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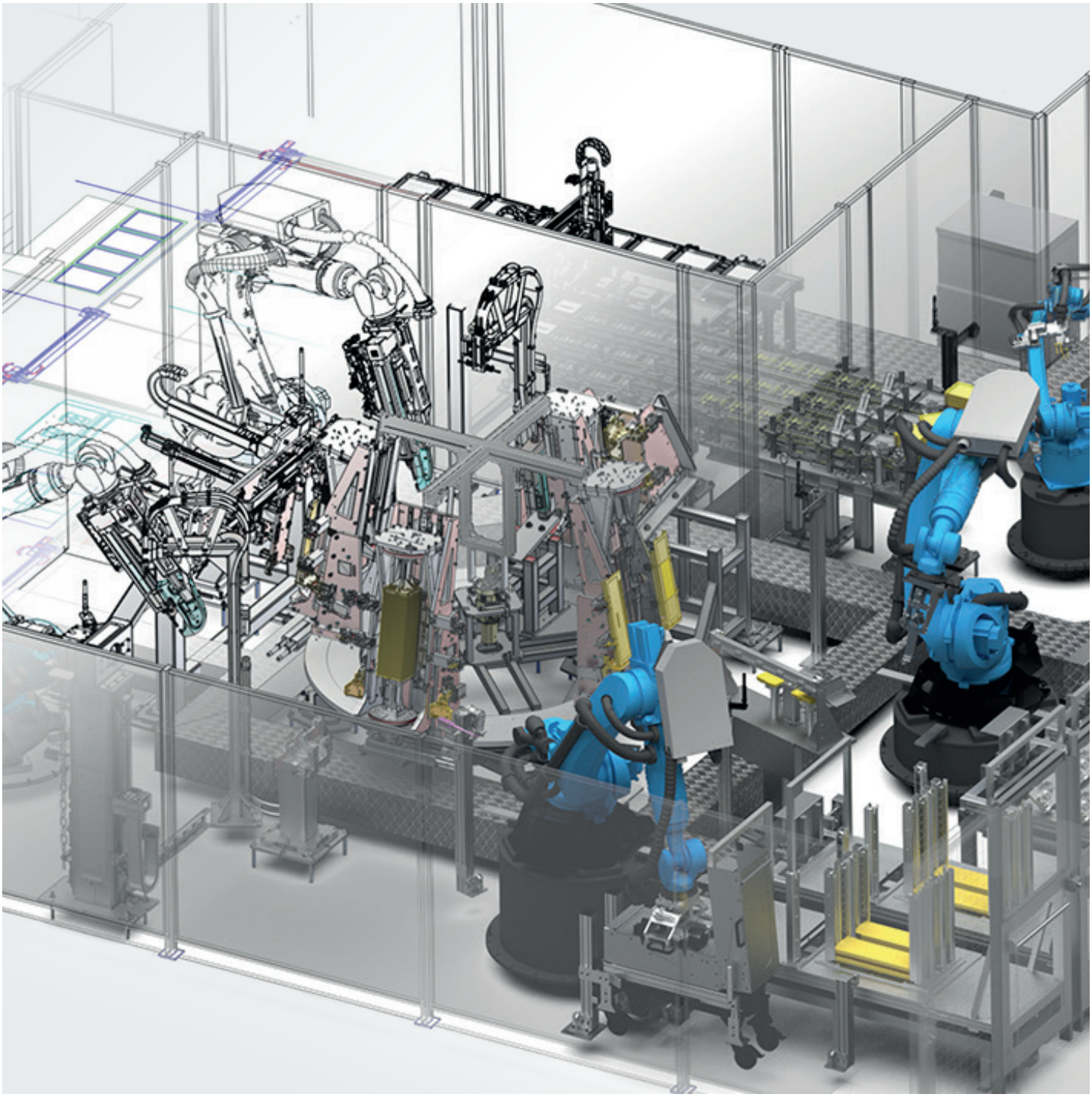
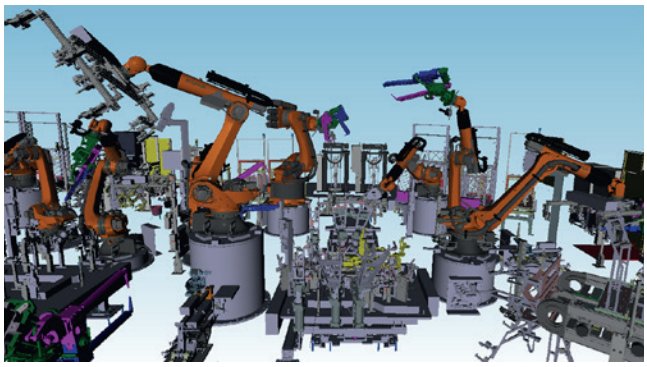


