Welcome to the webinar
“Efficient planning, commissioning and operation of industrial test stands using PMX”

The presentation starts at 10:00 CET

Speaker

- Michael Guckes
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  HBM Test and Measurement
- Product manager for industrial amplifiers and software
- Graduate engineer
- 20 years experience in factory automation

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Three key factors count in industry: quality, time and cost

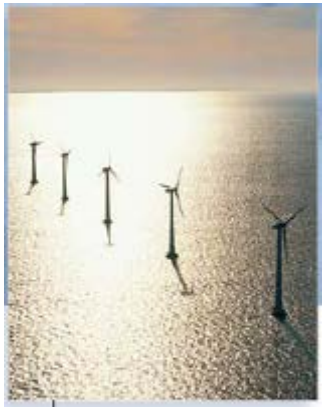
- Manufacturing Monitoring, Test Rigs, Functional Test Stands, Condition Monitoring
- Absolute cost control through integrated systems and functionality according to Industry 4.0

Assembly

Metal working

Machine control

Functionality testing



Energy production

Medical production

Functional test stands

Application example in process control

Application

- Industrial production, presses, test-stands,..
- Rough conditions with dust, humidity and vibrations

Performance in required application aereas

Metal working

Production monitoring applications

- Production monitoring
- Condition monitoring
- “Effective” Installation
- High precision 0.1% to 0.05%; 24bit resolution, 38.4kHz sample rate, 3kHz bandwidth/channel,
- 32 virtual channels
- 4 to 16 meas- I/O-channels
- Fieldbus-integration
- Analog, digital I/O-signals

End-of-line testing applications

- Production-related functional tests
- Testing of 4 up to 500 channels via additional integrated CAN-Field-modules

Industrial test-rig applications

- Fix installed, but modular test rigs for product development
- with definite flexibility PLC controlled or via internal Soft-PLC

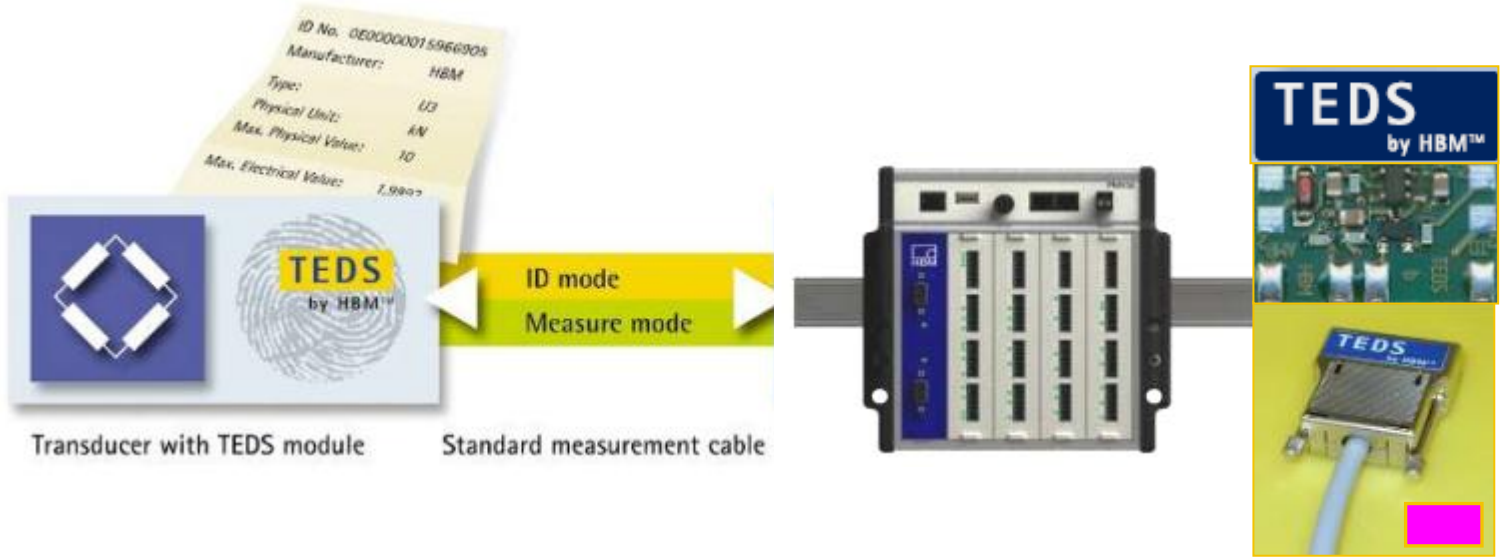
Design concept – Flexibility for the application

