

Welcome to the Webinar “A new area with Open Automation”

The presentation will begin at 9am Central time

All attendees microphones are muted for the entire webinar session. Be sure your speaker is active and join the audio conference.

If you have a question, please send it to the host using the “Q&A” function. Questions will be answered at the end of the presentation.

PUBLIC

Organizational Information

- All participants' **microphones** are **muted** during the webinar.
- Please do not forget to **activate** your PC **speakers** to enable **audio** or connect **headphones** to your PC. You may have to take the step of joining the audio conference to hear sound.
- Please type any questions you have into the WebEx Q&A dialog
- You can open the Q&A window by selecting the “Q&A” icon in the WebEx toolbar at the top of your screen:



- Today's presentation will be E-mailed to all attendees. The webinar will also be posted on our website: <http://www.hbm.com/en/3157/webinars/>
- If you have additional technical questions, feel free to contact our Americas technical support team at support@usa.hbm.com or the European support team at support@hbm.com

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- Product manager for industrial amplifiers and software
- Graduate engineer
- 20 years of experience in factory automation
- E-Mail: michael.guckes@hbkworld.com



Michael Guckes

Agenda

- What is Open Automation technology and how can we benefit from it?
- Our way on the digitalization road: what are the drivers?
- What will change and what will stay in our Smart world?
- Is software the key? Which tools are needed?
- SDK's Software Development Kits
- A look how we can proceed in an economic way - LIVE demo

Tasks of modern control technology

Industrial environments include three factors: quality, time and cost

What users need:

- Precise and electrical robust operation
- Simple integration into the system components
- Easy handling
- Comprehensive, preventive diagnostics, easy maintenance
- High system availability

Megatrends:

- Shorter and shorter product life cycles
- Increasing IT networking
- Demographic change



Digital revolution: Communication 4.0

2021

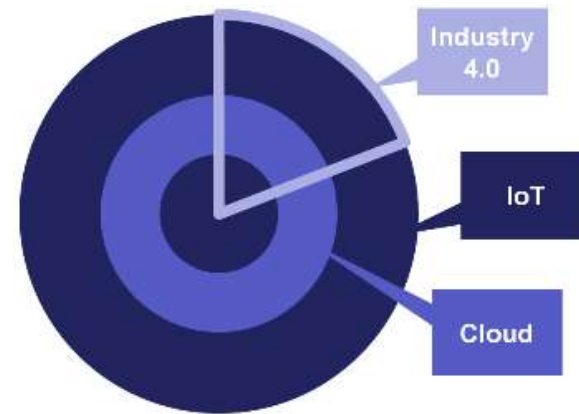


Industry 4.0 and the internet of things (IoT)

Industry 4.0 is only a part of cloud and IoT

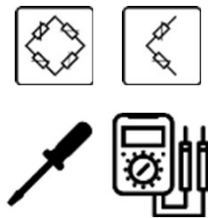
Brings benefits:

- Asset services
- Predictive maintenance
- Device management



Digital revolution: Measurement & controls 4.0

1998

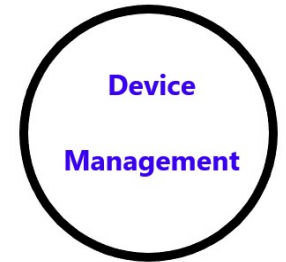
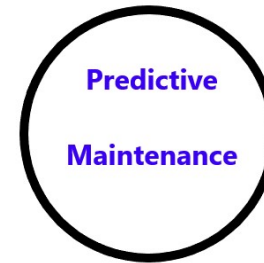
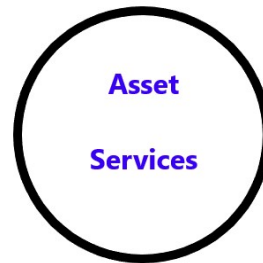


Today's Smart Electronics

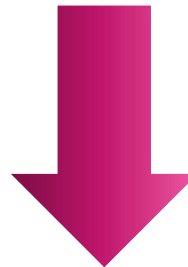


Advantages with Industry 4.0 & IoT

- Intelligent components
- Ensure quality
- Avoid rejects
- Avoid machine downtimes
- Increase transparency in the production



