
The end-to-end digital twin in detail

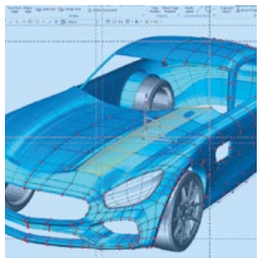
The digital twin is the precise virtual model of a product or a production plant. It displays their development throughout the entire lifecycle and allows operators to predict behavior, optimizing performance, and implement insights from previous design and production experiences.

Our comprehensive concept of the digital twin consists of three forms: the digital twin of the product, the digital twin of production, and the digital twin of the performance of both product and production. Thanks to our comprehensive domain expertise and optimized tools, Siemens is the only company that offers this holistic approach.

There is tremendous value gained from performing “what if” scenarios and predicting future performance with the digital twin. The ultimate goal of the digital twin is in the closed-loop connection between the virtual world of product development and production planning with the physical world of production system and product performance. Through this connection actionable insight is gained from the physical world for informed decisions throughout the lifecycle of products and production operations.

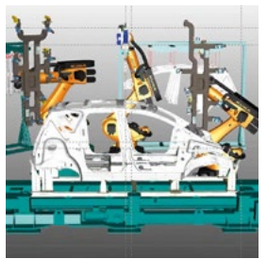






Digital Twin Product

The product digital twin comprises the product design as well as virtual, system-oriented product development. This enables complex products to be designed, simulated, and validated, multi-physic simulation, electronic design automation and software management – across domains with no need for physical prototypes.



Digital Twin Production

The digital planning, simulation, and optimization of the production with automatic generation of the PLC code creates the production digital twin. The co-simulation of mechatronics and automation results in a holistic simulation model that serves as the foundation for virtual commissioning.