Removable for Extension and Service

Hardware

- Housing with Ethernet, USB host, Synchronization, CAN master/ slave (opt.)
- 10-30 VDC power supply
- flexible slots for sensor, analog output, digital I/O and interface modules
- slot for communication & bus interfaces
- The slots are equipped as specified by the customer
- Cards can be removed for service
- Card are calibrated, no recalibration in the field necessary

TEDS – Immediate usage of sensor calibration data



- TEDS = Transducer added Data Sheet (acc. IEEE1451.4)
- No manual adjustments of the sensor data and amplifier data necessary !!!
- Readout of TEDS-data via existing sensor cables
  (no additional cables necessary) (0-Wire / 1-Wire)
  - ➔ Cable and plugs can be used as usual

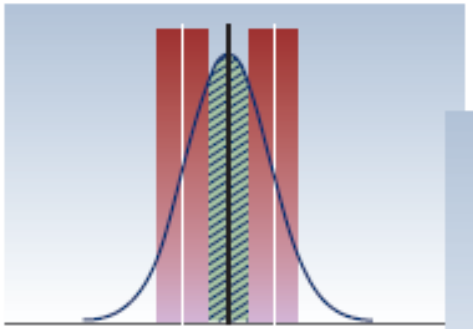
TEDS by HBM™

8

Use case Process control

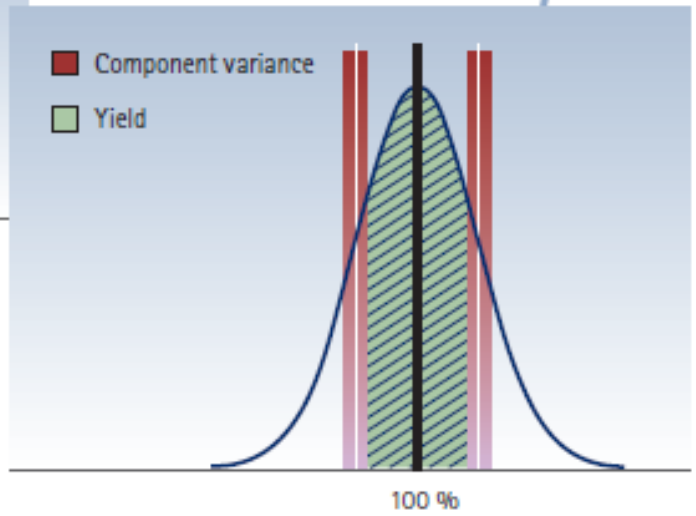
- Greater accuracy makes it possible to record manufacturing tolerances more precisely.
- Components are precisely tested and manufactured with the necessary tolerance.
- Reduces rejects and conserves resources while maximizing output.

...without



Process monitoring with conventional measuring amplifiers, high rejection rate due to measuring inaccuracies

