# Webinar
# “Three ways to optimize your production with IOT”

WEBINAR

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**Michael Guckes**

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# Three ways to optimize your production with IOT

Overview:

- IT, OT, IoT, Cloud and Industry 4.0 – What is this?
- What are the benefits of Industry 4.0?
- Cloud, edge and fog computing
- Industry software protocols
  - OPC UA, REST
  - Practical application

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# Information Technology & Operational Technology

IT:

- Spectrum of technologies for data processing
- Does not include embedded technology

OT:

- Gartner: OT is hardware and software that detects or causes a change by directly monitoring and / or controlling physical devices, processes, and events in the enterprise.

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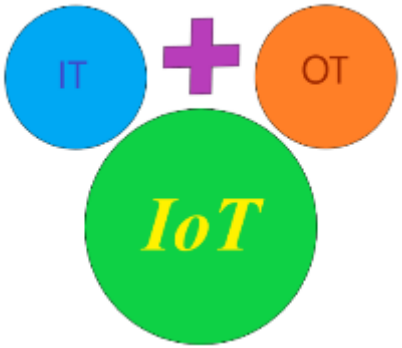
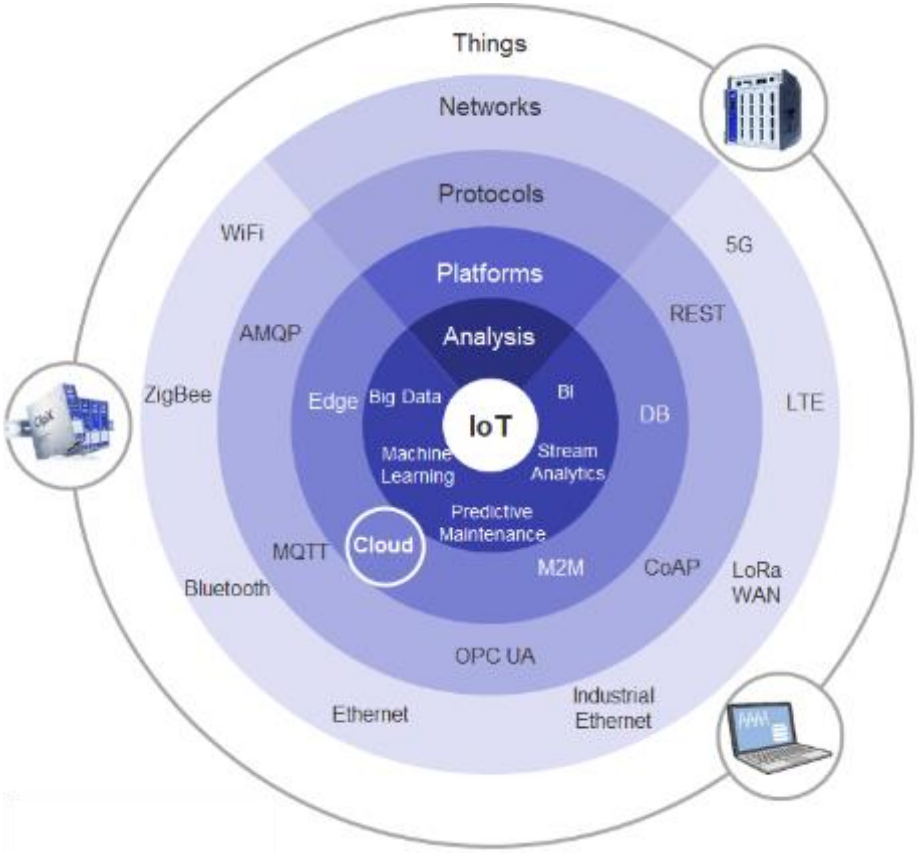
# IoT – Internet of Things

- Merging of IT and OT
- Integration of ‘things’ in the communication flow of the internet
- Industrial part: IIoT
  (Industrial Internet of Things)

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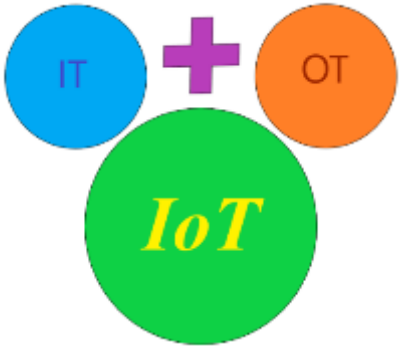
# IoT – Just a temporary trend?

- Analysts see IoT on an unchecked growth path
- Market share is expected to grow to over $ 23 billion by 2020
- By 2020 there will be an estimated 20.4 billion networked devices

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# Cloud

- Central processing of data
- Scalable computing power
- Big data
- Low cost
- Efficient
- Easy data storage and analysis