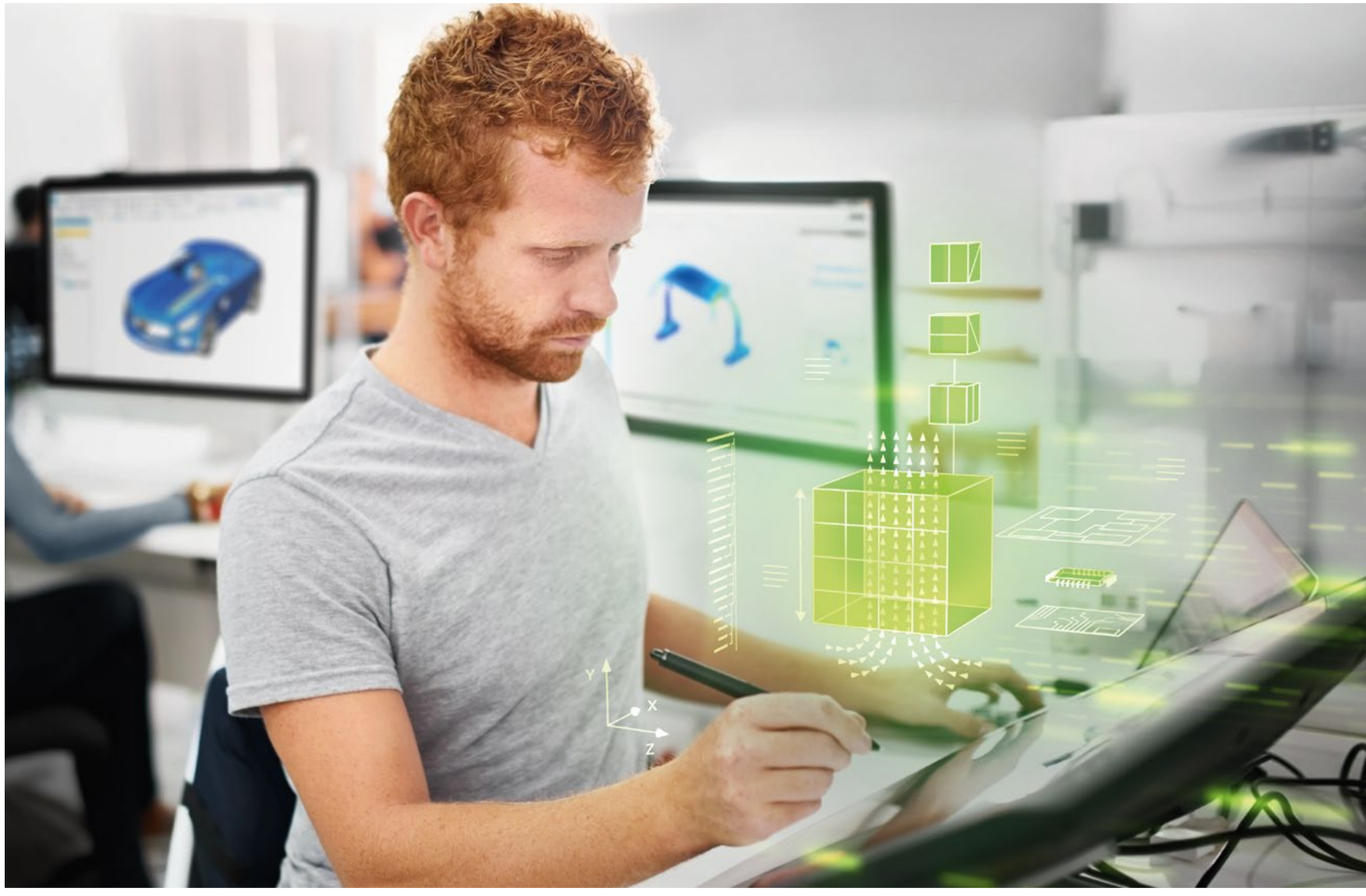
Digital Twin Performance

In the real world, the digital twin of the performance is constantly fed with data from the product and the production facilities, which leads to new insights. Thanks to the connection with integrated automation components, the shop floor provides all relevant data. Feeding back all insights into the entire value chain via MindSphere – right back to product design – generates a fully closed decision-making loop for the continuous optimization of the production and product in the real world.

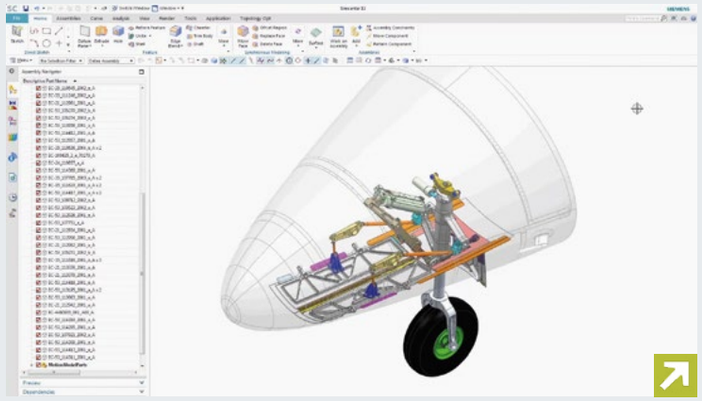
1 Product design

The virtual and system-oriented development of a new product or machine lays the groundwork for realistic simulations and tests that can deliver useful information early in the design phase. For example, physical behavior can be simulated using the product's 3D data to optimize material behavior, airflow, or heat development. Mechatronics, electronics, system-on-chip, and embedded software are also designed and simulated in the virtual environment.

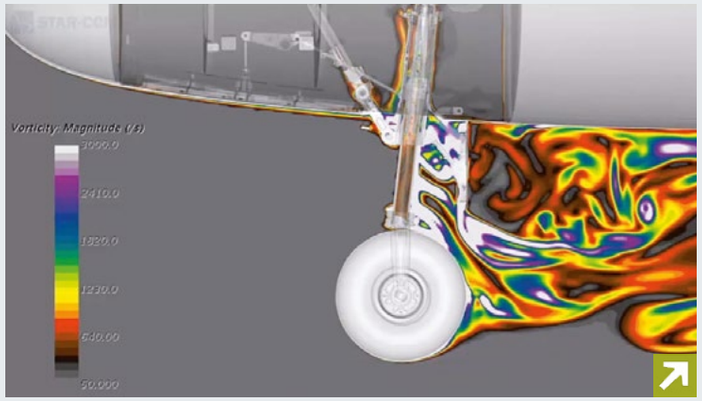
Digitalization saves time and money because the number of necessary prototypes is drastically reduced. In addition, it allows different disciplines to work on the same project simultaneously, simplifies the configuration of different product versions, and supports new production procedures like additive manufacturing.



