Welcome to the webinar
"The Advantages of Digital Force, Pressure and Torque Measurements for Your Test Benches and Production Processes"

Michael Guckes

- **Product Manager Industrial Measurement Solutions**

- Product manager for industrial signal conditioners and software

- Graduate engineer

- 20 years of experience in factory automation

- **E-Mail:** michael.guckes@hbm.com

Michael Guckes

Topics:

- Advantages of the digital measuring chain

- What benefits does high-quality measurement technology bring?

- How do "smart functions" support automation technology?

- Modern automation concepts and efficient diagnostics; applications

- Live Demo

Why is accuracy important?

Mount Everest   8848m
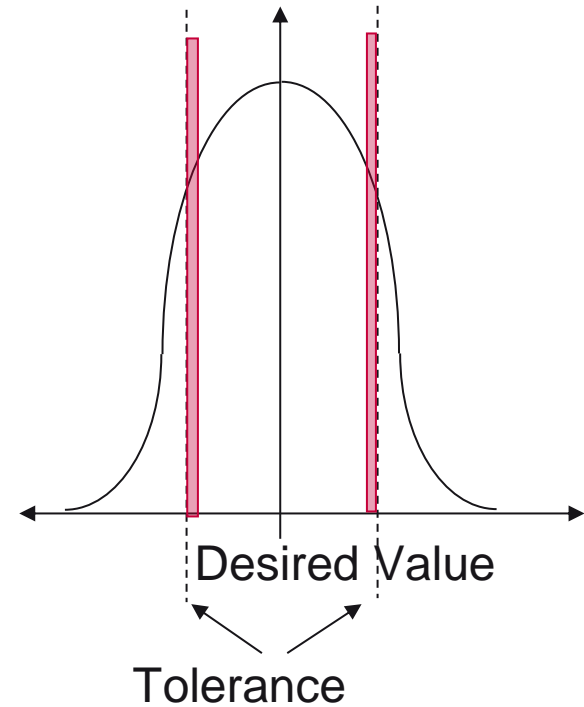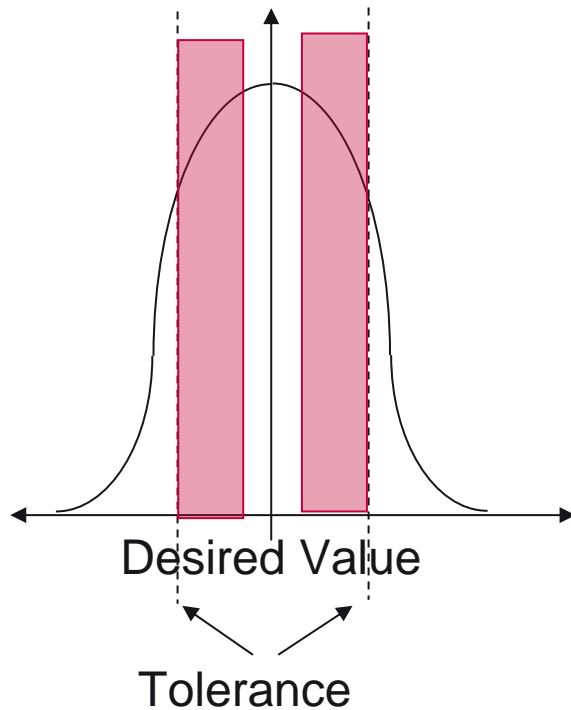
Hydrostatic pressure: +/- 1,0m (0,01%)
GPS: +/- 1cm (0,0001130%)

HBM force sensor: S2M/500N

Character	S2 (old)	S2M (new)
Hysteresis	0,1	0,02
Linearity	0,05	0.02
TCZero	0,05	0,02
TKSpan	0,05	0,02
Creep	0,05	0,02

500N

old
new
60N (12%)
18N (<4%)
0N

Desired Value

Tolerance

Desired Value

Tolerance

- Make sure your investment is future-proof!