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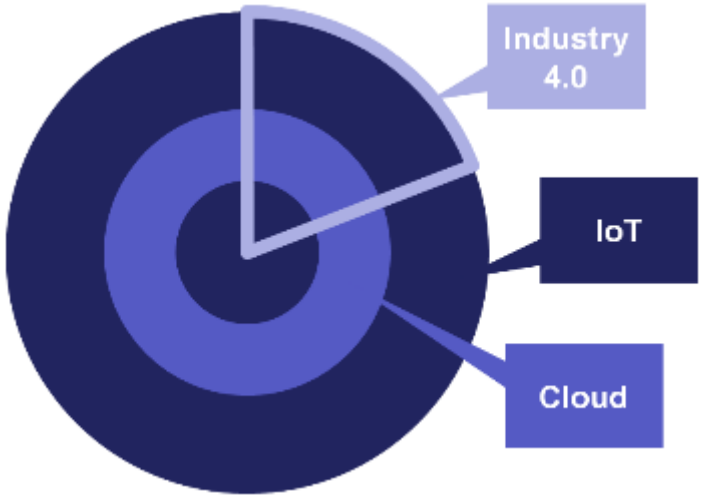
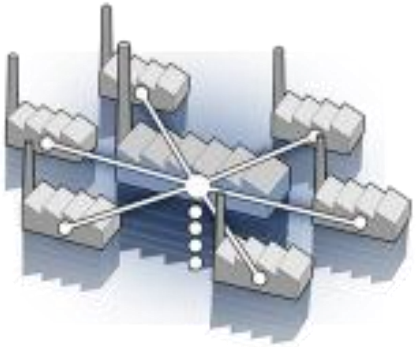
# Industrie 4.0

- Industry 4.0 is only one part of Cloud and IoT




- Provides benefits:
  - Asset services
  - Predictive maintenance
  - Device management



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# What are the benefits of industry 4.0?

Asset Services

Predictive Maintenance

Device Management

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# Asset Services

- Monitoring the production line
- Automatic reactions of the machines
- Real time processing

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# Predictive Maintenance

- Production optimization
- Avoid unplanned downtime
- Increasing production security and continuity
- Prediction and automatic scheduling of maintenance

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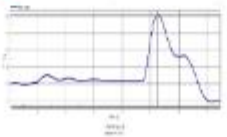
# Predictive Maintenance

1 The production machines are equipped with sensors to record data such as pressure, force, vibration ....

3 As soon as wear is detected, the maintenance order is automatically issued

2 Using AI and machine learning algorithms, possible failures can be detected ahead of time

4 Reduction of losses due to unplanned downtime



Asset Services

Predictive Maintenance

Device Management

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# Device management

- Access from anywhere
- Create a secure and solid infrastructure
- Retrofit existing systems with Industry 4.0 components

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# How can you benefit from it?

## User…

- Save time and money by avoiding downtimes
- Get greater transparency of production processes
- Benefit from: increased productivity
  optimized production processes
  increased product qualitiy

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# Cloud as a future complete solution for data processing?

- By 2025, the total amount of data will increase from 23 zettabytes (2017) to 175 zettabytes
    - Cloud offers appropriate storage capacities
- Analysis of this amount of data requires a lot of computing power
    - Cloud offers scalable computing power

***However…***

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# *However…*

- Cloud has no real-time capability (In 2025, the proportion of real-time data is estimated at 30%)
  - Latency in processes that require fast reactions is too high
- Security concerns
  - Sensitive data must be protected

## *Solution?*

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# Edge Computing

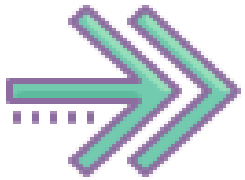
- Edge Computing = decentral processing of the data at the edge of the network

  → „Analytics on the Edge“

- Remarkably low latencies → Real-time processing

- Processing data from sources that can not be transferred to the cloud for cost or technology reasons

- Fast and easy algorithms



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# Edge Computing with PMX

Fieldbus connection (PROFINET, PROFINET, EtherCAT …)

32 internal calculated channels (19,2kHz → real-time)

Convenient setup through intuitive web interface

2-16 measurement channels per module

Very good accuracy class

Easy and fast evaluation (e.g. with evidas)

Individually equippable

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# The right mixture is the key – Fog Computing

- A solution consisting of both components is purposeful

  → Processing of real-time data at the periphery of the network

    - Also reduces the data load on the internet

  → Storing historical, unresponsive data in the cloud

    - Trend analysis is carried out in powerful centers

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# Industry protocols

- Which standards are there?
  - OPC UA – Open Platform Communications Unified Architecture
  - REST – Representational State Transfer
  - MQTT – Message Queuing Telemetry Transport
  - DDS – Data Distribution Service
  - AMQP – Advanced Message Queuing Protocol
  - …

→ In Europe, OPC UA is considered the most dominant protocol

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# REST – Representational State Transfer

- Server ←→ Client principle
- More primitive structure
- Data is sent to HTTP servers at fixed intervals (always Value / Max / Min / Mean)
- Client must know the server name
- No communication Server → Client

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# Properties of OPC UA

- OPC UA is a standardized, platform-independent software interface
- Minimal software development and maintenance effort
- Powerful, user-friendly and flexible
- Multiple access possible
- Safe → User rights
- Server ←→ Client principle