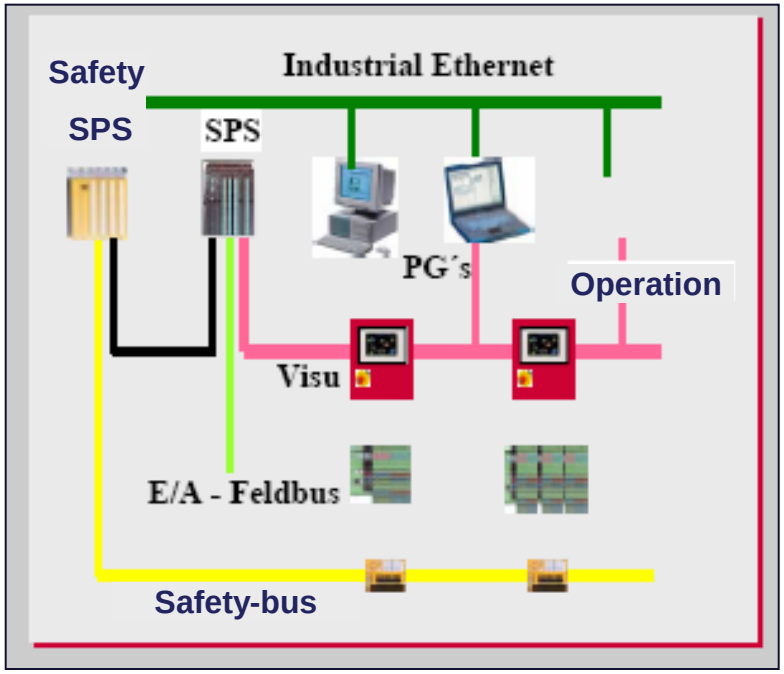
... with



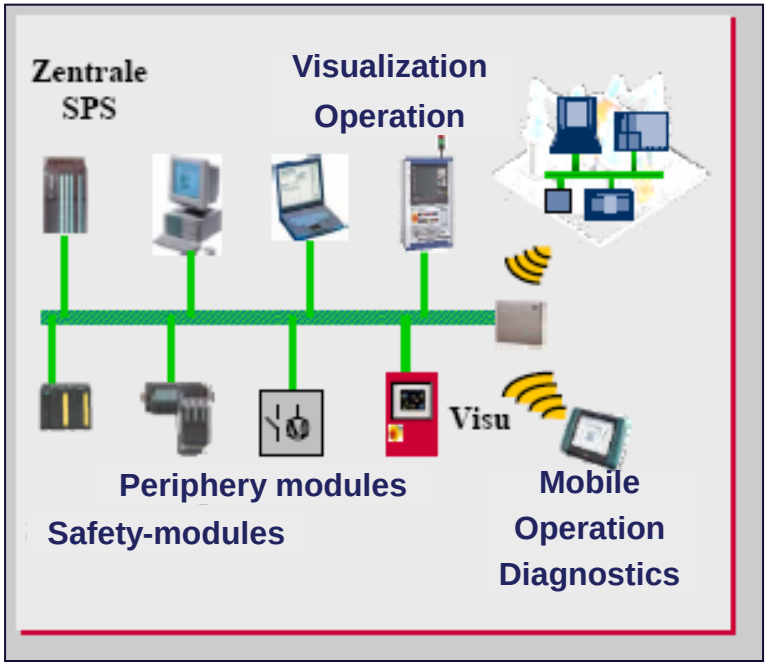
Increased efficiency with PMX, optimum yield with precise measurement results