Optimize processes

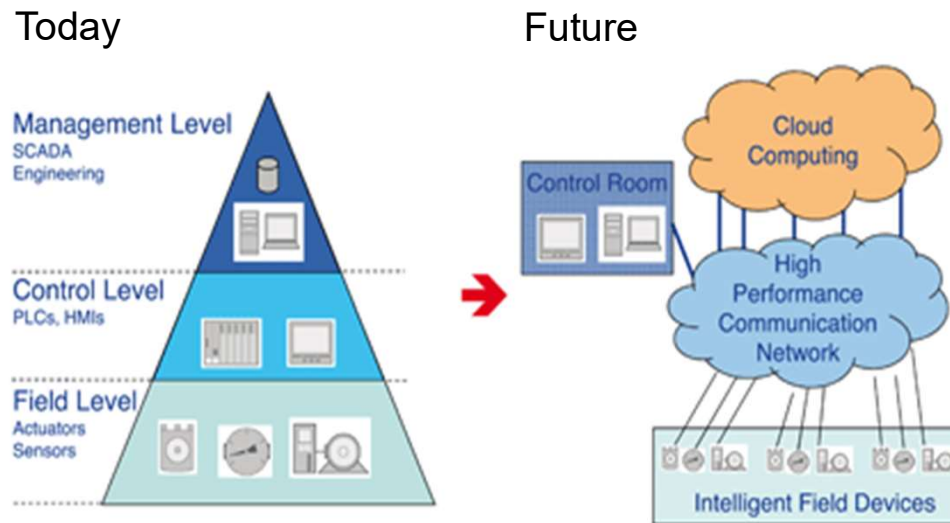


Decrease costs



Increase turnover

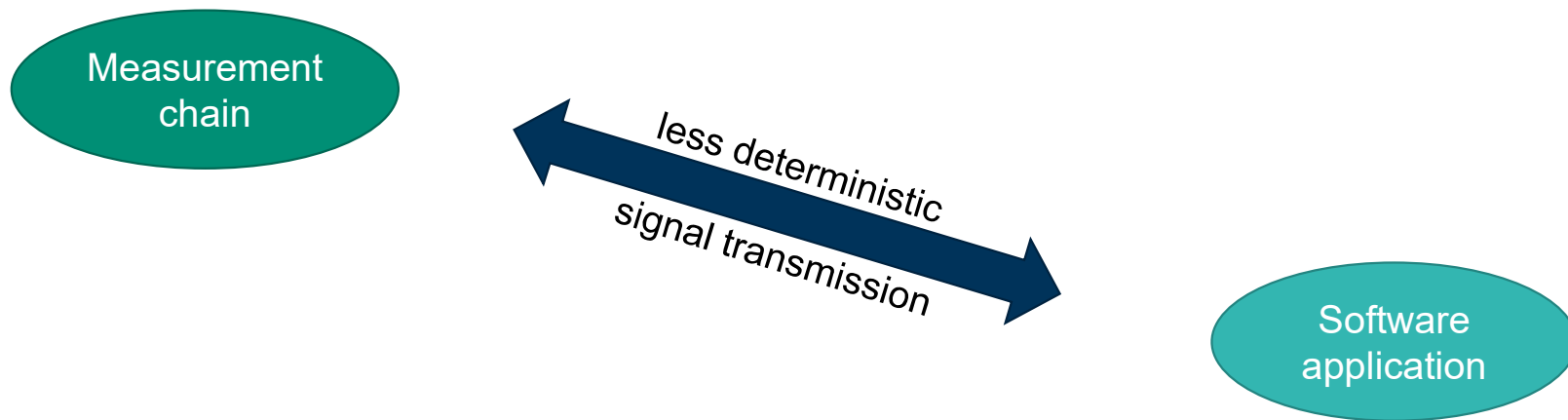
Communication technology for Industry 4.0



- Ethernet technology will replace the Fieldbus in the long term
- TSN standard for real-time capable networks
- Communication protocols and the LAN and WLAN interfaces integrated on one system on chip
- High integration on one component lower the costs for an efficient communication connection
- Google Cloud joins the OPC Foundation

Where does software take place?

