Siemens Digital Industries Webinari

DE1: Siemens Digital Enterprise

Siemens Digital Industries Webinari 1/2

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Datum	Tema	Predavač
14.04. / 19.05.	FA1: Motion Control	*Darko Živković, Jelena Đukić*
15.04. / 14.05.	FA2: Energy Management System	*Zoran Jovanović*
22.04. / 21.05.	FA3: Redundantni kontroleri serije S7-1500R/H	*Mirko Milovanović*
05.05. / 26.05.	FA4: WinCC Unified	*Mirko Milovanović*
15.04. / 13.05.	MC1: DT konfigurator	*Nenad Bakal, Pavle Dragišić*
23.04. / 22.05.	MC2: Sizer, large drives	*Miloš Marković, Pavle Dragišić*
06.05. / 26.05.	MC3: Sizer, motion drives	*Miloš Marković, Pavle Dragišić*
21.04. / 21.05.	CI1: Industrial Networks	*Jelena Đukić*

Siemens Digital Industries Webinari 2/2

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Datum	Tema	Predavač
16.04. / 15.05.	PI1: PI Academy world	*Andrijana Popara, Miljan Miljanić, Marko Marić*
24.04. / 22.05.	PI2: PI workshop for specialist	*Andrijana Popara, Miljan Miljanić, Marko Marić*
08.05. / 29.05.	PI3: #New@PI	*Andrijana Popara, Miljan Miljanić, Marko Marić*
30.04. / 29.05.	AE1: Digitalna rešenja u procesnoj industriji	*Jelena Đukić, Marko Milenković*
29.04.	CP1: Control Panel Online Symposium	*Siemens worldwide webinar*
22.04. / 27.05.	CP2: Clever engineering in the control panel	*Tijana Džodžo*
28.04. / 12.05.	CP3: New series of signaling devices 3SU	*Tijana Džodžo*
21.04. / 20.05.	CP4: SIRIUS 3RW Soft starters	*Bojan Janković*
07.05. / 28.05.	DE1: Siemens Digital Enterprise	*Zoran Jovanović*

Današnji predavač

Zoran Jovanović

Responsibility

Area Sales Manager
Factory Automation
Energy Management Systems
Digital Enterprise

Contact

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Beograd, Srbija

Siemens Digital Enterprise

Beograd 07.05.2020.

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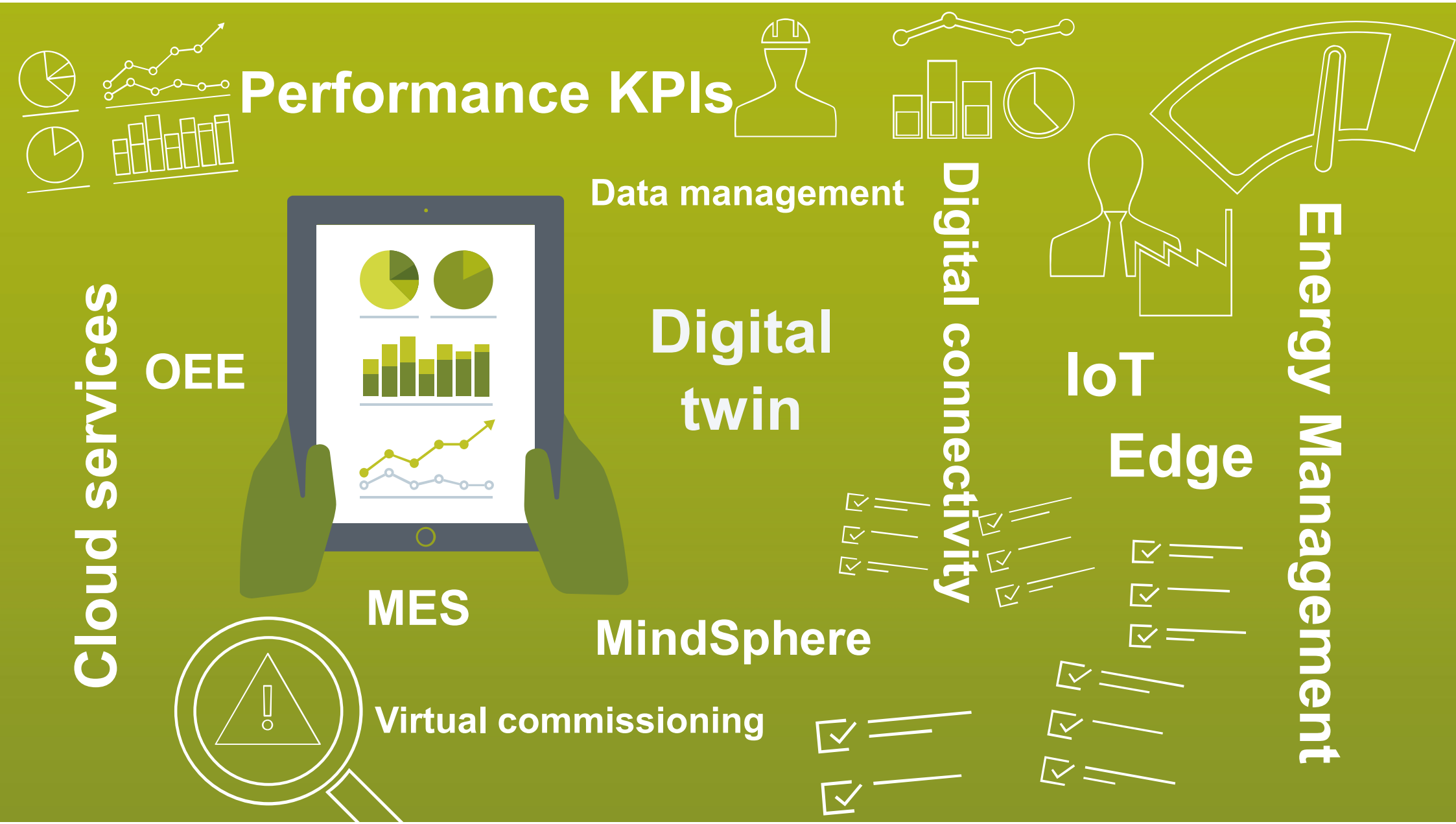
Digitalization changes everything

The next trillion dollars will be earned with data – for our customers and for our industries.

Michael Dell, founder of Dell Inc.

Digital is the main reason just over half of the companies on the Fortune 500 have disappeared since the year 2000.

Pierre Nanterme, CEO Accenture


Performance KPIs
Data management
Digital connectivity
Energy Management
Cloud services
OEE
Digital twin
IoT Edge
MES
MindSphere
Virtual commissioning

The Digital Enterprise
Challenges of the future

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Speed

Flexibility

Quality

Efficiency

New business models

Security

Digital Enterprise is our portfolio of solutions for the digital transformation – in both discrete and process industries

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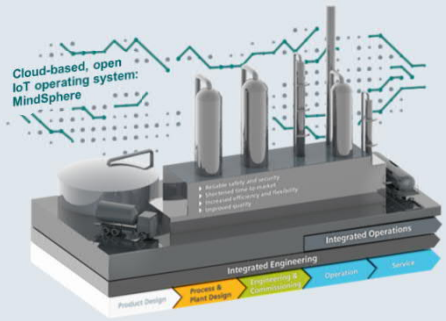
Digital Enterprise

Process Industries

Product design | Process and plant design | Engineering | Operation | Services

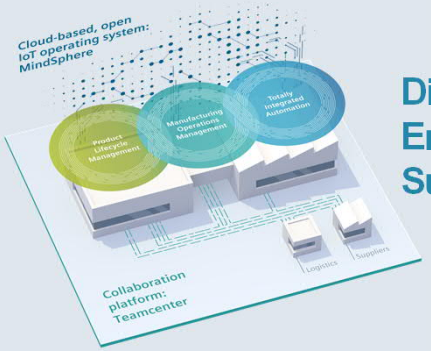
Industrial Software and Automation for process industries



Discrete Industries

Product design | Production planning | Production engineering | Production execution | Services

Industrial Software and Automation for discrete industries



Digital Enterprise Suite

+ **Industrial Communication**

+ **Industrial Security**

+ **Industrial Services**

Digitalization is key to achieving next-level productivity

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Digitalization dimensions and perspectives

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Horizontal Integration

1

C.R.M (sales, marketing ...)

Supplier | Inbound logistic | Production | Outbound logistic | Customer

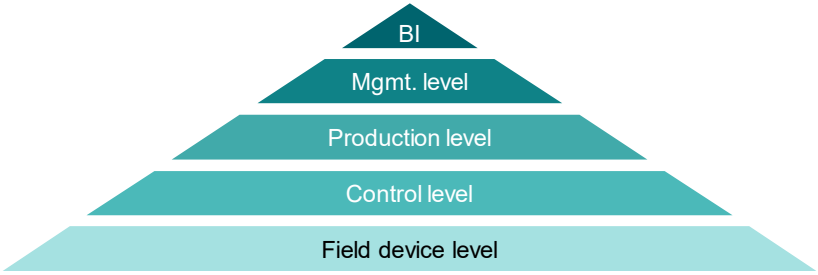
S.C.M (Quality control, energy efficiency, regulatory compliance ...)