VIRTUAL COMMISSIONING

EFFICIENT & SAFE SYSTEM COMMISSIONING THROUGH DIGITAL SIMULATION

WHAT IS VIRTUAL COMMISSIONING (VC)?

VC is the process through which plants or systems are digitally simulated and tested before being physically constructed or commissioned. An exact virtual model of the system is created with the aid of advanced simulation software that depicts the plant mechanism, plant electrical systems and the original control software. This enables comprehensive testing and safeguarding of the interaction of these components.



WHY IS VC USED IN PLANT ENGINEERING?

VC is used to ensure at an early stage that all systems are functioning correctly and harmonize with each other before physical assembly commences. This aims to achieve decoupling of the dependency between system design and both PLC and robot programming and speed up on-site commissioning.

Advantages of VC over traditional methods:

SHORTENING OF COMMISSIONING TIME

Early testing of the interaction between mechanical systems, electrical systems and the control software in the virtual model can considerably shorten the commissioning phase.

EARLY ERROR DETECTION AND TROUBLESHOOTING

Potential problems are identified and corrected prior to physical implementation, saving time and money.

ENHANCED TEST OPTIONS

VC provides extensive test options that cannot always be achieved on the real plant or during classic commissioning.

COST REDUCTION

Overall costs are considerably reduced through minimizing of subsequent adaptations and downtimes during commissioning.

RISK MINIMIZATION

Timely identification and development of countermeasures for risks before the plant actually exists.

FLEXIBILITY

Examination of every PLC area depends on specific customer and project specifications, enabling individual adaptations.

SAFETY

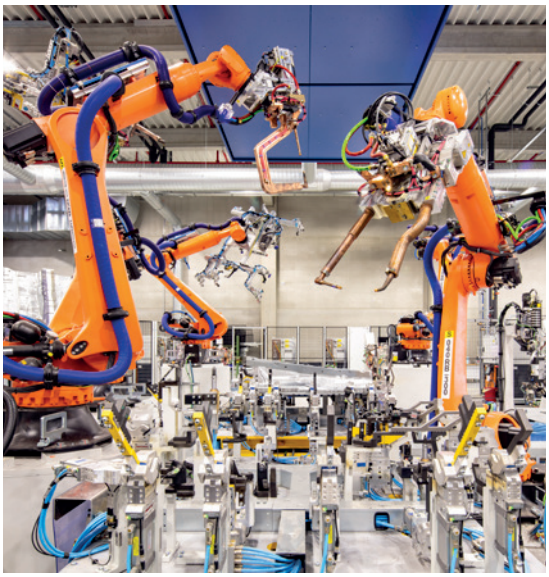
Virtual reviews of all safety aspects improve operational safety from the outset.

OPTIMIZATION

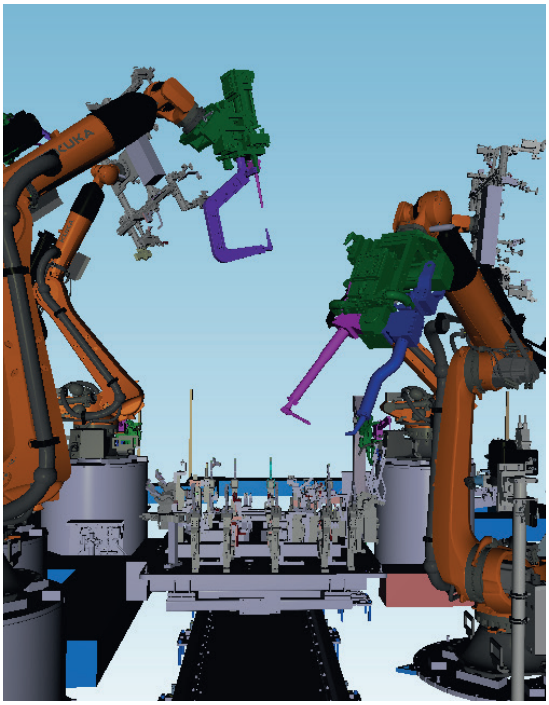
Different operating scenarios can be tested and optimized, enhancing the efficiency and performance of the plant prior to construction.

