


ON THE FAST
TRACK TO
NETWORKED
PRODUCTION

HEITEC 4.0

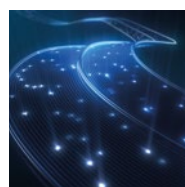
INDUSTRY EXPERTISE
IN AUTOMATION,
DIGITALIZATION
AND ELECTRONICS



Innovations always break established rules – and that's exactly what 's currently happening with Industry 4.0. It's an approach that eliminates the rigid structuring of production facilities and products and replaces it with flexible, networked production facilities. At the heart of Industry 4.0 is the Internet of Things, which can extensively network humans, machines, and things. It lays the foundation for numerous new services and offerings that can be used to autonomously plan and optimize machines and processes. As a result, the Internet of Things breaks up rigid production structures, and machines and processes continuously adapt themselves to production tasks. This approach, however, requires a significant expansion in machine-to-machine communication and partially automated responses from the system.

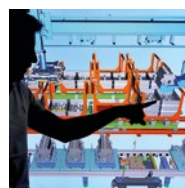
As an expert in automation and information technology, HEITEC has developed a wide-ranging portfolio of solutions covering everything from digital plant and process planning to virtual commissioning and the networking of plants and production processes for the purpose of optimizing production. All these solutions support the development of intelligent factories with adaptive machines and plants, both with centralized as well as decentralized production controls. With its offerings in the areas of automation, production and testing systems, and electronics, plus extensive experience in a wide range of different industries, HEITEC is helping its customers transition to Industry 4.0 even faster.

HEITEC 4.0 – DIGITALIZATION
IS CHANGING THE INDUSTRY



HEITEC 4.0 overview

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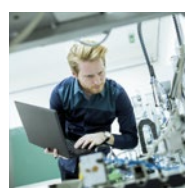
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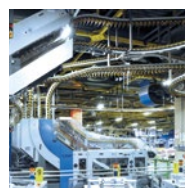
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HEITEC 4.0 overview

Planners, engineers, and plant operators need digitalized models and data that they can fall back on time and time again.

The HEITEC 4.0 portfolio of solutions demonstrates how the introduction of Industry 4.0 can be gradual and user-friendly, design risks can be reduced, plant commissioning time can be shortened, and processes can be optimized during ongoing operation.

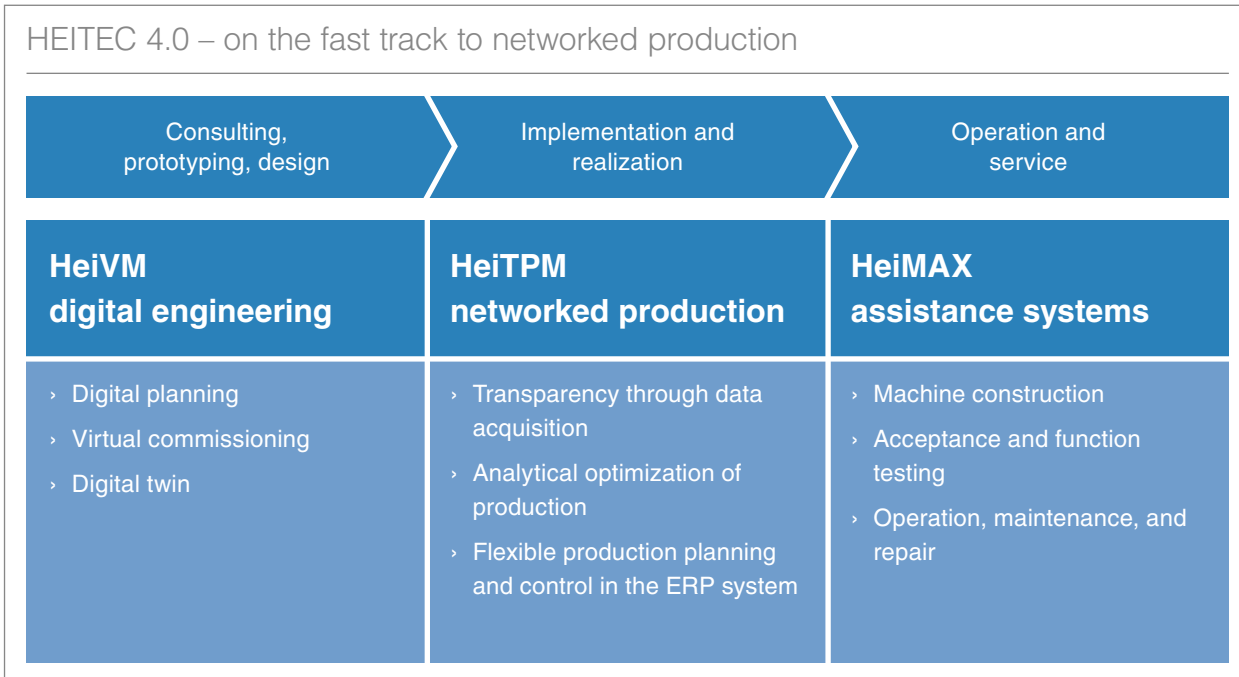
With these enhancements in mind, HEITEC provides an extensive portfolio of solutions that can be used individually – from consulting and implementation to plant operation and service. HeiVM digital engineering brings planning simulations even closer to reality. Production technologists can use these simulations to assemble their systems in advance, configure them for a range of conditions, simulate and optimize workflows, and select alternatives. This makes it possible to reduce planning errors and substantially shorten the time needed for project execution and commissioning. Once the digital twins have been created using HeiVM, they remain available to the system integrator and/or plant operator throughout the entire lifecycle.

