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

- Chemicals
- Glass & Solar
- Marine
- F&B
- Water & Wastewater
- Minerals
- Pharma
- Batteries
- Oil & Gas
- Fiber
- Power & Utilities
- Tire

Discrete industries

- Electronics
- Aerospace
- Automotive
- Wind
- Machine Tool Manufacturing
- Intralogistics
- Additive Manufacturing
- Cranes
- Robotics

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Dr. Wolfgang Heuring, CEO Siemens Motion Control
One of the most dynamic and innovative industries is the ...
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

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

**Performance**
Machine availability and capacity, commissioning times, maintenance

**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

Collaboration platform Teamcenter

1. Product design
2. Production planning
3. Production engineering
4. Production execution
5. Services

Product manufacturer

Machine builder

Suppliers and logistics
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

Conventional productivity measures:
- Lean production; Lean administration

Annual productivity

Comparing productivity by:
- Conventional methods
- Automation and digitalization

Speed - Flexibility - Quality - Efficiency

Security
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

Annual productivity in Erlangen

Annual productivity in Bad Neustadt

## FY16 FY17 FY18 FY19 FY20 FY21

3-5% 3-5% 3-5% 7-8% 7-8% 7-8%

### Basic productivity (value-added costs) Additional productivity (through flexible automation and digitalization) Total productivity

Handling robot screws power electronics module

Arena of Digitalization

Dr. Wolfgang Heuring, CEO Siemens Motion Control
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
SINUMERIK Portfolio

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
Innovate faster
Engineering in the TIA Portal
Excite
digitalization
TIA Portal – Basis for the Digital Twin
Scalable portfolio for machine builder

- Engineering & virtual testing
- Engineering & virtual testing with 3D
- 3D engineering electrical & mechanical
- Engineering & virtual testing w/ openness

Faster engineering using the virtual test rack
Safer engineering with greater confidence based on 3D machine model
The result: faster actual machine commissioning
Considerable time savings due to maximum test accuracy based on original codes

Create MyVirtual Machine /Operate
Create MyVirtual Machine /3D
Create MyVirtual Machine /SIMIT Integrated
Create MyVirtual Machine /Open
The Mikron Digital Twin
“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
The Heinrich Georg Digital Twin
“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.
SINUMERIK Edge is an integral part of the digitalization architecture.

- **In-Machine** (Field level)
  - Machine Tool
  - SINUMERIK
  - High frequency data
  - Automation system
  - Digitalization system

- **In-Line** (Factory level)
  - Analyzed data to cloud or to local systems
  - Edge App deployment

- **In-Cloud** (Cloud level)
  - MindSphere
  - Edge Management
  - Edge Apps
SINUMERIK Edge and CNC Shopfloor Management Software drives productivity in four areas

Production Efficiency and Productivity
- Analyze MyPerformance (Integrate)
- Analyze MyPerformance /OEE-Monitor (MindSphere)

Job Preparation and Execution
- Run & Create MyVNCK
- Analyze MyWorkpiece /Toolpath

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

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