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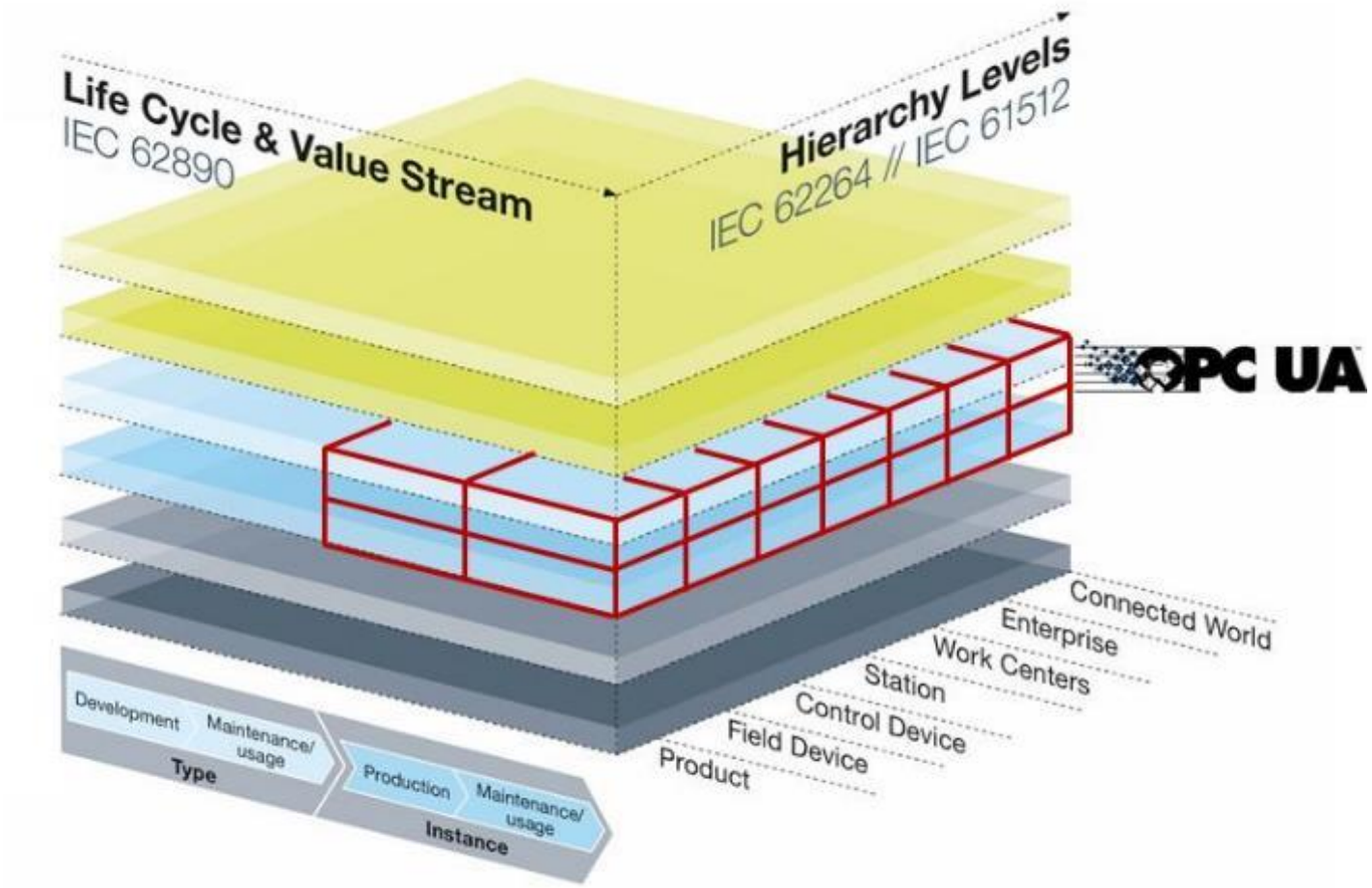
# Properties of OPC UA

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

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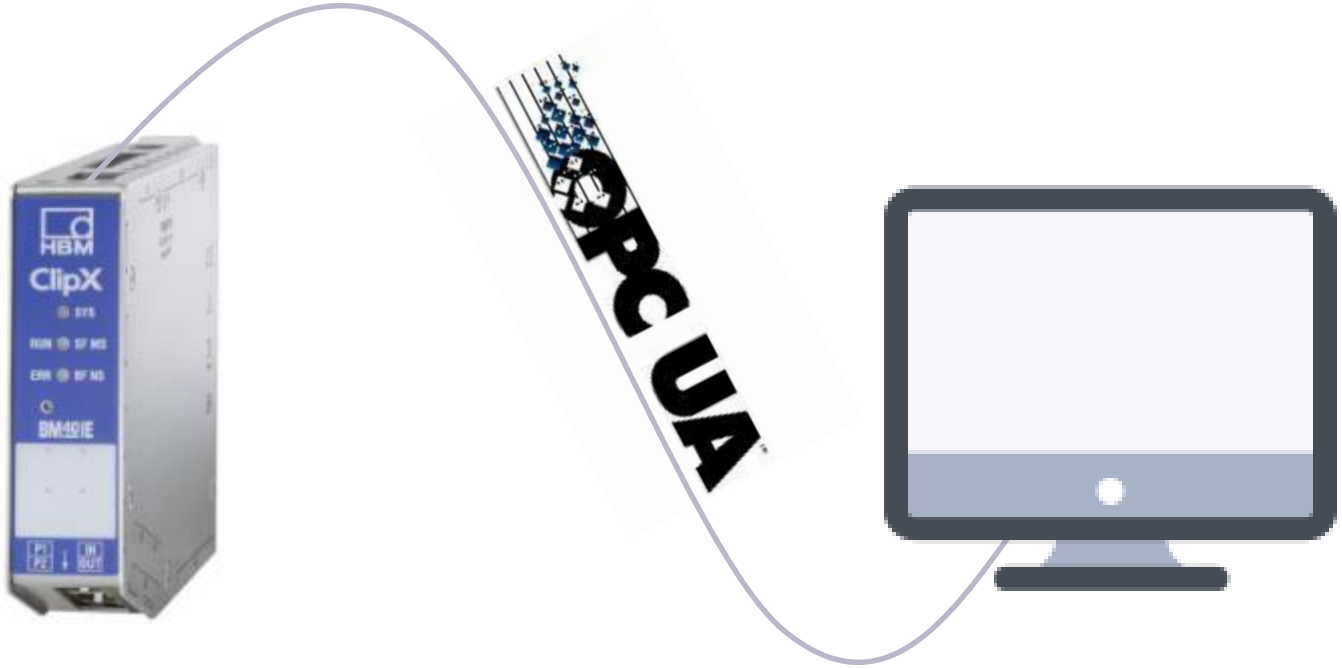
# OPC UA with ClipX