Life cycle Integration

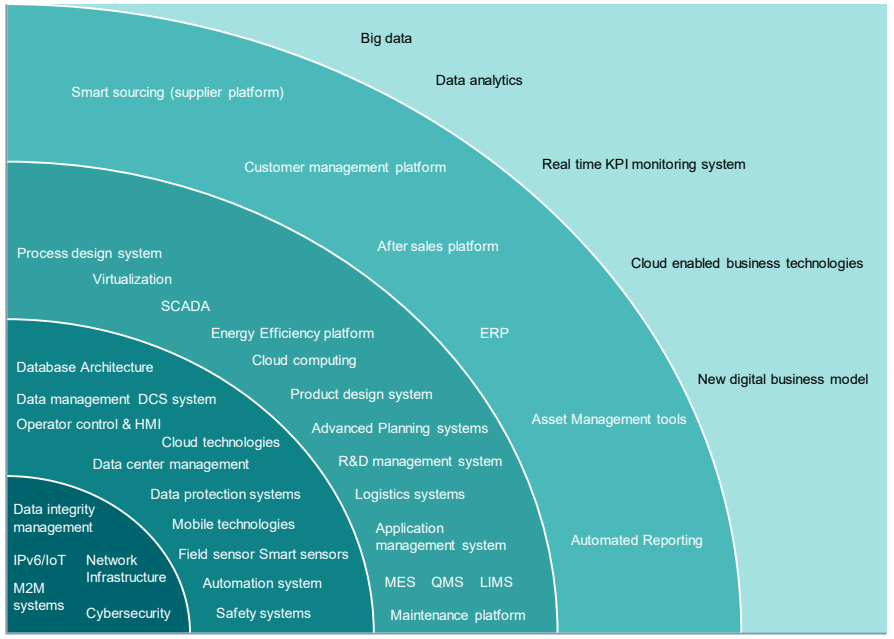
2

Vertical Integration

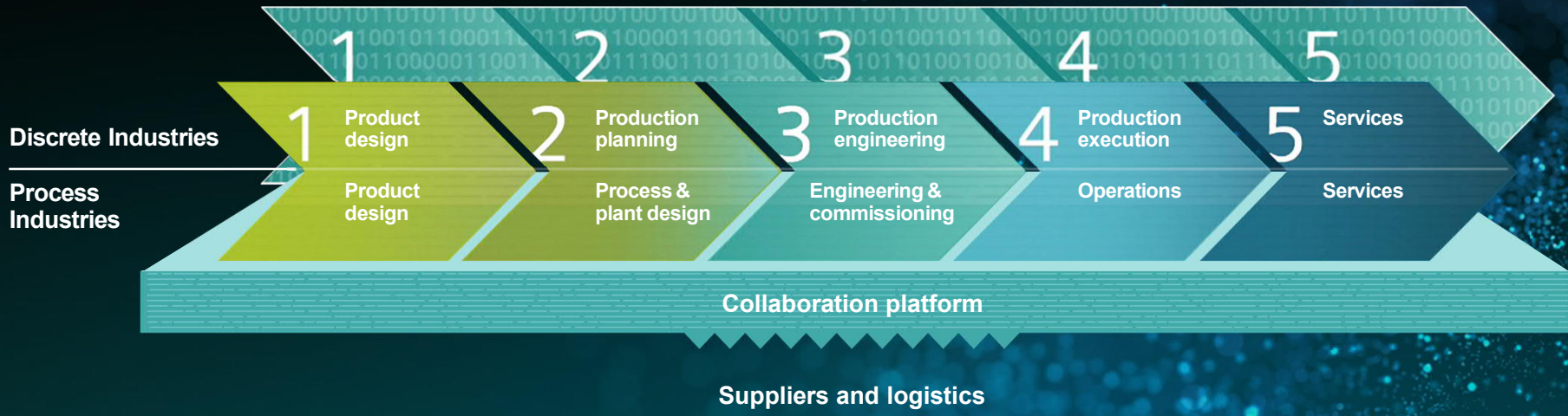
3



Technology perspective



With Siemens Digital Enterprise we address the entire plant lifecycle



End-to-end solutions for all industries

Numerous starting possibilities

Brownfield or greenfield

Standardized and open interfaces

Digital Twin of Product, Production, Performance

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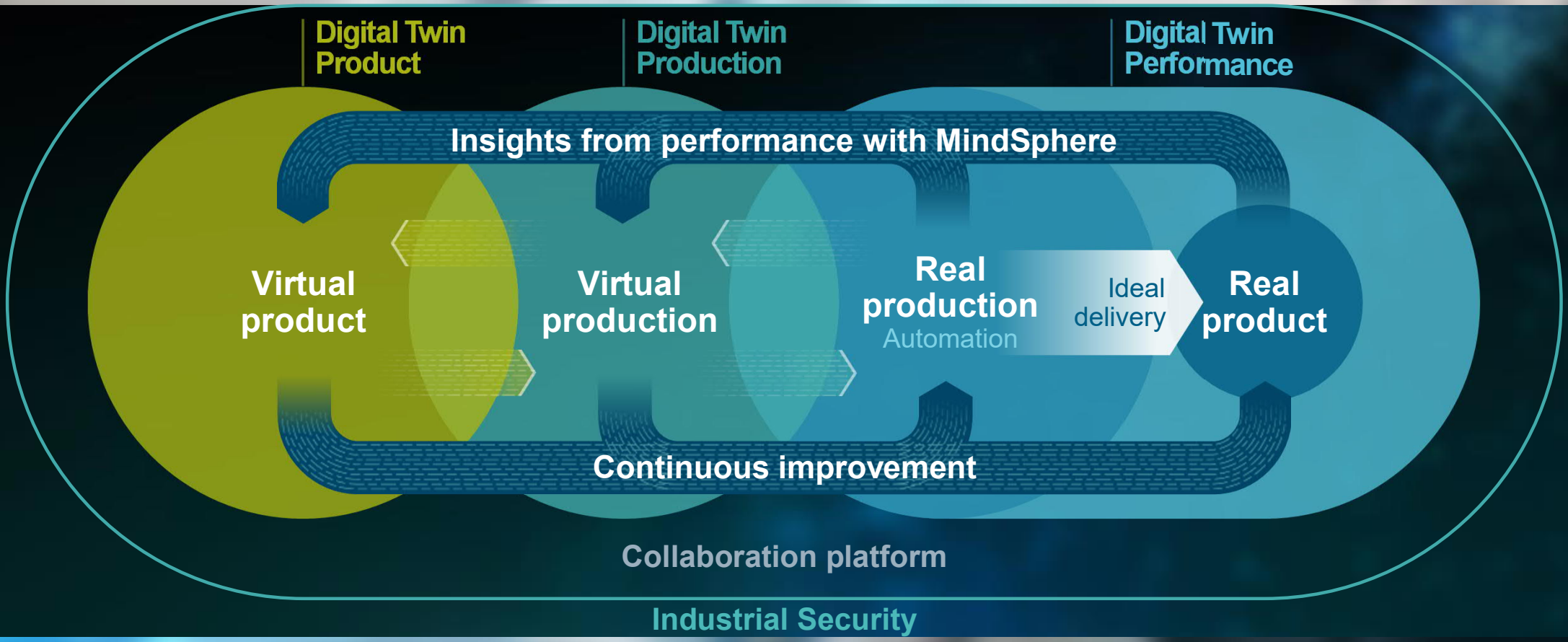

Digital Enterprise software platforms – comprehensive, constantly expanding software portfolio

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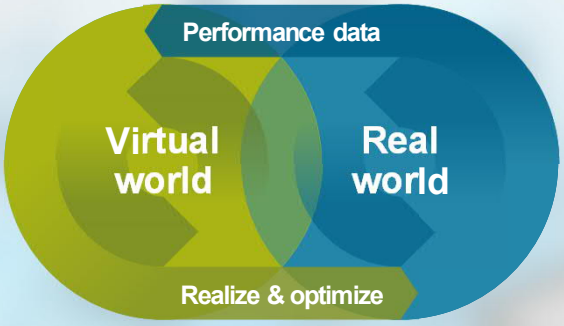

MindSphere

NX CAD	Teamcenter Manufacturing	NX Line Designer/MCD/ Automation Designer	Simatic IT	MindSphere Apps
Polarion			Camstar	Digital Lifecycle Service
Simcenter	NX CAM / Additive	Simit	WinCC/SCADA	Asset Performance Suite
Mentor Xpedition	Tecnomatix	TIA Portal	CNC Shop floor Mgt SW	
Mentor Capital	Mentor Valor	Simatic PCS7	Edge Apps	XHQ

Teamcenter, Comos, PlantSight

End-to-end domain know-how results in unique customer benefits

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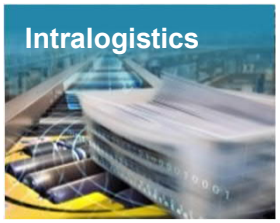
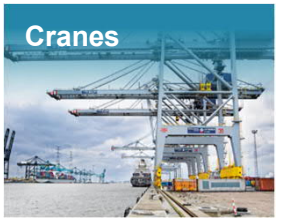
Process Industries





Discrete Industries

SIEMENS DIGITAL INDUSTRIES PORTFOLIO POSITION

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DIGITAL TWIN

DESIGN, SIMULATION, VIRTUAL COMMISSIONING

NX MCD, SIMIT, PLCSIM, PROCESS SIMULATE, PLANT SIMULATION

TEAMCENTER, TECNOMATIX, SIMCENTER

CLOUD CONNECTIVITY

MINDSPHERE

ENERGY MANAGEMENT

SIMATIC, MINDSPHERE

DIGITAL CONNECTIVITY, INDUSTRUAL SECURITY

SCALANCE, PROFINET, OPC UA

DATA MANAGEMENT

COMOS

PREDICTIVE MAINTENANCE, CONDITION MONITORING

MINDSPHERE, SIMATIC

OEE

SIMATIC, MINDSPHERE

OPERATIONS MANAGEMENT

XHQ, COMOS, SIMATIC IT, PCS7/WINCC


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MindSphere
Siemens cloud services

MindSphere – the cloud-based, open IoT operating system offers a solid foundation for new, data-based business models

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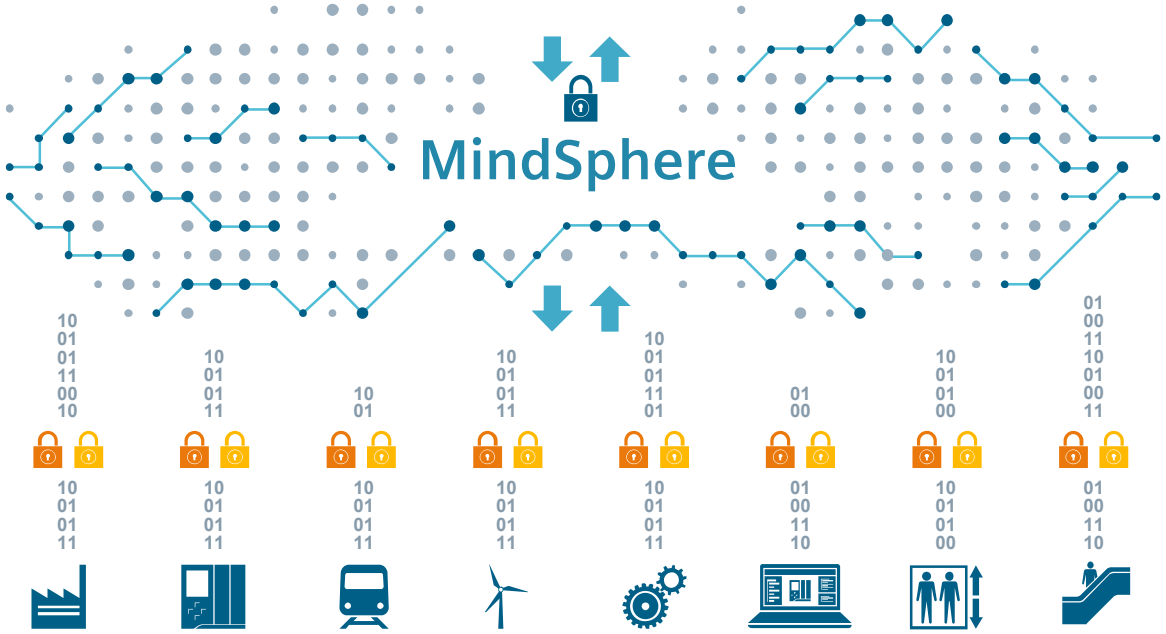
Developed by Siemens, OEMs, end customers and App developers



MindApps

- Asset transparency and analytical insights, e.g. predictive maintenance
- Subscription based pricing model
- Fleet management

MindSphere

- Open interface for development of customer specific apps (MindApps)
- Various cloud infrastructures: Public, private or on-premise

MindConnect

- Open standards (e.g. OPC UA) for connectivity (also to 3rd party products)
- Plug and play connection of Siemens products

MindSphere Connectivity Suite
MindConnect Nano

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Description

MindConnect Nano is a device for collecting data using different protocols and transferring the data to MindSphere. The device supports transmission of data through a secure internet connection, to enable cloud-based applications and services.

Benefits

- Fast and easy connectivity of industrial machines and automation systems to MindSphere
- Data collection via standard industrial protocols
- Software update management – Always up to date
- Rugged design for maintenance-free, continuous operation
- Comprehensive security concept in accordance with applicable industry standards
- Up to 500MB local data buffer

Supporting Protocols

- Siemens S7 (for collecting data from S7-3xx / S7-4xx / ET-200s PLCs);
- OPC UA (for collecting data from all data sources which can provide data via an OPC UA server); the MindSphere Nano supports data collection with Part 8 of the OPC UA specification (Data Access)
- Additional Field protocols will follow

Performance

- **Data reading cycle: Up to 250 data points / second**
- **Data transfer cycle: Every 10 seconds**

MindSphere Connectivity Suite
MindConnect IoT2040

SIEMENS
Ingenuity for life

Description

MindConnect IoT2040 is a device for collecting data using different protocols and transferring the data to MindSphere. The device supports transmission of data through a secure internet connection, to enable cloud-based applications and services.

Benefits

- Fast and easy connectivity of industrial machines and automation systems to MindSphere
- Data collection via standard industrial protocols
- Software update management – Always up to date
- Rugged design for maintenance-free, continuous operation
- Comprehensive security concept in accordance with applicable industry standards
- Up to 500MB local data buffer

Supporting Protocols

- Siemens S7 (for collecting data from S7-3xx / S7-4xx / ET-200s PLCs);
- OPC UA (for collecting data from all data sources which can provide data via an OPC UA server); the MindSphere Nano supports data collection with Part 8 of the OPC UA specification (Data Access)
- Additional Field protocols will follow

Performance

- **Data reading cycle: Up to 30 data points / second**
- **Data transfer cycle: Every 10 seconds**

MindSphere Connectivity Suite
MindConnect FB 1500*

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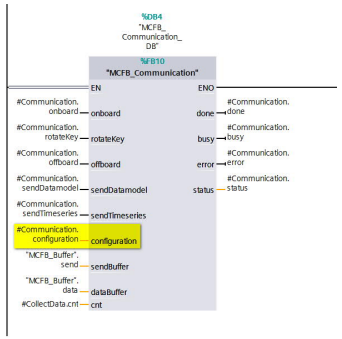
Description

MindConnect FB is a TIA Portal STEP7 LIBrary to extend the functionality of the S7-1500 PLC. It supports encrypted transmission of PLC data to MindSphere through a secure internet connection, to enable cloud-based applications and services.

Benefits

- Fast and easy connectivity of industrial machines and automation systems to MindSphere
- Simple configuration and commissioning - Configure your data model in STEP 7 (TIA Portal V15)
- No additional hardware needed
- Unencrypted onsite (local) traffic which allows local package inspection
- Comprehensive security concept in accordance with applicable industry standards
- Local data buffering possible



Supporting Protocols

S7-1500 acts as gateway into field-level which allows access to various data sources

Performance

- **Data reading cycle: Up to 110 data points per second can be configured in TIA Portal (the exact amount of data points depends on each controller)**
- **Data transfer cycle: Every 10 seconds**

* Compatible with S7-1511 to S7-1518 with firmware V2.0 or higher

MindConnect Security
MindConnect Nano / IoT2040 – Key Security Features

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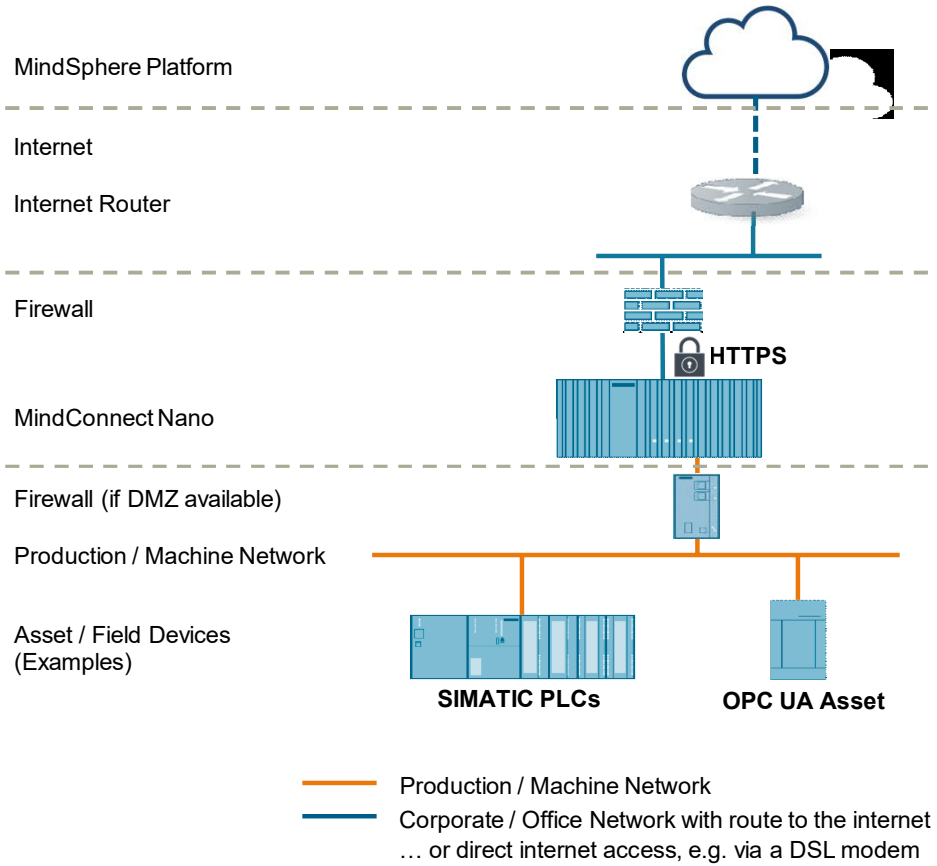
- In line with the **ISO 27001 / IEC 62443** international standards (the best-known cyber security standards for information security and Industrial Control System security respectively)
- **Reference** network **topology** incl. recommendation for **network segmentation**
- **Security** in the **on-boarding process**
  - Unique identification number embedded in hardware
  - Unique on-boarding security token
  - Only valid MindConnect Nano boxes from Siemens are on-boarded to MindSphere
  - Configuration files on the USB stick are encrypted
  - MindConnect Nano reads/writes only the designated files on the USB stick

