Digital Enterprise – Thinking industry further!

SPS 2019 | November 26, 2019
Klaus Helmrich, Member of the Managing Board of Siemens AG and CEO Digital Industries
**Digital Enterprise 2019 – Thinking industry further!**

1. **Our customers’ requirements are increasing:** environmental efficiency is just as important as productivity, flexibility and time-to-market.

2. **Our Digital Enterprise portfolio meets these requirements through an even more powerful connection of the virtual and the real world.**

3. **New control systems and other platform innovations ensure data integration and flexibility across all stages of the value chain.**

4. **Our growing ecosystem for Industrial Edge and Cloud supports scalability from the shop floor to the Cloud.**

5. **With cutting-edge technologies, we are paving the way for modular, highly flexible production processes.**
Continuously growing demands for productivity and flexibility as well as for environmental efficiency

<table>
<thead>
<tr>
<th>Productivity</th>
<th>Flexibility</th>
<th>Time-to-market</th>
<th>Environmental efficiency</th>
</tr>
</thead>
<tbody>
<tr>
<td>Example machine building</td>
<td>Example chemicals</td>
<td>Example aerospace</td>
<td>Example water</td>
</tr>
<tr>
<td>Up to 25% shorter machine</td>
<td>Individualized color</td>
<td>2.5 instead of six years</td>
<td>Up to 240,000 m³ supply</td>
</tr>
<tr>
<td>commissioning</td>
<td>batches of 100 liters</td>
<td>of development time</td>
<td>of desalinated water</td>
</tr>
<tr>
<td></td>
<td>instead of 5000+ liters</td>
<td>for airplanes</td>
<td>per day instead of 51,000 m³</td>
</tr>
</tbody>
</table>
Alfred Ritter GmbH & Co. KG
Energy data analytics increases energy efficiency

Integration of data
from production, building and power generation

Lower energy costs
Reduced primary energy consumption: -20%
Optimized generation of compressed air: -40%

Target
Further -10% energy consumption per bar of chocolate
Strategic partnership with Grundfos

Digital solutions reduce water consumption

- **Digital twin** for increased productivity, shorter time-to-market and reduced material consumption

- **MindSphere connection** for optimization of pumps and motor schedules for reduced energy consumption

**Aims for Grundfos**
- Halving of water consumption by 2025
- Water efficiency and treatment saves 50 billion liters of fresh water
Environmental efficiency across the entire value chain – Example Additive Manufacturing

**Design**

>50% weight reduction for energy savings in production and operation

With bionic structures using Siemens NX, StarCCM+

**Production**

> 60% weight reduction
> 800,000 liters less kerosene

With Sinumerik Run
MyRobot/Direct Control, Simotics

**Performance**

70% saving on resources in burner repair, no new purchase required

With on-demand printed spare parts using Siemens AM network
Digital Enterprise – Creation of data pools for the seamless connection of the virtual and the real world

Digital Enterprise
Digital end-to-end solutions for industry

MindSphere

Automation and industrial software for process industry and discrete industry

Industrial communication
Industrial security
Industrial services
Digital Enterprise – Powerful connection of virtual and real worlds

Digital Twin Product

Digital Twin Production

Digital Twin Performance

Collaboration platform

Industrial Security

Klaus Helmrich, Member of the Managing Board of Siemens AG and CEO Digital Industries
Digital Enterprise 2019 – Thinking industry further!
More technologies for implementing the future
Digital Enterprise 2019 – Thinking industry further!
Platform innovations from the shop floor to the Cloud

Data analytics in the Cloud

CNC system Sinumerik One

Process control system Simatic PCS neo

Software and low-code development

Visualization WinCC Unified System

Data analytics on the shop floor – Industrial Edge

MindSphere

One Process control system Simatic PCS neo

Siemens
Ingenuity for life

Unrestricted use © Siemens 2019
Nuremberg, November 26, 2019

Klaus Helmrich, Member of the Managing Board of Siemens AG and CEO Digital Industries
First digital CNC – Completely seamless image from the virtual idea to the real production of the product

SINUMERIK ONE
CNC platform

- Design and concept with Mechatronic Concept Designer
- Engineering with TIA Portal
- Test/commissioning with Create/Run My Virtual Machine
- Simulation of product processing in foreman’s office
- Seamless high-performance connection of CNC and PLC
- Shorter commissioning times
Up to 50% shorter time-to-market

Up to 25% increased productivity in processing

10x shorter PLC cycle times through integration of Simatic S7-1500
New process control system Simatic PCS neo – For a more modular production

**Simatic PCS neo**
- Petrochemicals, water and plant infrastructure
- Continuous processes, modules are scalable from single plants to globally networked systems

**Simatic PCS 7**
- Comprehensive range of applications for all process industries
- Continuous processes as well as batch and regulated industries e.g. pharma
- Further development for all existing process applications