- With the firmware 2.0 HBM‘s ClipX is OPC UA capable
- Easy connection via Ethernet in the network (wireless or by cable)




Server

Client

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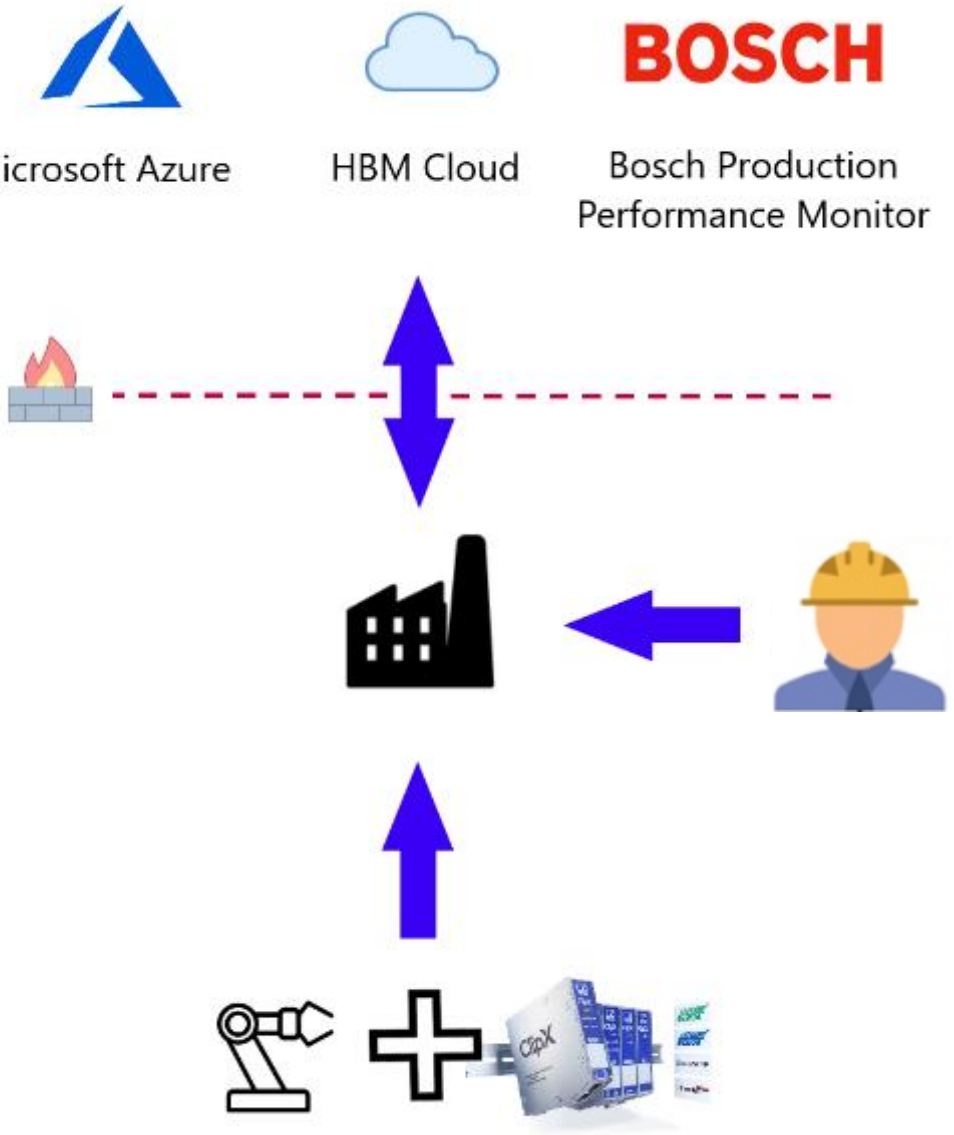
# Practical example: ClipX with OPC UA and REST

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# Remote maintenance and diagnostics

