HEITEC

engineering solutions

ON THE FAST TRACK TO NETWORKED PRODUCTION

HEITEC 4.0

INDUSTRY EXPERTISE
IN AUTOMATION
AND ELECTRONICS

HEITEC 4.0 – DIGITALIZATION IS CHANGING THE INDUSTRY

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 monitoring of plants and production processes with special embedded systems for faster production networking. 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 technology, measurement technology, electronics, and software, and with experience in a wide range of different industries, HEITEC is helping its customers transition to `Industry 4.0 even faster.

HEITEC 4.0 overview

Innovation and market cycles are shorter than ever – new products must be moved into production quickly and cost-effectively. At the same time, the products themselves are becoming increasingly individualized, all the way down to batch size 1. As a result, a growing number of production plants need to be converted at ever-shorter intervals. Plant operators, planners, and engineers need digitalized models and data that they can fall back on time and again.

With the rigorous digitalization of its engineering methods, HEITEC is demonstrating how design risks can be reduced, plant commissioning time shortened, and processes optimized during operation.

With these benefits in mind, HEITEC has developed solutions, cross-tool interfaces, and technology objects that take design simulation even closer to reality. With these solutions and interfaces, production engineers can assemble and configure their plants, simulate and optimize workflows, and choose alternatives under various boundary conditions – all in advance.

HEITEC has developed a toolkit of object-oriented components for creating digital twins and so has created the necessary tools for successfully handling faster innovation cycles and new technologies.

Once created, the digital models are made available to the system integrator and/or plant operator by the HeiVM virtual machine throughout the plant's entire lifecycle. As a production technology expert, the process owner can then personally construct the plant and put it into operation.

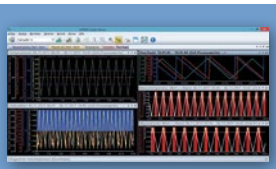
HeiTPM provides solutions for IT integration, data monitoring, and analysis. It builds bridges between the machines on the shop floor – characterized by real time, heterogeneous interfaces, and a variety of protocols – and the object and service-oriented IT world. HeiTPM enables rapid integration into a variety of IT environments. The applications are linked to manufacturer-independent platforms like Acron and SAP and various cloud solutions.

The rigorous use of the digital Heitec 4.0 framework throughout the entire plant lifecycle ensures a high level of plant productivity and availability.

HEITEC 4.0 – on the fast track to networked production

Digital engineering	Horizontal and vertical integration	Data monitoring and analysis	Embedded systems for decentralized intelligence
› Virtual commissioning › Digital twin › Digital planning	› Networked automation and drive solutions › Production networked with SAP ERP systems	› Monitoring of machines, plants, and quality › Ad-hoc visualization and analysis › SAP Fiori® UX technology	› Non-standard components for automation › Decentralization of intelligence
HeiVM	HeiTPM	HeiTPM	

Individual IT solutions



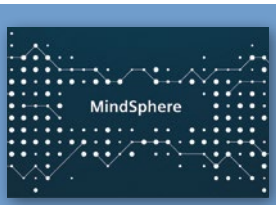
ACRON

Process data
- Machine data
- Error messages
- Measured and metered values
- And much more

SAP
- Production planning
- Warehouse management
- Finance and controlling
- Quality management
- Personnel management
- Purchasing, and more

SAP SAP PCo

SAP **Planning data**
- Process information
- Component requirements
- Production specifications

