

Digitalization in Machine Tool Manufacturing – Thinking further!

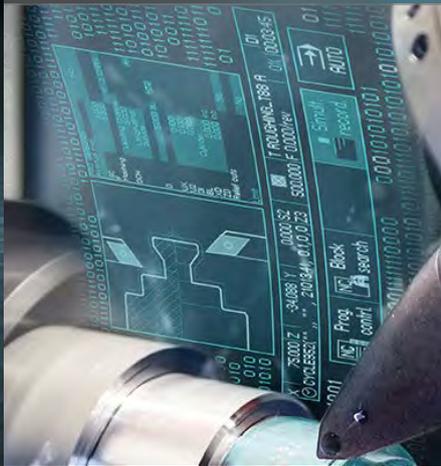
Dr. Wolfgang Heuring | CEO Siemens Motion Control | EMO Press Conference 2019

Siemens Motion Control is developing, producing and selling a market leading product portfolio to more than 30,000 customers



Business Unit Motion Control: Dr. Wolfgang Heuring - CEO

Industry Software



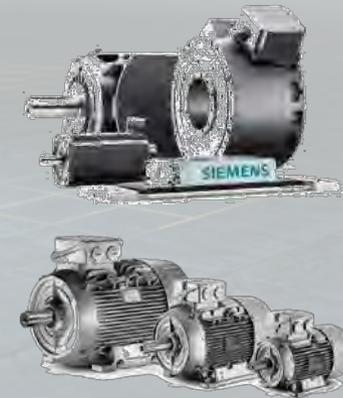
SINUMERIK



SINAMICS



SIMOTICS



Services



~ 20,000 employees



16 Factories



> 30,000 customers worldwide



30 R&D locations

Motion Control – we focus consequently on dynamic industries



Process industries

Discrete industries

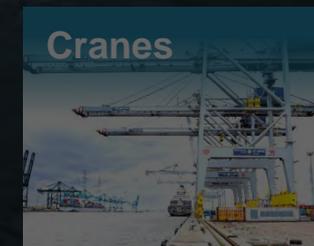
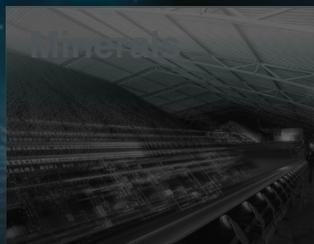


One of the most dynamic and innovative industries is the ...



Process industries

Discrete industries



The machine tool industry has increasing challenges to raising productivity and improving competitiveness

Flexible production

Customized products,
variable lot sizes down to lot size 1

Performance

Machine availability and capacity, commissioning times,
maintenance

Process optimization

Transparency over the entire production process,
productivity, time-to-market

New technological concepts

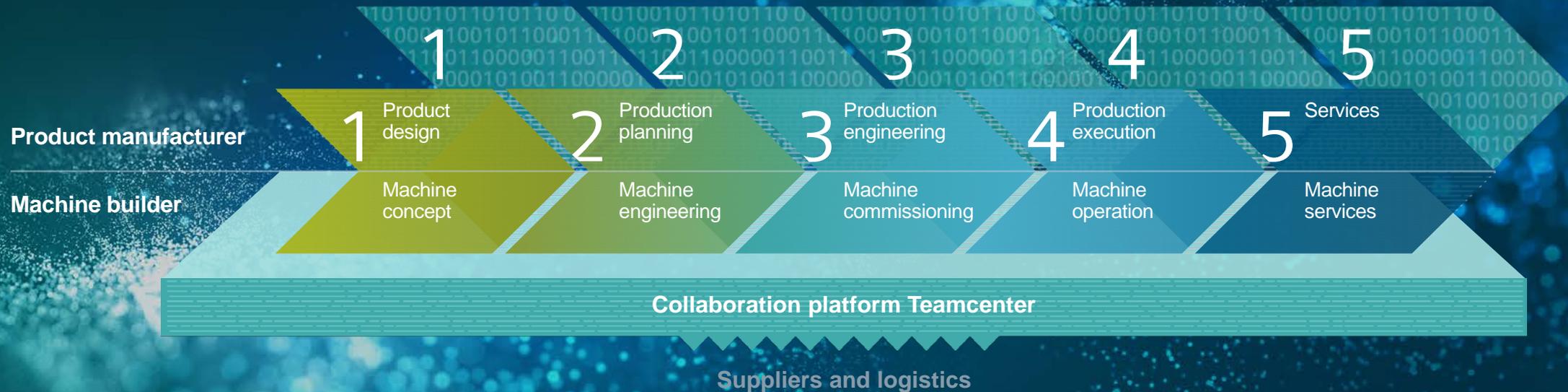
Additive manufacturing, robotics,
edge and cloud computing