## Live-Demo available around the world (max. 2 connections)

ClipX live on the internet: http://clipxdemo2.hbm.com

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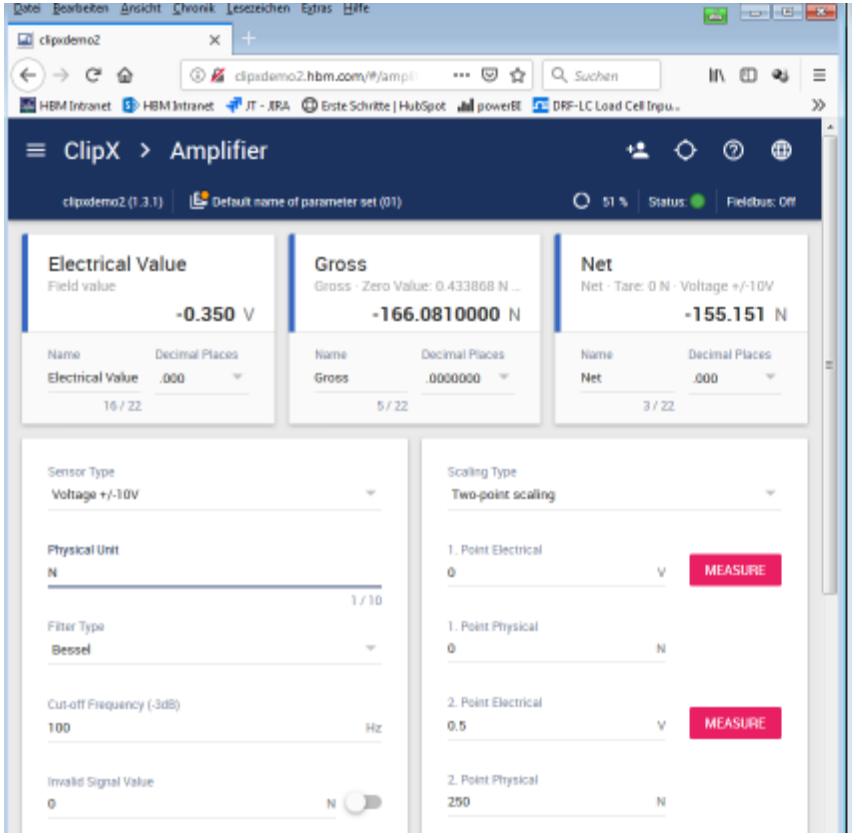
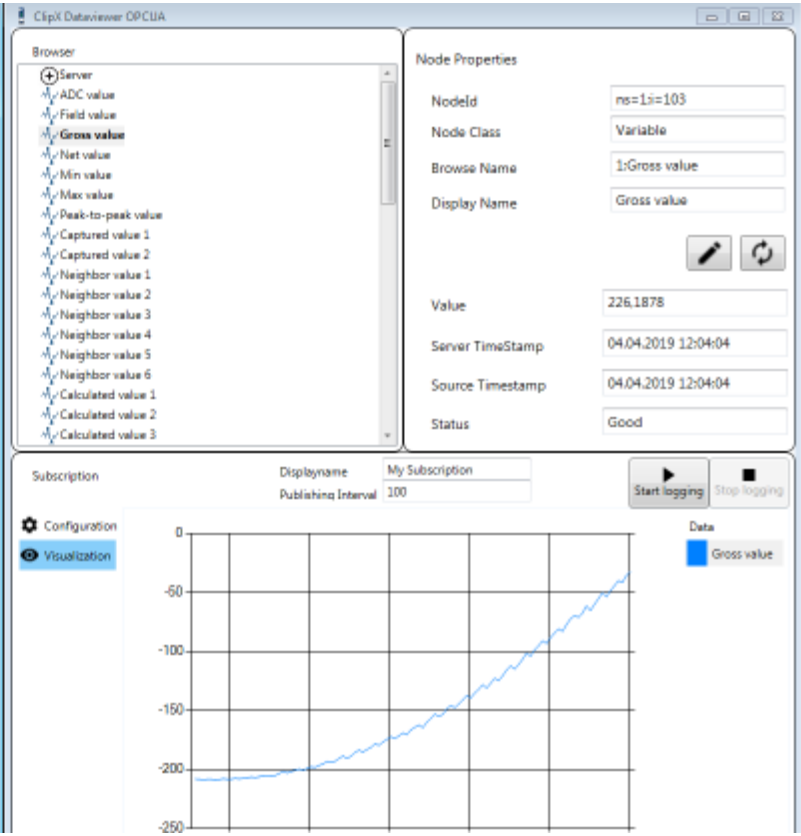
# Remote maintenance and diagnosis

## Live demo available around the world (max. 2 connections)




Ethernet connection
with
ClipX web server

OPC-UA connection
with
ClipX OPC client

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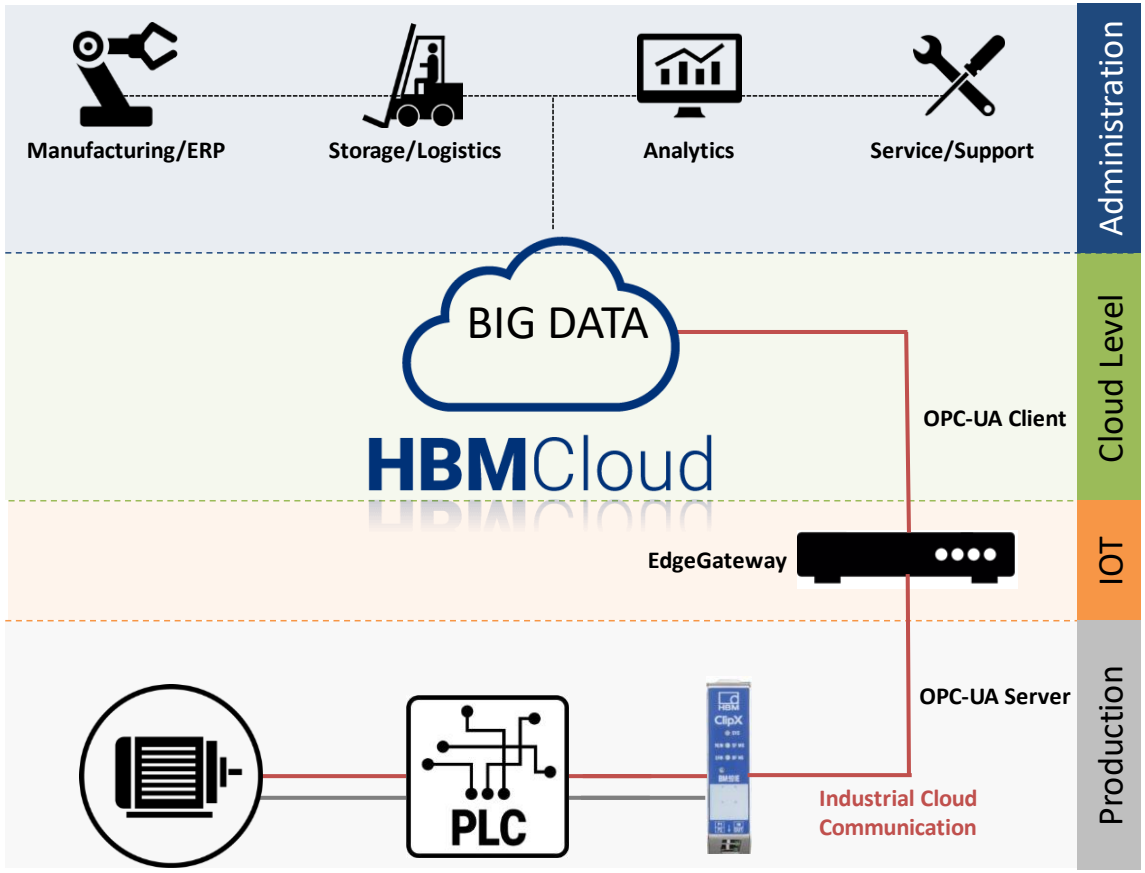
# IoT and Cloud with ClipX