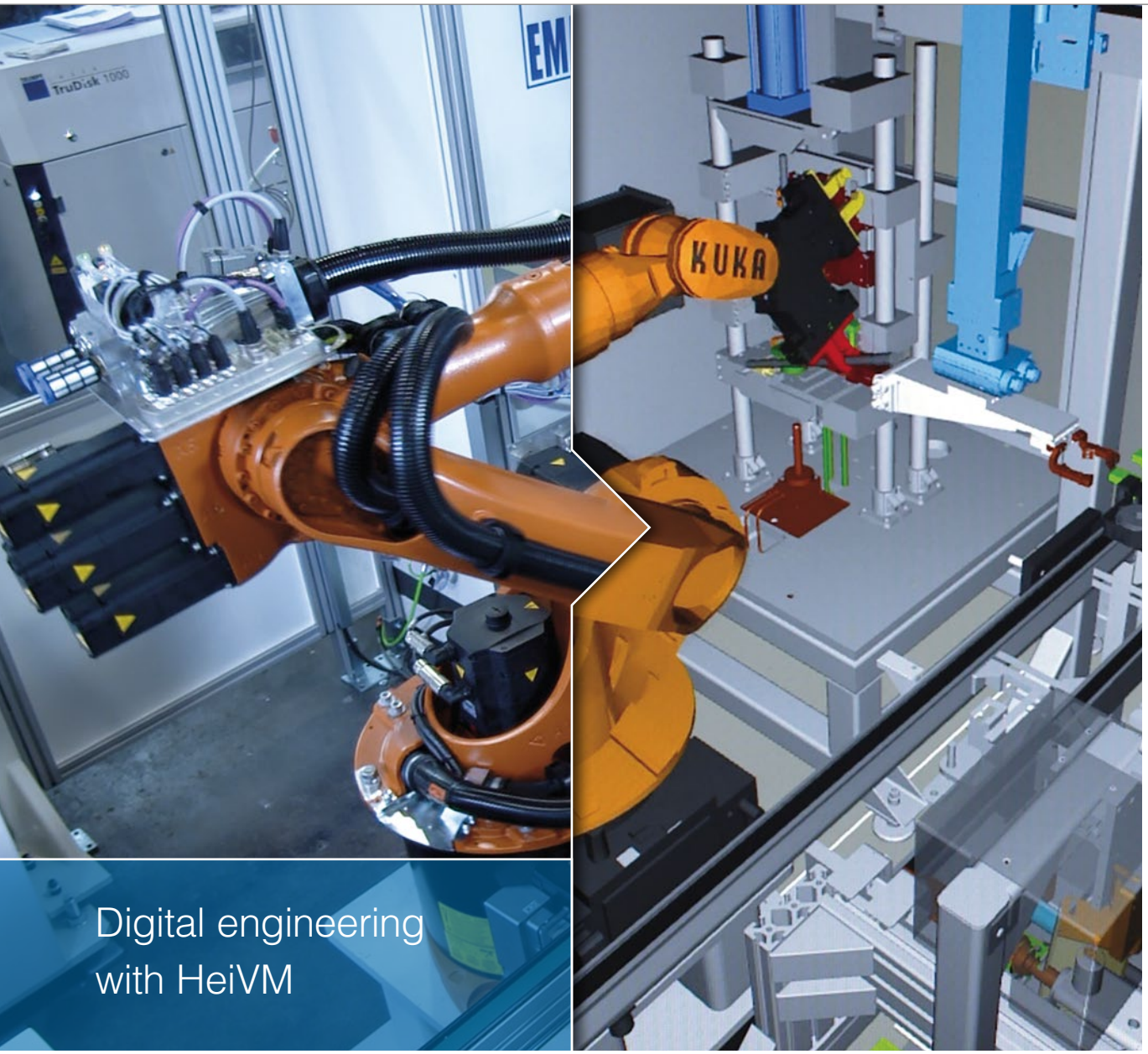


Siemens MindSphere Cloud

Siemens Nanobox

OPC UA

For example:

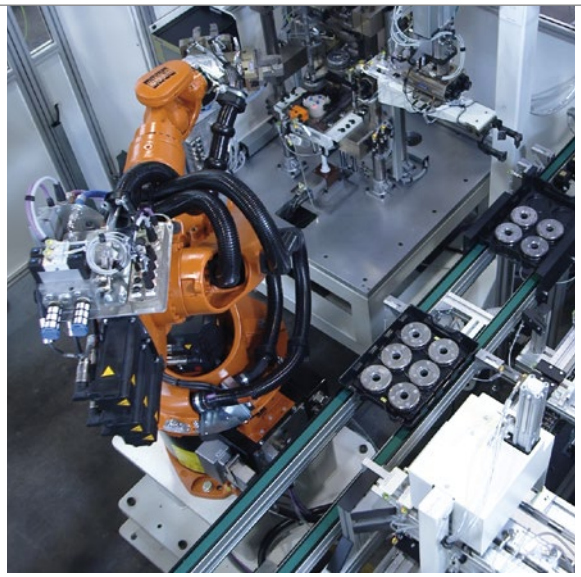


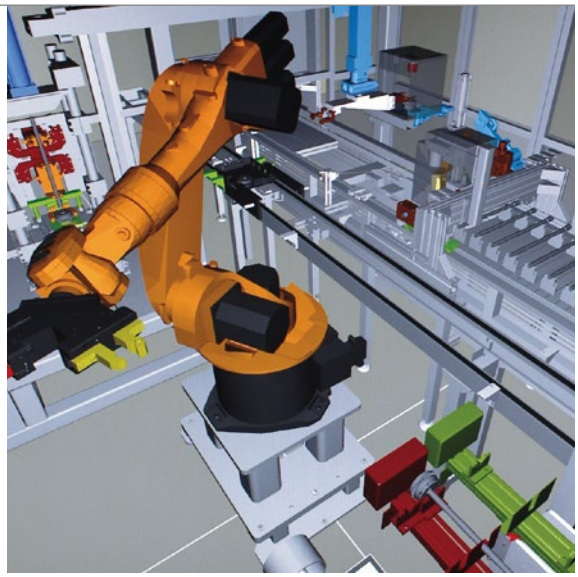
Digital engineering with HeiVM

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. It allows engineers to test the functionality and time response of automation concepts and to 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.

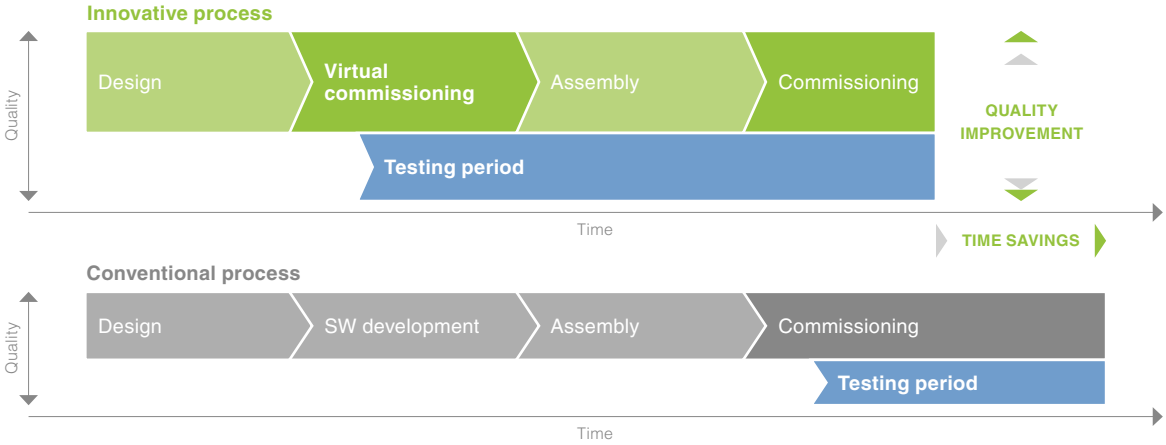
Virtual engineering from HEITEC helps reduce project lead time by approximately 15 percent and commissioning time by 50 to 80 percent. When designing machines that are being built for the first time, it decreases lead time by four to six weeks.