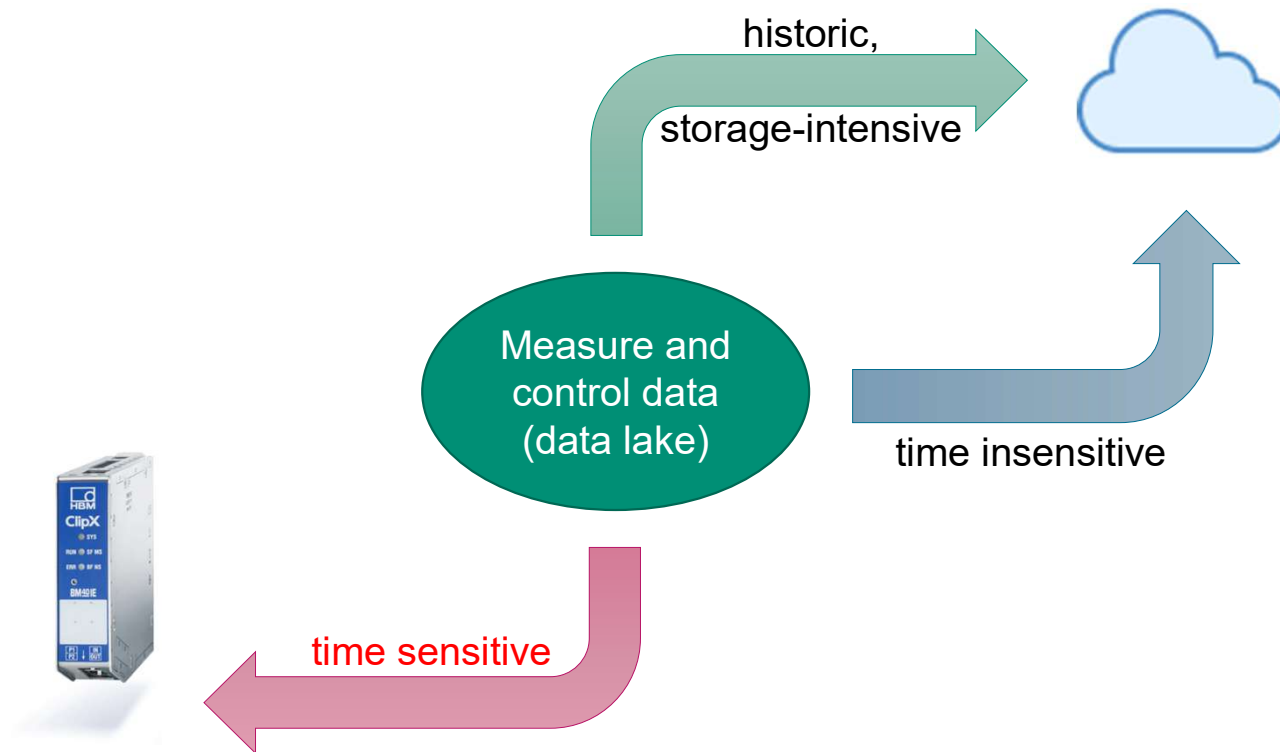
- Replacement of PLC tasks by software applications
- Condition: Less requirements for determinism



- Determinism increasingly available in software applications by using TSN protocols (Time-Sensitive-Network in Layer 2)

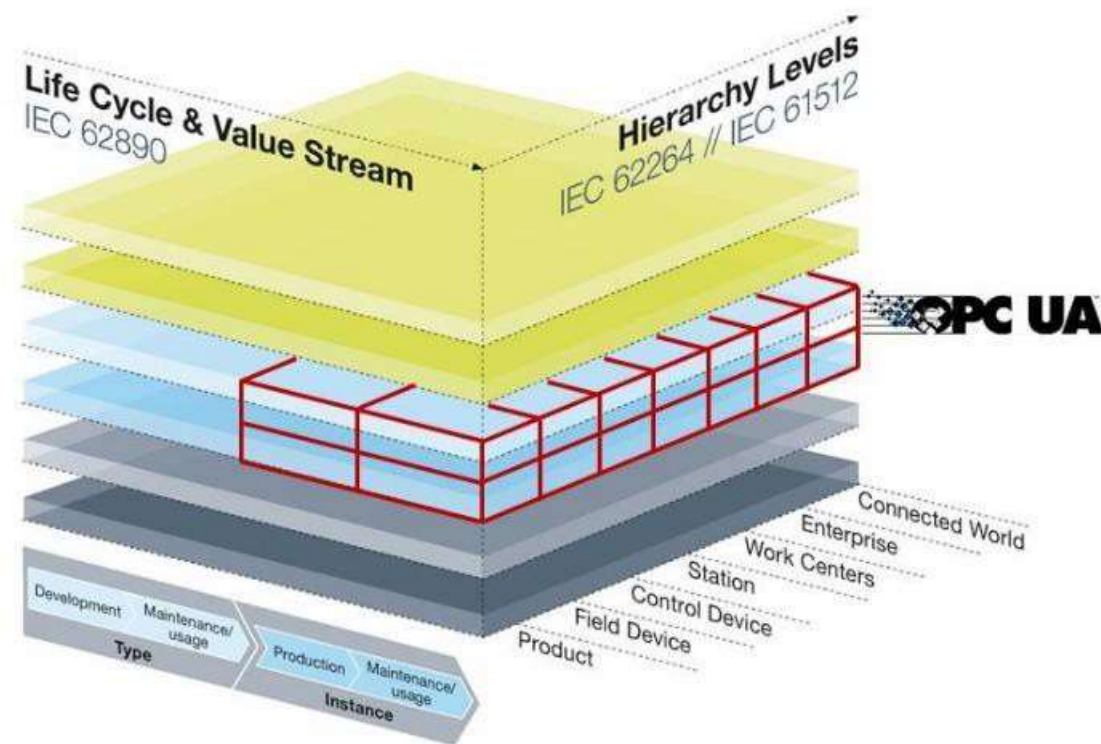
Intelligent hardware – data processing

- Despite cloud uptake – edge computing is essential
- ‘Process data where it is most useful’