- Use your sensor in the largest possible range – and save money

- Optimize your production yield with low uncertainty

ClipX – 7 sensor technologies

1 sensor input channel

- SG / Piezores.-full-bridge – up 4 sensors in parallel , impedance 80Ohm.. 5kOhm, 0.01% accuracy

- DC amplifier with 32 bit resolution and integrated sensor supply 5V

- Sample rate 19.2 kS/s & bandwidth up to 3.5 kHz
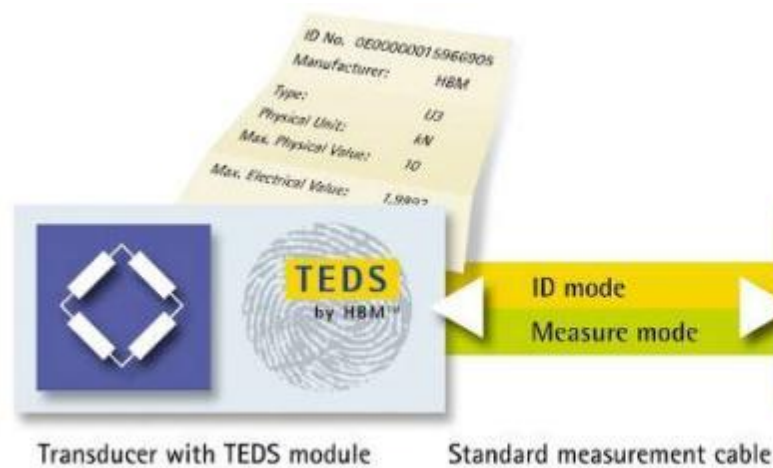
Sensor connection

- The calibration data is stored as a calibration certificate in PDF format in the internal ClipX device memory.

- Users can download it at any time via hbm.com or via the ClipX browser

- Quality assurance in production and test benches

TEDS – Setup of measuring chain within seconds

Transducer with TEDS module   Standard measurement cable

- Reads TEDS (0 <u>and</u> 1-wire) as per the IEEE1451.4 standard
- Easy setup of the measuring chain
- Scaling options: 2-point, table, polynom

The 4th Industrial Revolution Is Upon Us.

PRODUCTIVITY

FROM INDUSTRY 1.0 TO INDUSTRY 4.0

FIRST
INDUSTRIAL REVOLUTION

Introduction of mechanical production facilities with the help of water and steam power

1784

First mechanical loom

SECOND
INDUSTRIAL REVOLUTION

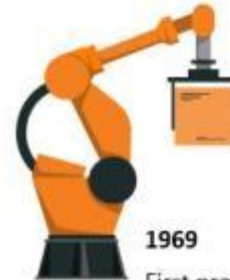Introduction of a division of labor and mass production with the help of electrical energy

1870

First assembly line

THIRD
INDUSTRIAL REVOLUTION

Use of electronic and IT systems that further automate production

1969

First programmable (PC)