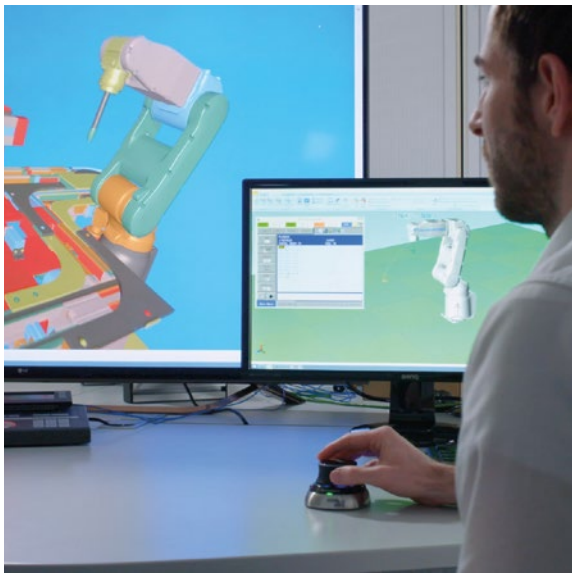




Virtual commissioning

Quality improvement and time savings in the installation of your plant





Digital engineering with HeiVM

- Virtual commissioning
- Digital twin
- Digital planning

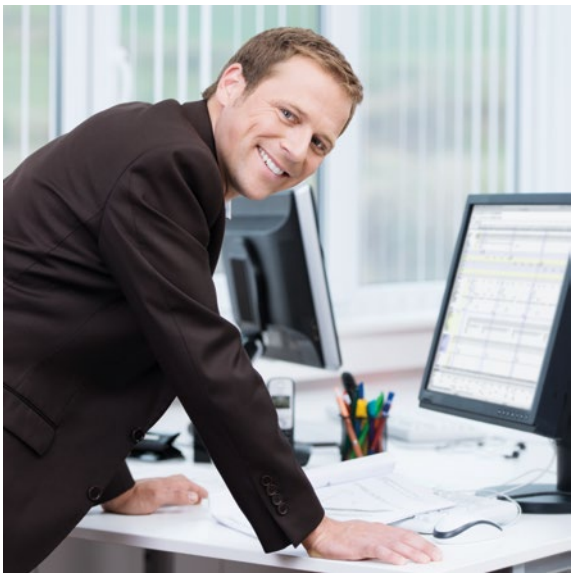
Benefits:

- 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
- Significant cost savings and greater productivity

Horizontal and vertical IT integration with HeiTPM

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, both on the shop floor and throughout the company, and vertical networking from these areas 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, 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.



Horizontal and vertical IT integration with HeiTPM

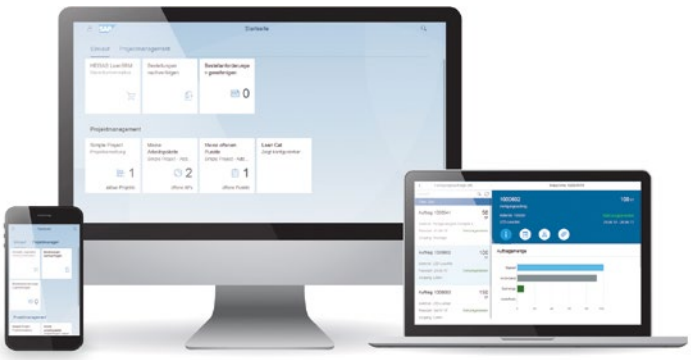
- Flexible connection of ERP systems to shop-floor systems
- Intelligent machine-to-machine communication
- Uses of modern human-machine interfaces
- Cross-company information flows

Benefits:

- Fast and flexible integration into diverse IT environments
- Processes and IT systems that seamlessly interact with one another instead of individual, independently operating solutions
- 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 due to the acquisition of meaningful KPIs for reliable product quality
- Increased production flexibility as a result of automated data acquisition and the consolidation and provision of information relevant to production

Data monitoring and analysis with HeiTPM

A key feature of Industry 4.0 is that humans, machines, and components communicate with each other. To ensure that this goes smoothly in practice, the appropriate software has to retrieve any data from the controllers and from the production line sensors and process that information for the various process participants.
HeiTPM offers solutions based on standard components available on the market that are completely integrated and adapted to the customer's specific solution.