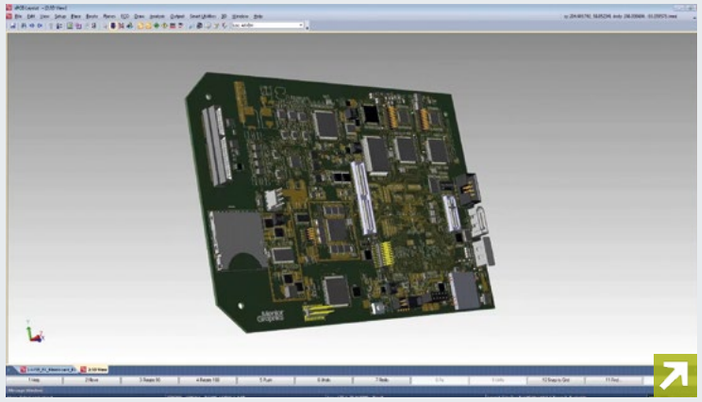
Portfolio highlights (extract)



NX CAD/CAM:
Design, simulate, and perfect products in the virtual world



Simcenter:
Simulate the product's physical behavior



Mentor Capital, Xpedition:
Develop integrated electrical and electronic systems

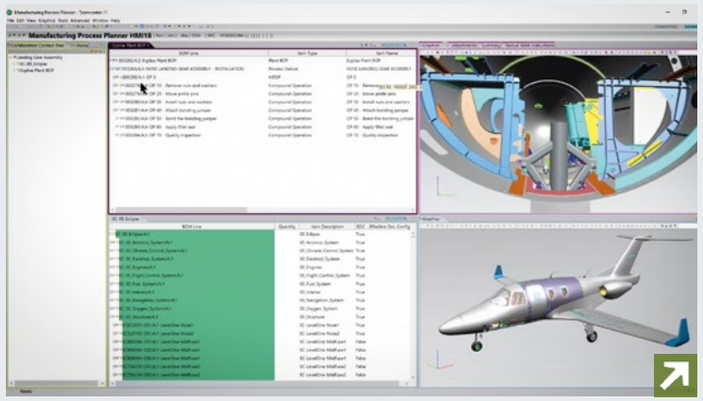
Polarion ALM:
Develop, simulate, validate, and manage embedded software

2 Production planning

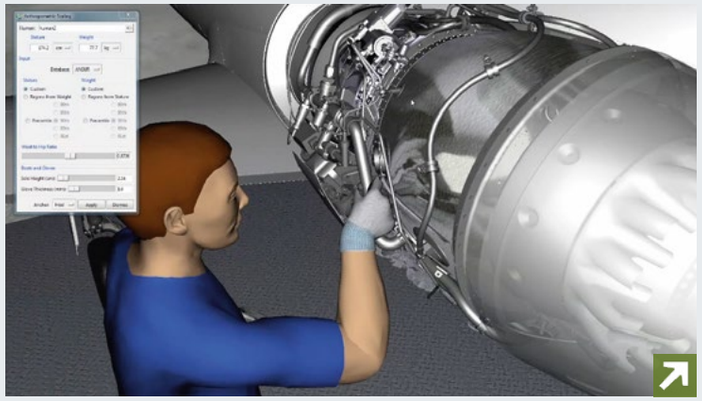
The entire production process can be planned and developed in the virtual world. Here the product data and components are linked to the available production processes, equipment, tools, and other necessary resources as well as the subsequent transfer of specifications to the suppliers. Even assembly operations can be simulated to create and optimize robot paths and ensure ergonomic workstations for people in order to reduce the risk for work related injuries.

For production planning, it is also important the flow of materials through the production facility be improved to increase throughput to promptly detect bottlenecks, and to optimize the plant's energy consumption.