FOURTH
INDUSTRIAL REVOLUTION

The Digital Connected World

1800

1900

2000

Principles of Scientific Management

TQM

- **Lean**
- **Six Sigma**

1998

2018

HBM: public

1998

2018

Operation and visualization

Router
with VPN

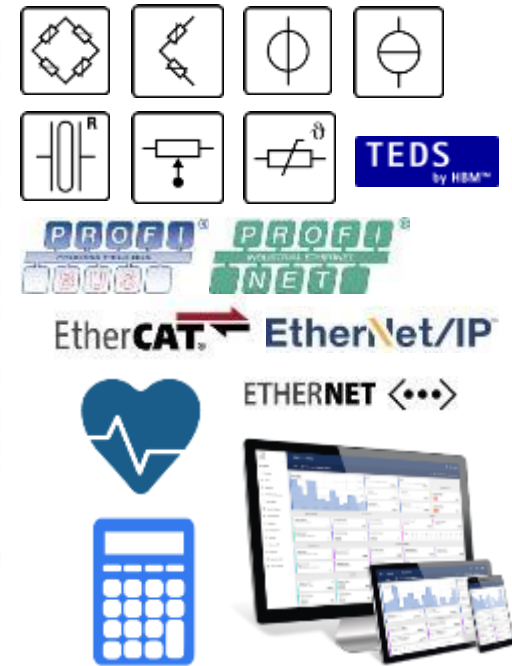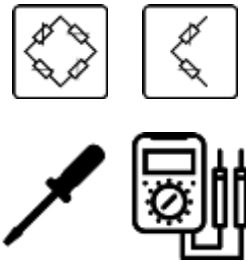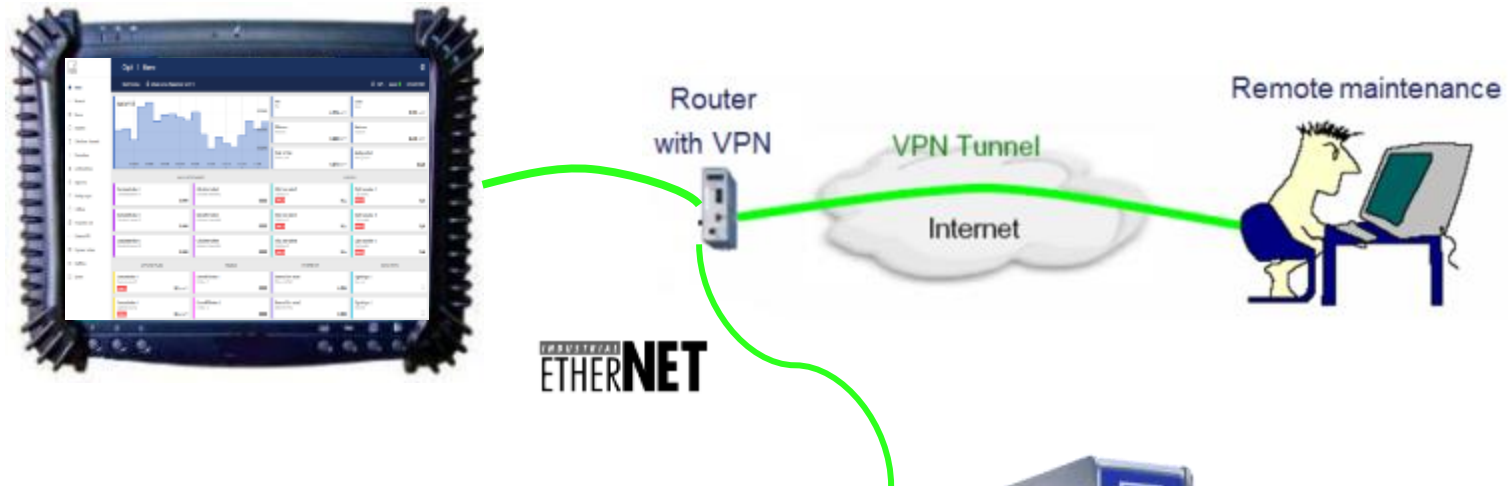VPN Tunnel

Internet

Remote maintenance

ETHERNET

ClipX

Connection for remote maintenance via Internet

Every ClipX has its own web interface with responsive design:

Live-Demo available around the world (max. 3 connections)

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

ClipX provides diagnostics for reliable operation and predicted maintenance:

Signals and visualization:

- ClipX with 3 different operator levels; password protected
- Level 2 freely configurable
- Measuring-, TEDS- and System-status
- Test-signals freely configurable
- Log file for error and operator loggings, stored within ClipX
- Status information (short) in the head-line

ClipX web interface:

BM40

BM40PB

BM40IE

Analog device

Profibus device

Industrial Ethernet device

Ethernet(TCP/IP)
Digital I/O´s (2/2)
Analog output:
+/-10V or 4..20mA

Ethernet(TCP/IP)
Digital I/O´s (2/2)
Analog output:
+/-10V or 4..20mA

+

Ethernet(TCP/IP)
Digital I/O´s (2/2)
Analog output:
+/-10V or 4..20mA

+

EtherCAT. Distributed clocks
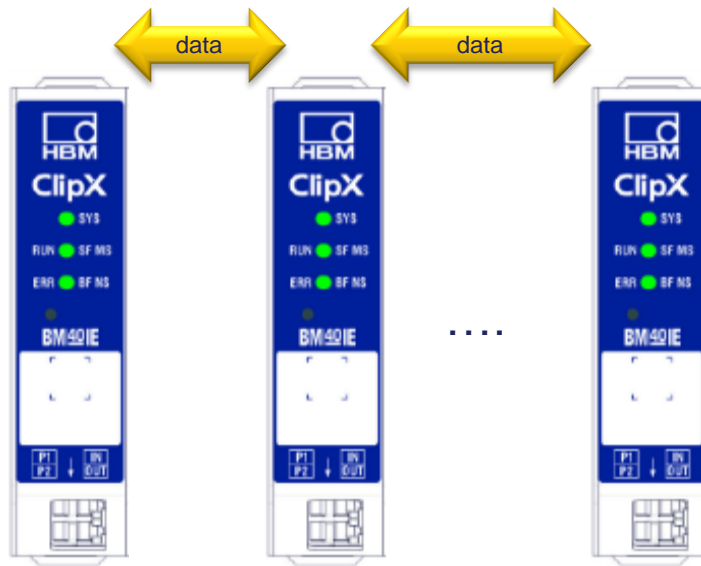
PROFINET RT and IRT mode