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.
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.
Integration is based on the latest SAP technologies and HEISAB* process expertise. SAP Fiori® UX technology offers easy operation, an attractive design, and device independence for mobile applications via the Launchpad.
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.

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

HMI for making standardized and flexible user interfaces

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.

Data monitoring and analysis with HeiTPM

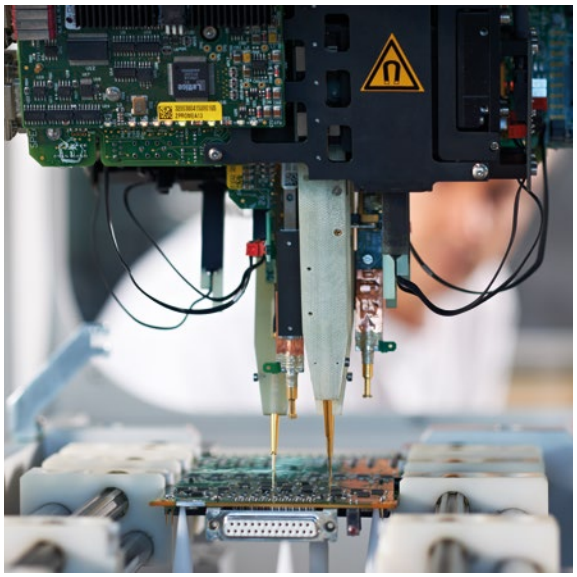
- Collection of data and transformation into information objects via gateways (OPC UA communication standard)
- Long-term storage and analysis of information objects
- Customized and mobile monitoring
- Design and implementation of modern operating concepts for machines

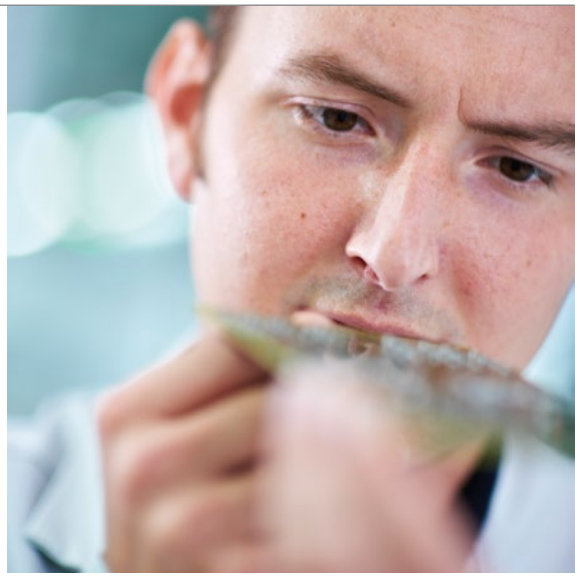
Benefits:

- High transparency in the production process through visualization of process data
- Compliance with quality processes and assurance of quality standards
- Time and cost savings thanks to simple and optimized maintenance
- Greater productivity through easier and faster preparation, optimization, and processing of production orders
- Reliable business planning using real-time production data
- New user experience in the production environment through modern SAP Fiori user interfaces and applications

Embedded systems for decentralized intelligence

In keeping with the idea of Industry 4.0, components, machines, and sensors must become cyber-physical systems to ensure that production in the sense of “mass customization” and “batch size 1” can be flexibly designed as self-regulating processes.
HEITEC 4.0 provides a solid foundation for true integration that allows a smart sensor or machine to deliver its information directly to the corporate management level.