Requirements

Old structure

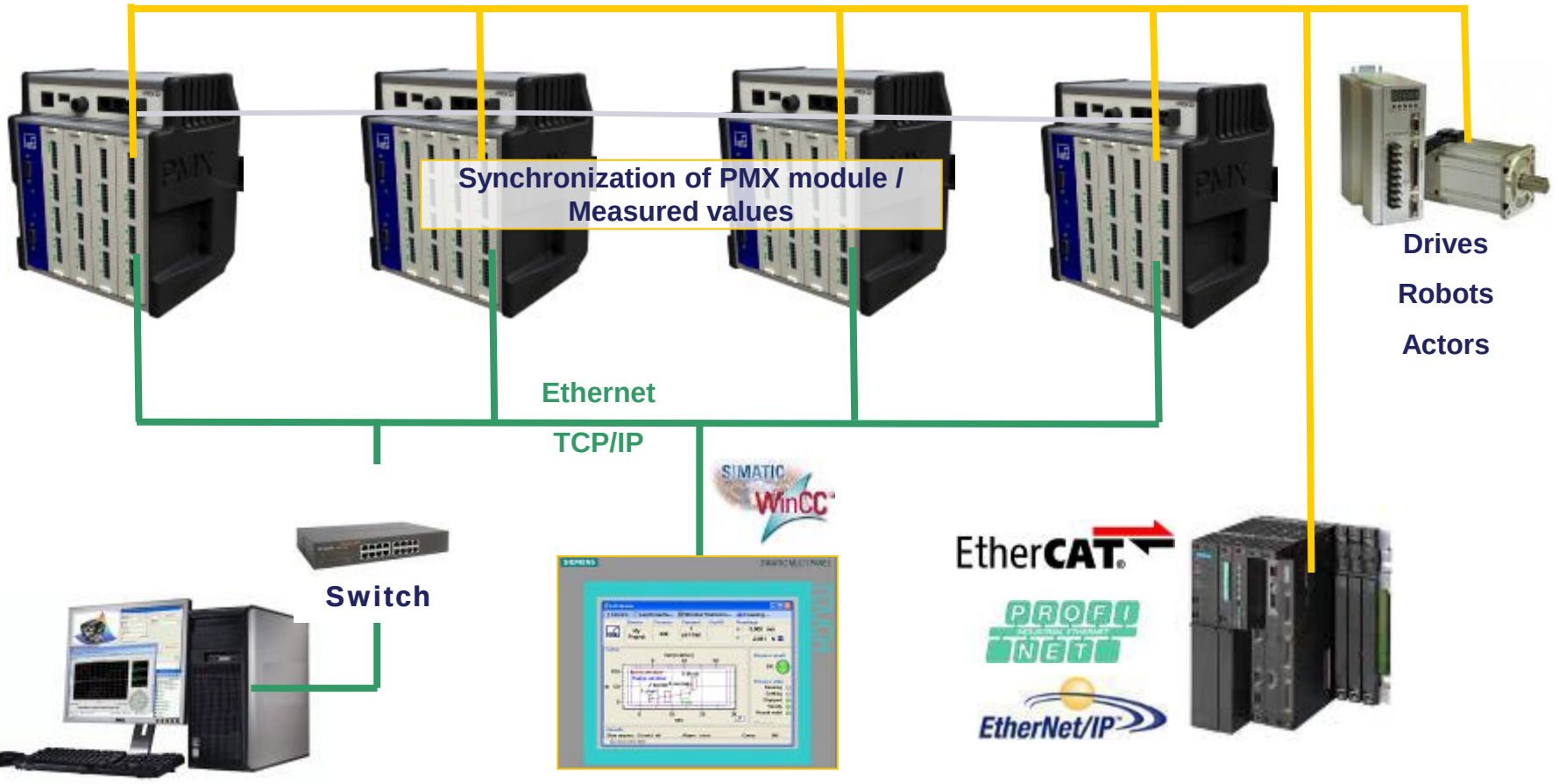


New structure



Standardization through consistent network structure

Automation in industrial test-rig applications



important multi-client capabilities

Innovative Web Technology

Flexible and cost-saving

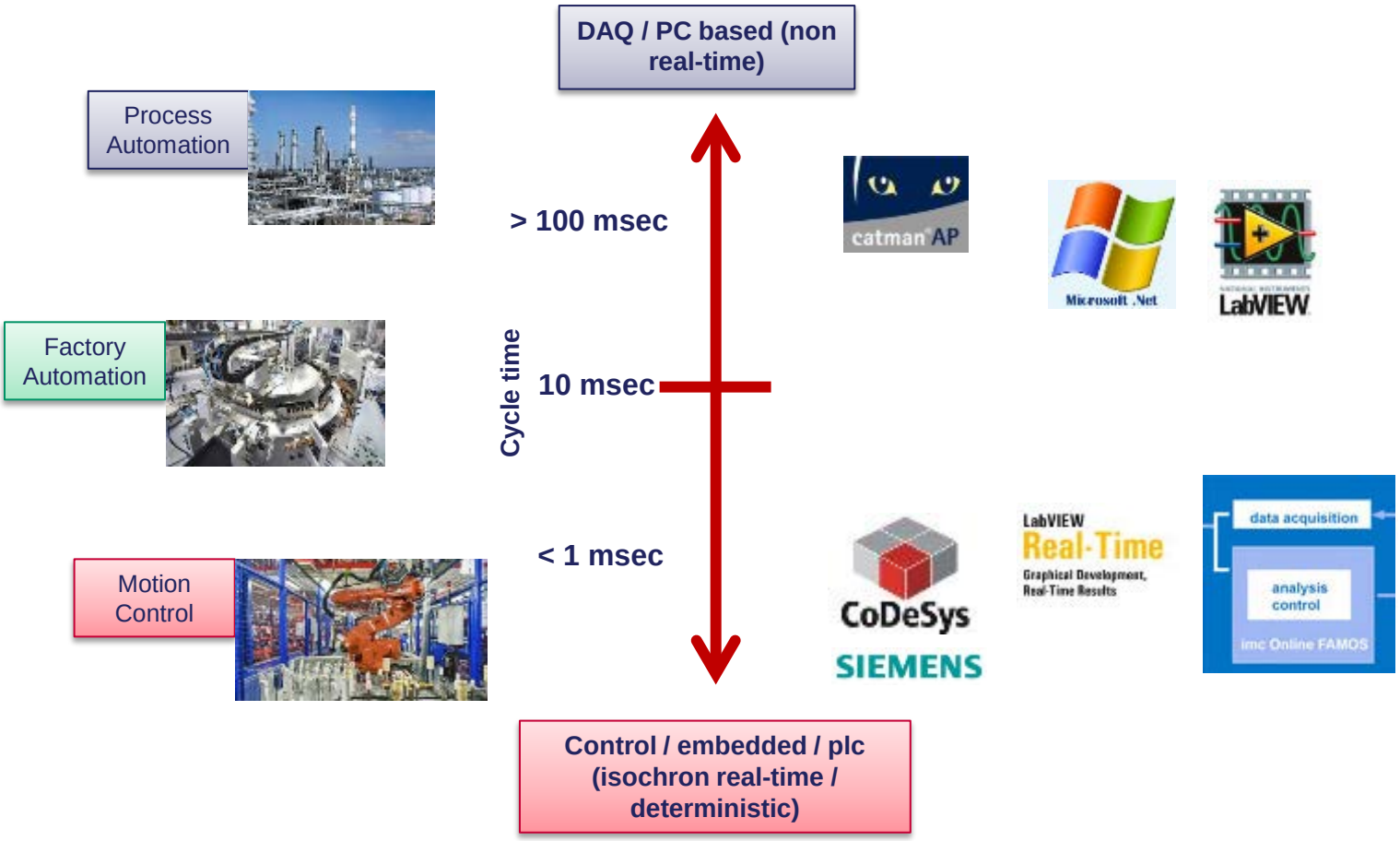
Whether you are a machine operator or installer, configurable, three-level user administration (operator, service, administrator) always gives you access to all relevant device and diagnostic data. This cuts down on the number of software tools you need and reduces complexity and system faults.

Easy integration with the control system

HBM measurement technology can be easily integrated with the control system and test bench environment using various software drivers, the PMX command set, LabVIEW and the .NET/API programming interface. That makes it easy to implement individual solutions and safeguard application know-how.

Segmentation Software vs Control functions

- PC-application for DAQ (easy and ready to measure)
- dotNET/ LabVIEW: PC-application for Non-Real-Time applications
- LabView Real-Time: Runs in NI-hardware for Real-Time applications
- PLC/ Codesys: Runs in hardware for Real-Time and Control applications



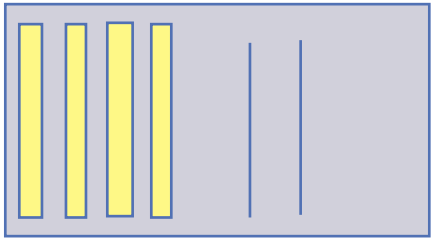
Amplifier- evaluation platform- and automation concepts