Reference Topology



MindApps
developed by Siemens or by Partners

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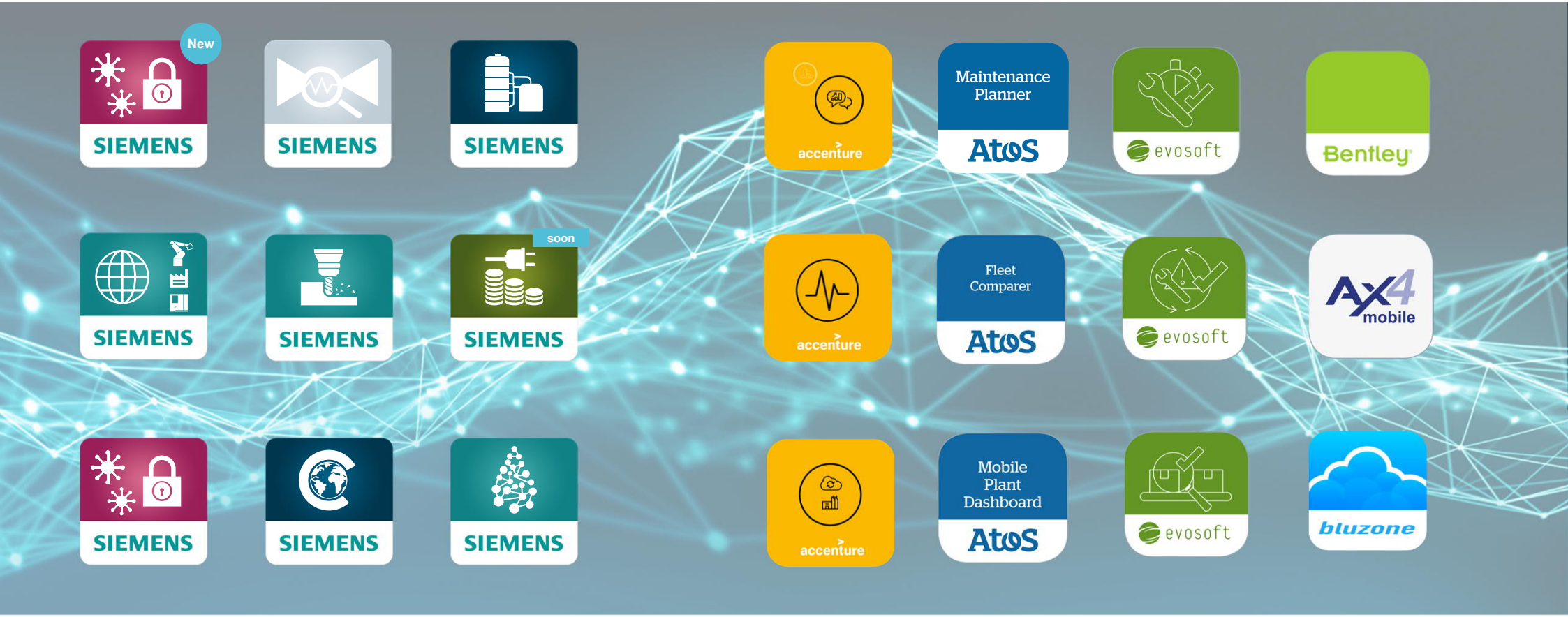

www.mindsphere.io

SIMATIC MindSphere apps
Product family overview

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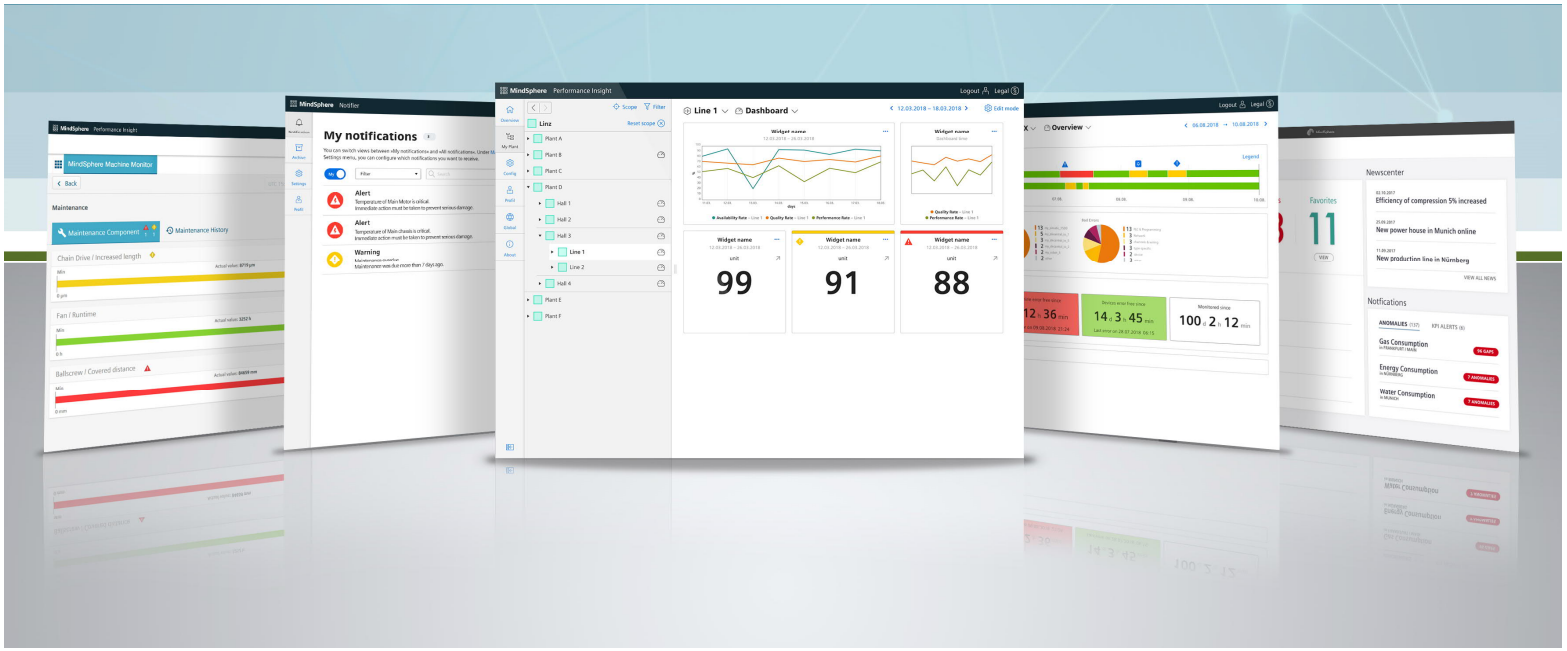

Machine Monitor

The maintenance tool for machine builders

Notifier

The tool for simple value monitoring and to stay tuned via push notifications

Performance Insight

The tool to increase productivity for any machine / line / plant

Machine Insight

The tool for an easy and more efficient remote diagnosis for machines

Energy Manager

The tool for energy managers in manufacturing and infrastructure

Today's focus

SIMATIC Notifier
Receive push notifications on your Smartphone

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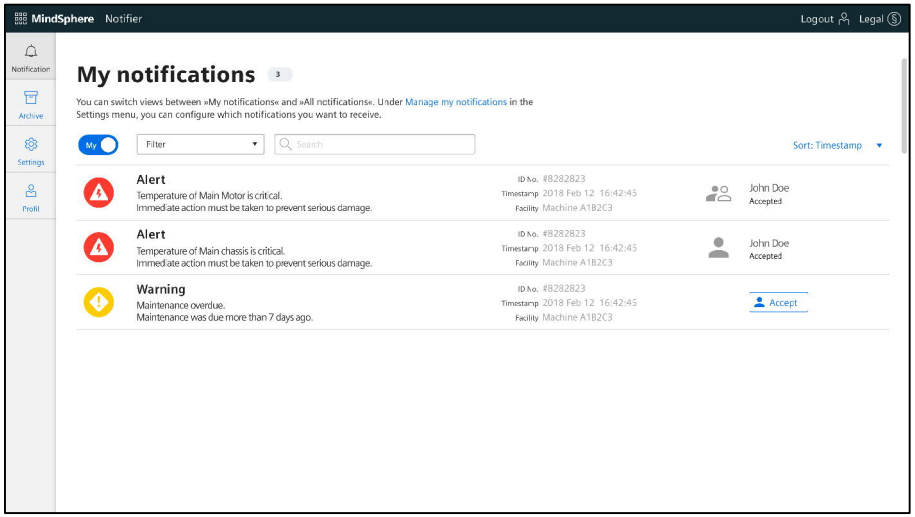
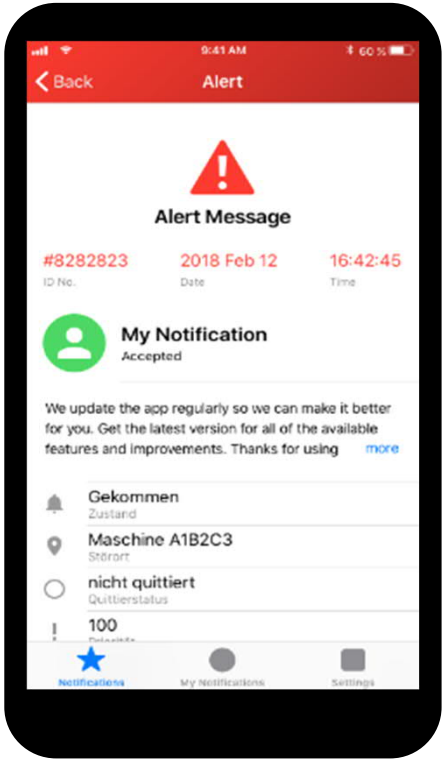
The MindSphere app SIMATIC Notifier allows you to reduce reaction times and so downtimes by sending push notifications to your staff's pocket.

Material shortage? Issues on your OEM machine?

- Distribute alarms & notifications to mobile phones





SIMATIC Performance Insight
Machine & Plant Performance at a glance

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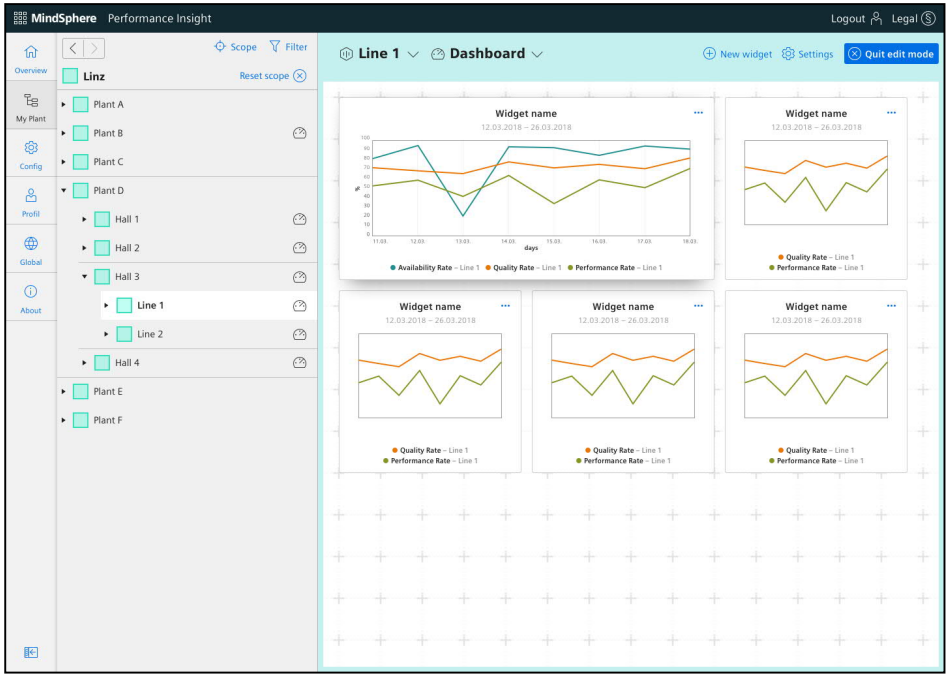
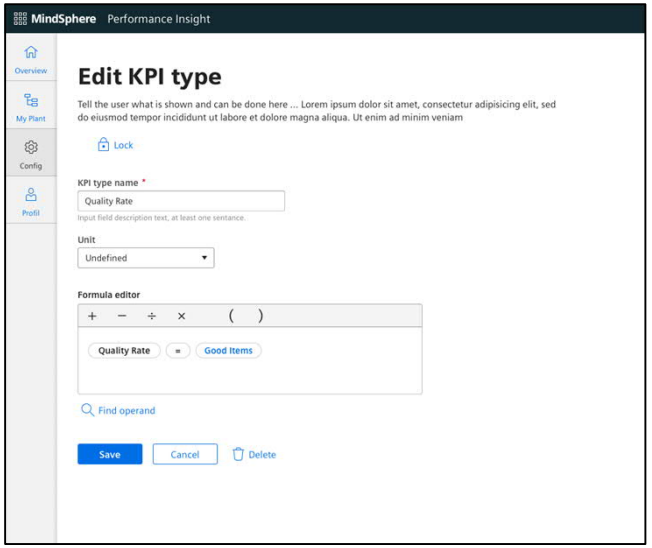
The MindSphere app SIMATIC Performance Insight enables additional transparency over machines, manufacturing lines or whole sites.

Production optimization can be done with additional insights and analytics based on individual KPI calculations for e.g. Overall Equipment Efficiency, Quality and more.