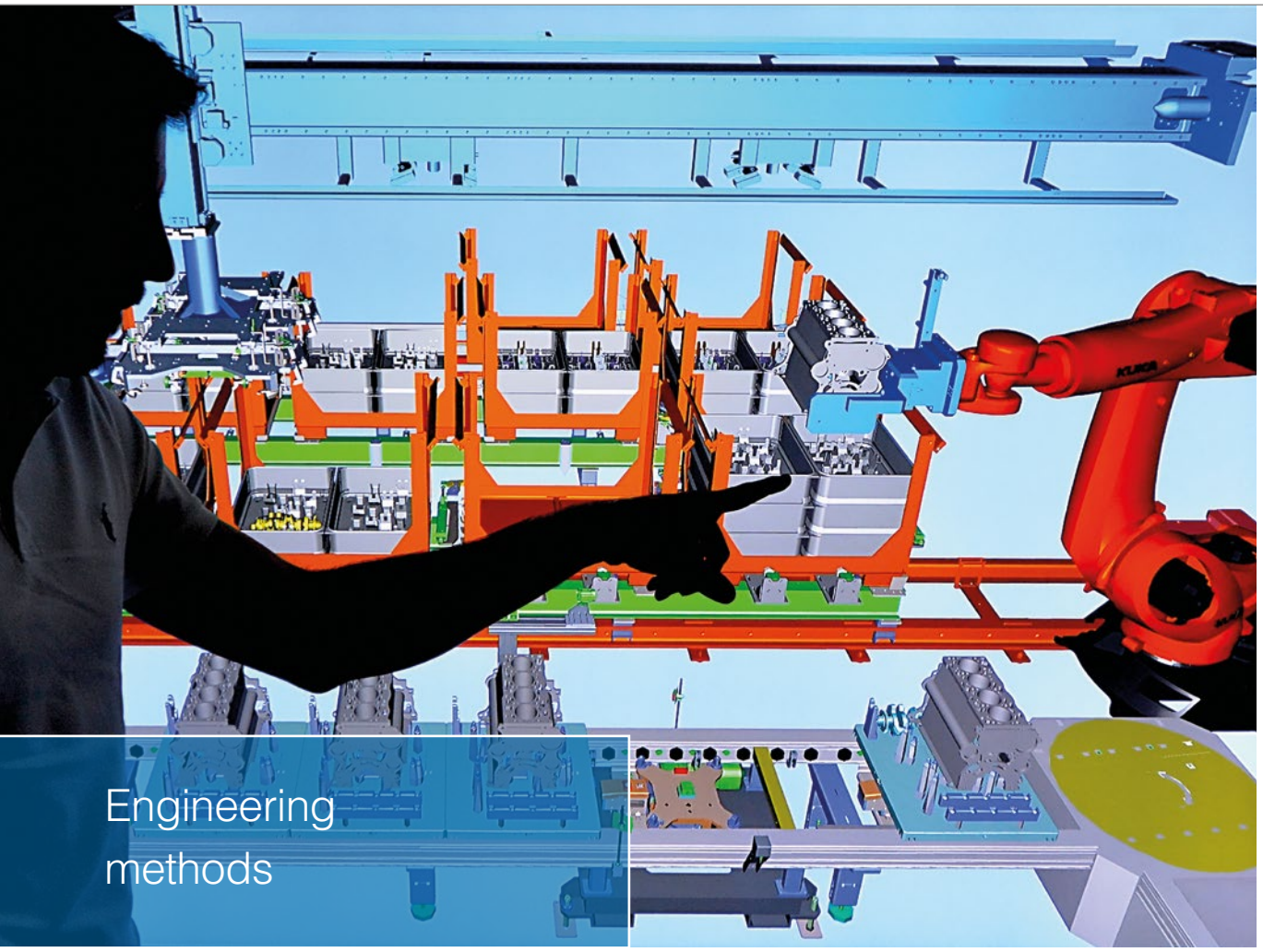
HEITEC develops special embedded systems by drawing on its expertise in mechanics, housing technology, electronics, and software. Thanks to dedicated processing logic, communication, and storage capabilities to connected sensors or actuators, the acquired decision-making capability makes it possible to solve complex processes autonomously and faster than ever before. The networking of these embedded systems, which operate autonomously to some degree, paves the way for numerous new services for the optimization of production.