The networking of production – horizontal networking between humans, machines, and systems and vertical networking beyond business organizational systems – is one of the most important ways for a company to remain competitive and innovative.

HeiTPM completes the digital information and interaction chain from the corporate management level through to the machine level. It creates bridges between the machines on the shop floor and the object- and service-oriented IT world.

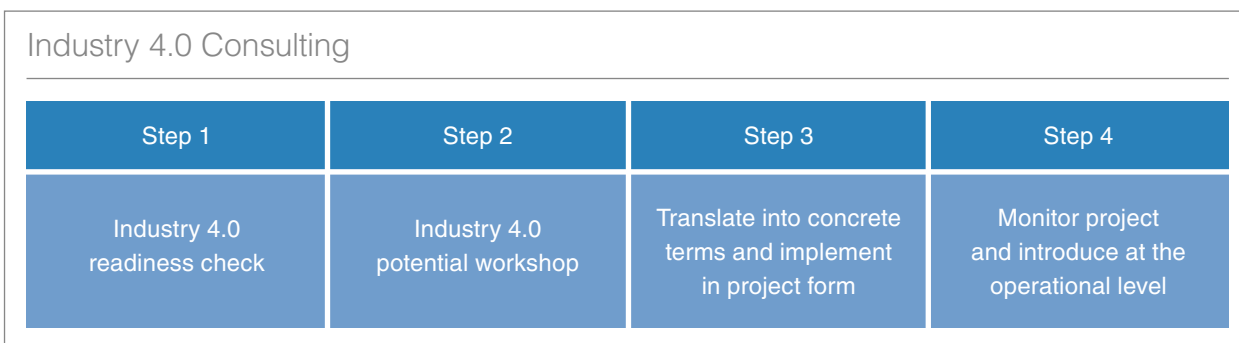
HeiTPM enables rapid integration into a range of IT environments through to ERP systems, ensuring production transparency, optimized production, and flexible production planning and control.