COMPARISON OF ON-SITE TASKS: REALITY VS. VIRTUAL (VC)

	REALITY
MECHANICAL INSTALLATION	• On-site system installation • Installation of robots
ELECTRICAL INSTALLATION	• Connection of all components
START OF COMMISSIONING	• PowerOn: System activation • Shakedown of PLC and robot programs



	VIRTUAL (VC)
MECHANICAL INSTALLATION	• Creation of VC model • Simulation of a 3D cell with all kinematics and the material flow
ELECTRICAL INSTALLATION	• Development of behavioral models (macros) • Linking of all signals • Integration of the robot controller
START OF COMMISSIONING	• Start of virtual commissioning • Creation of the VC model completed • Test phase for PLC and robot programs



VC PROCESS SEQUENCE

These steps provide a comprehensive overview of the virtual commissioning procedure and help the systemic and efficient design of the process.

01

CONCEPT & PLANNING

The fundamental concept of the system is developed in this phase. This encompasses the definition of technical requirements, the definition of goals and planning of the overall project schedule.

02

MODELLING

3D modeling: A detailed 3D model of the system is created here. This model provides the basis for all further tests and simulations.

Kinematics: Motion sequences within the system are modeled. This encompasses the simulation of moving parts and machines to ensure that they function correctly.

Material flow: How materials and products move through the system is analyzed and simulated. This aids the identification of bottlenecks and optimization of the flow.

03

STRUCTURE OF BEHAVIORAL MODELS

Connection of components: All mechanical and electrical components of the model are connected together to create a completely functional system.

Linking signals: Communication between the components is established by integrating the required signals and control commands.

Integration of robot controller: The control system for robots is integrated in the model to simulate the interaction with other parts of the system.

04

START OF VIRTUAL COMMISSIONING

Actual virtual commissioning commences with the complete structuring of the model. The model is operated under practically real conditions in this phase to tests its functionality.

05

TESTING OF PLC AND ROBOT PROGRAMS

Programmable logic controllers (PLC) and robot programs are intensively tested. Errors and problems are identified and remedied to ensure the reliability and efficiency of the system.

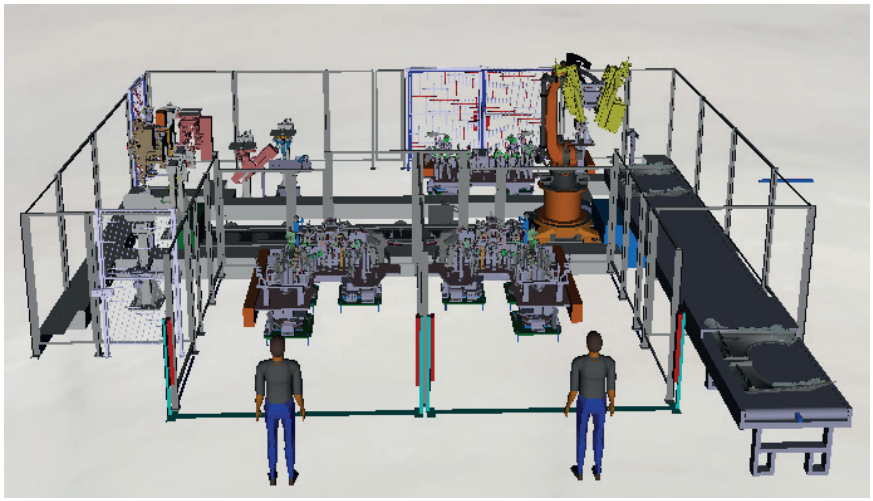
06

OPTIMIZATION & IMPLEMENTATION

Optimization measures are conducted on the model based on the results of tests. The optimized system is then prepared for implementation in the real world.