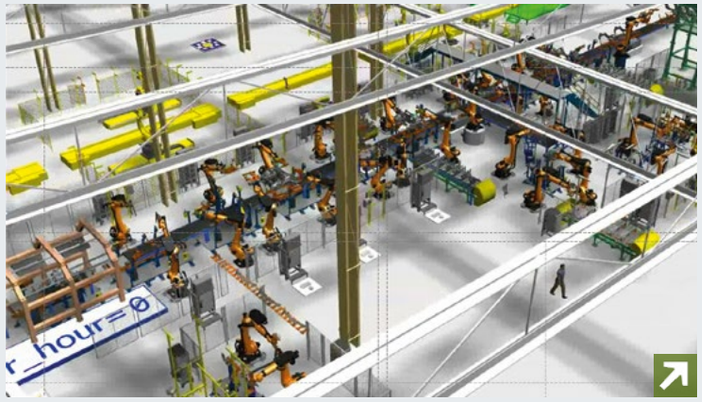
Portfolio highlights (extract)



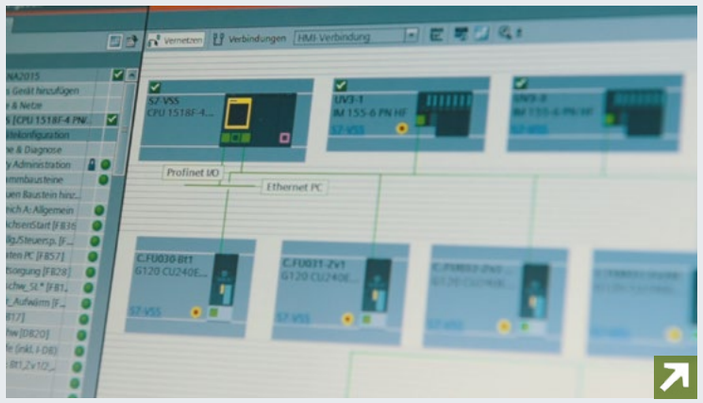
Teamcenter Manufacturing:
Plan and validate production processes



Tecnomatix Process Simulate:
Simulate workflows and offline programming of robots



Tecnomatix Plant Simulation:
Simulate and optimize production processes and material flow



TIA Portal with PLCSIM Advanced:
Simulate and validate production lines with virtual commissioning

Virtual NC Kernel (VNCK):
Enabling virtual tests in parallel with real operation using the original SINUMERIK software

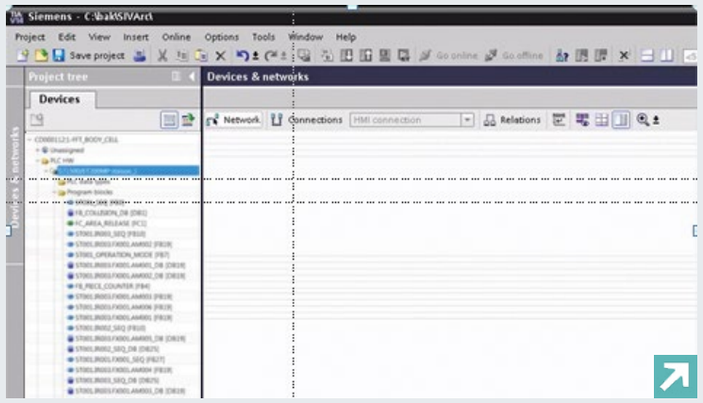
Siemens and Bentley Systems partnership:
Optimizing factory design

3 Production engineering

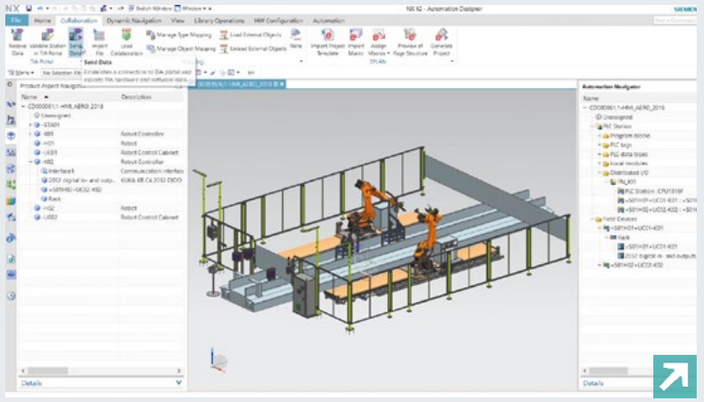
To ensure the relevant machines, production cells, and production lines interact efficiently, they are digitally modeled, simulated, and validated. Even the behavior of real controllers can be simulated.