Embedded systems for decentralized intelligence

- Non-standard components for automation
- Decentralization of “intelligence”

Benefits:

- Optimal machine design
- Optimized utilization of material and components
- Reduced costs and increased productivity



Engineering methods

Our broad development base

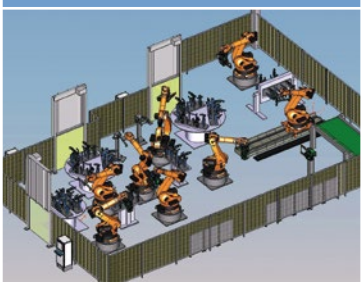
- Virtual systems
- Virtual machines
- Material flow
- Robot applications
- Offline software qualification
- Support/service
- Resource qualification

Plant Simulation

An event simulation tool that makes it possible to build digital models of logistics systems

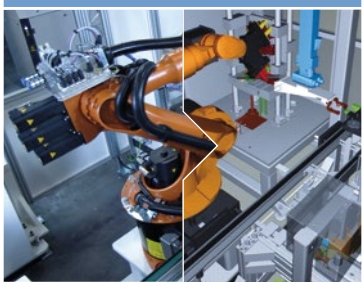
Process Simulate

A tool for the virtual validation of assembly concepts before production starts



Process Designer

3D modeling of assembly processes and lines, along with analysis and management of production processes



HeiVM – virtual machine

HeiVM stands for HEITEC's virtual models of a plant or machine: the so-called digital plant or machine that provides a near-exact representation of the customer's solution. To program the controllers and robots, these virtual models should ideally be identical to their physical counterparts in terms of the functional behavior of their kinematics and interfaces.
Comprehensive libraries of virtual components – from presses, robots, and conveyor belts to automation systems, sensors, and actuators – make it easier to model processes. They allow operators to test automation concepts for both functionality and time behavior as well as to optimize process workflows before the real plants and machines are available.

HeiVM features:

- Digital planning using plant and machine models (digital specifications book)
- Real-time simulation of operating sequences in the production environment including all interfaces
- Software qualification using the actual plant layout and workflows

HeiTPM – solutions for IT integration, data monitoring, and analysis

HeiTPM builds bridges between the object- and service-oriented IT environment and the machines on the shop floor and features heterogeneous protocols, interfaces, and synchronously timed workflows – right down to the last millisecond in real time.
HeiTPM adds semantic and structural information to the data obtained from the shop floor. Using standard protocols – for example, based on OPC UA, or MQTT – the resulting self-describing information objects can be forwarded to systems for online visualization, long-term storage, or further analysis using data-mining or machine-learning methods. For plant owners and operators, this means transparency in production so that you can increase plant availability and productivity.

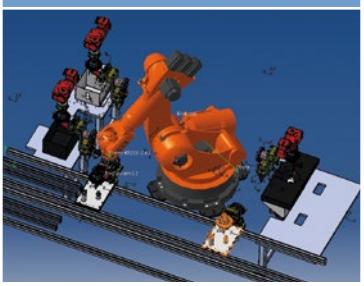
HeiTPM features:

- Analysis of process and control parameters and signaling data to find and permanently correct causes of failure
- Ad-hoc visualization and analysis
- Manufacturer-independent connection to various platforms: Acron, SAP, and cloud-based solutions like Mindsphere

THE DIGITAL FACTORY

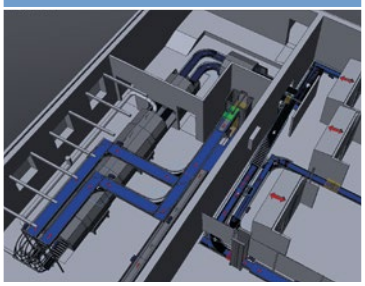
VINCENT/EMELI

Software for planning, visualization, simulation and validation of production plans