New business models

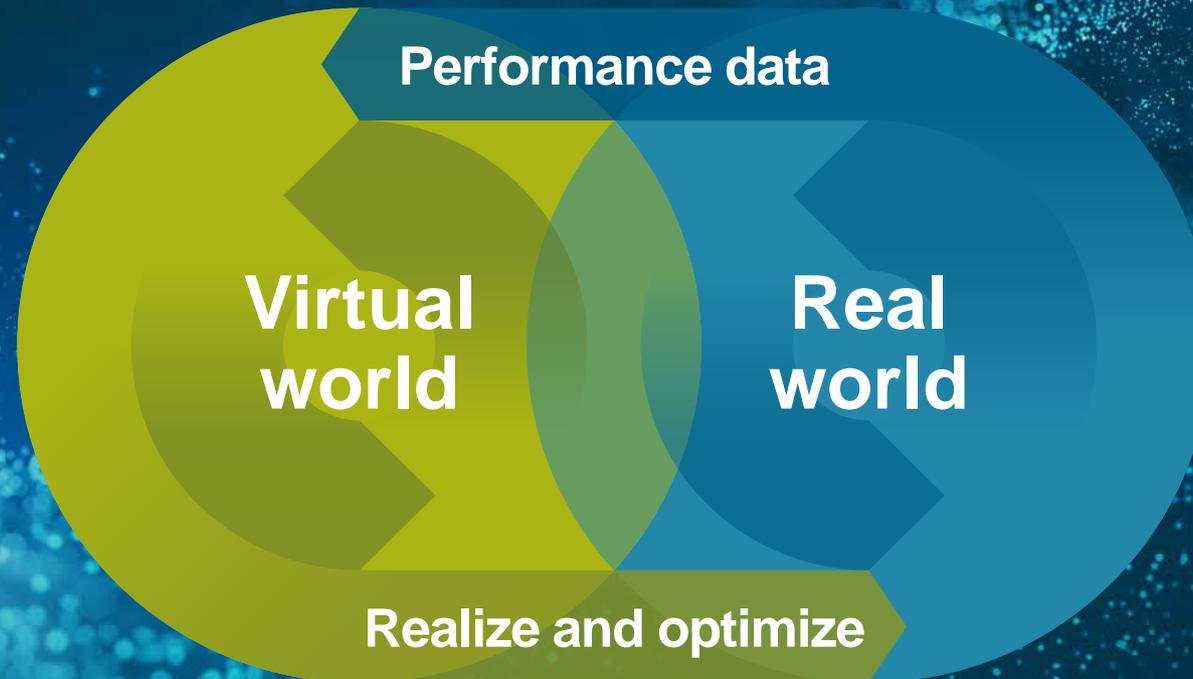
The answer to
master the
challenges is ...

Embracing digitalization!

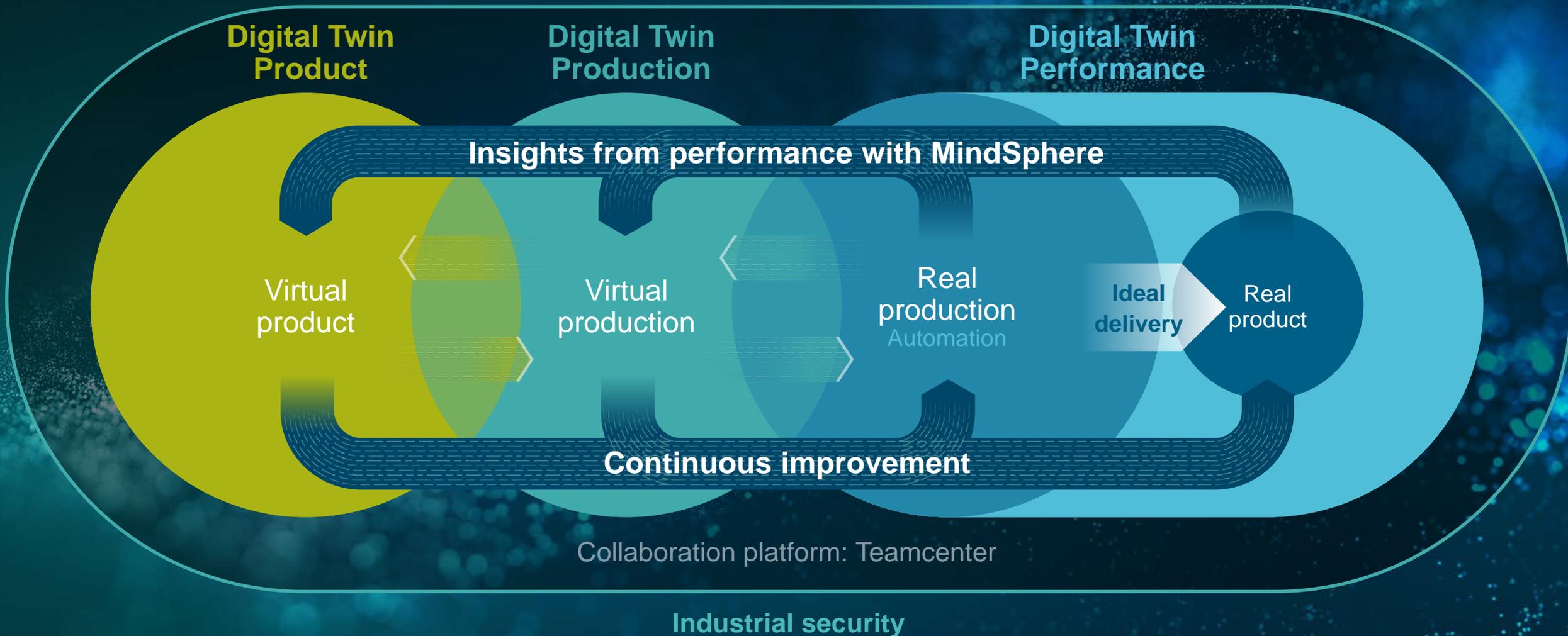
Our holistic approach - Integrating and digitalizing the entire value chain for product manufacturer and machine builder