Engineering is simple and efficient with the TIA Portal engineering framework. Once engineering has been validated, the PLC code from the digital twin is transferred directly to the TIA Portal. The overall results are then evaluated through virtual commissioning with Tecnomatix Process Simulate to eliminate flaws and optimize sequences in a timely and cost-effective manner. The PLC code is then transferred to the real machine and real commissioning begins.

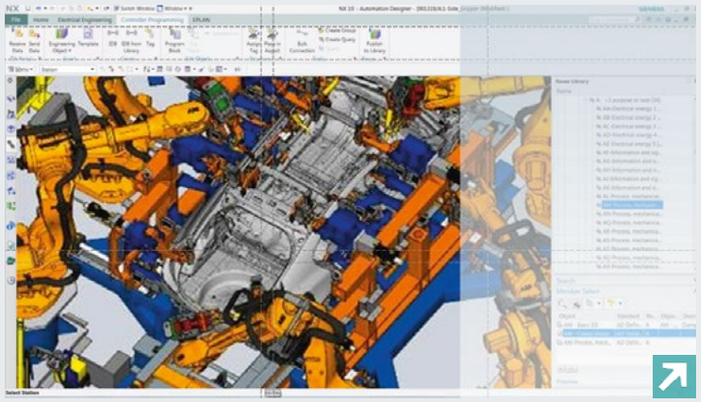
Portfolio highlights (extract)



Totally Integrated Automation Portal (TIA Portal): Fast and efficient engineering and commissioning



Automation Designer: The integrated solution for engineering electronics and automation enables automatic generation of PLC code for the TIA Portal



NX Mechatronics Concept Designer, Tecnomatix Process Simulate, PLCSIM Advanced, TIA Portal: Validate PLC code in the virtual world (Virtual Commissioning)

CNC Shopfloor Management Software: A digitalization portfolio with software applications for higher productivity in building and operating machine tools.

4 Production execution

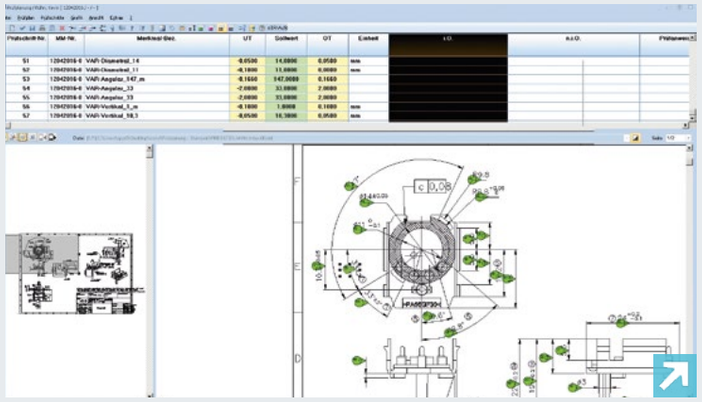
To enable smooth and optimal production, all important information is transferred digitally: The bill of process is sent to Manufacturing Operations Management system and linked to a real customer order. The optimal job sequence is planned on the basis of plant availability and possible restrictions. Automatically generated work instructions, technical and safety information, and other necessary documents are available in digital form to employees in the production facilities.

Comprehensive quality management ensures variations in quality are immediately detected so measures can be planned proactively rather than reactively. This is made possible by the networked products and solutions of Totally Integrated Automation (TIA), Industrial Communication, and Industrial Security.