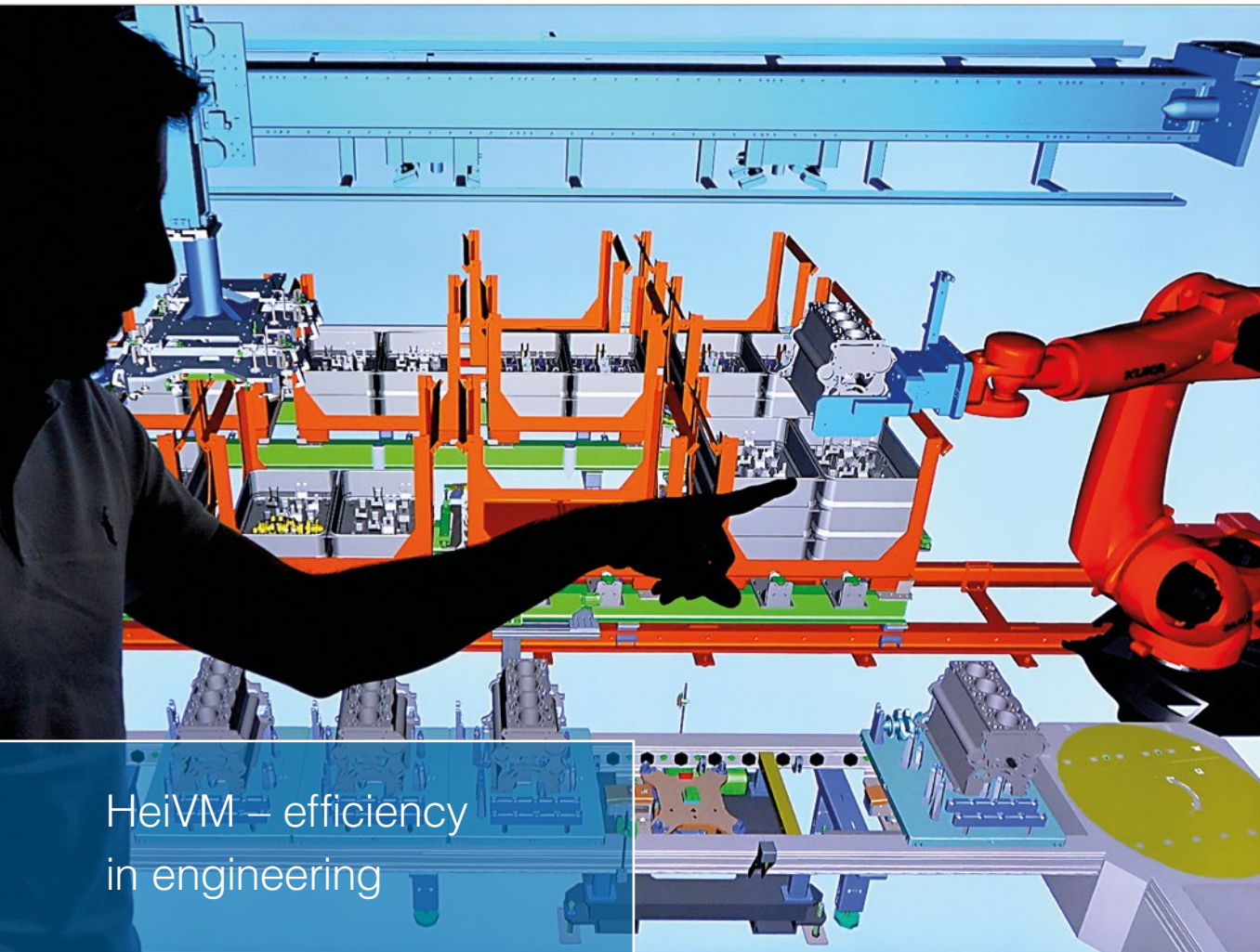
Workflows and processes are measurably optimized, thanks to the provision of relevant information to employees in production and the documentation of quality-related steps. The HeiMAX assistance systems ensure an optimal, demand-driven workflow for production design, coordination, and implementation activities, which helps reduce machine and plant downtime. The rigorous use of the digital HEITEC 4.0 portfolio of solutions throughout the entire plant lifecycle ensures a high level of plant productivity and availability.



Industry 4.0 not only makes it possible to increase production, it also offers many options for developing new solutions for production and new business models like digital services. And Industry 4.0 begins at the interface between production and IT. Recognizing this potential and making it a reality requires new approaches and thought processes. Whereas production is characterized by long machine and plant running time, IT depends on short development cycles. Only those who take both sides into account will be able to recognize opportunities and exploit them for their company.

As an intermediary between professional domains and technical/IT areas, HEITEC sees itself as a technology partner throughout the entire plant lifecycle. The company assists its customers with the digital transformation through user-focused consulting services characterized by strong solution expertise. These services range from the precise recording of the actual plant situation – including, for example, an Industry 4.0 readiness check – to generating ideas in ideation and potential workshops and the later phase of translating these ideas into concrete terms, implementing them in project form, monitoring the project, and successfully introducing it at the operational level.


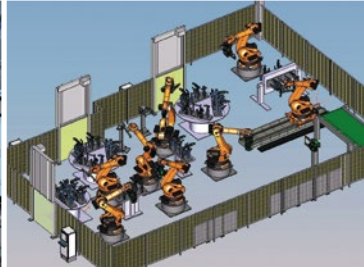
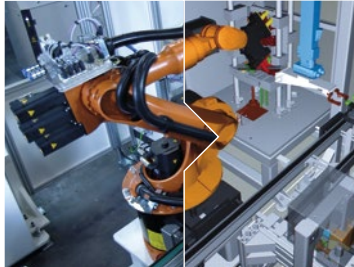




HeiVM – efficiency
in engineering

The broad development base

- › Virtual systems
- › Virtual machines
- › Material flow
- › Robot applications
- › Offline software qualification
- › Digital twin
- › Production optimization
- › Process optimization
- › Support/service
- › Training

Digital plant planning	Digital robot handling	Real process simulation
Digital plants – factory planning using the HeiVM toolkit for simulation (feasibility, cycle times)	Digital robot handling using virtual controllers from the HeiVM toolkit	Virtual commissioning in real time with process speed and bus cycles < 1 ms
		

As an expert in automation and information technology, HEITEC has developed a consistent method for efficiently designing engineering based on mechatronic functional units and virtual commissioning. New opportunities are also being created for digital services, such as the digital twin.