Creating a powerful digital twin to merge the virtual with the real world - the basis for continuous optimization



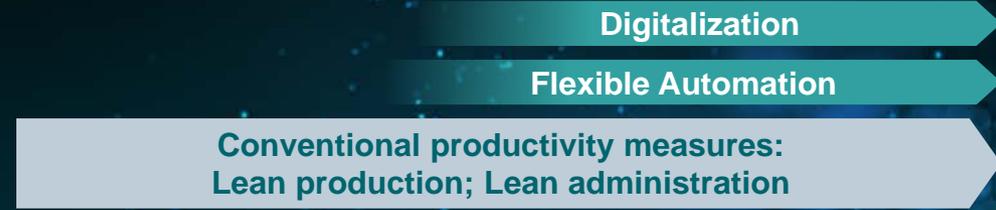
The digital twins seamlessly connect the steps of the value chain both for product manufacturer and machine builder



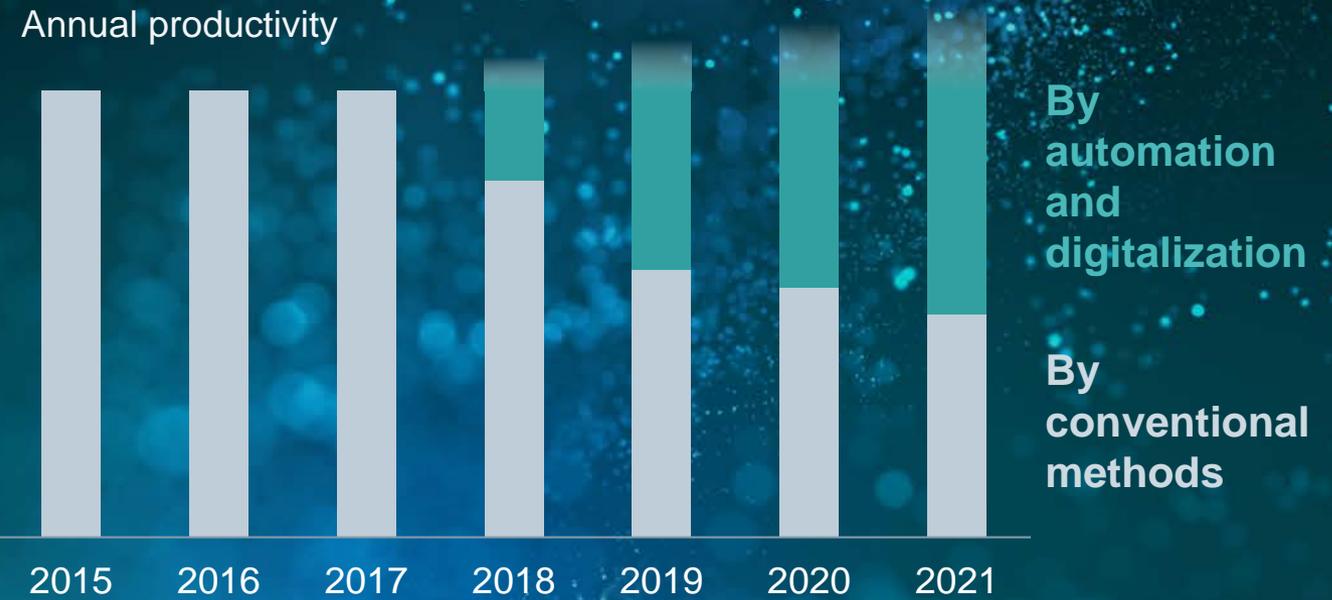
Digitalization and flexible automation enhance successful lean methods to further increase factory competitiveness



... requires digitalization and automation in addition to conventional lean methods



Annual productivity



Drive digitalization in factories in a technology and value driven three-step approach to reach highest productivity increase