Properties of OPC UA

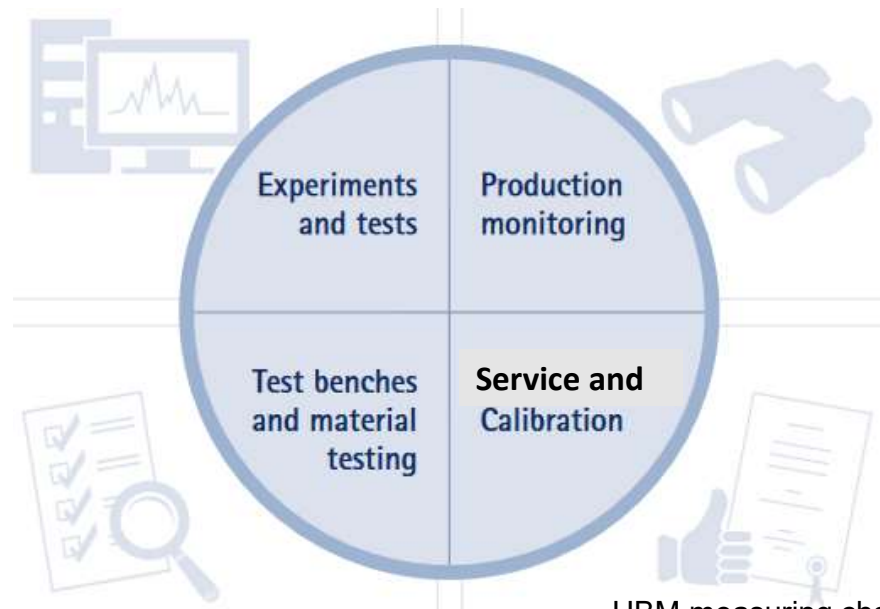
- OPC UA covers a large area of the Industry 4.0 Reference Architecture Model (RAMI 4.0)



Measurement and Control Smartness in Core applications

Reliable measurements in diverse sectors of industry including aerospace, automotive or **test stand construction**.

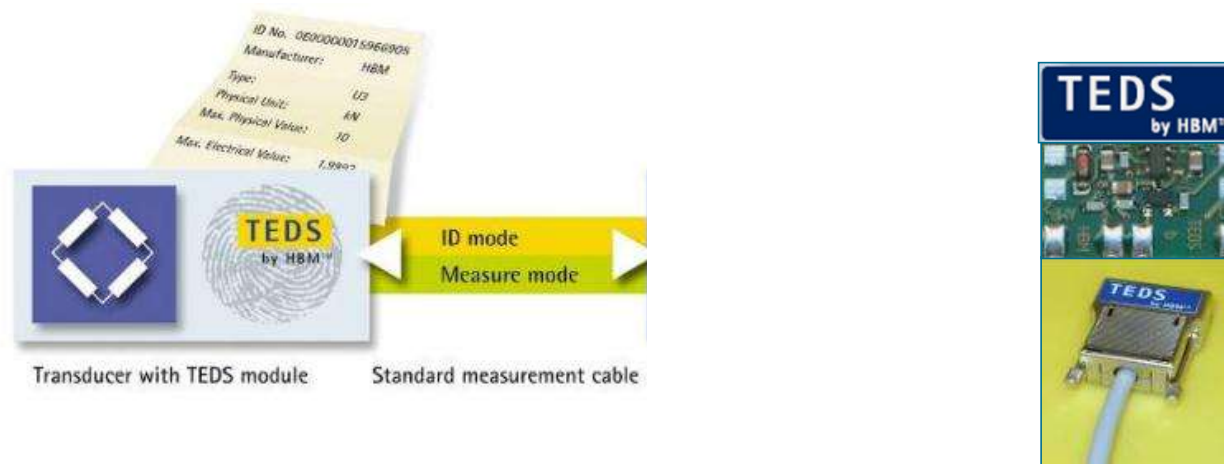
For **production monitoring (WT & IMS)** ensures enabling high quality, fast cycle times and reliable processes.



International quality guidelines require that **material and product properties** are checked for safety.

HBM measuring chains with industrial precision for **machine and factory calibration** in industrial process control, test & measurement tasks

TEDS – Setup measuring chain in only seconds



- Read TEDS (0 and 1-wire) as per the IEEE1451.4 standard
- Easy setup of the measuring chain
- Scaling: 2-point, table, polynomial

Calibration Tracability – Quality you can trust

- The calibration data is stored as a calibration certificate in PDF format in the internal amplifier device memory.
- Users can download it at any time via hbm.com or via the browser of the amplifier
- Quality assurance in production and test benches



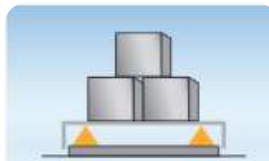
Example: Controlling Press Capacity

1. Summing & Center of gravity

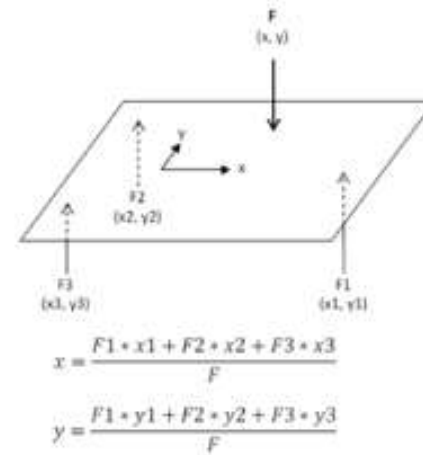
- a) IPC: press-force control
- b) WT: Silko-/ Container weighing