This merging of technology and IT adds another new dimension to project planning and implementation in the production environment. With the digital twin accompanying the real plant, brand-new possibilities emerge for efficiently designing production, maintenance, and modernization activities.

HEITEC supports its customers with its consulting and solution expertise through the gradual and practical introduction of new engineering methods, from recording the actual situation to concept development and proof of concept in the “sandbox” – as well as support during the introduction phase and during subsequent use: for example, in the event of technological issues.

Engineering methods with HeiVM

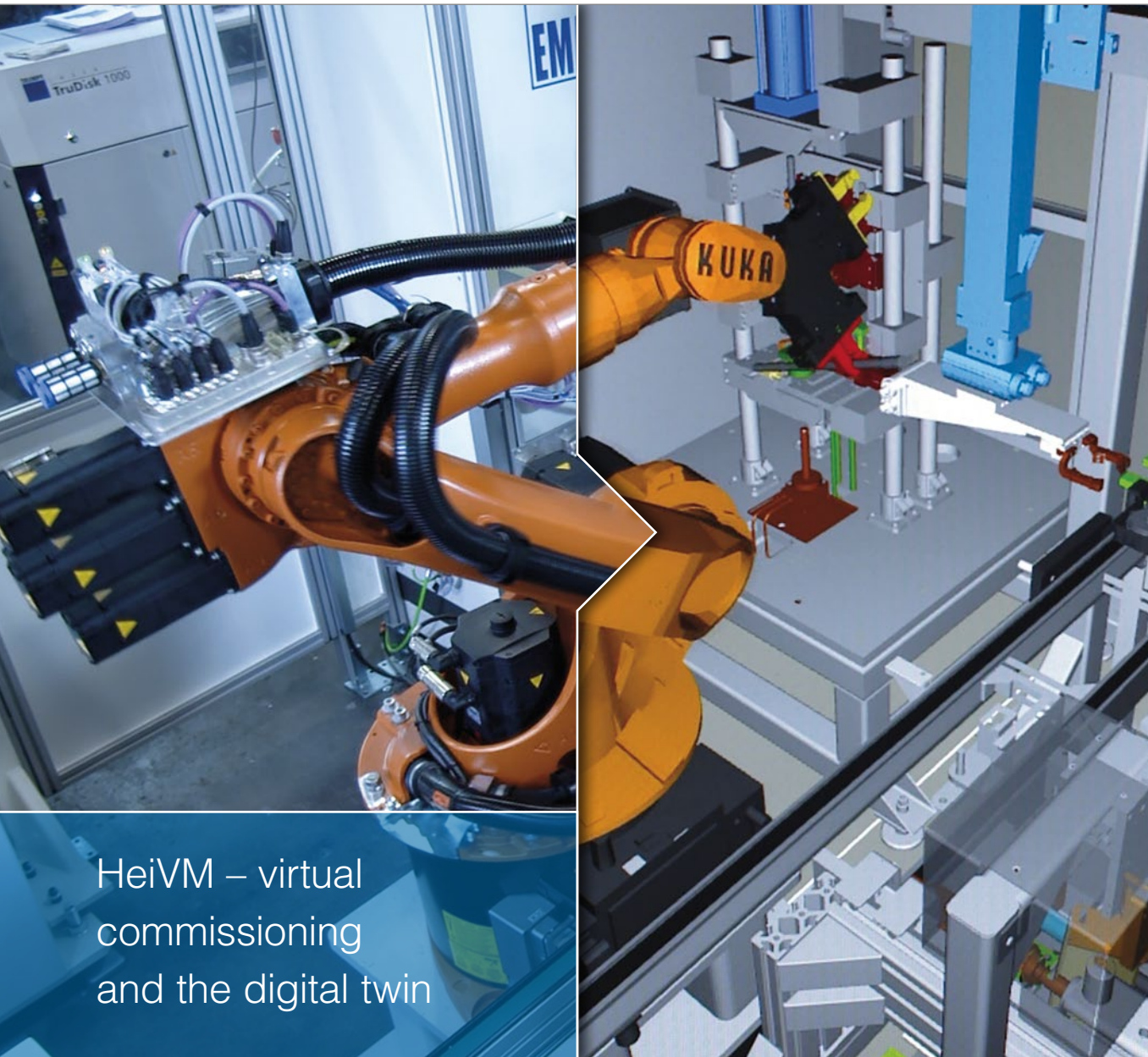
- › Methods for gradually improving the mechatronic engineering process
- › Plant simulation during the planning phase
- › Introduction of virtual commissioning
- › Independent consulting on tool selection
- › Introduction of digital services like the digital twin

