MAN Energy Solutions
Future in the making

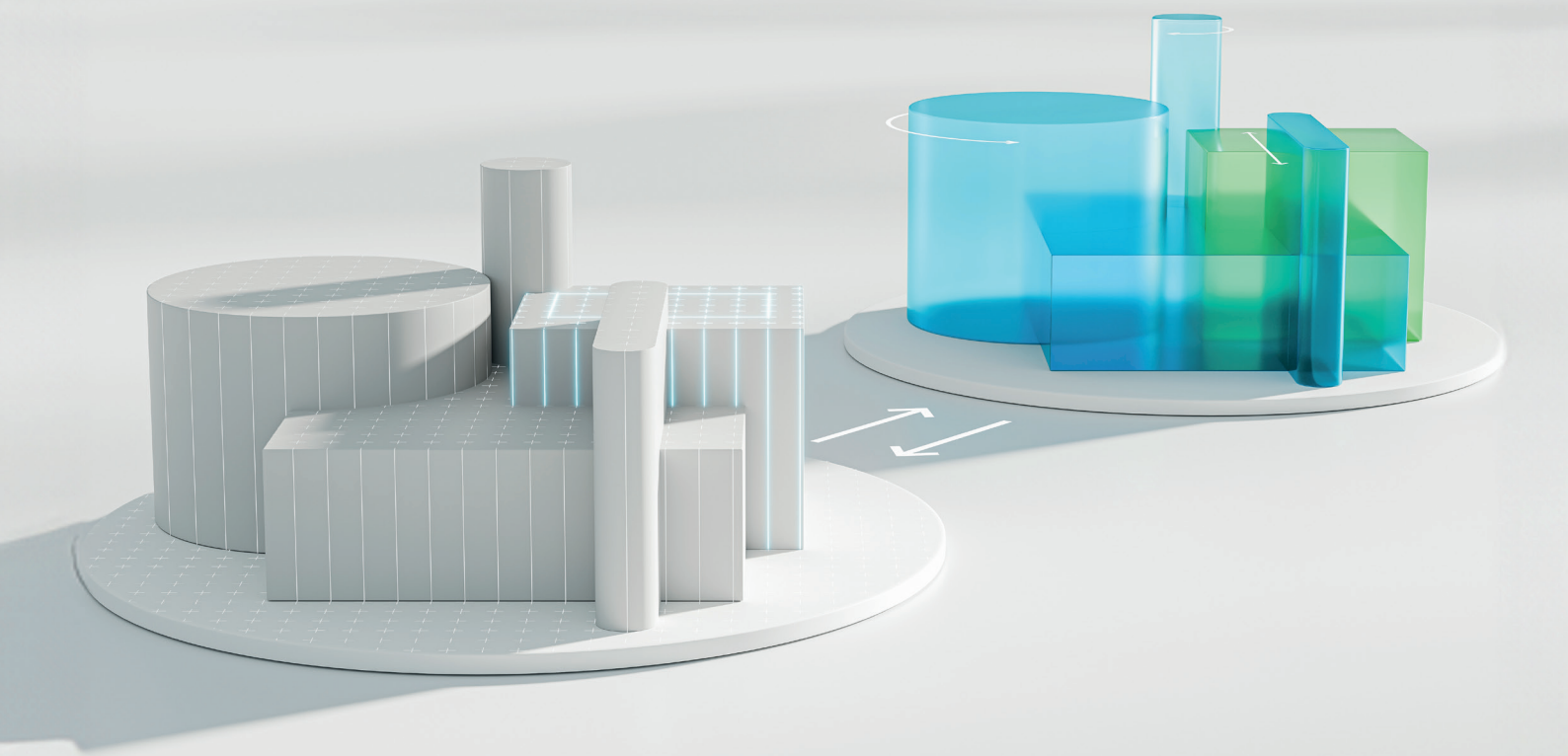
Digital Twins

We use digital twins to simulate very complex turbomachinery systems and their behavior and management by means of artificial intelligence, allowing the equipment to be optimized even before it is installed. This accelerates the design of complex control concepts in an early phase and enables the development of special software functions.