- Easy integration of ClipX in IoT infrastructures and the cloud

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# Industry 4.0 – Application in the test bench at HBM

- Sensor calibration
- Calibration station with test chamber
- Load space with deadweight system

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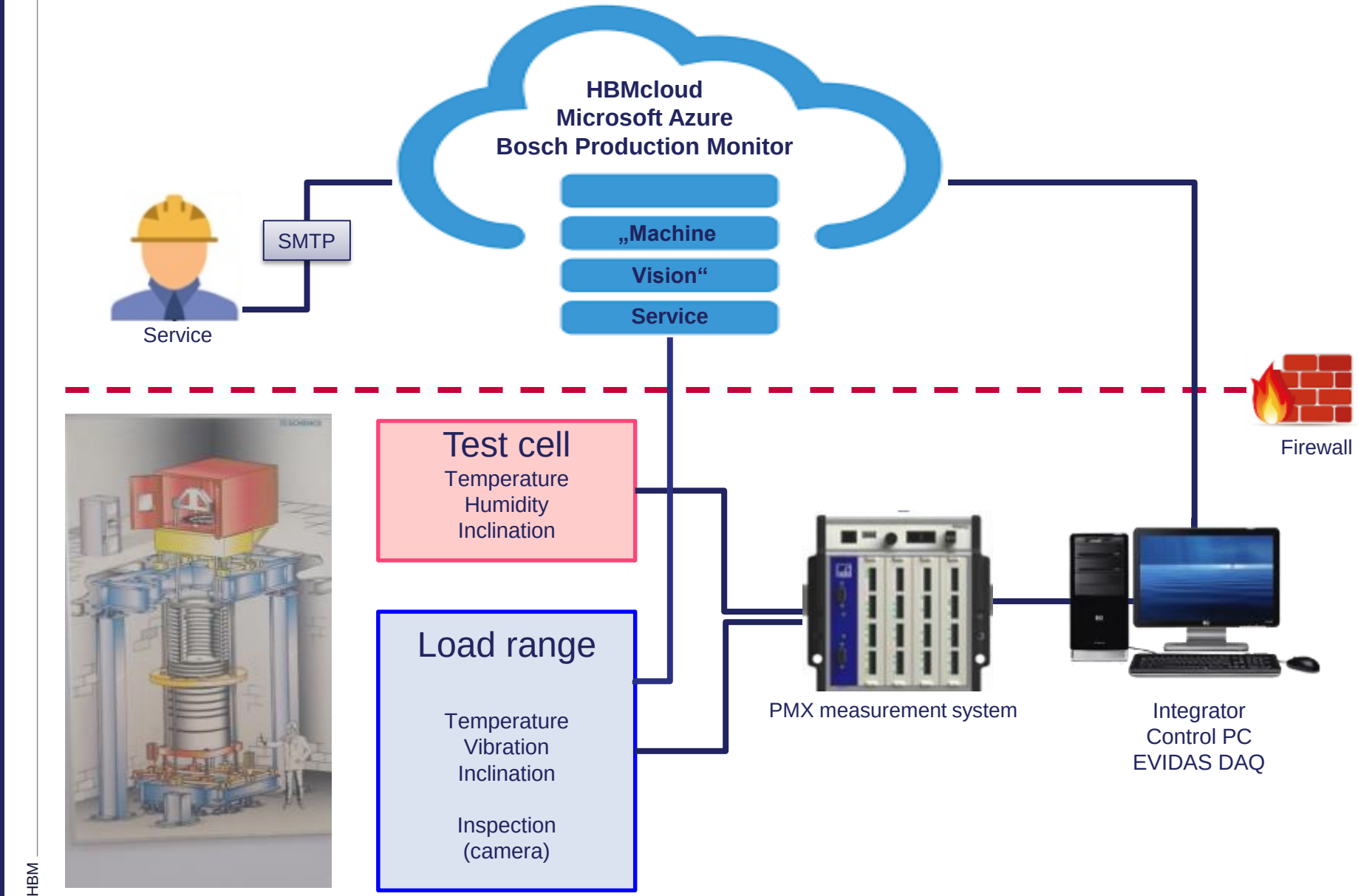
# Industry 4.0 - Application in the test bench at HBM