Benefits:

- › Greater efficiency in the engineering process
- › Increased flexibility
- › Reduced costs
- › Added value thanks to new business models

DIGITAL FACTORY

Digital assembly lines	Digital special machines	Digital manual workstations	Digital logistics
Digital assembly lines – implemented with the HeiVM toolkit (feasibility, productivity)	Digital special machines – with the HeiVM toolkit, based on fine granulation	Digital planning of HMI with the HeiVM toolkit, version planning	Digital logistics with the HeiVM toolkit: for example, as intermediate storage in production facilities
			



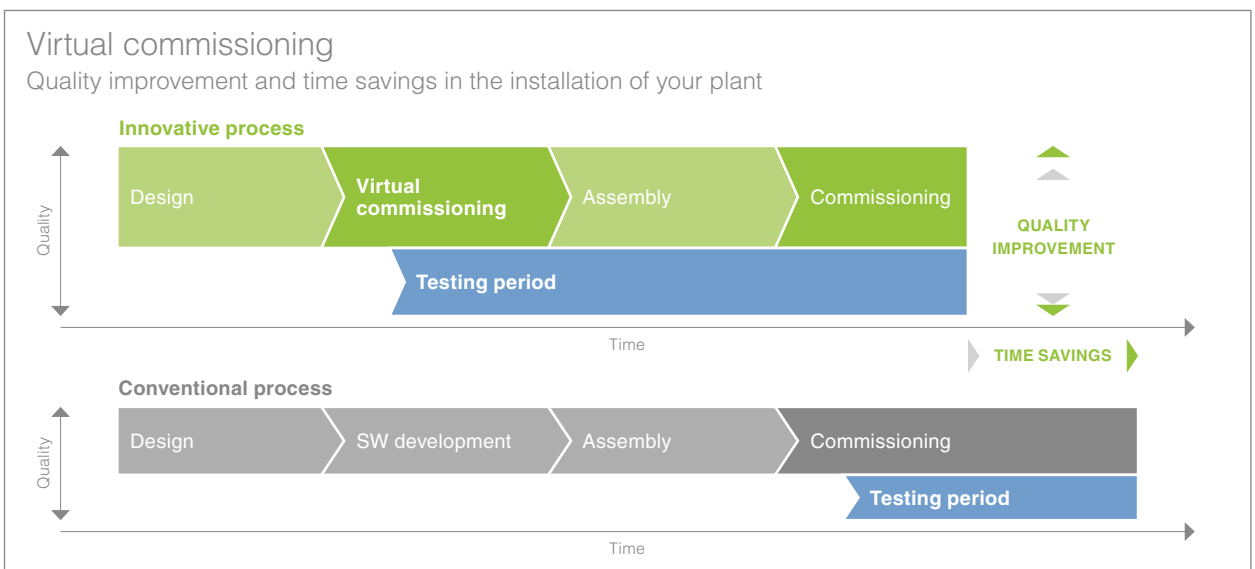
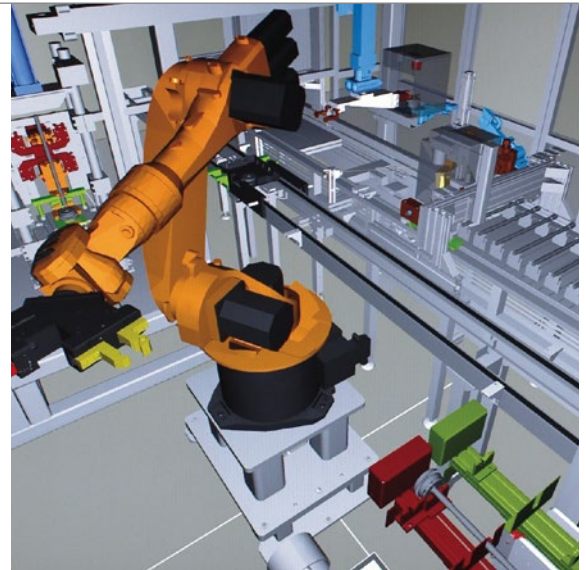
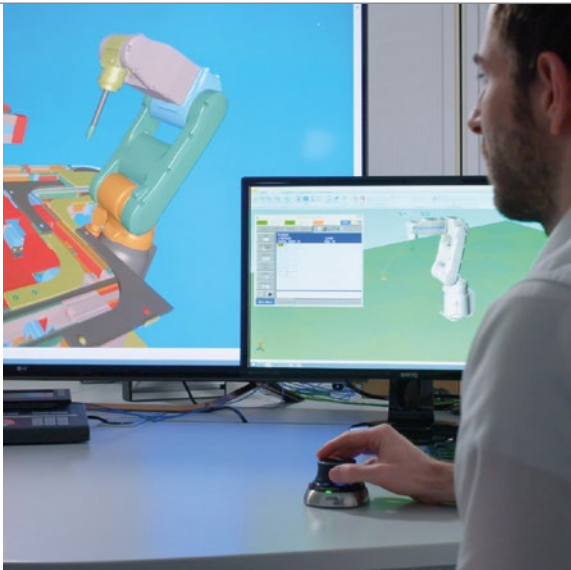
HeiVM – virtual commissioning and the digital twin