IN SHORT:

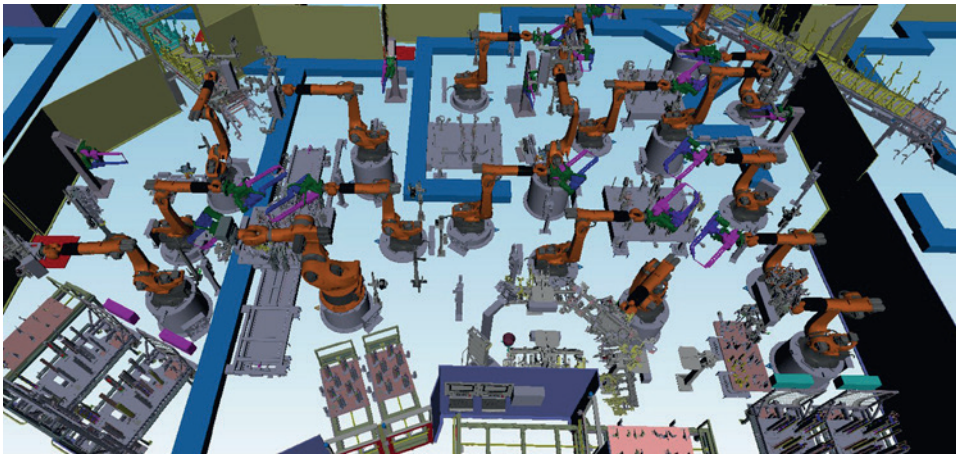
DIGITAL SHADOW



A digital shadow in the context of virtual commissioning (VC) is a simplified but dynamic virtual depiction of a physical system updated in real time to reflect operative data and processes. In contrast to the digital twin used for interactive simulations and analyses, the digital shadow focuses primarily on real-time monitoring of the system. The associated 3D model is connected directly to the real system to continually transmit its current state. The digital shadow enables centralized monitoring via a webstream.

DIGITAL TWIN

A digital twin during virtual commissioning (VC) is a highly detailed virtual copy of a physical plant or a system that is specially designed for use in the simulation and checking prior to actual commissioning. This model integrates all relevant information on the system engineering, electrics and control software to simulate the real behavior of the system under different operating conditions. In the context of virtual commissioning, the digital twin enables engineers and technicians to optimize processes, identify possible malfunctions at an early stage and configure the system so that it offers a maximum degree of efficiency and safety during commissioning. Simulations in advance mean that the digital twin contributes to the minimizing of risks, shortening of the commissioning time and the reduction of costs.



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EBZ GROUP: YOUR LEADING EXPERT FOR VIRTUAL COMMISSIONING (VC)

We at the EBZ Group understand the significance of efficient and precision commissioning of systems. As your experienced partner, we provide tailored solutions with advanced tools from EKS Intec (RF::Suite), on request supplemented by a broad range of other systems. Our specialized expertise encompasses the programming and simulation of robots and PLC systems, and we can look back on a success story that extends over many years.

OUR TECHNICAL SPECIALTIES

- **ROBOT CONTROL SYSTEMS**
  KUKA, ABB, FANUC – we virtually commission the leading brands in industrial robotics.
- **PLC SYSTEMS**
  Siemens, AllenBradley – our expertise ensures seamless integration and functional reliability.

SPECIALIZED INFRASTRUCTURE

- **VC SWITCH CABINET**
  Specially developed to meet the unique requirements of virtual commissioning.
- **DEDICATED OFFICE FACILITIES**
  Our facilities are specially designed for the realization and monitoring of VC projects.

TEAM AND EXPERIENCE

- **TEAM STRENGTH**
  Our committed team consists of 20 highly qualified VC specialists.
- **SECTOR EXPERIENCE**
  More than a decade of successful implementations in a variety of sectors.
- **PROJECT SCOPE**
  Over 1,000 PLC systems and 10,000 robots have been virtually commissioned by us.

Put your trust in EBZ and profit from our extensive experience and in-depth technical expertise. Trust in our expertise to have your plants operating safely, efficiently and on schedule!

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