EtherNet/IP

Intermodule communication - the ClipX-bus

max. 6 ClipX modules

- Every ClipX module can send and receive Data via the ClipX-bus

- Measuring values or calc. channel values with status

- Send: 1 signal, reveive max. 5 signals

- Every module has 6 internal calculated channels (SMART functions) and calculates with its own and/or meas. channels from neighbour modules

System variants

- The ClipX amplifier system adapts to your application and just grows with your needs while being easy to configure
- The measurements are synchronized via the internal ClipX bus and transmit measured values between the modules

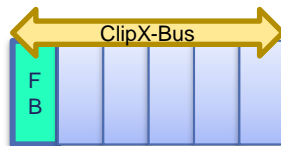ClipX single module, with and without fieldbus
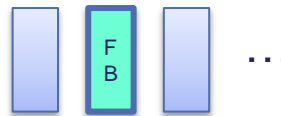
To each ClipX a sensor can be connected, with or without fieldbus
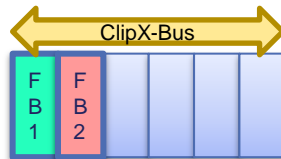
ClipX system without fieldbus
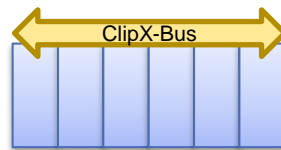
ClipX system with 2 to 6 modules internally synchronized without field bus module
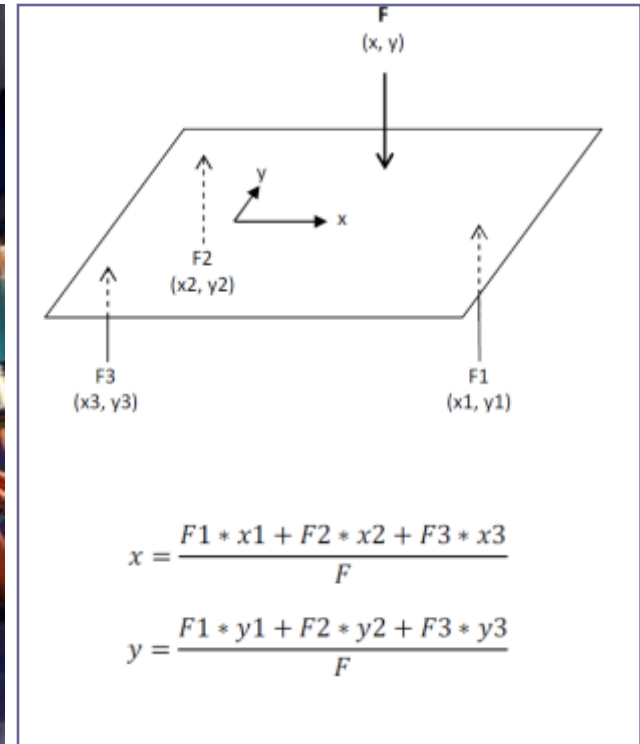
ClipX system with one fieldbus

ClipX system with 2 to 6 modules internally synchronized with a fieldbus module

ClipX system with several fieldbuses

ClipX system with 2 to 6 modules internally synchronized with 2 different fieldbus modules

Example: Measuring and controlling Press Capacity

$$x = \frac{F1 * x1 + F2 * x2 + F3 * x3}{F}$$

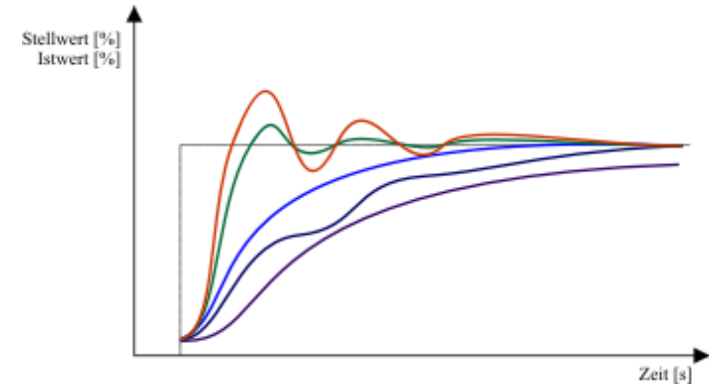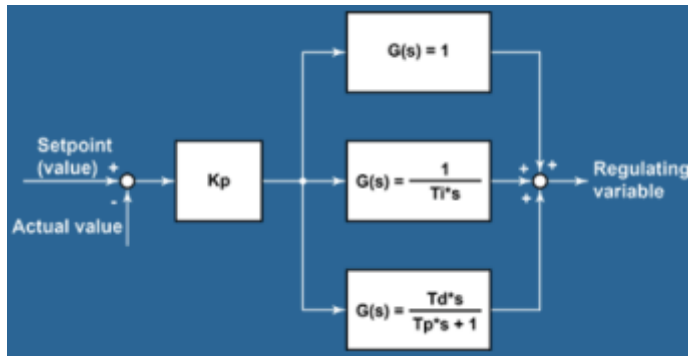$$y = \frac{F1 * y1 + F2 * y2 + F3 * y3}{F}$$