During plant design, software-based support of engineering processes using virtual models of machines, plants, robot applications, and material flows is a key driver of productivity. With the aid of the virtual twin, engineers are able to test the functionality and time response of automation concepts and optimize process sequences before implementation.

Using real commissioning on the virtual model, HEITEC 4.0 maps all current and future operating sequences in the production environment in real time and controls them using the original automation software. Users can now achieve better software release quality for automation and drive solutions and

detect design and process errors at an early stage. Parallel development processes significantly minimize the duration of the project. By expanding the virtual plant into the area of logistics, material flows can be simulated and the plant software adapted to the plant's actual layout and workflows. This facilitates the commissioning and testing of possible alternative solutions.

Virtual engineering from HEITEC helps reduce project lead time by approximately 15 percent and commissioning time by 50 to 80 percent. When designing machines that are being built for the first time, it decreases lead time by four to six weeks.



In addition to virtual commissioning, using the digital twin in conjunction with the real plant offers operators numerous possibilities for increasing the plant's level of productivity and availability.

Thanks to the integration of information gathered from the real plant during production – like order data, synchronously switched process data, and error messages – in the digital twin of the plant, production can now be analyzed in the office. This makes it possible to design optimization strategies for the production sequence, research causes of errors, and analyze quality data. Any modifications can then be tested on the virtual model using real information from operation and, if successful, applied to the plant.

Digital engineering with HeiVM

- › Virtual commissioning
- › Digital twin
- › Digital planning

Benefits:

- › Decreased project and commissioning time
- › Reduced plant downtime
- › Better software quality for trouble-free production
- › Faster and easier employee training thanks to training on the virtual model
- › Production and process optimization using the digital twin
- › Significant cost savings and greater productivity



HeiTPM – production transparency and optimization

A key feature of Industry 4.0 is the communication between humans, machines, and systems. HeiTPM creates bridges between the machines on the shop floor and the company's IT world. Greater production transparency is achieved through the acquisition, processing, and distribution of the relevant data.

This involves a seamless transmission of process data from operating machines as well as fault messages to the IT level – for example, ERP – where it's analyzed and fed back to production as planning data in the form of process information, component requirements, production specifications, and other parameters.

The benefits of an open cloud solution are also available; in this case, the process data is then transferred to the cloud via Edge computing as needed.

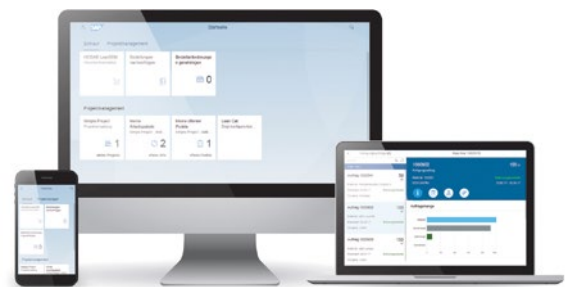
HeiTPM makes it possible, for example, to determine a machine's capacity utilization with no additional hardware and in this way to increase machine availability. Depending on requirements, OnPremise solutions are also available to record process data.

All the information collected from the real plant makes it possible to create the necessary transparency and analyze production. That's how causes of errors can be discovered, quality data evaluated, and optimization strategies for production workflows created.

If older plants need to be made Industry 4.0-capable, HeiTPM offers a variety of options for ensuring connectivity, such as retrofitting sensor technology and data sharing.