SIMATIC Machine Monitor
Machine Overview for a more efficient machine service
Track maintenance intervals of machine components

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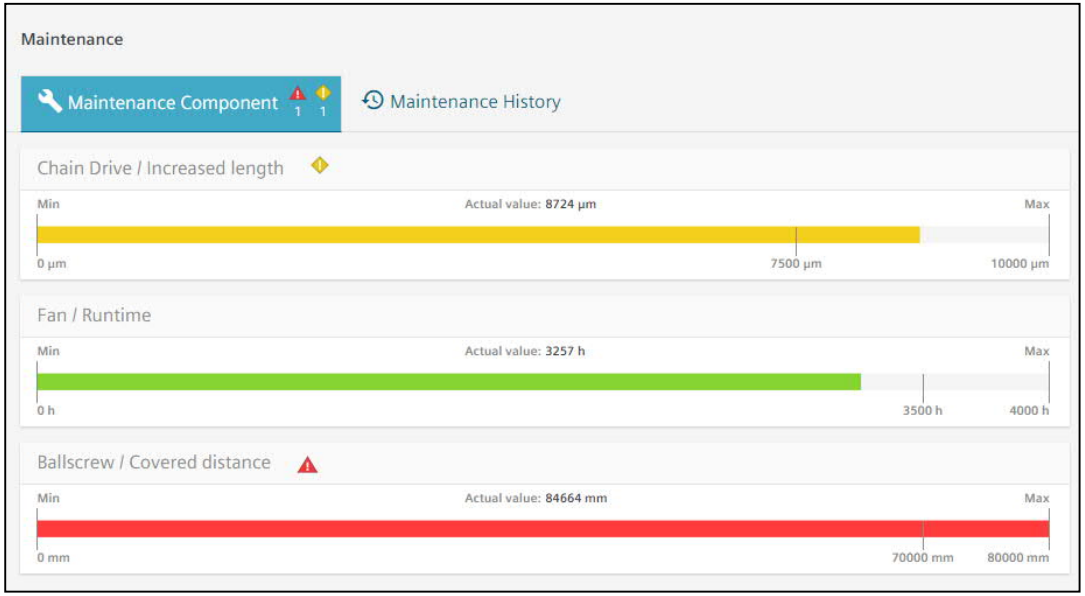
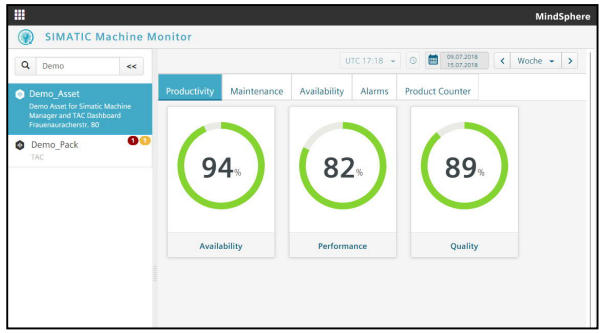
The MindSphere app SIMATIC Machine Monitor monitors and visualizes the operations and maintenance condition of distributed machines worldwide.

- Maintenance indicator for the most efficient planning of services





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SIMATIC MindSphere app

SIMATIC Energy Manager

Transparency for energy managers in manufacturing and infrastructure

Increase the energy & resource efficiency for production as well as infrastructure areas. Providing transparency with energy related calculation- and visualization methods e.g. Sankey-diagram

Machine manufacturer application – Example of more efficient service planning

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Challenges and opportunities

- Optimized planning of the service calls for machines distributed around the world (diagnostics in advance)
- Providing dynamic service (instead of static) based on gathered machine data

Solution

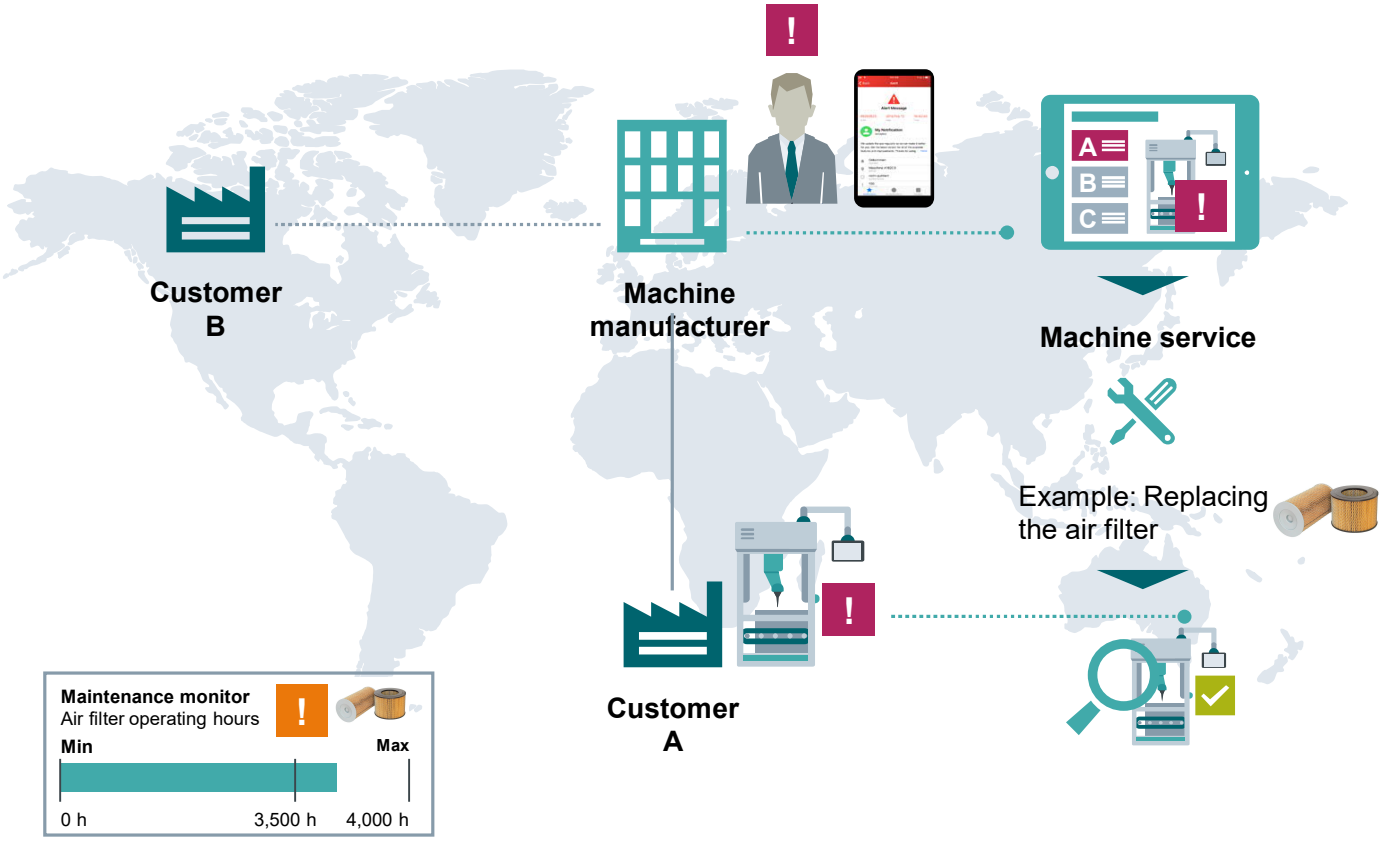
Monitoring of the customer's machines with regard to

- Immediate maintenance intervals, and maintenance history
- Potential need for maintenance through analysis of alarms & performance data

To use the data to optimize the global machine service

You benefit from

- Reduced costs for service calls thanks to dynamic service planning and remote fault diagnostics in advance
- Optimized utilization of the service personnel through early alerting in the event of irregularities
- High degree of customers satisfaction



Machine user application - Example for easy and efficient downtime management

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Challenges and opportunities

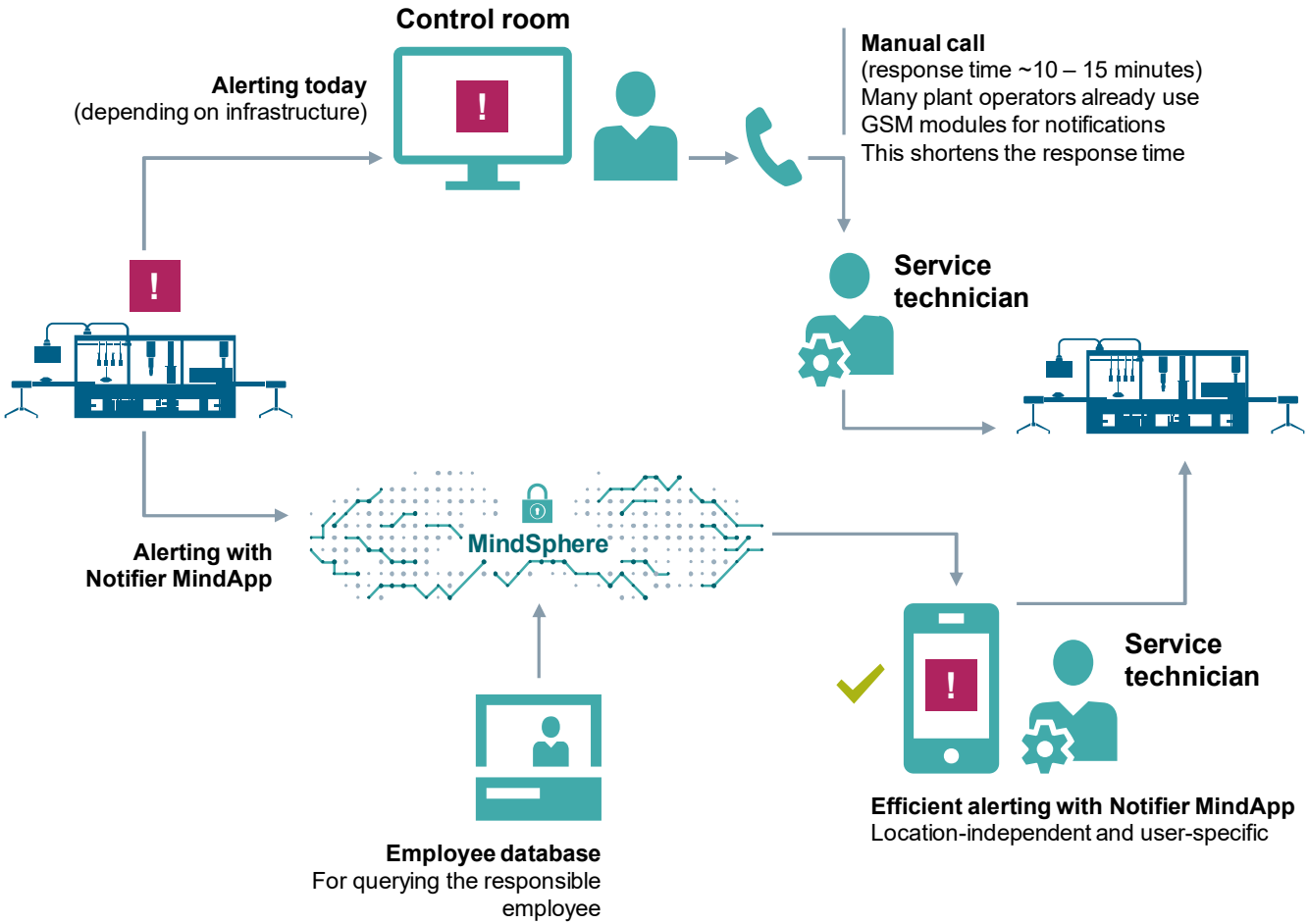
- Shorter unplanned machine downtimes
- Effective and fast fault localization for their elimination

Solution

Immediate alerting of the production personnel or the machine manufacturer via smartphone in the event of a downtime (incl. information)

You benefit from

- Shorter durations of downtimes (Ø5 minutes) thanks to more efficient service calls (display detailed alert message on the smartphone)
- More efficient management of alarms and events through a centralized management system (Notifier web menu)



Machine user application – Worldwide comparison of the effectiveness of lines

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Challenges and opportunities

- Worldwide performance comparison of machines and plants
- Recognition of potential optimizations for improving performance capability

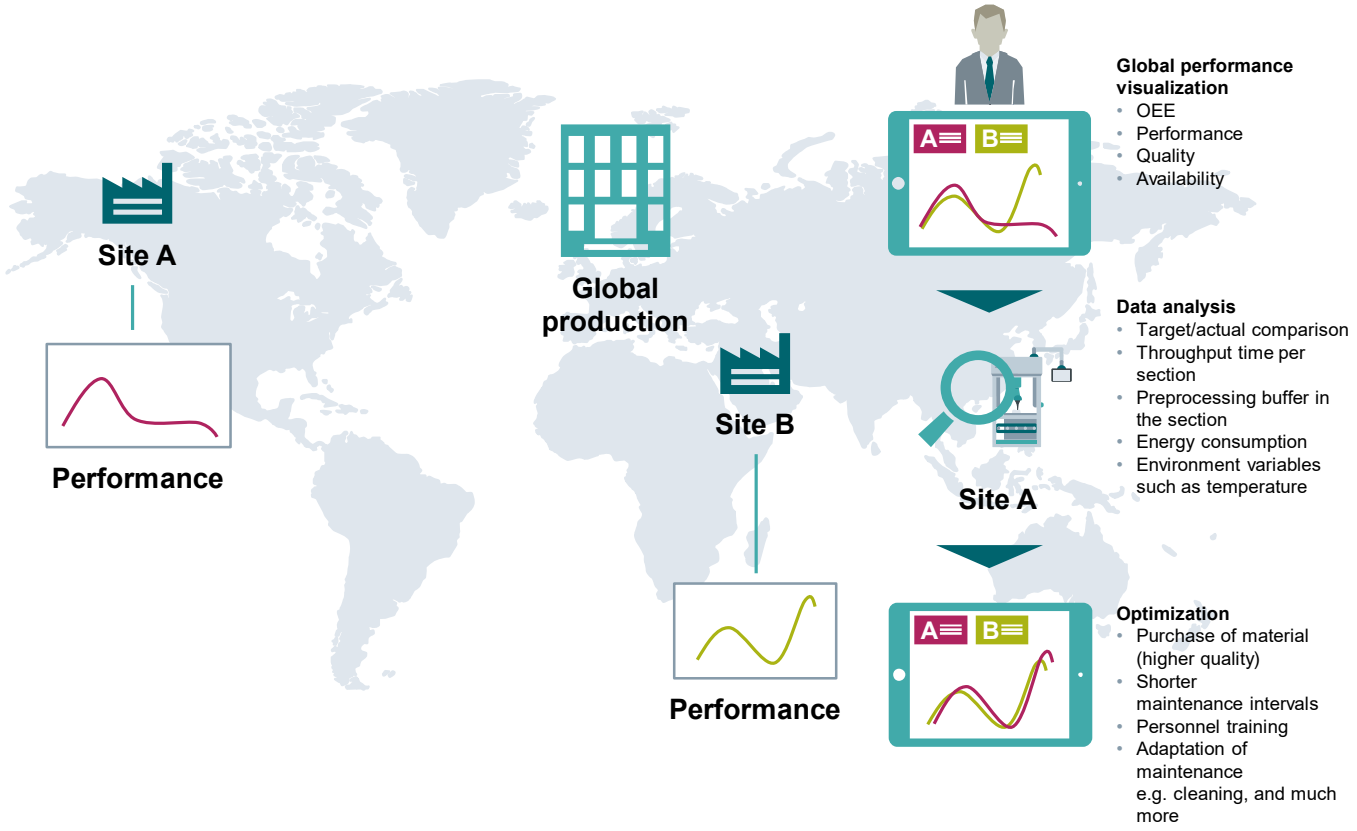
Solution

Increased productivity of machines, lines and plants through the comparison of

- Cycle times, throughput times, ramp-down times

You benefit from

- Worldwide determination of differences in performance for optimization through the use of standardized, comparable performance indicators
- Retrospective performance analysis by means of historical detailed view of relevant plant parameters such as cycle times



Package 1: SIMATIC MindSphere apps Trial Package
Your entry into industrial IoT with SIMATIC MindSphere apps

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MindSphere apps included:

- SIMATIC Performance Insight
- SIMATIC Notifier
- SIMATIC Machine Monitor
- SIMATIC Energy Manager

MindSphere platform included:

- MindAccess IoT Value Plan S

Hardware (Optional):

- MindConnect Nano (Reduced price for first order)

More Information:

https://www.dex.siemens.com/mindsphere/applications/simatic-trial-package

www.siemens.com/simatic-mindapps

Track and optimize the productivity, energy consumption and service of your machines and sites worldwide with SIMATIC MindSphere apps.