1

Gather experience & create insights

- Ensure connectivity
- Create transparency
- Implement applications

2

Set-up a digital program to ensure end-to-end implementation

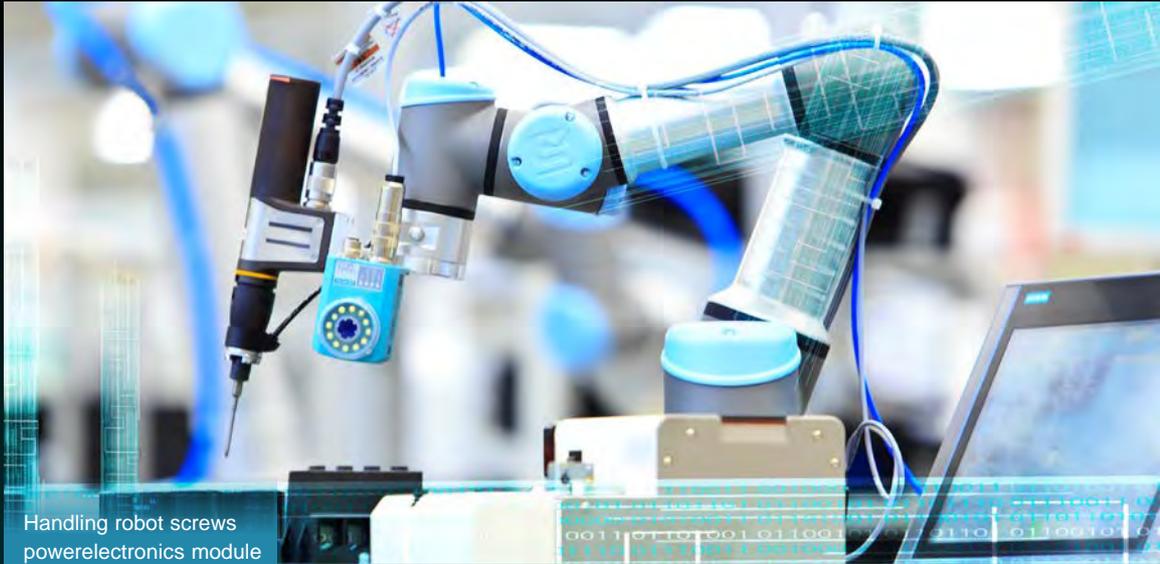
- Define digitalization strategy
- Define reference processes
- Create technology roadmaps

3

Exploit the full potential of digitalization and continuous optimization

- Run digital walkthroughs
- Detailed bottom-up analysis
- Include specific expertise e.g. for automation, robotics, data analytics or smart planning

Significantly increased productivity through digitalization and flexible automation solutions in our own factories



Handling robot screws powerelectronics module

Annual productivity in Erlangen



Arena of Digitalization

Annual productivity in Bad Neustadt





Digitalization in Machine Tool Manufacturing – Thinking further!