Production and machine-related data can also be seamlessly linked with business processes, synchronized, and directly integrated into the ERP systems' business applications, which offers flexible design options for profitable end-to-end processes. That's how HEITEC 4.0 completes the digital information and interaction chain from the corporate management level to the machine. This puts a key element of networked production into the hands of users.



Standardizing user interfaces and making them more flexible

To ensure better support in the face of increasing complexity in technology and in the production processes of operators, it is necessary to redesign human-machine communication to machines. With HeiTPM HEITEC 4.0, we offer a platform for standardizing the user interfaces of machines to make them more flexible. Different controllers are abstracted for the HMI software in such a way that they can be visualized for different activities on the machine in individual and intuitive apps.

Machine and plant operators can use the apps to prepare, optimize, and process production orders, input completion notifications directly on the machine, and request a new order.

Data monitoring and analysis with HeiTPM

- › Collection of relevant data (including process data, quality data, machine data, operational data, and energy data) and its transformation into information objects
- › Long-term storage and analysis of information objects
- › Customized and mobile monitoring

Benefits:

- › High transparency in the production process due to visualization of process data
- › Compliance with quality processes and assurance of quality standards
- › Time and cost savings, thanks to optimized processes
- › Greater productivity through easier and faster preparation, optimization, and processing of production orders



HeiTPM – flexible production planning and control

Today customers want increasingly customized products. This entails the production of ever-smaller batch sizes and results in higher costs due to more frequent production changes. These challenges can be mastered with increased networking: horizontal networking between humans, machines, and systems and vertical networking from the shop floor to business organizational systems.

The production- and machine-related data is seamlessly linked and synchronized with business processes and directly integrated into the ERP systems' business applications.

HeiTPM provides rapid, flexible integration into a wide variety of IT environments and maps production in real time, creating consistent, end-to-end transparency and a 360-degree view of plant processes. Based on the real-time data from production, information is synchronized and interconnected in such a way that production orders can be quickly prepared and processed. As a decision-making aid, the integrated end-to-end IT solution extracts information relevant to each target group from the networked production data, and then uses intelligent algorithms to generate the knowledge to optimize the production processes and make them flexible and reliable. Customized production monitoring is possible anytime, anywhere.

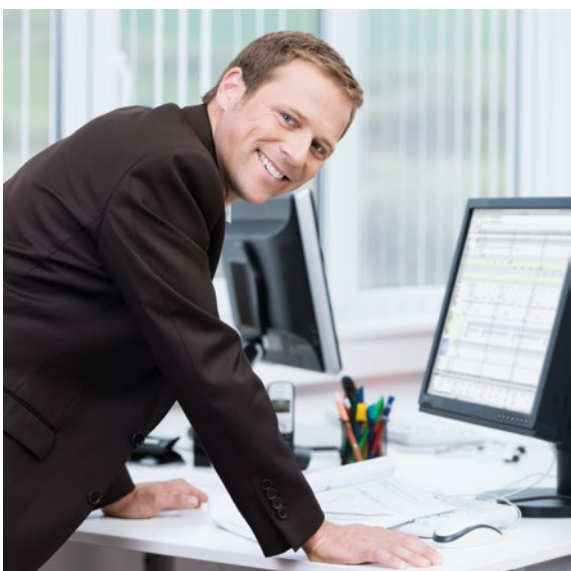


Optimal results through straightforward processes and current data

The production cockpit was developed as an application by the SAP consulting firm HEISAB based on the new SAP UI5 and SAP Fiori UX technology. It offers a lean and mobile option for recording data directly on the shop floor level and processing it in the SAP ERP system.

Detailed, real-time information is easily and transparently collected from production and made available to users in a compressed form. Based on clear targets and actual comparisons, production can be easily controlled and capacity utilization modified as needed. In addition to displaying data and processes, the cockpit also offers the option to actively intervene in and control processes with the aid of add-on functions.

* HEISAB GmbH is a company within the HEITEC Group that provides IT consulting throughout the overall production process. HEISAB offers customized SAP solutions that include vertical integration from the ERP level to the shop floor.