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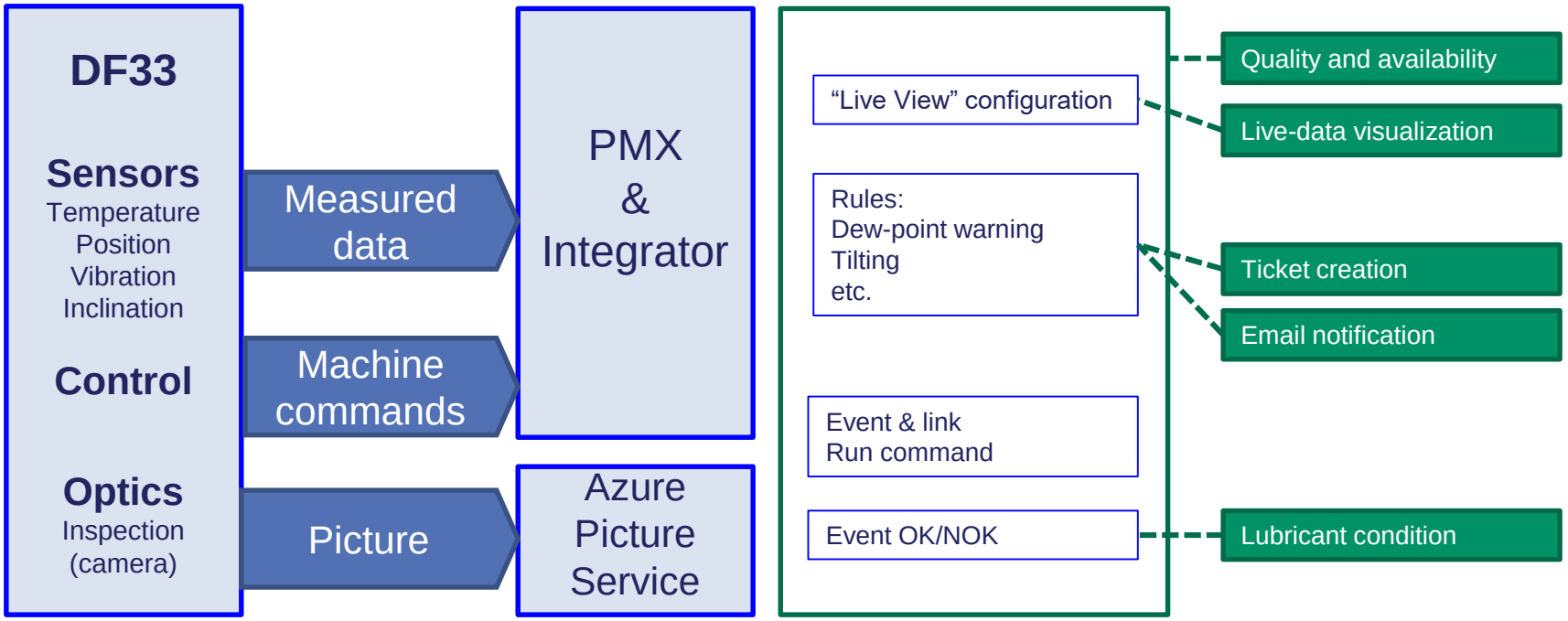
# HBM test bench - signal and data flow diagram




Engine room | Bosch Production Monitor | Innovation gain

BPM Link:

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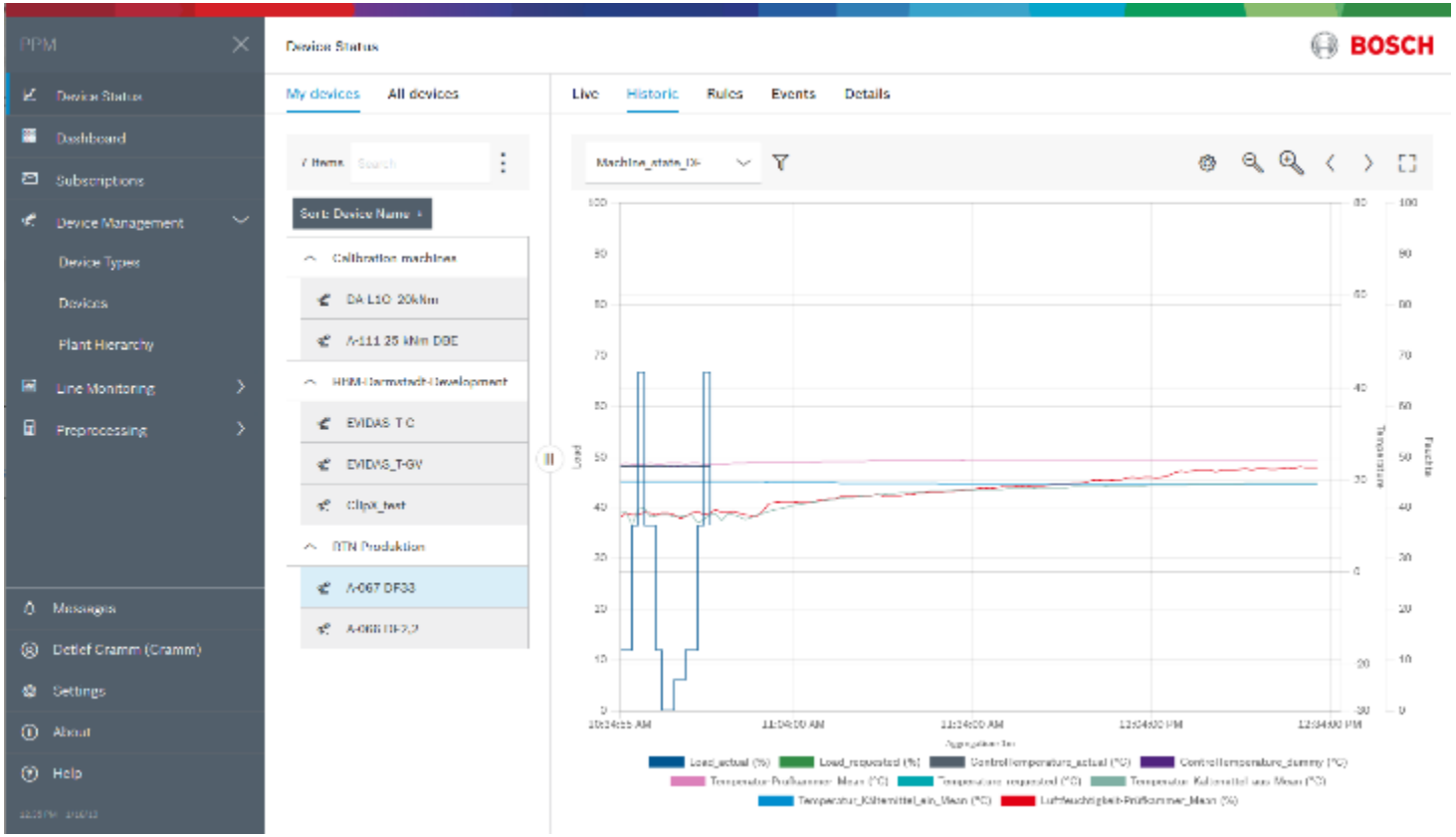
# OPC-UA application with PMX and ClipX (Process Control)