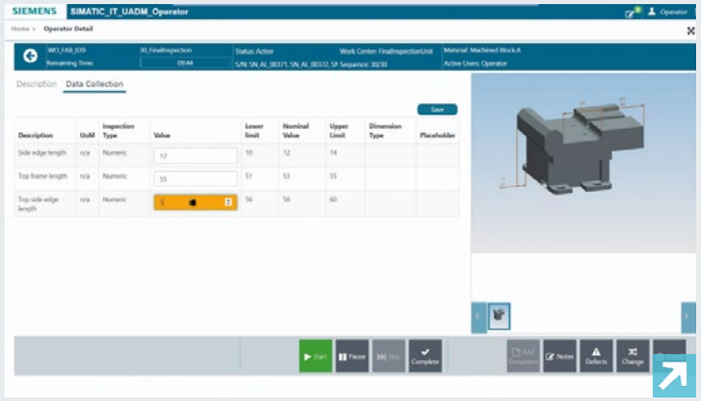
Portfolio highlights (extract)

Manufacturing Operations Management (MOM)

SIMATIC IT Preactor:
Advanced planning and order scheduling



QMS Professional:
Implementation and documentation of quality checks

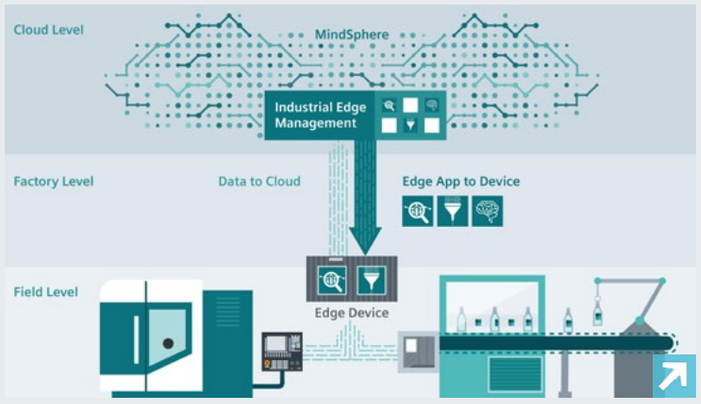


SIMATIC IT Unified Architecture/CAMSTAR Enterprise Platform:
Digital processing of work processes, target/actual comparison and analysis of performance

Totally Integrated Automation (TIA)

SIMATIC, SINUMERIK, SIMOTION, SIMOTICS, SINAMICS, and SIRIUS:
Efficient and secure production with TIA

Industrial Security:
Holistic security offering with Defense-in-Depth concept



Industrial Edge:
The Industrial Edge digitalization platform expands automation devices to include cloud functions

5 Services and MindSphere

With the beginning of production, data is generated along with the products, and this valuable data is transferred securely and collected in the cloud. This enables continued analysis of the performance of both the product and the production equipment. The evaluated data provides insights into the condition of machines, plants, and the products. As a result, maintenance of machines or plants can be aligned with actual requirements instead of fixed maintenance intervals. MindSphere, the open, cloud-based IoT operating system from Siemens, serves as the development platform for apps and digital services.

Digital Industry Services

Siemens Digital Industry Services and Industrial Security Services support their customers in their digital transformation and ensure plant security at the same time. Siemens can be involved right from the earliest stages of planning, engineering, installation, and commissioning all the way to operation and modernization. Siemens enables you to improve the overall equipment effectiveness, as well as your resource and maintenance management. We analyze Big Data and merge it with data of the physical equipment to create Smart Data. This Smart Data allows you to run your assets in the best possible way.

Portfolio highlights (extract)

MindSphere:
Platform as a Service (PaaS) functionality with connectivity elements to connect equipment, as well as apps and digital services

Corrective services:
Restore the functional state of machines and plants as quickly as possible

Digital Industry Services:
Generate new business models through the intelligent use of data

Preventive services:
Systematically prevent unscheduled down-times and expand expertise

Predictive services:
Status monitoring, predictive maintenance and services for machines and plants

Digital Enterprise Suite

Our unique integrated software and automation portfolio for transforming your operations into a digital enterprise

Become a digital enterprise today

The Digital Enterprise Suite offers an integrated portfolio of industrial software and automation that allows discrete industries to consistently integrate and digitalize the entire value chain, including suppliers.

The result is a digital enterprise ready for the challenges of Industrie 4.0 and the digital industrial revolution. Simulation, testing and optimization in a completely virtual environment reduces time to market and increases flexibility, quality, and efficiency. The capacity to feed back all insights into the entire value chain via MindSphere allows the continuous optimization of the production and the product in the real world.