SINUMERIK ONE – The digital native CNC

Uwe Ruttkamp | Siemens Motion Control | EMO Press Conference 2019

SINUMERIK ONE

Bring ideas to life



Maximize productivity

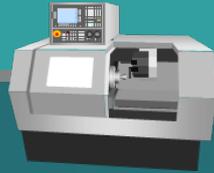


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SINUMERIK Portfolio

SIEMENS
Ingenuity for life

Entry-level machines



SINUMERIK 808



Standardized machines



SINUMERIK 828



Modular machines



SINUMERIK 840

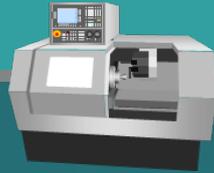


Increasing modularity & productivity

SINUMERIK Portfolio with SINUMERIK ONE



Entry-level machines



SINUMERIK 808



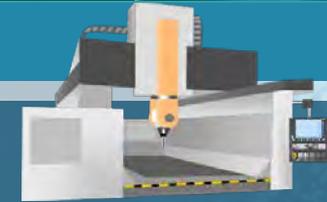
Standardized machines

SINUMERIK 828



Modular machines

SINUMERIK ONE
Real & Virtual



Increasing modularity & productivity

Scalable Hardware Platform

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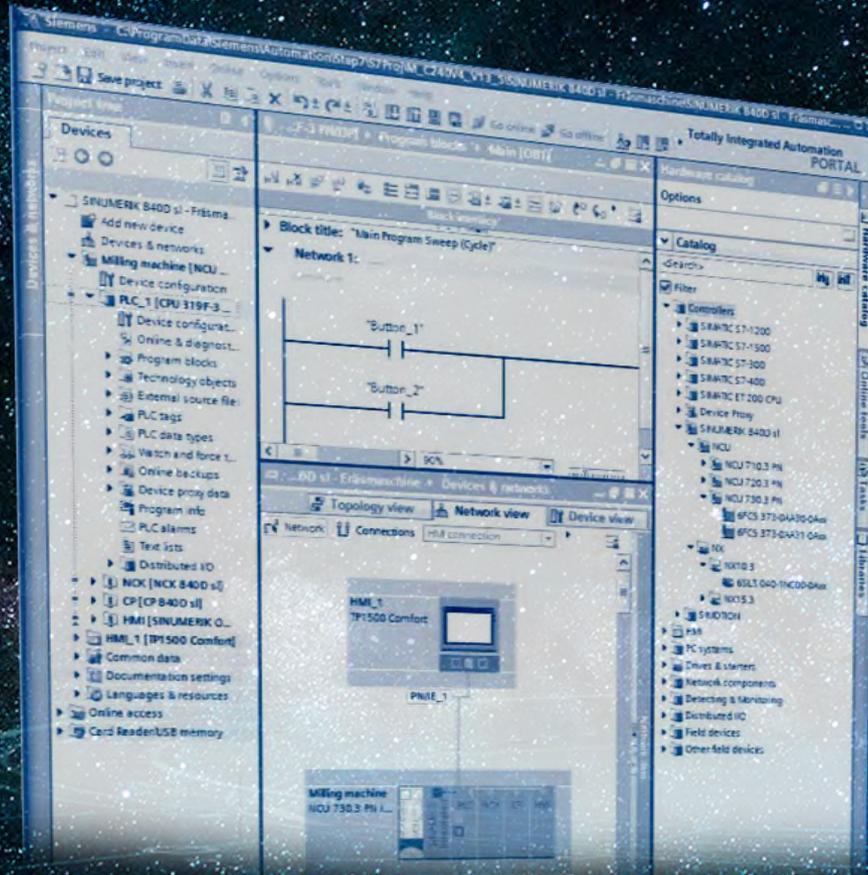


Innovate faster



Engineering in the TIA Portal

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Excite digitalization



TIA Portal – Basis for the Digital Twin



SIEMENS Create MyVirtual Machine

Projekt Ansicht Hilfe

Simulationssteuerung Taktzähler 162015 130%

SIEMENS SINUMERIK OPERATE 05/07/19 3:00

SI telegrams, PROFSafe-type 983 AX1:MX1/SEBUO_3.3.3

Receive direction Control word (S_STW2)

BR 7...8	Int.Event Ack	SLP		SLS	SOS	SS2	SS1	STO
BR15...8			SDI Negative	SDI Positive		SLS BR1 Selection	SLS BR0 Selection	SLA
BR23...16	Safe Cam Desel.				SLP Selection			
BR31...24			SS2ESR	SS2e	Gear stge Switch	Gear stge Bit 2	Gear stge Bit 1	Gear stge Bit 0

Send direction Status word (S_ZSW2)

BR 7...8	Int.Event	SLP		SLS	SOS	SS2	SS1	STO
BR15...8	SSM Speed		SDI Negative	SDI Positive		SLS BR1	SLS BR0	SLA
BR23...16	Safe referenced	SP Valid			SLP Area 1/2			
BR31...24	SLP Bottm	SLP Top	SOS selected	SS2e	SS2ESR			

green = 1; grey = 0; - not assigned

Bus Axis diag. Safety Trace System utiliz.

NCU Run Stop

PLC I/A-Table

Adresse	I/O	Kommentar
%Q19.0		emergency led
%Q4.3		safe door
%I6.3	0 1	close door
%I6.2	0 1	open door
%I6.4	0 1	enables drive

Komponentenstatus

- NCU
- COS
- simDrive
- CP1543
- MCP
- CM1542-5
- PLCSimAdv
- simNCK
- HMI

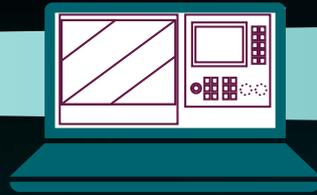
Scalable portfolio for machine builder



Engineering & virtual testing

Faster engineering using the virtual test rack

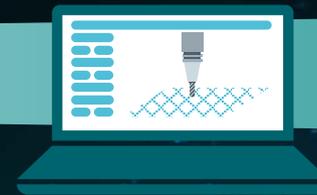
Create MyVirtual Machine /Operate



Engineering & virtual testing with 3D

Safer engineering with greater confidence based on 3D machine model

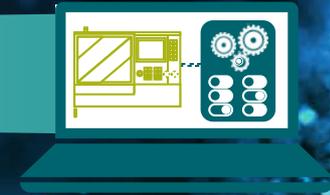
Create MyVirtual Machine /3D



3D engineering electrical & mechanical

The result: faster actual machine commissioning

Create MyVirtual Machine /SIMIT Integrated



Engineering & virtual testing w/ openness

Considerable time savings due to maximum test accuracy based on original codes

Create MyVirtual Machine /Open

The Mikron Digital Twin

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“Through the consistent use of digital twins, we are already prepared for the changes which are clearly emerging in the machine tool industry.”