The prior execution of virtual commissioning also reduces real-life setup time. You benefit from customized software solutions, improved software quality, increased efficiency through optimized process control, reduced commissioning time and simulation-based operator training.

Benefits at a glance

- Improved insight and understanding
- Increased efficiency of a train
- Optimized performance of a train
- Minimized risk of damaging the assets
- Cost savings



Bridge between the physical and digital process

Dynamic Simulation

An advanced engineering tool that provides an in-depth understanding of transient processes of turbomachinery trains across numerous scenarios through rigorous thermodynamic and fluid flow calculations.

Typical Scenarios
- Start-up of the compressor unit from process conditions
- Start-up of the compressor unit from settle out
- 100 % duty point steady state operation
- Normal and emergency shutdown
- Feed reduction and anti-surge valve failure etc.

Tools
- Self-developed simulation library in MATLAB Simulink
- Aspen HYSYS

Customer added values
- Evaluation of design and identification of potential problems
- Confirmation of operation under a number of defined procedural and upset conditions before equipment delivery to site

Simulation-based Operator Training System

Simulation-based operator training system with typical process scenarios.

Scope
Simulation-based operator training on real software and Human Machine Interface (HMI).

Tools
Stand-alone PC with Software in the Loop (SiL)-simulation using dynamic simulation process and train model in SIMIT and original project software and HMI in PCS7.

Customer added values
- Increased production and improved quality
- Faster recovery from process upsets
- Reduced abnormal incidents caused by human error
- Test process control optimization prior to operation