Explore the possibilities for 3 months for free!

Detect optimization potential by monitoring and analyzing machine KPIs

with SIMATIC Performance Insight and Energy Manager

Stay tuned via push notifications on your smartphone worldwide

with SIMATIC Notifier

Optimize your machine service planning by tracking maintenance needs

with SIMATIC Machine Monitor

3 month Free Software Trial

After the 3 months free trial period all products go over into monthly subscription if not cancelled prior. Cancellation as possible at any day but no later than 14 days prior to the end date of free trial period via E-Mail to: trial@mindsphere.io

OEE / Performance Insight
Overall Equipment Effectiveness

Overall Equipment Effectiveness from single machine to production line

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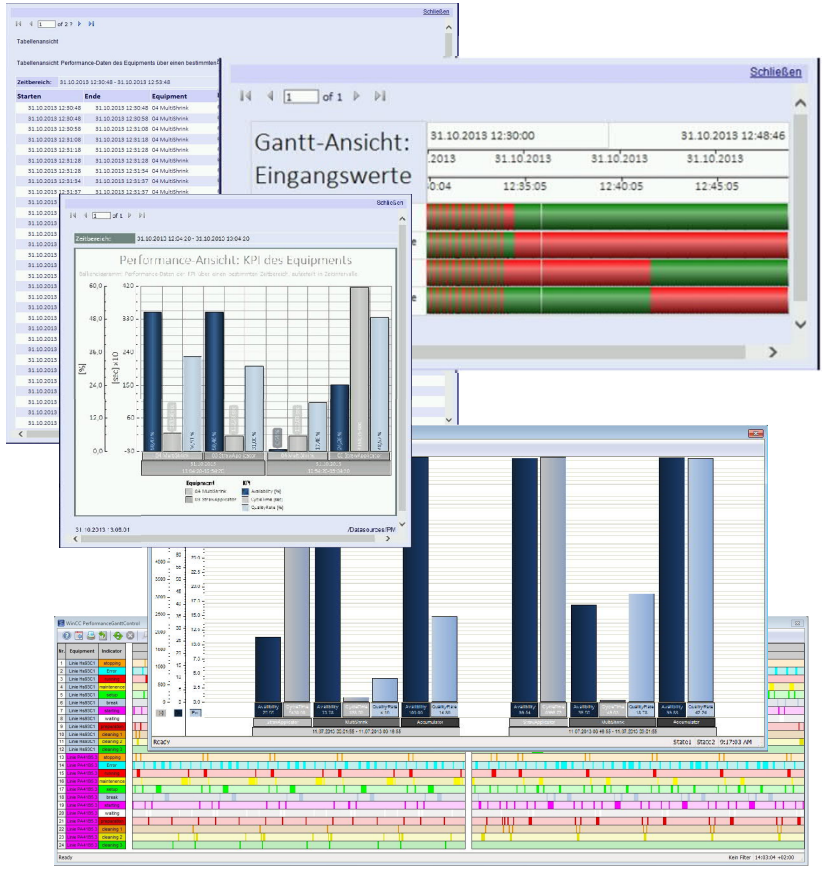
The Challenge

- Localize weak points
- Understanding correlation
- Cost-effective and investment protection

The value proposition

- Flexible calculation of plant specific (KPIs)
- Significant analysis via Performance, -Gantt or table controls locally and via Internet



Siemens offer

- WinCC V7 and Option Performance Monitor
- WinCC Unified and Option Performance Insight
- MindSphere / Performance Insight and Machine Insight application
- Production analysis and optimization based on individual key performance indicators(KPIs)

Benefits

- Ad-hoc reporting
- Global access in combination with SIMATIC Information Server
- Easy integration to existing plants
- Standardization for OEMs

Performance Monitor
Overall Equipment Effectiveness OEE

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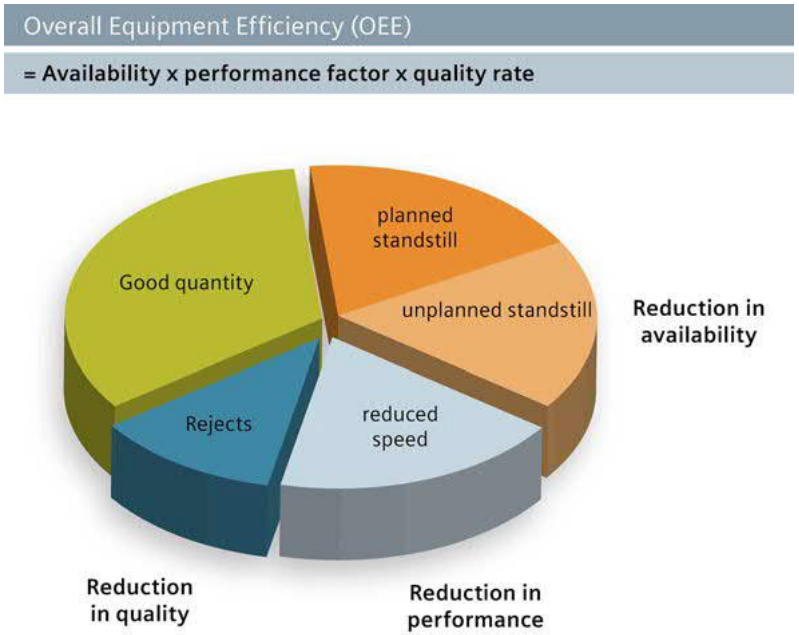
The OEE shows the **unscheduled loss** of plants.

OEE **=** Availability ***x*** Performance ***x*** Quality

Availability: percentage of scheduled time that the operation is available to operate.
Performance: represents the speed as percentage of the designed speed.
Quality: represents the Good units as a percentage of the Total units.

Availability **=** *uptime / available time*
Performance **=** *actual performance / planned quantity (e.g. quantity / customer)*
Quality **=** *(produced quantity – rework - rejects) / produced quantity*

The OEE of multiple machines is calculated by multiplication of each individual OEE.
Example: 3 machines (OEE 90 % each) : OEE Overall = 0,9 × 0,9 × 0,9 = 0,73 (73%)



OEE – Overall Equipment Effectiveness

Identify the percentage of truly productive manufacturing time

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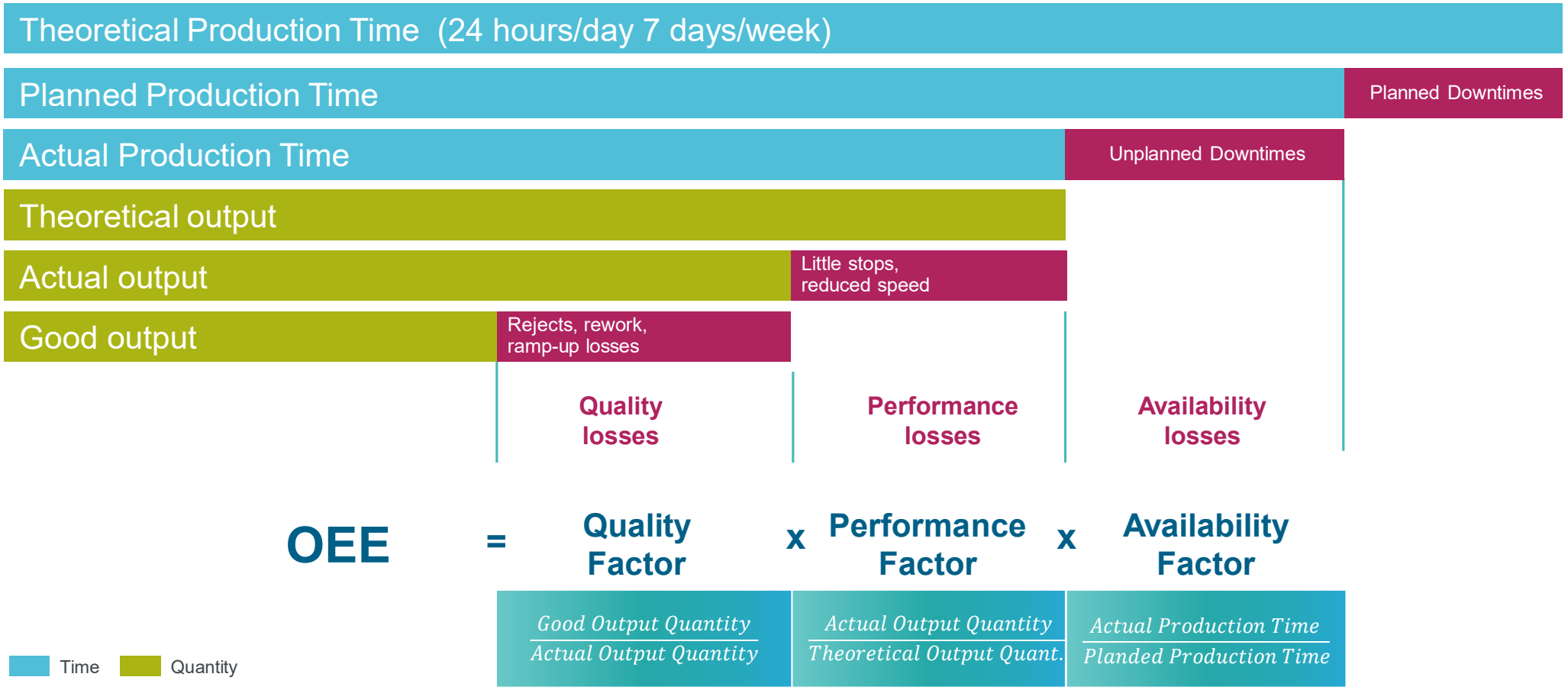

$$\text{OEE} = \text{Quality Factor} \times \text{Performance Factor} \times \text{Availability Factor}$$

$$\frac{\text{Good Output Quantity}}{\text{Actual Output Quantity}} \quad \frac{\text{Actual Output Quantity}}{\text{Theoretical Output Quant.}} \quad \frac{\text{Actual Production Time}}{\text{Planded Production Time}}$$

Time Quantity

Performance Monitor
Customer benefits

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Productivity
Time to Market
Security
Availability

Transparency in production

- Calculation of key performance indicators (KPI) e.g.: OEE, MTBF, MTTR
  - Comparison of plant components (Equipment)
  - Indication of correlations e.g. between indicator and provider
- Analysis of indicators: distribution on the Internet with the Web Navigator

Maximize productivity and quality

- Weak-point analysis
- Flexible web-based analyzing reports with the option SIMATIC Information Server

Cost-effective and protection of investment

- Less training and configuration effort due to standard tools
- Easy integration to existing plants
- Short Time-to-Market for OEMs due to standardization of machine condition information (e.g. OMAC)

Flexible and efficient production

Increase productivity

Standardization for OEE Analytics

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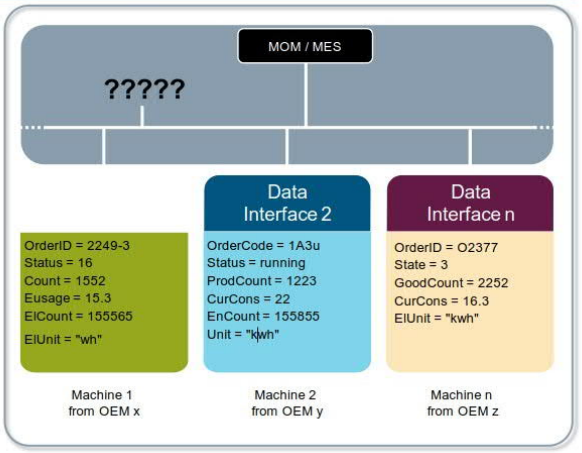
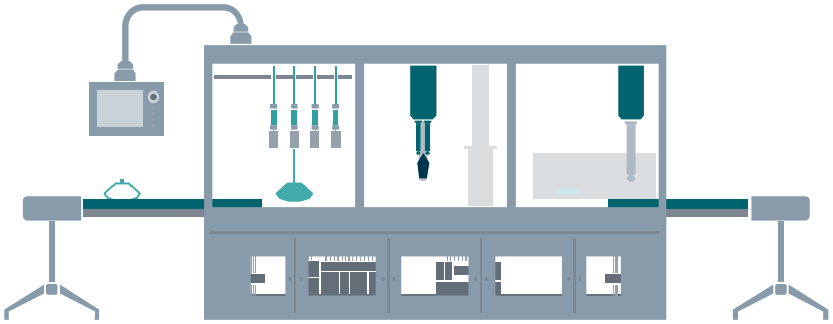
A typical initial situation:

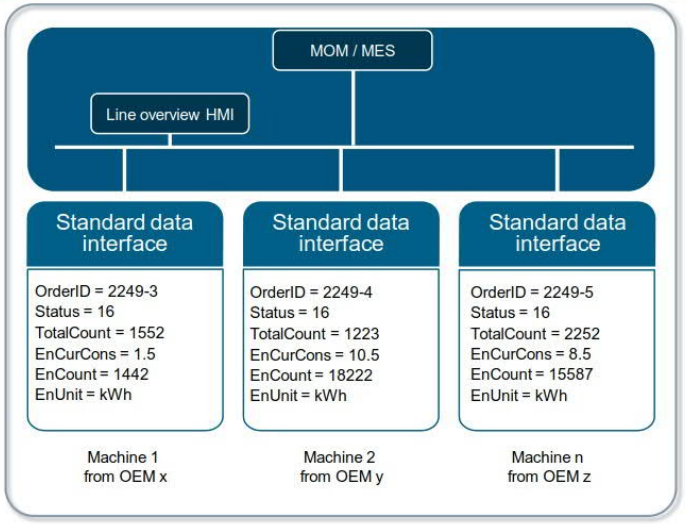


Actual status

- Machines from different OEMs can have different interfaces
- The contents of the interfaces can be different



The perfect environment:



WinCC/PerformanceMonitor
Gantt Control

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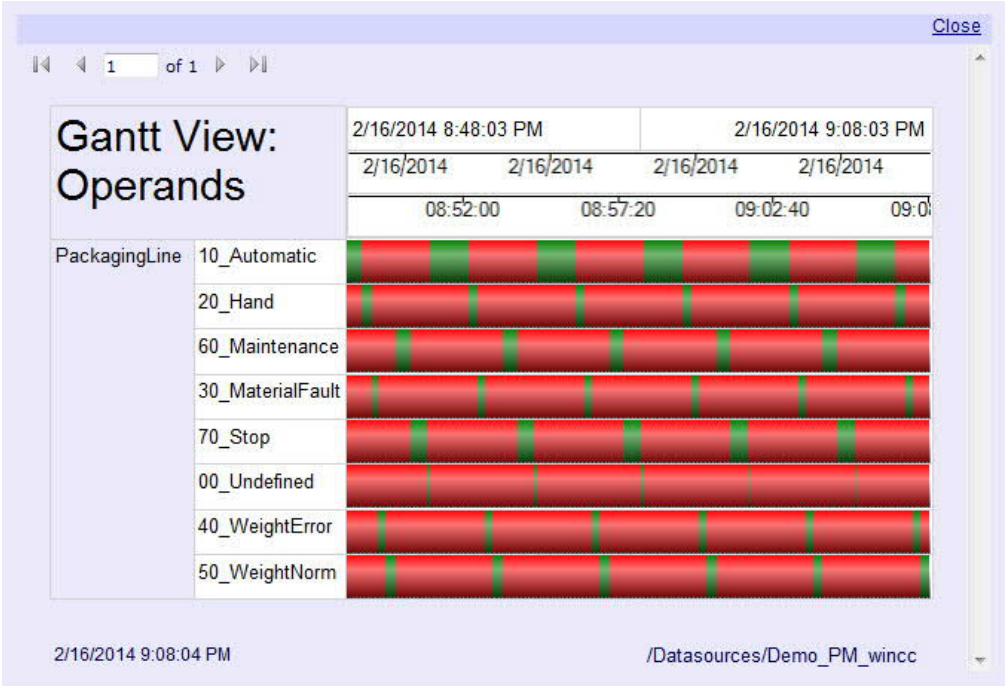
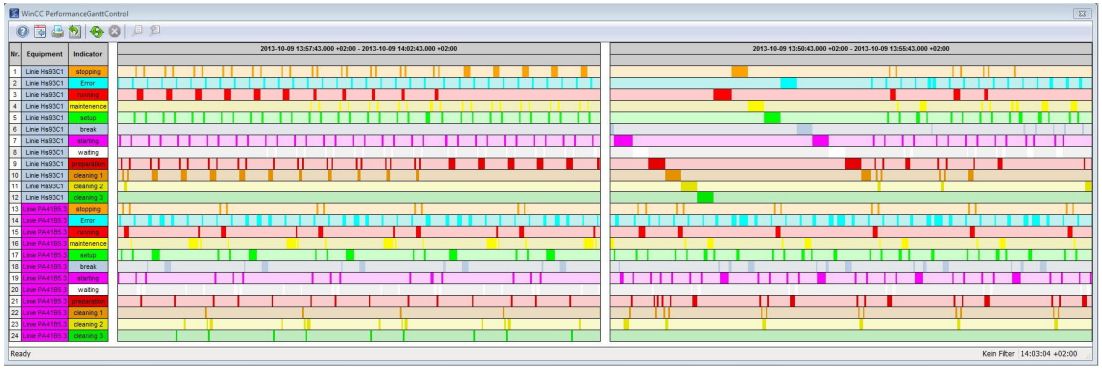
- Visualization of time-based entry values (operands)
- Analysis of data for time periods, Shift, State,…
- Manual correction of values (if authorized):
  - Insert, Delete, Split and Merging of data sets
- Export (.csv) and printing
- Available also for WinCC/WebNavigator *) and SIMATIC Information Server *)



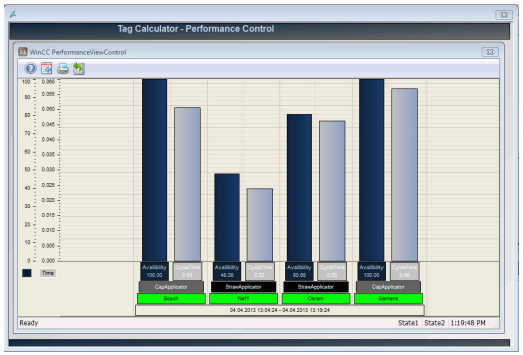


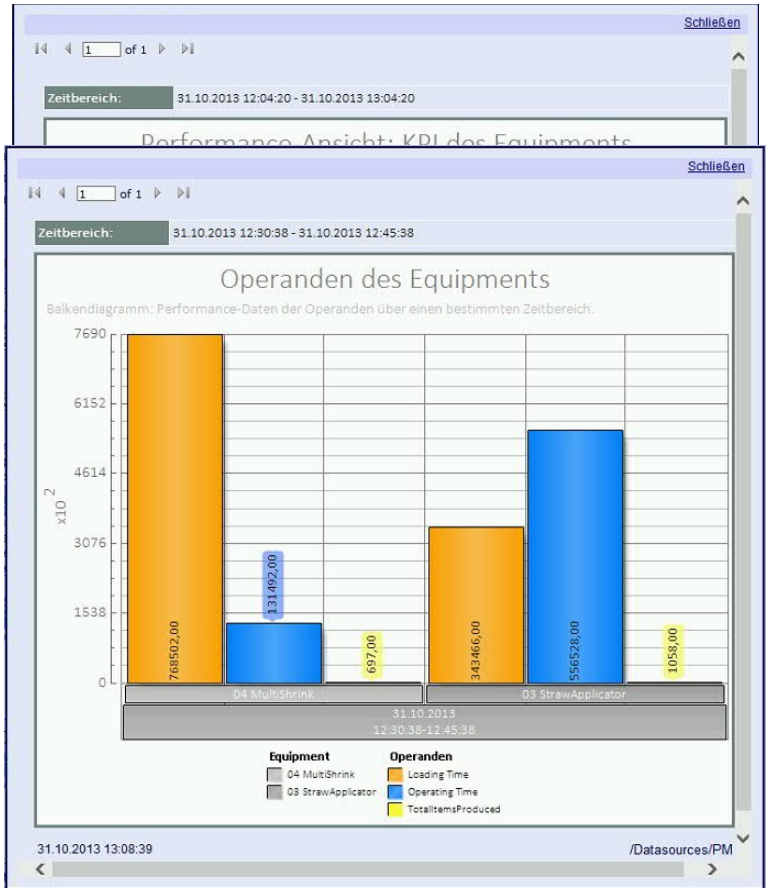
*) requires additional license

WinCC/PerformanceMonitor
Performance Control

SIEMENS
Ingenuity for life

- Performance Analysis (KPI) – also with correlation to context values
- Cause analysis by „Drill-down“ to operands
- Analysis of data for time periods, Shift, State,…
- Export (.csv) and printing
- Available also for WinCC/WebNavigator *) and SIMATIC Information Server *)



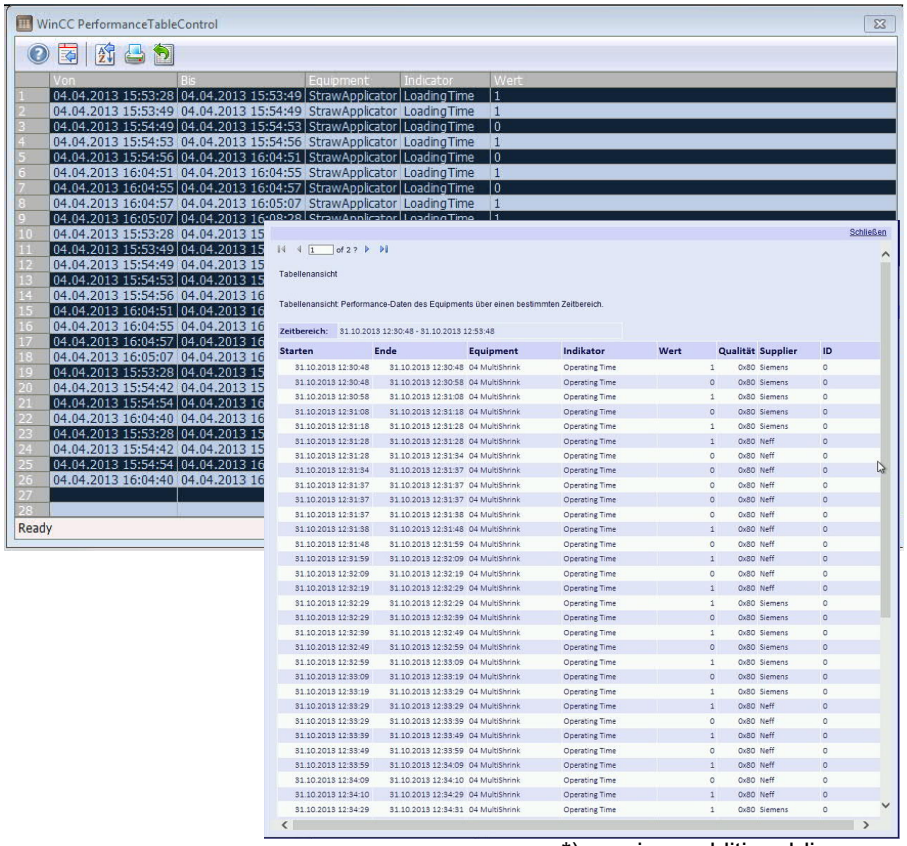


*) requires additional license

WinCC/PerformanceMonitor
Table Control

SIEMENS
Ingenuity for life

- Chronological List of
  - Entry values (operands)
  - Context values
- Analysis of data for time periods, Shift, State,…
- Manual correction of values (if authorized):
  - Insert, Delete, Split and Merging of data sets
- Export (.csv) and printing
- Available also for WinCC/WebNavigator *) and SIMATIC Information Server *)



*) requires additional license

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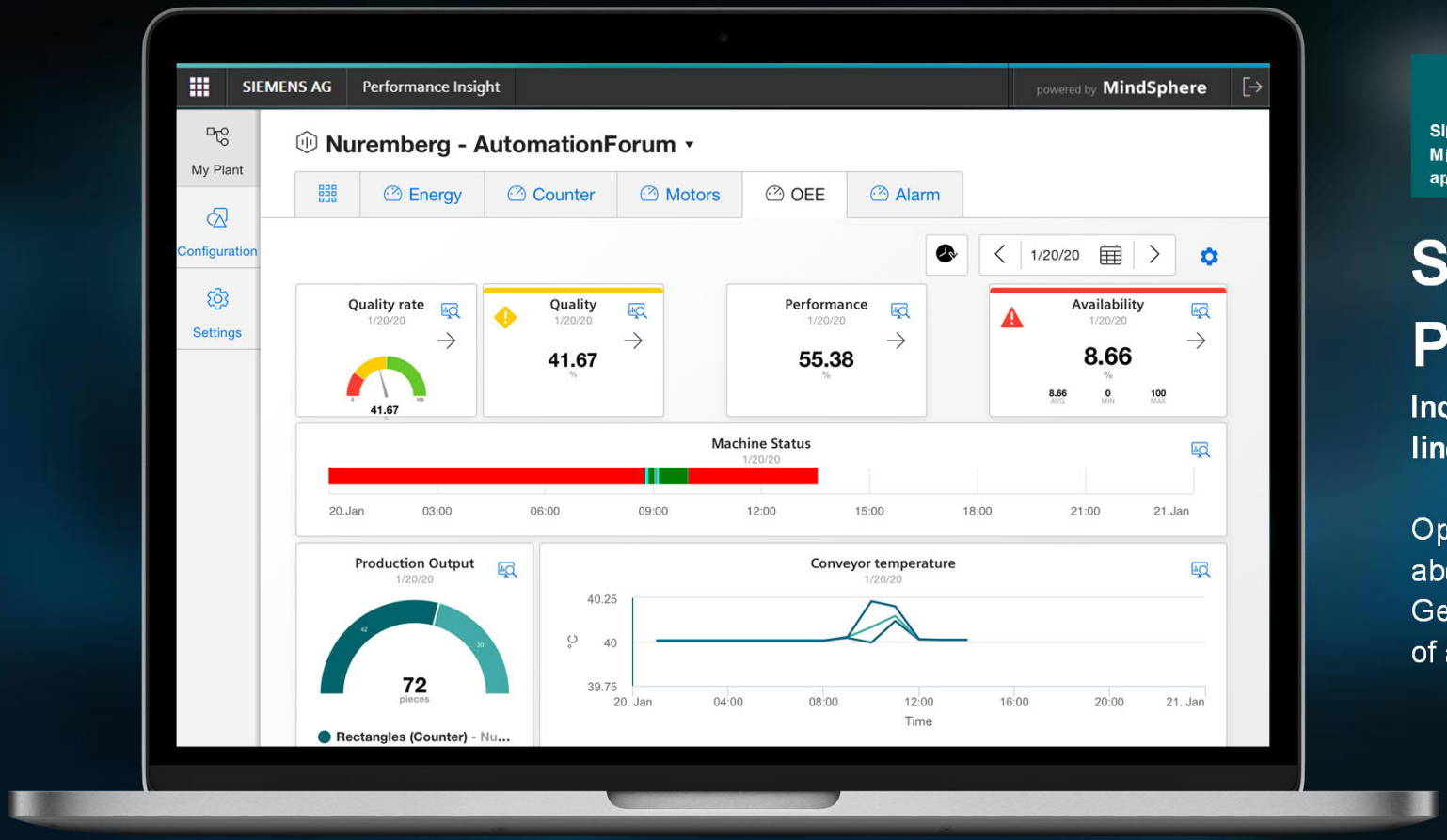
Ingenuity for life