Peter Sauter, CEO
Mikron GmbH Rottweil



Discover a new way of thinking



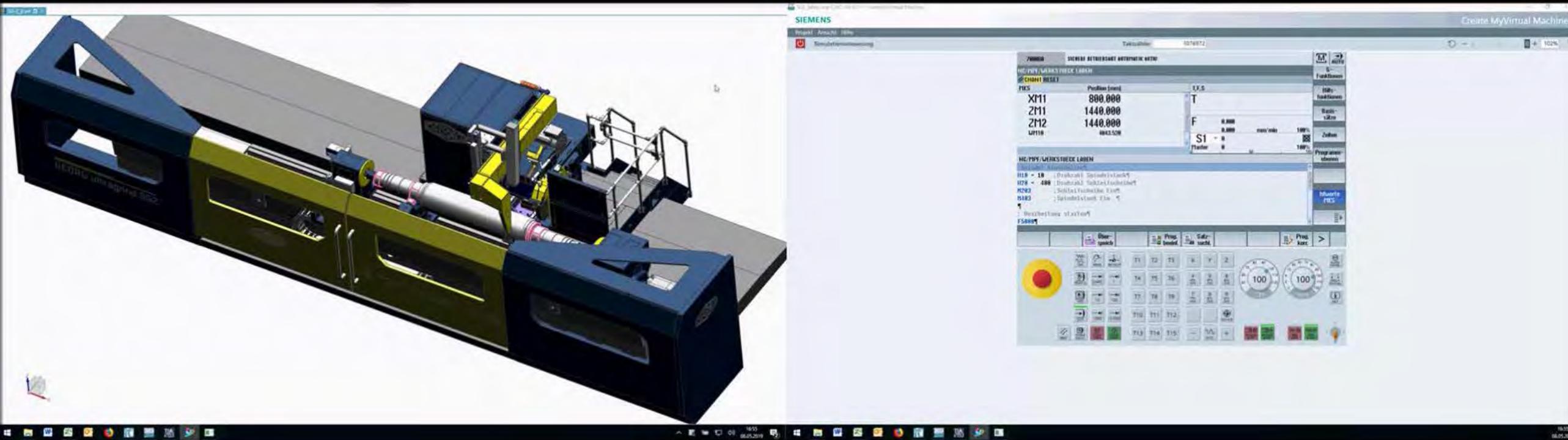
The Fooke Digital Twin

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The Heinrich Georg Digital Twin

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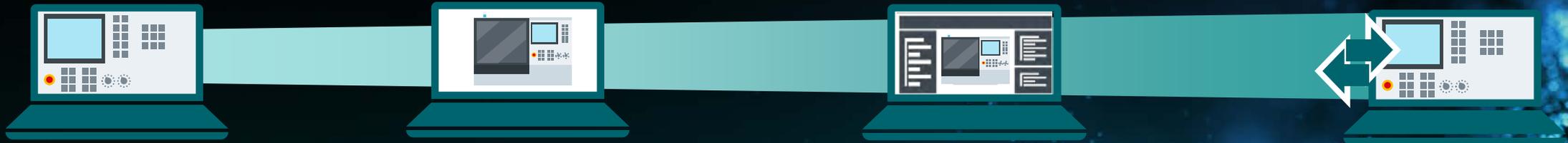


“SINUMERIK ONE opens up completely new opportunities for us and especially for our customers and machine users to increase the productivity and efficiency of our machines.”

Dr.-Ing. Wieland H. Klein
Managing Director / Member of the Board
Heinrich Georg GmbH



Scalable portfolio for machine user



Job preparation & machine training

Job preparation with 3D simulation

Job preparation with CAM

Openness for external devices & applications

Save time on the shop floor with virtual job preparation

Increase process reliability with 3D simulation

Increase process reliability with NX CAM

Open architecture for 3rd party integration

Run MyVirtual Machine /Operate

Run MyVirtual Machine /3D

NX Virtual Machine

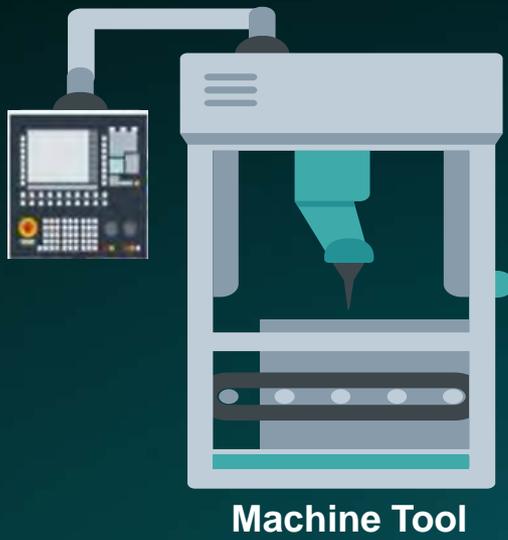
Run MyVirtual Machine /Open

The key technologies to exploit the full potential of digitalization in Machine Tool Manufacturing are ...