Serve-press
with several force sensors



Platform scales
with several load cells



Calc.channel: Mathematical functions

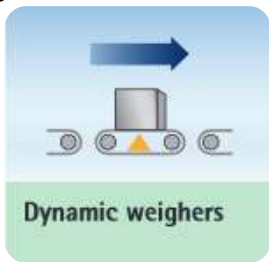


2. Speed & Automatic averaging

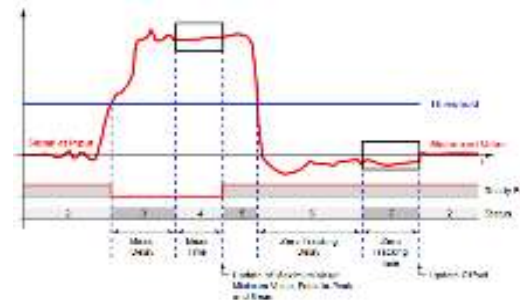
- a) IPC: Motion-control for robots (collision detection)
- b) WT: Check Weighing



Serve-press
with several force sensors



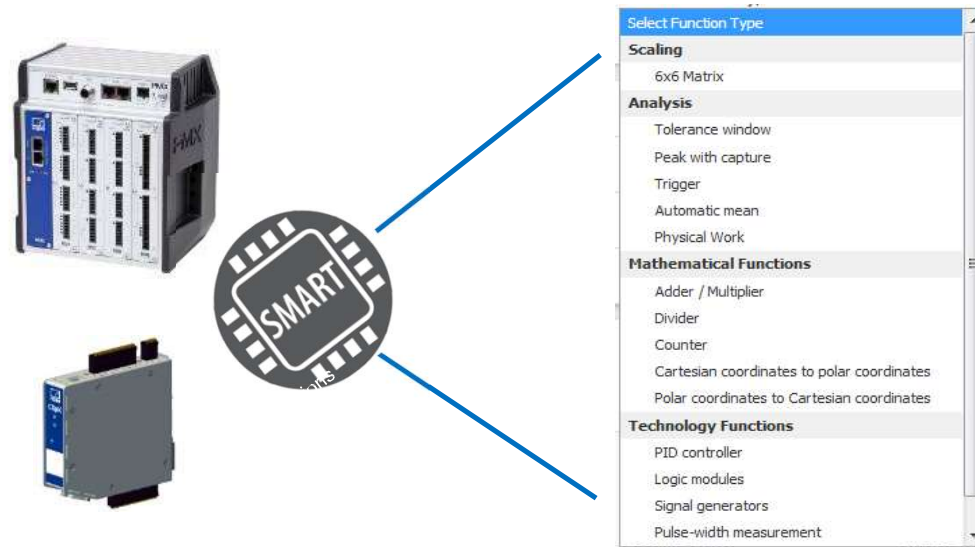
Dynamic weighers



Calc.channel: Automatic Mean

How do Smart Functions help in testing and production technology?

Automation with Calculated channels



- A lot of **applications require additional signals/ information and calculations** to be derived from the measured signal .e.g.: Peak, Mean, math. logic functions, timer, counter, PID regulator,..
- Combinations are possible, Calculation speed is **1ms** for each channel, easy setup via Web-GUI

Intelligent hardware – Edge computing

- Intelligence in the measurement components
- Change from programming to parameterization

Pre-implemented logic:

```
0001 IF switch = TRUE THEN
0002   devSpeed:=T#10ms;
0003 ELSE
0004   devSpeed:=T#25ms;
0005 END_IF
0006
0007 IF devTimer.Q THEN
0008   devTimer ( IN := FALSE, PT := devSpeed);
0009   engine := NOT engine;
0010   IF engine = FALSE THEN
0011     steps := steps + 1;
0012   END_IF
0013 ELSE
0014   devTimer ( IN := TRUE, PT := devSpeed);
0015 END_IF
```

Software program code



#2 PID controller 0.161

Sources		Function Parameters		Outputs	
Setpoint	0 (setpoint)	Y _{max}	20	Y Regulating Varia...	Calculated Chan...
Process Value	U9C Force (Gross)	Y _{min}	0	Min/Max Flag	--
K _p	5 (kp)				
T _i	6.1 (ti)				
T _d	3.2 (td)				
Y _{default}	0				
Start/Stop with	1				
Enable by	1				