Integration of monitoring data into IOT-software like Bosch Production Performance Manager (PPM)
Based on standard Ethernet connections (Infolink)

- PMX - via IOT-Hub like EVIDAS
- ClipX - direct via IOT-Protocol (Rest, Bosch)

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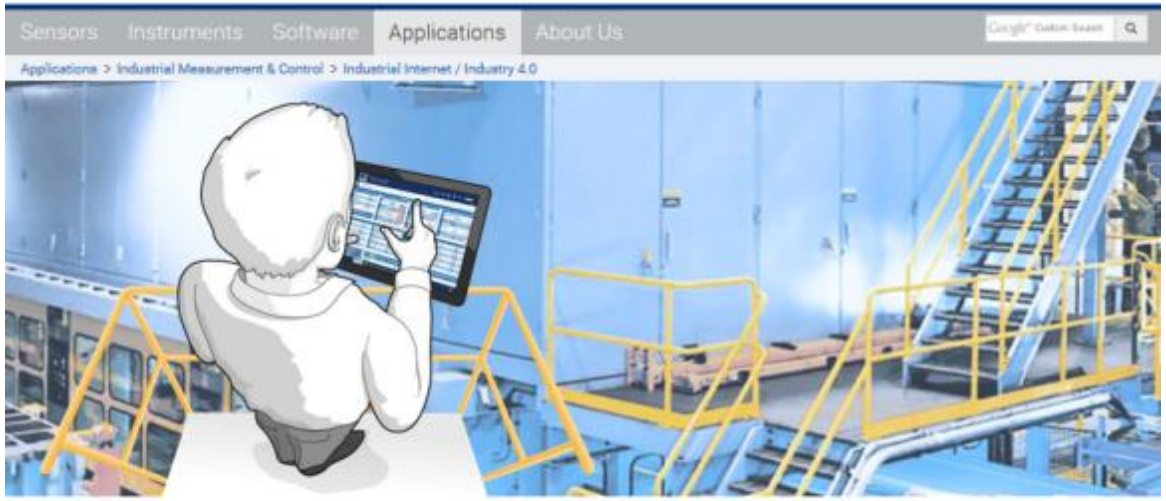
# Additional information

More information on IOT can be found on our website:

**https://www.hbm.com/en/4547/industrial-internet-industry-40/**




## Test and measurement technology meets Industry 4.0

Enhanced flexibility, higher speed and increased efficiency in the production process are the objectives pursued by forward-thinking companies. The vision of networking man and machine with other objects is the central pillar in this context and is quickly becoming a reality. 'Industry 4.0' is the name the vision is known by.

Only through the use of cutting-edge "Test and measurement technology 4.0" can this vision of a networked production of the future become reality. Since the more complex and dynamic the processes in the manufacturing companies throughout the world, the more important becomes the availability of real-time data on critical parameters.

### "Test and Measurement Technology 4.0": What Does That Actually Mean?

- **Sensors** that allow for easy and fast integration with complex production systems - for example through availability of "electronic data sheets"
- **Measuring amplifiers** that can communicate in real time with sensors and today's Industrial Internet systems
- **Test and measurement software** that bridges the gap between easiest possible handling and increasingly complex functionality

### "We Learn About Industry 4.0 and What it Means for Test and Measurement Technology"

"HBM, as a test and measurement partner in the industry, is proud to be able to contribute to the success of Industry 4.0. In joint projects with universities we learn what Industry 4.0 means in practice for test and measurement technology. Our innovative products for use in manufacturing are proof that we have many ideas for making Industry 4.0 a reality."

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Gain more experience via practical exercises at the HBM Academy:
**https://www.hbm.com/en/0224/seminars-trainings-events-tradeshows/**

**Our tip:**

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# Any questions?

- Type your questions into the WebEx Q&A window
- Or email the presenter directly: michael.guckes@hbm.com

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