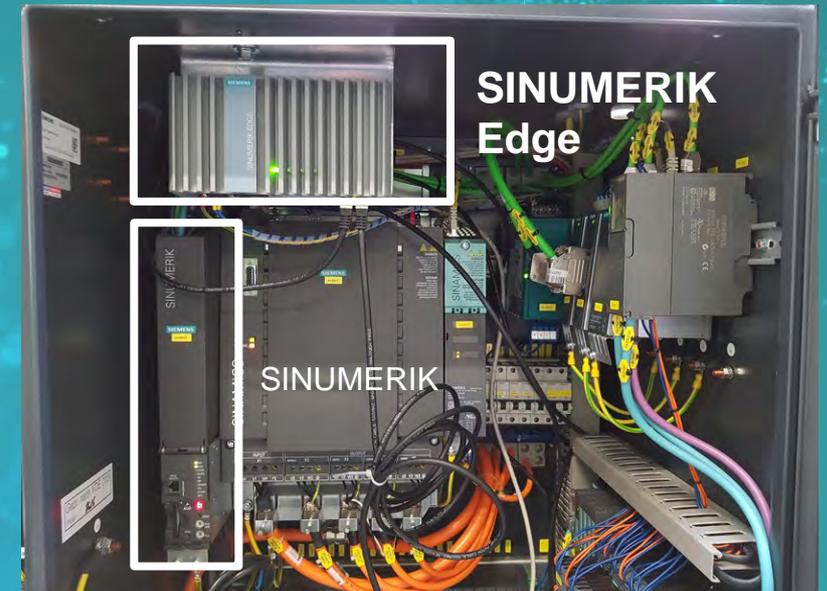
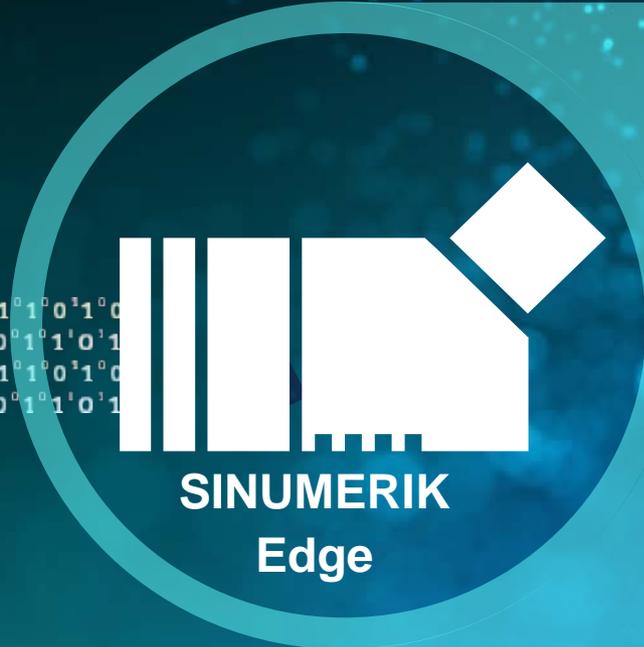