Today it's both possible and necessary to become a digital enterprise. Regardless of your industry or the size of your company: You can start your digital transformation right now.

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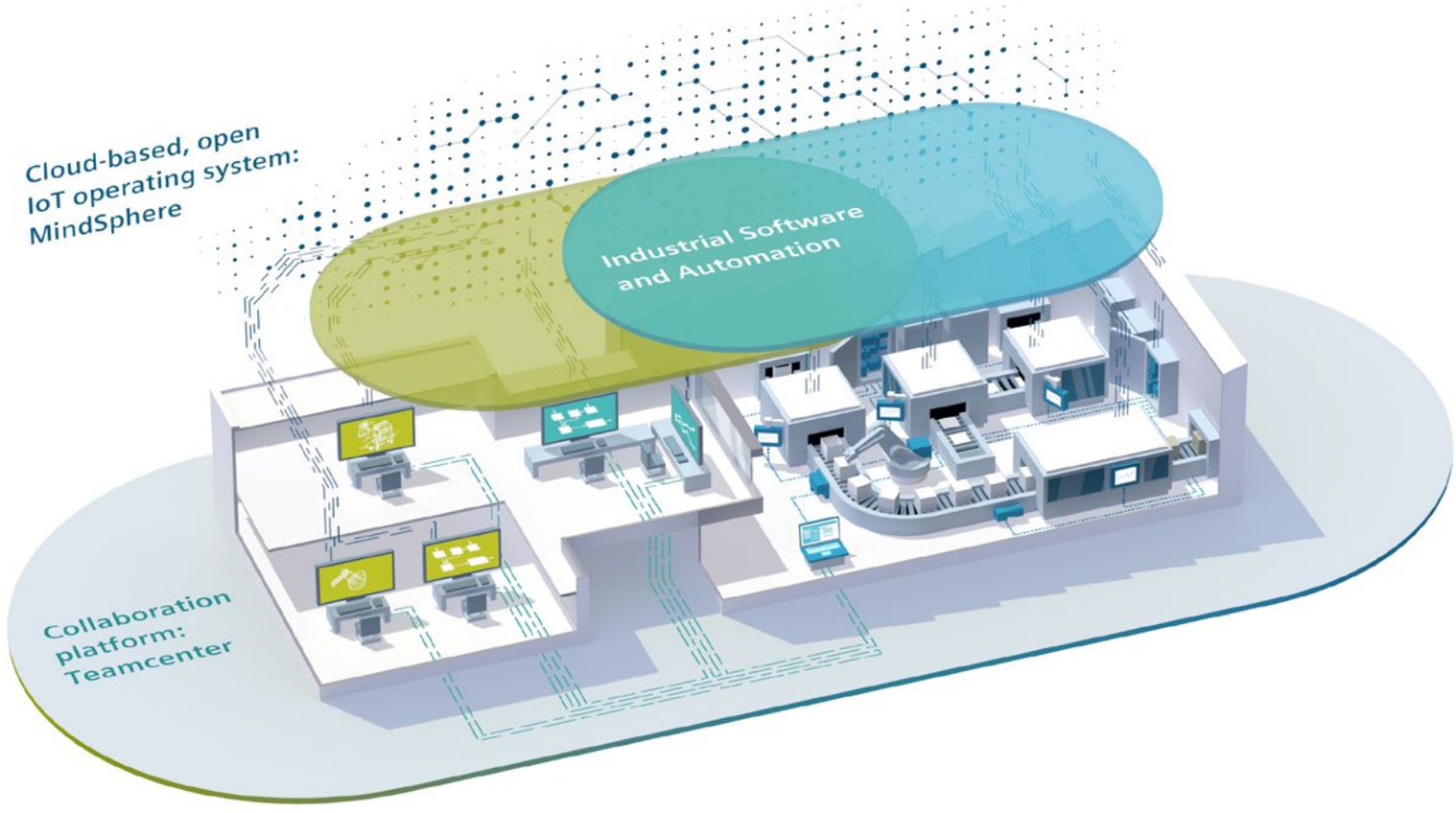

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