SIMATIC MindSphere app

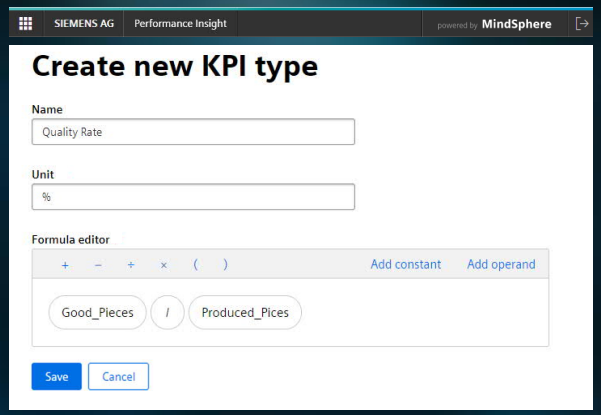
SIMATIC Performance Insight

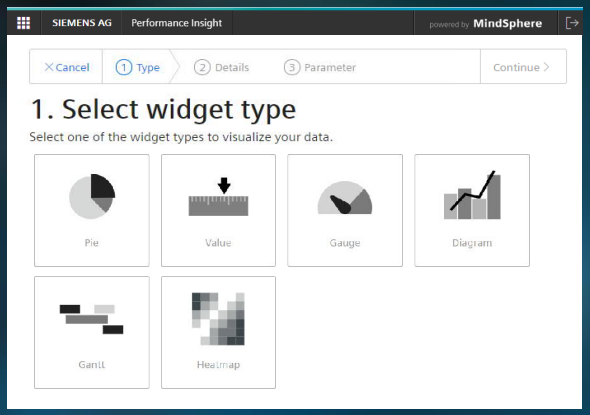
Increase productivity for any machine, line or plant - Worldwide

Optimize Assets by gaining transparency about OEE, Quality and further KPIs. Generic visualization enables an integration of all kind of machines worldwide

Get the most valuable information for precise decision-making to optimize machine availability and performance

SIEMENS
Ingenuity for life



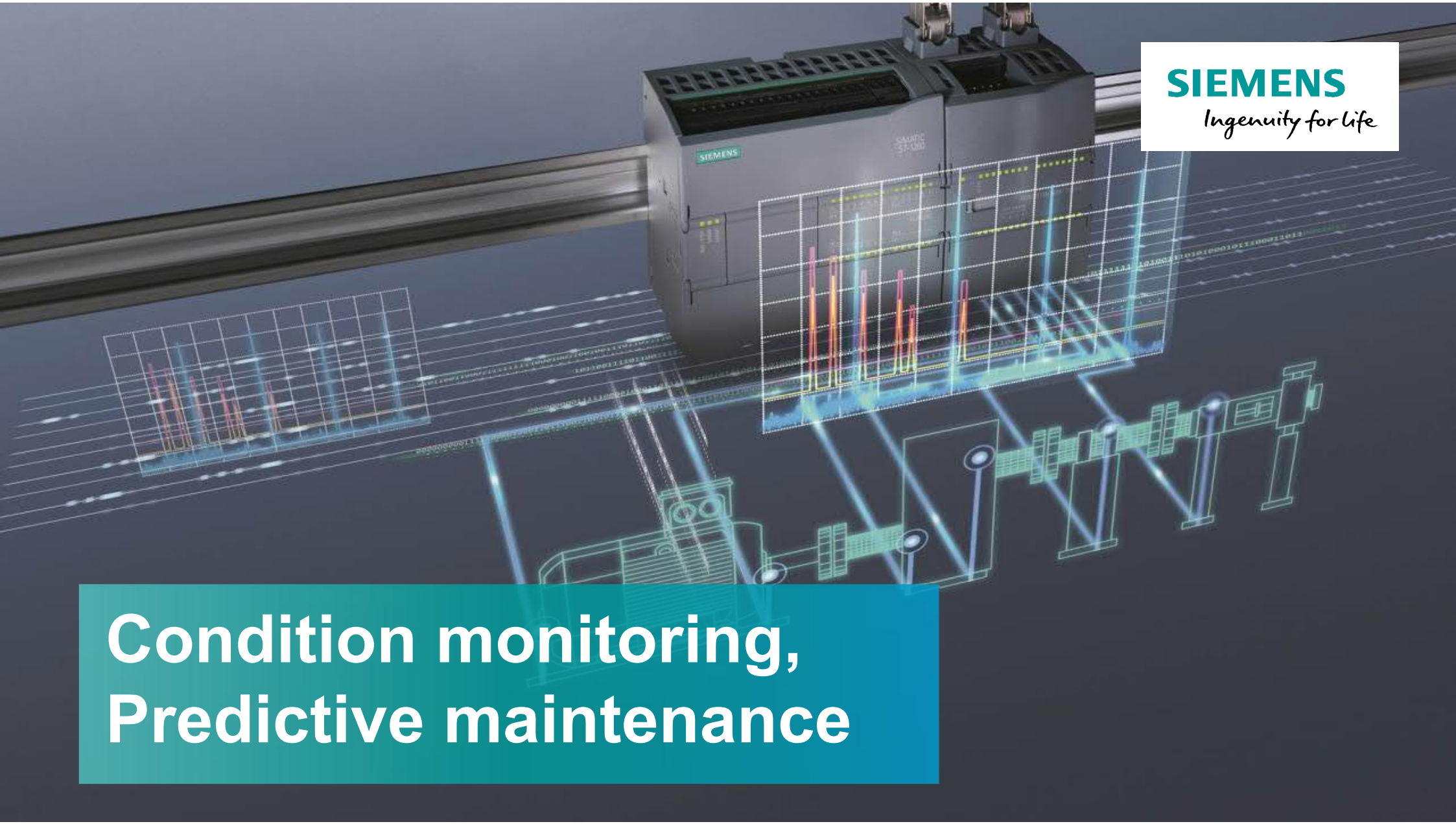


Individual KPI calculations for e.g. Overall Equipment Efficiency, Quality and more.

Detailed graphs allow to determine and compare manufacturing performance over different time slots e.g. shift-performance

Get the most valuable information for precise decision-making to optimize machine availability and performance

Support of different widgets to visualize machine states and performance indicators over time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Condition monitoring,
Predictive maintenance

Applications & focus

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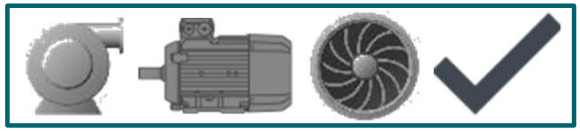
Rotating Machines

Fans, pumps, motors, centrifuges, gears,...
in automated applications



Customer expectations

Preventive maintenance, avoidance of unplanned downtimes, Increased productivity and analysis of weak points, continuous transparency including mechanical components

Future-oriented solutions

Remote monitoring, MindSphere based monitoring, added value through machine data, new business models through digitalization e.g. warranty extension, service contracts,...

Condition monitoring

Identifies and reports faults in managed assets by monitoring identified key parameters/aspects including vibration, temperature, etc.

Fan
Exemplary construction

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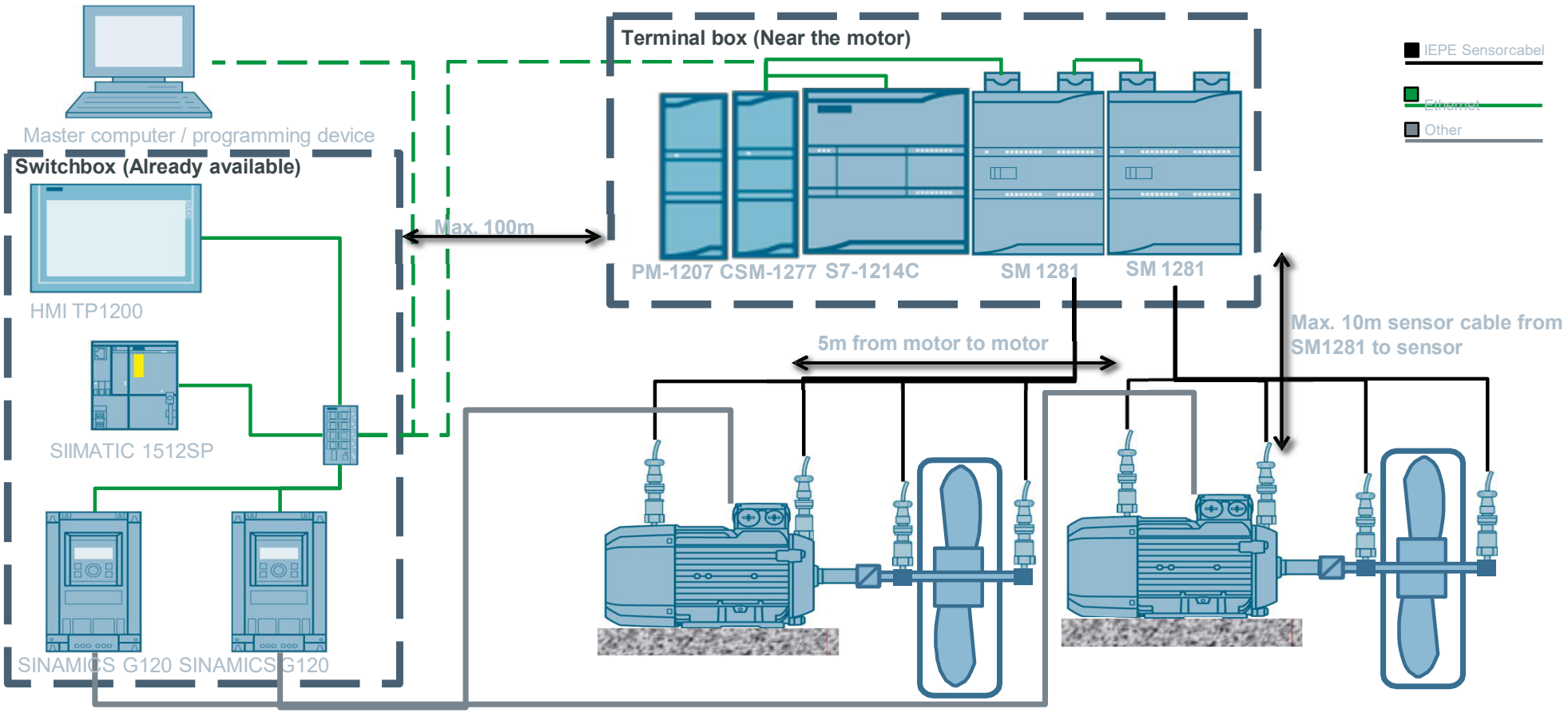

SIPLUS CMS
Mechanical condition data turns into digital added value

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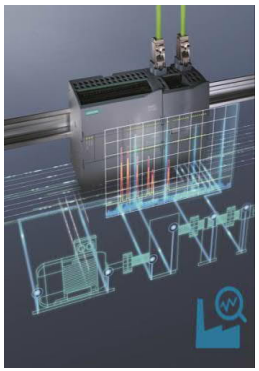
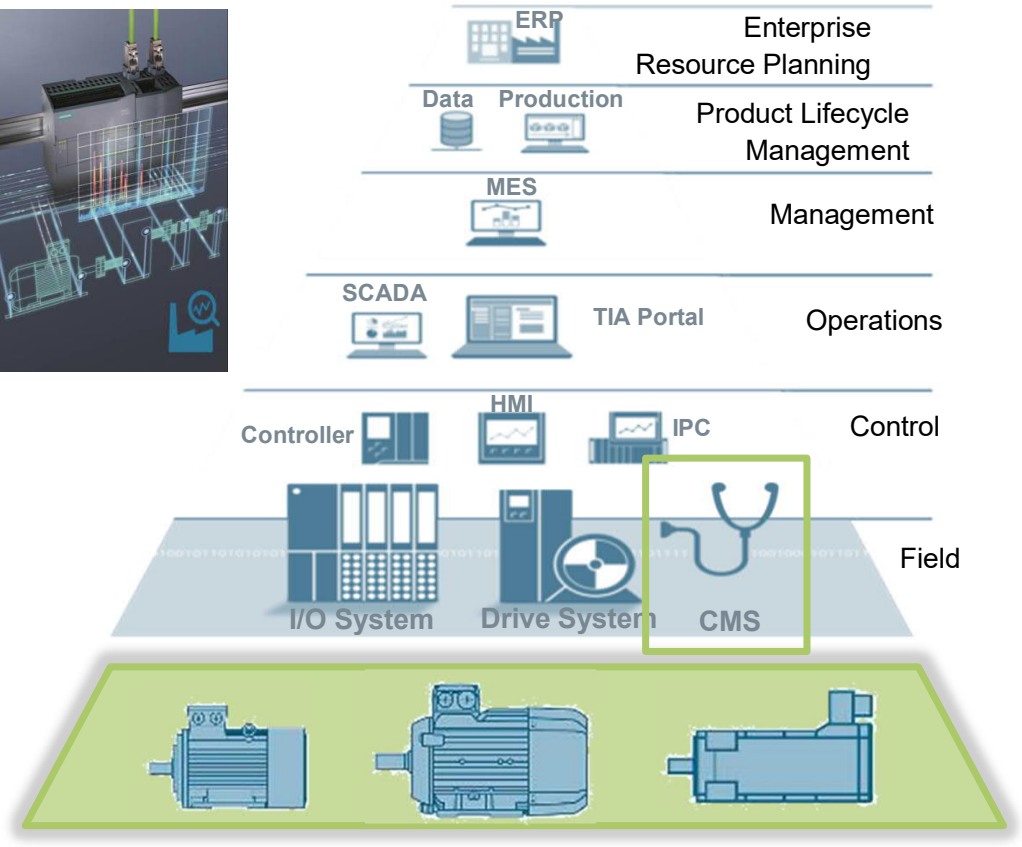
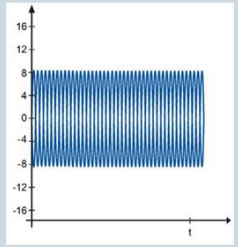
Ingenuity for life