Common hardware platform and application architecture for Simatic PCS 7 and Simatic PCS neo
Acquisition of PSE
Precise simulation models for the entire life cycle

- **Model-based simulation** optimizes digital twin for product/process design and operation in **Chemicals, Petrochemicals, Pharma and F&B**

- Detailed dynamic simulation of technical processes, validated with **real-time process data**

Customer SABIC

- Optimized operation of a cracker
- Precise simulation of operation

Up to **2% higher yield**
Newly developed visualization platform based on modern web technologies

**Simatic WinCC Unified System**

- **Scalable** from the machine level to a comprehensive system visualization
- Execution on panel and PC systems, fit for Cloud and Edge
- Integration of applications through open, powerful interfaces and technologies\(^1\)
- New generation of HMI panels with Edge functionality
- Engineering in the TIA Portal

---

\(^1\) ODK (Open Development Kit), OpenPipe, Custom Web Control
Xcelerator – Platform for rapid app development

- Data analytics and apps
- Software, digital services and new business models

Rapid low-code app development

- Any database/Cloud/device/infrastucture
- Low code, leading Rapid App Development (RAD) system
- Individual, adaptable apps
- Can be integrated inside and outside the company
Growing ecosystem for MindSphere World – Currently >120 members from a whole range of industries

Members

Germany
Belgium
Switzerland
Finland
Italy
France
Spain
Singapore
SEA Pacific
Korea
Taiwan & Japan
China
USA
Canada
Central & South America

End 2018
01/2019
06/2019
08/2019
In planning

0
20
40
60
80
100
120
140

01/2018
2018
2019
2020
2021
2022
2023
2024
2025
2026
2027
2028
2029
2030

0
20
40
60
80
100
120
140

Unrestricted use © Siemens 2019
Page 17
Nuremberg, November 26, 2019
Klaus Helmrich, Member of the Managing Board of Siemens AG and CEO Digital Industries
bror tonsjö ab, sweden

finance concepts for the digital transformation of sme's

• connection of shop floor and erp system to mindsphere: optimized production processes and fewer downtimes
• 15% higher production efficiency
• financing: predictable cash flow management (24-months payment plan)
• costs are covered by gains in efficiency

"with the payment plan from sfs we can match benefits to costs much more effectively."
clas tengström, ceo bror tonsjö
AI-based data analytics close to the process to increase machine performance – Industrial Edge
Acquisition in Edge environment: Pixeom
Creation of an Industrial Edge ecosystem

• Container technology: execution of Cloud and Edge apps without additional hardware configuration

• Easy management of apps and central updates for devices, even on distributed infrastructures

• Industrial Edge ecosystem: Openness for apps and devices from different manufacturers
New Edge apps for concrete customer benefits

Industrial Edge apps for manufacturing and machine tools

- **Simatic Notifier**: Notifications on wearables for rapid responses in the event of errors – increased availability and productivity

- **Simatic Assistant for Machines**: Direct interaction with industrial equipment via voice control

- **Sinumerik Analyze MyWorkpiece/Vision**: Artificial intelligence for image detection – higher quality and reduced wear
From linked automation to the flexible shop floor – Increased networking makes production more modular
Production and logistics in the next five years – Clear rise in wireless communication

Trend toward flexible and modular production concepts creates challenges for wireless communication: more devices, lower latency, greater reliability

Safety and real-time video support

Flexible production

Fully automated logistics

Production elements and logistics elements – Use of IWLAN or Industrial 5G depending on respective application requirements
Complete networking

**Industrial 5G at Siemens**

- Portfolio expansion with industrial 5G-based hardware
- Application for a private industry frequency at Siemens’ own location
- Research projects and test center for interoperability
Siemens and Qualcomm
First stand-alone 5G network in industrial environment

- Proof of concept by Siemens and Qualcomm in Siemens Automotive Test Center in Nuremberg
- Test of 5G technologies and relevant standards under industrial conditions, e.g. for secure real-time communication
- Stand-alone network as basis for the development of the first 5G-capable routers in the Scalance M product family
We offer our customers a complete portfolio for their digital transformation

**Consulting**
Showing the way to digital transformation

**Implementation**
Implementing technologies

**Optimization**
Continuously optimizing existing plants

**Finance**
Offering finance solutions
Digitalization changes the face of industry –
From design through sales to the shop floor

From real showroom to digital design and sales room

From foreman’s office on site to simulation room in the factory

From linked automation to the flexible shop floor
From SMEs to global players
Innovation in the Nuremberg Metropolitan Region

- “Innovationskunst” initiative by science and business to promote innovation in the Metropolitan Region
- 10 founding companies
- Almost 2,000 Siemens developers and 1,100 developers from Siemens Healthineers involved
- Nuremberg: e.g. AI and Cloud applications; energy-efficient motors | Fürth: e.g. Industrial Edge | Erlangen: e.g. additive manufacturing
Experience Industrie 4.0 with Digital Enterprise – in Hall 11