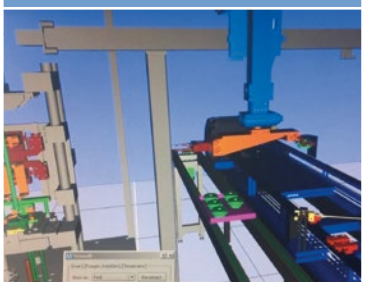
MCD

Simulation software for testing and for training operating and maintenance personnel on virtual machines



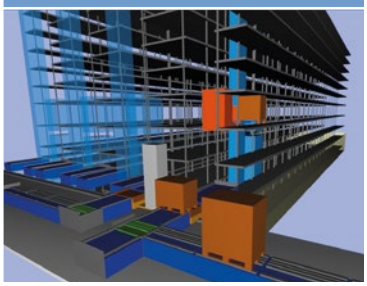
VIRTUOS

An engineering solution for operating real controls on a virtual machine or system, especially in drive technology and in the NC sector



Machineering

3D visualization tools, from PLC simulation to HIL control connections, that can be adapted to individual needs



HEITEC 4.0 – on the fast track to networked production

- Digital engineering with HeiVM
- Horizontal and vertical IT integration with HeiTPM
- Data monitoring and analysis with HeiTPM
- Embedded systems for decentralized intelligence

Data becomes information,
information becomes knowledge.

Your benefits

Practical and gradual introduction of Industrie 4.0

Time and cost savings

Increased productivity

Competitiveness is ensured

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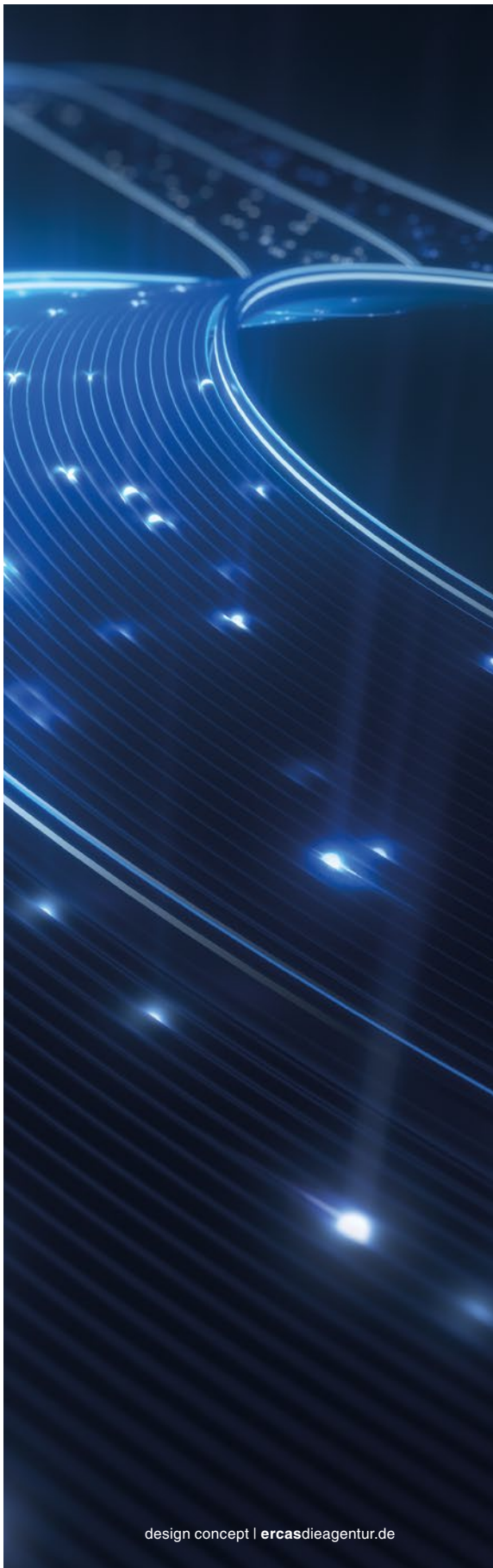

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