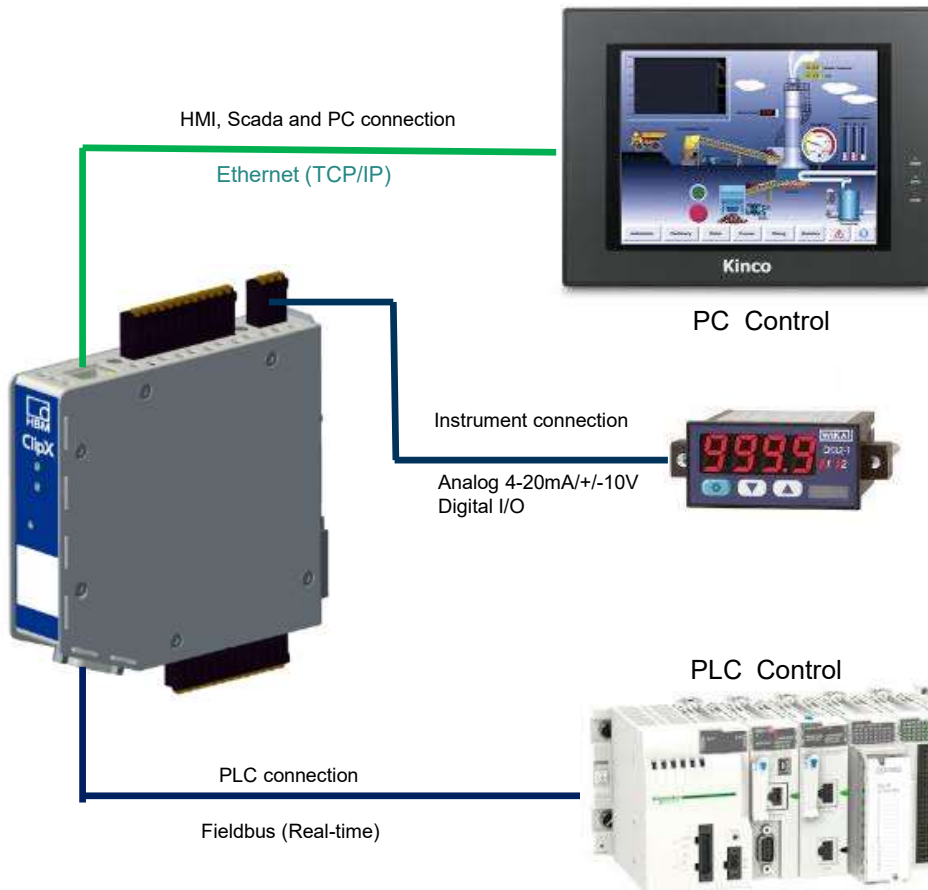
↑ UP ↓ DOWN DELETE

Pre-implemented calculated channel in the edge controller

ClipX smart amplifier backend

(2x Web, 1x Eth, 2x OPC, 1x Analog, 1x PLC)

Simultaneous PC and PLC connection



Signal Sampling rate 19.2kHz

Power BI 2 Hz

OPC UA 10 Hz

PC Data-Viewer and recorder 1kHz

API 1 kHz

Linux

MATLAB

Delphi

NATIONAL INSTRUMENTS

Analog-out 2 kHz

ClipX Object-Dictionary (Index/Sub-index):

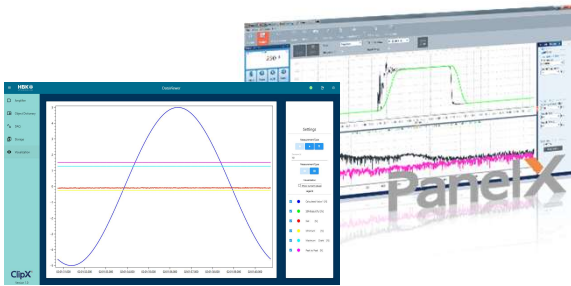
- Read/Write all parameters and functions
- Build "parameter-set" for PLC
- EtherCAT:
- Hot-plugging, Distributed Clocks

EtherCAT 4 kHz

EtherNet/IP 1 kHz

Modbus

Flexibility for Production Systems with Open Automation



Ready-to-use multifunctional PC software

for production and weighing applications. Can be used for servicing and parameterization or for continuous plant operation.

Powerful plant operating and servicing tools



Web-based visualizations

for terminals, tablets, and smart devices in the form of an integrated web-server, a PWA or mobile apps. Modern ergonomic user interfaces with intuitive operation

Operates on all browser-based devices, whether stationary or mobile



APIs and drivers

as a pre-made programming kit with templates for the creation of individual GUIs perfectly adapted to the application at hand.