Calc. channel: mathematical functions

Industry compliant measurement technology:

- SLB700 strain sensors measuring forces on each column
- 2 sensors per column:
    - mounted in opposite positions, allow bending compensation of column
    - force measurement on 2 or 4 columns allow calculation of load-distribution

Calc. channel: OID - regulator

Manual
Fieldbus
Ethernet
Other ClipX

Set point

PID

Process value

Analog output
Fieldbus
Ethernet
Other ClipX

Act. value

Sensor input
Fieldbus
Ethernet
Other ClipX

Application fields

Reliable measurements in diverse industries including aerospace, automotive or **test stand constructions**

For **production monitoring:** ensures high quality, fast cycle times and reliable processes

Experiments and tests

Production monitoring

Test benches and material testing

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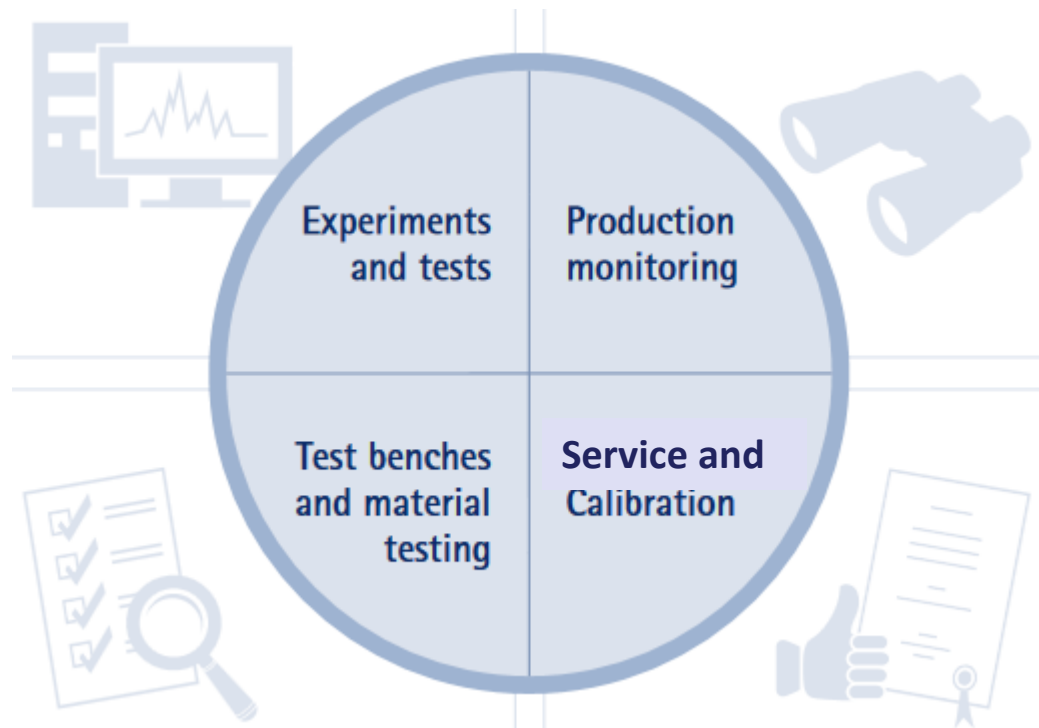
International quality guidelines require that **material and product properties** are checked for safety

HBM measuring chains with industrial precision for **machine and factory calibration** in industrial process control

Digital measurement chains

As…

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

User…

- Save time and money
- Use modern and future-proof technologies
- Get a „full service" with HBM

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

Our tip:

– Individual In-house seminars by appointment

Contact us! seminare@hbm.com or +49 6151 8038061

Any questions?

- Type your questions into the WebEx Q&A dialog

- Or email the presenter directly: michael.guckes@hbm.com

www.hbm.com

Michael Guckes
International Product Marketing IMS
Tel. +49 6151 / 803 - 409
michael.guckes@hbm.com