SINUMERIK Edge is an open platform that enables machine digitalization

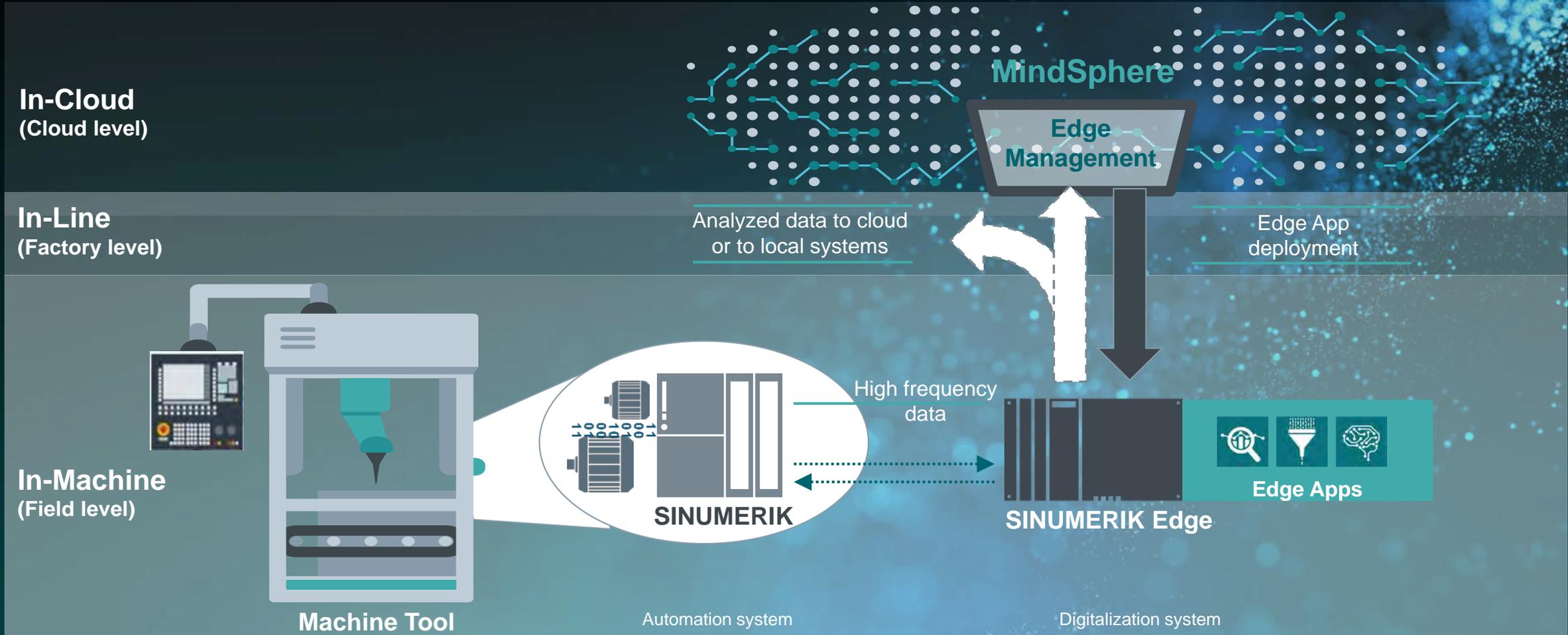
SIEMENS
Ingenuity for life



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SINUMERIK Edge is an integral part of the digitalization architecture



SINUMERIK Edge and CNC Shopfloor Management Software drives productivity in four areas



Production Efficiency and Productivity

- Analyze MyPerformance (Integrate)
- Analyze MyPerformance /OEE-Monitor (MindSphere)

Machine Availability

- Manage MyMachines (MindSphere)
- Manage MyMachines /Remote (MindSphere)

Job Preparation and Execution

- Run & Create MyVNCK
- Analyze MyWorkpiece /Toolpath

Machining Process Improvement

- Optimize MyMachining /Adaptive Control & Monitoring
- Optimize MyMachining /Trochoidal (Edge)

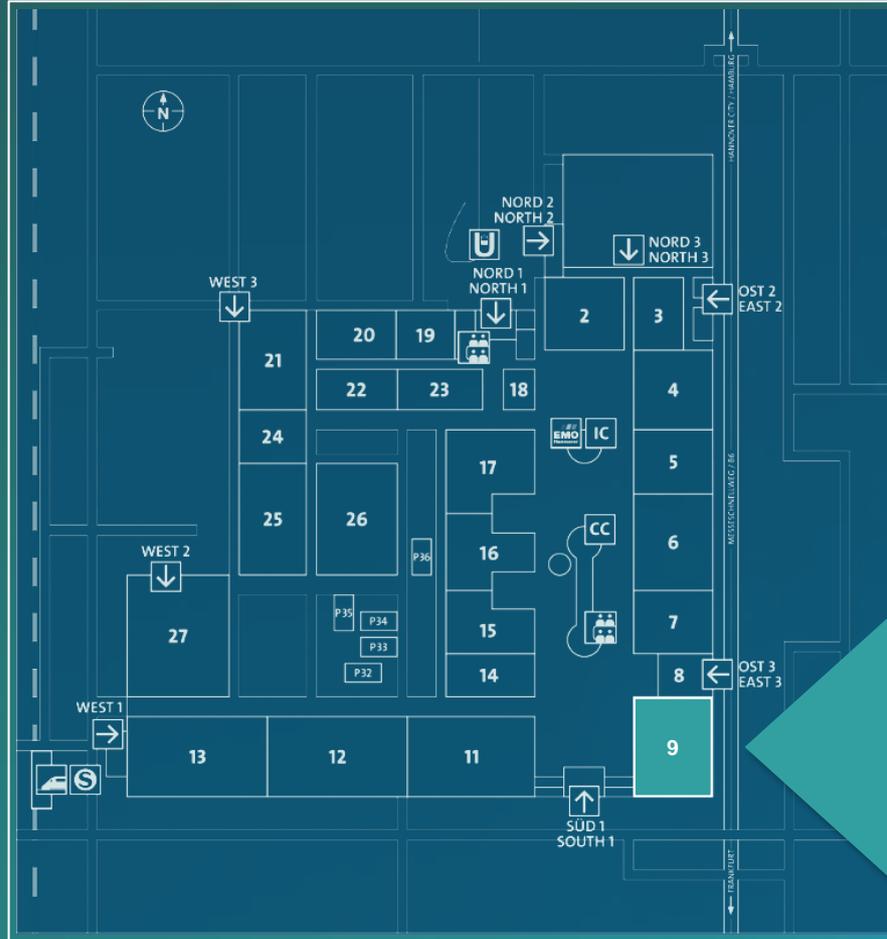
NEW

Analyze MyWorkpiece /Monitor allows real-time analysis of the workpiece quality during production





Bring ideas to life



16. – 21. September 2019
We are looking forward to your visit!

Siemens Stand
Hall 9 / H50