Multifunctional human machine communication for high security of know-how and investment



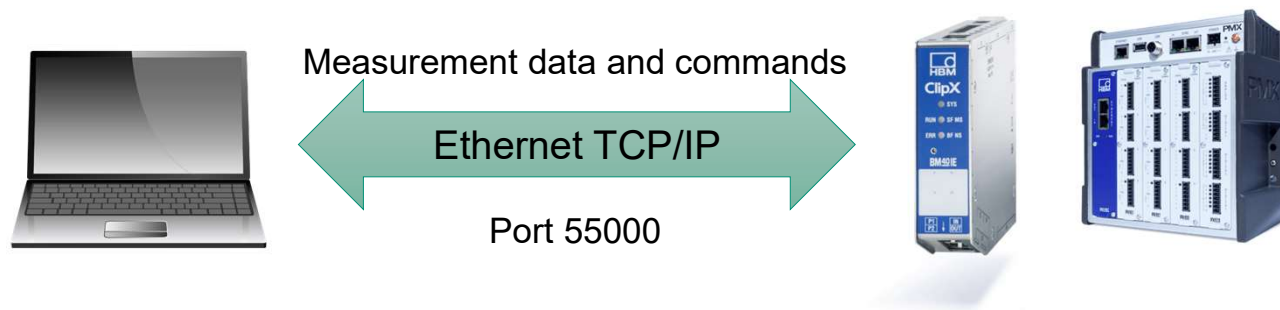
Integration into existing software

- Connection to well-known DAQ- and data processing software necessary



Open interfaces – Device API's

- Possibility for integration in smaller, user-dependent software
- Simple basic structure for communication with the device
 - ClipX and PMX → Object directory (read, write function, addressing all device parameters)