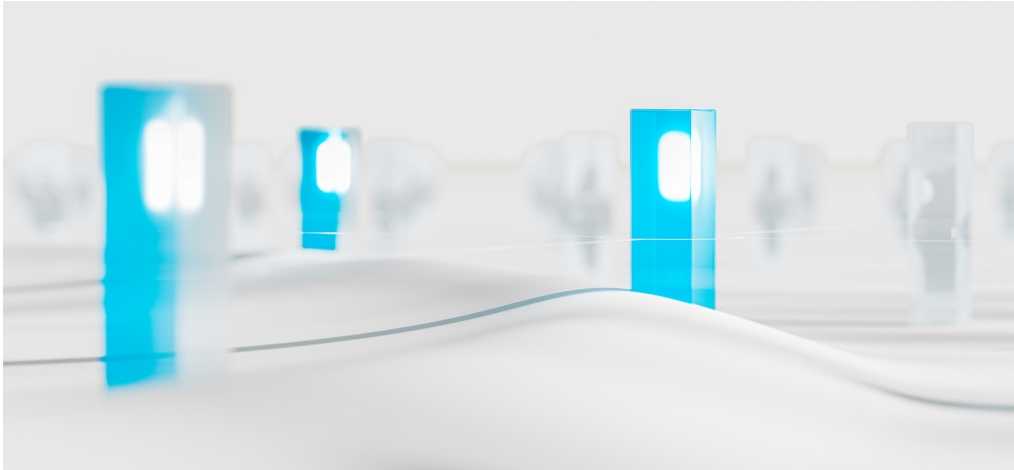
Virtual Commissioning

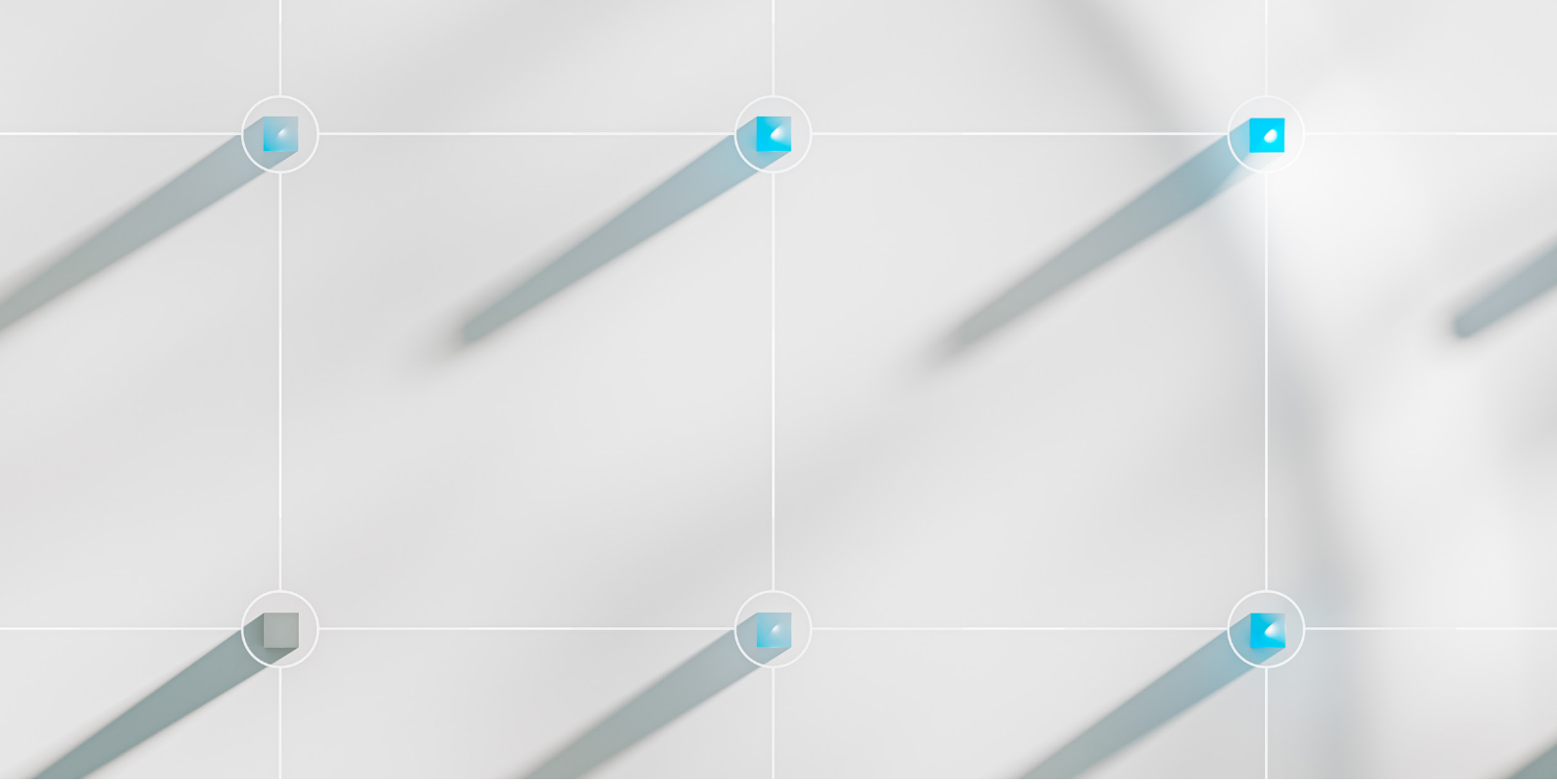
Hardware in the Loop or SiL-simulation facilitates software bug-fixing and accurate controller settings before real commissioning.

Scope
- Optimization of control system in advance using simulation
- Assisting in the design of complex control concepts in an early phase

Tools
- Self-developed simulation library in MATLAB Simulink
- SIMIT

Customer added values
- Significantly reduced commissioning time on site
- Increased efficiency through optimized process control
- Strong foundation for possible later plant optimization





Virtual Sensors

Artificial Intelligence (AI) based software-algorithms replicate the behavior and functionality of real sensors.

Scope
- Replacement for physical sensors in case of sensor damage / failure
- Virtual redundancy to a physical sensor

Tools
AI-based algorithm integrated in the PCS7 PLC software. Code is generated using the self-developed tool Vision.

Customer added values
Prevention of false alarms and spurious trips from damaged physical sensors resulting in non-intended process shutdowns:

- Downtime improvement due to spurious trips to enhance availability
- Higher asset availability
- Less unnecessary production losses
- Less risk of hazardous events following a spurious activation, such as during start-up
- Less excessive stresses on components and systems during shutdown and start-up
- Less profit losses due to non-intended process shutdowns before equipment delivery to site

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