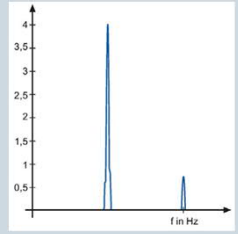




Transparency of mechanical components over all levels

- Early detection of mechanical damage
- Continuous predictive maintenance
- Avoid unplanned downtimes
- Connection to cloud solutions
- Open new business
- Scheduled maintenance instead of spontaneous repair





CMS1200 and MindSphere

New Apps for digital added value

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SIMATIC
Machine Insight APP

MindConnect Edge Analytics

SIMOTICS Connect 600

Performance Analytics App

SIDRIVE IQ MindApp

CMS1200
+ FB MindSphere Lib

SIMATIC
Condition Analyzer APP

Industrial Network, Remote Access and Security

Holistic approach is vital

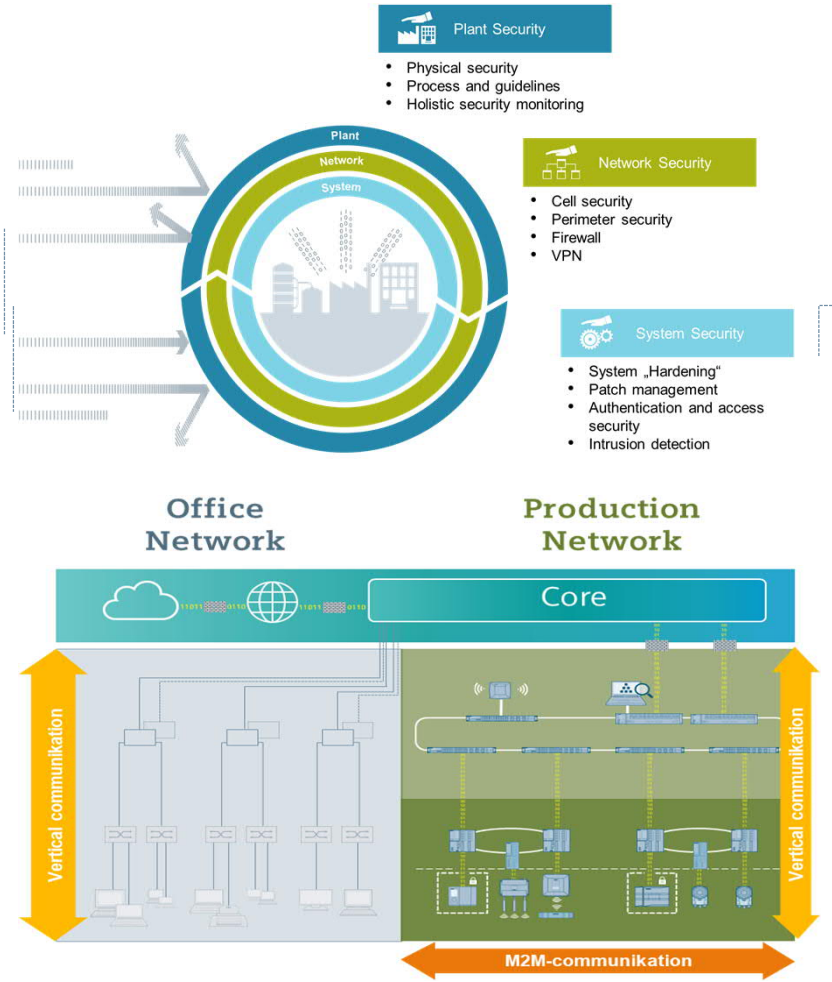
Secure and reliable networks are the technical foundation for digitalization. IT (Office) and OT (Production) have different characteristics and support different requirements. Both worlds need to communicate and to take care about security.

Focus areas:

- IT and OT network separation
- Physical topology and use of VLANs
- Remote Access strategy
- Monitoring
- Antivirus/Antimalware

Possible next steps:

- Network and security design workshop



COMOS
Maximum productivity for the entire plant lifecycle

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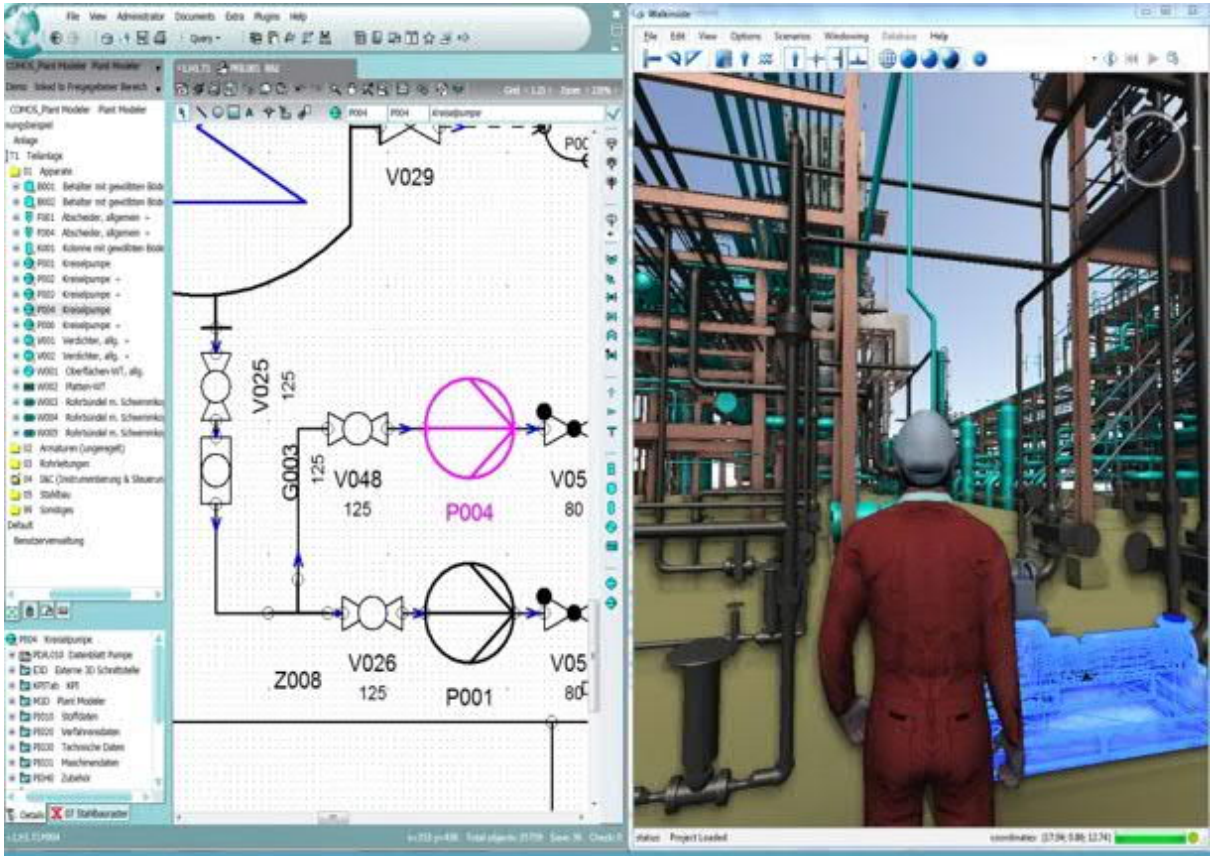
Standard Operating Procedures (SOP):
Proveri korake u proceduri pre ulaska u pogon

Izazovi u poslu održavanja:
Proceniti raspoloživo mesto za proces zamene



2D/3D provera:
Pronalaženje opreme u 3D modelu ili 2D šemi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The Digital Enterprise
Electronics Works Amberg

The Digital Enterprise – Electronics Works Amberg
Increasing quality

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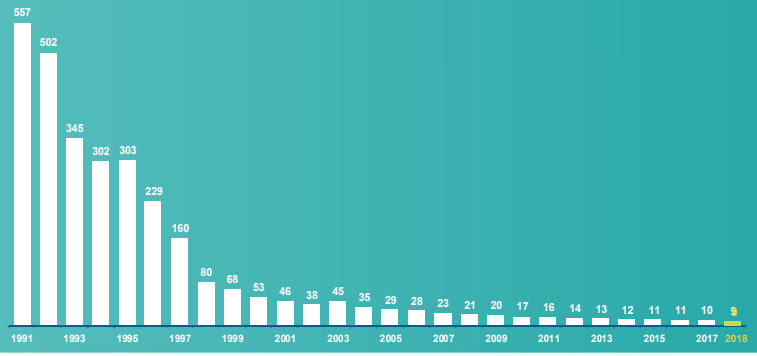
Increasing quality

- Highest quality standards
- Perfection for our customers

▶ ~ 50 Mio. process and product data points are acquired per day

▶ ~ 10 dpm-A equals 99.999% process quality



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Enhancing flexibility

- Mass customization
- Volatile markets

- ~ 350 changeovers per day to handle 1,200 different products
- > 99.5% delivery reliability to assure 24h delivery time

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Reducing time-to-market

- Shorter innovation cycles
- Faster product introduction despite increasing variety

- ~ 13,000 work plan changes per year
- > 120 variations are built per day
- ~ 1 product per second

Speed

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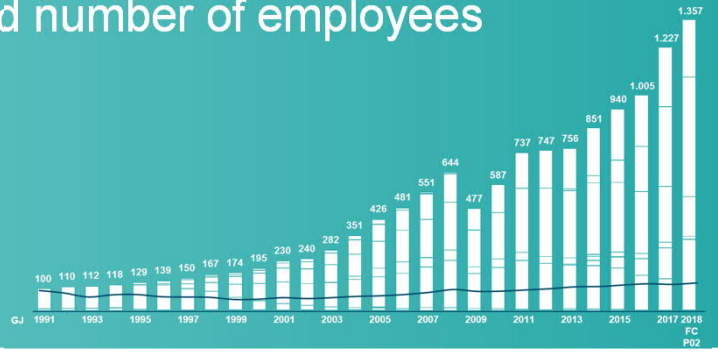
Increasing efficiency

- Efficient resource utilization
- Optimal capacity utilization

- ▶ Highest production line utilization to serve over 60,000 customers
- ▶ 13x production volume since start of production (1990) with equal floor space and number of employees



We use what we sell –
Siemens Electronics Works: Amberg

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~1 product per second

~ 350 changeovers per day

>1200 different products in Teamcenter

13x production volume
since start of production (1990) despite equal floor space and number of employees

~10 dpm (defects per million)
equals 99.999% process quality – every day

With Siemens' integrated technologies, Maserati reduced development time while increasing production output

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30% shorter development time

More than **70,000** combinations available

3 times more cars produced

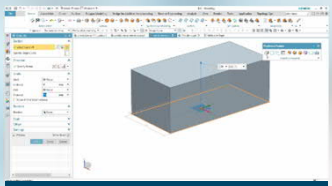
Digital Enterprise

Thinking industry further!

Autonomous production/handling systems: AGV

New process control system

PlantSight Cloud Services



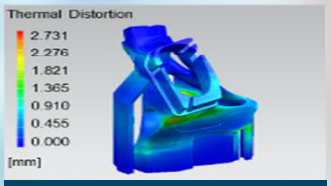
NX Software with Artificial Intelligence

Siemens Industrial Edge

Industrial communication with Industrial 5G

Cloud-based services, e.g. TIA Portal in the cloud

Transparent supply chain with Blockchain



Consistent end-to-end solution for Additive Manufacturing

Cybersecurity monitoring with Edge and AI

What Edge Computing is about –
Edge combines benefits of local and cloud computing

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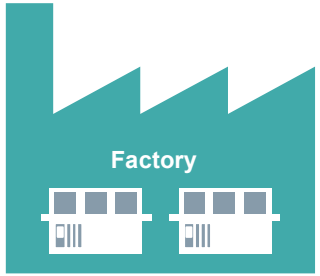
Local computing



Devices installed once – never or few updates

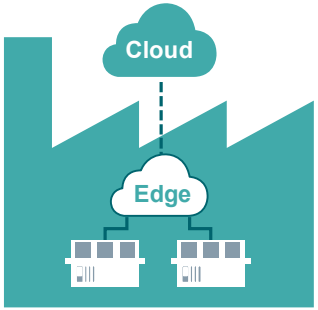
Updates transferred via USB stick or local network

Cloud computing

App installation and deployment on-demand

- Central data and global intelligence
- Quick updates in the cloud
- Low frequency data/high latency of decisions
- Cloud dependency

Edge computing



App installation and deployment on-demand

- Local data and global data (if wanted)
- Shift from global to local intelligence
- Quick software update cycles for edge HW
- Analysis of high volume data and low latency decisions

Siemens – Thinking Industries further with end-to-end expertise for the digital transformation

Portfolio

Providing all the tools to overcome data silos in the virtual and real world

Consulting

Making sure our customers' way toward digital transformation is the right one

Implementation

Helping customers implement and optimize the digital enterprise

Optimization

Continuous improvement by analyzing ongoing Operation

Questions and Answers

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Thank you for your attention!

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