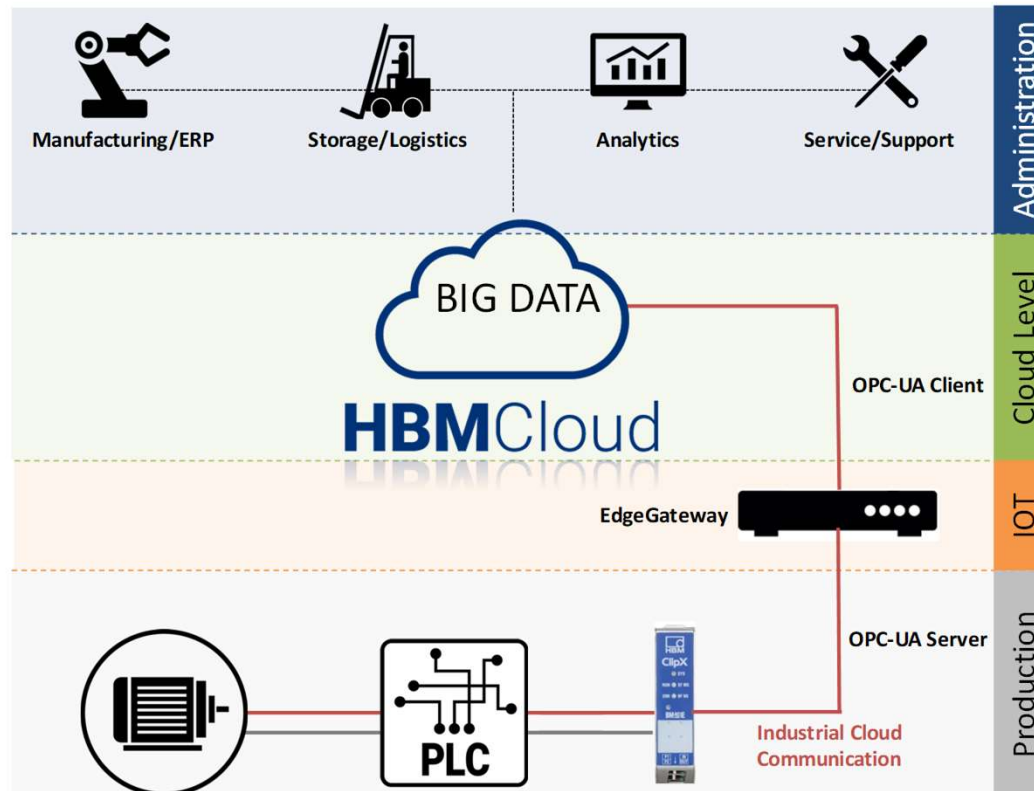


IloT - Protocol Overview

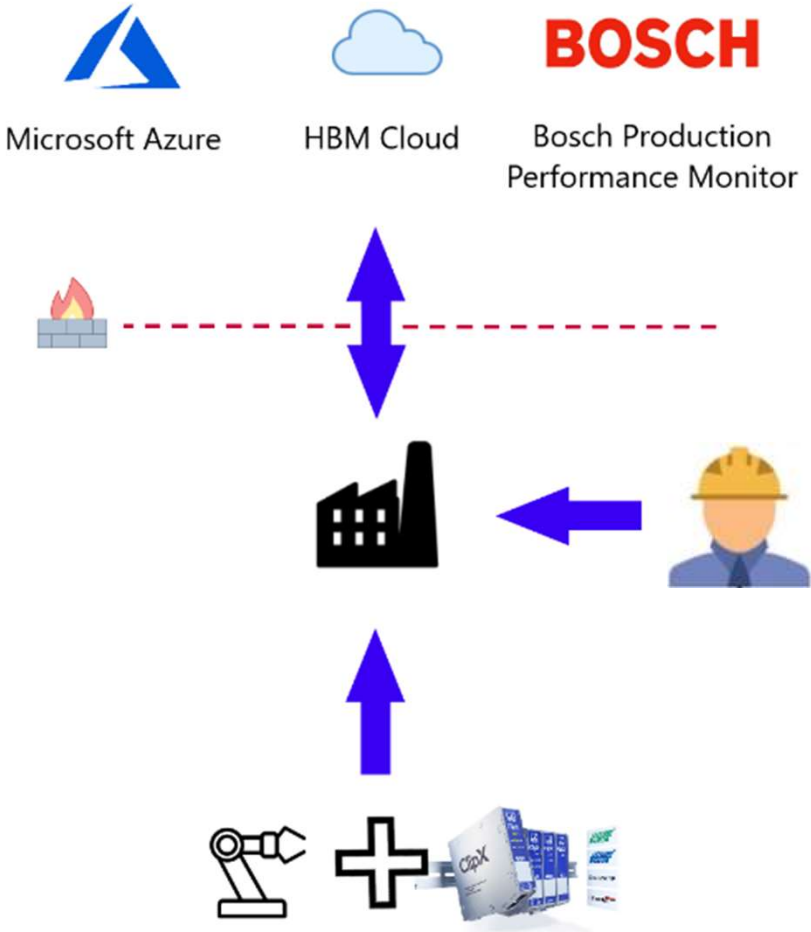
- Which standards are there?
- OPC UA - Open Platform Communications Unified Architecture (Client – Server)
- REST - Representational State Transfer (only interval transmission)
- MQTT - Message Queuing Telemetry Transport
- DDS - Data Distribution Service
- AMQP - Advanced Message Queuing Protocol...



Integration of ClipX in IoT infrastructures and the cloud



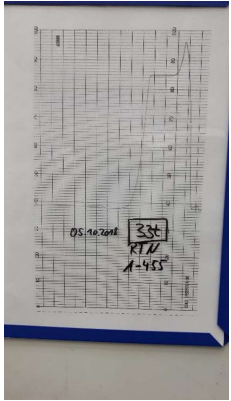
Communication technology for Industry 4.0



OPC-UA / REST application with ClipX (HBM Smart Factory)



Manually control



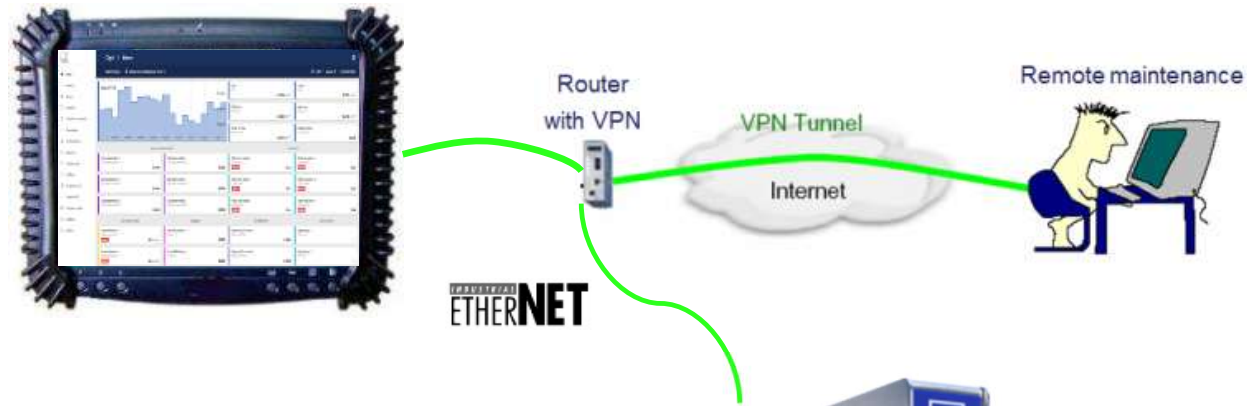
Manufacturing of ring torsion load cells
Monitoring of temperature in the ovens



Automatic acquisition and check by ClipX smart device



Operation and visualization – 100% Control



Connection for remote maintenance via Internet

Every ClipX has its own web interface with responsive design:



Remote operation, maintenance and diagnostics

Live demo accessible world wide (max. 2 connections)



ClipX live via internet: <http://clipxdemo.hbm.com>

SMART digital measurement chains in modern automation

Act as...

- Solution provider for precise industrial measurements
- Innovative integration via bus-systems into machine control systems
- Flexible for monitoring and automation tasks in various applications



Users benefit...

- Save time and money
- Use modern and future-proof technologies
- Get “full service” with HBM (field-service, calibration, custom-sensors, application-support, software-development)

Questions?

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Thank You

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