Horizontal and vertical IT integration with HeiTPM

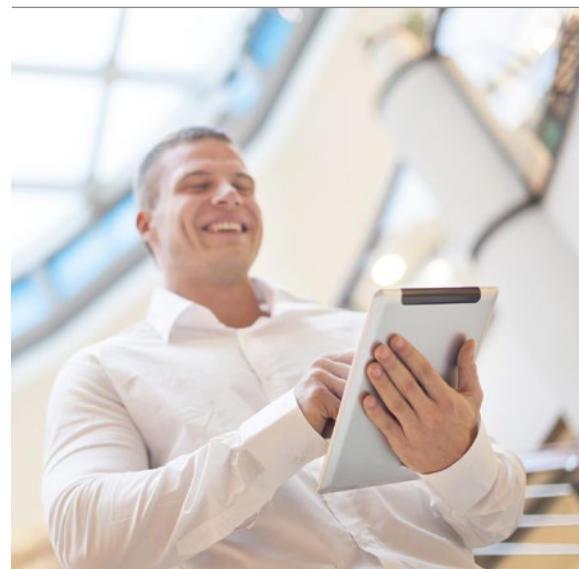
- › Fast and flexible integration into diverse IT environments
- › Flexible connection of ERP systems to shop-floor systems
- › Intelligent machine-to-machine communication
- › Use of modern human-machine interfaces
- › Cross-company information flows
- › Processes and IT systems that seamlessly interact with one another instead of individual, independently operating solutions

Benefits:

- › Increased production flexibility as a result of automated data acquisition and the consolidation and provision of information relevant to production
- › Real-time production planning and control and improved decision-making reliability, thanks to real-time views along the entire value chain
- › Transparent business and production processes, thanks to the acquisition of meaningful KPIs
- › Reliable business planning using real-time production data
- › New user experience in the production environment, thanks to modern SAP Fiori user interfaces and applications



HeiMAX – assistance systems



Building, acceptance-testing, and maintaining a machine or plant are all processes that require many individual steps to ensure that everything functions seamlessly. What they all have in common is that they ultimately need to be performed on a highly structured basis and successively checked off a to-do list. When a machine is being built, components are installed one after the other. For acceptance, a plant is systematically inspected for correct functioning. All workflows and processes are checked for wear for maintenance purposes. HeiMAX assistance systems support employees in production by supplying relevant information and documenting quality-related steps. They also ensure an optimal, demand-driven, and paperless workflow for the planning, coordination, and implementation of production and its documentation. In addition to machine and plant construction and regular maintenance and repair work, the Web application can now be used for acceptance or validation immediately after a plant is built or new software is installed, which saves time and money.

Use case

Support for machine construction

Increased transparency, speed, planning reliability, cost efficiency, and quality when assembling machines and plants.

- › Guided, reliable, and prioritized workflows for the performance of individual assembly steps
- › Automatic documentation of individual assembly steps (log)
- › Communication with ERP system/ ePlan/planning tool in order to obtain and share order-specific information on assembly
- › Increased efficiency and quality assurance in machine construction
- › Personnel are able to perform complex assembly activities after a brief training period
- › Digitalization of experts' specialized knowledge
- › Higher-level business units have an overview of the progress of plant assembly
- › Automatic to-do list

Use case

Acceptance and function testing of machines and plants

Increased transparency, speed, planning reliability, cost efficiency, and quality when performing acceptance tests.

- › Guided, reliable, and prioritized workflows for performing acceptance tests
- › Automatic documentation of individual acceptance steps (log) and, if necessary, of control signals, alarms, and process values using HeiTPM
- › Communication with ERP system/ ePlan/planning tool/requirements management in order to obtain order-specific information/ checklists/media for acceptance testing
- › Increased efficiency and quality assurance in acceptance testing
- › Higher-level business units have an overview of the progress of acceptance testing
- › Personnel are able to perform complex activities after a brief training period
- › Digitalization of experts' specialized knowledge
- › Automatic documentation of individual acceptance steps (log)
- › Automatic to-do list

Use case

Operation, maintenance, and repair of machines and plants

Short setup/conversion time, high availability of production plants, and assurance that all the correct format parts have been installed.

- › Guided and reliable format change or setup process, thanks to predefined workflows
- › Automatic documentation of individual steps of format change (log)
- › Communication with ERP system in order to obtain and share order-specific information on the format change
- › Increased efficiency and quality assurance in format changes or setup processes
- › Personnel are able to perform complex activities after a brief training period
- › Digitalization of experts' specialized knowledge
- › Higher-level business units have an overview of the current state of plant conversion

HEITEC 4.0 – on the fast track to networked production

With HEITEC 4.0, the company is offering a portfolio of solutions covering everything from digital plant and process planning to virtual commissioning and the networking of plants and production processes for the purpose of optimizing production.

- > HeiVM digital engineering
- > HeiTPM networked production
- > HeiMAX assistance systems

HEITEC 4.0 makes it possible to reduce planning risks, commission plants more quickly, and optimize processing during ongoing operation.

Your benefits

**Gradual and practice-oriented introduction
of Industry 4.0**

Time and cost savings

Increased productivity

Ensured competitiveness

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