Automation solutions

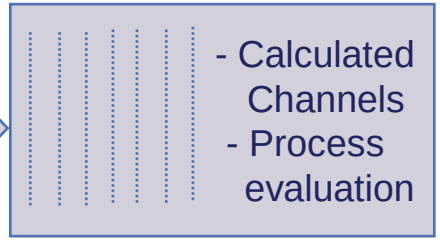
User-specific software
a.) **Soft PLC** as standard product
b.) as service by HBM
c.) by the customer
(know-how protection)

Digital analog interface

Advanced front-end Evaluation criteria



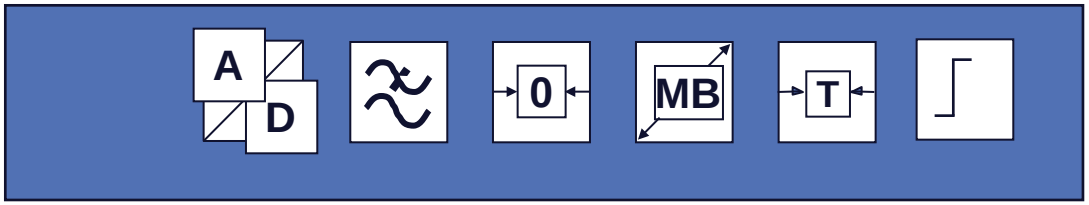
Math. calc



- Calculated Channels
- Process evaluation

Digital analog interface

Front-end (measuring channels)



Digital analog interface

Standard channels

Option: type upon request

Measure, evaluate and automate

Moderns automation systems offer: precise & robust measurment, control- & evaluation functions in real-time and easy-to-use setup and operation without software knowledge

Measurement

PMX detects your transducers automatically via TEDS for the most important measurement variables.

This saves time and prevents errors. The high resolution of 24 bits allows for accurate partial load measurements and high measuring bandwidths. A sampling rate of 19.2 kHz or 38.6 kHz for frequency measurements for every channel ensures high measuring bandwidths.

- SG full bridges
- SG half bridges
- Inductive full bridges
- Inductive half bridges
- Active sensors for current and voltage
- LVDTs
- Potentiometric sensors
- Piezoresistive sensors
- Current-fed piezoelectric sensors (IEPE)
- Frequency signals
- Angular/incremental encoders
- SSI sensors
- PWM sensors
- Magnetic transducers
- Pulse counters

Evaluation

PMX analyzes and processes your data in real time (< 1 millisecond).

The measuring amplifier system has integrated algorithms to support the actual measurement and pre-process data. 32 computing channels are available. That replaces small and mid-size machine control units and saves a tidy sum of money.

Scaling

- Two-point scaling
- Characteristic curve table
- Polynomials
- Taring
- 3x3 matrix
- Cartesian to polar coordinates
- SG stress analysis
- Dead time

Technology functions

- Two-point controllers
- PID controllers
- Signal generators (square, triangle and sine wave)
- Logic blocks (AND, OR, etc.)
- Edge detectors
- Timers
- CODESYS channel

Mathematical functions

- Adder
- Multiplier
- Divider
- Multiplexer 2:1
- Pulse width measurement
- Counter
- Integrator
- Differentiator
- Modulo function
- Constant signal

Evaluation functions

- Angle-synchronous filter
- Peak values
- Hold function (triggerable)
- Mean values (arithmetic, RMS)
- Trigger function (range, pulse)

Automation

PMX transfers data to your automation system.

Ethernet-based fieldbuses and Soft-PLC as well as digital inputs/outputs and monitoring outputs ensure fast machine control and automation.

- EtherCAT
- ProfiNET
- Ethernet/IP
- CODESYS
- CANopen (1 Mbit/s)
- Fast Ethernet (100 MBit/s)
- Digital inputs
- Digital outputs
- Analog output: voltage

Machine control

test bench

User interface and software solutions

User Interface / Software modules

Web Server

Catman®Easy

dotNET-API

LabView® Library

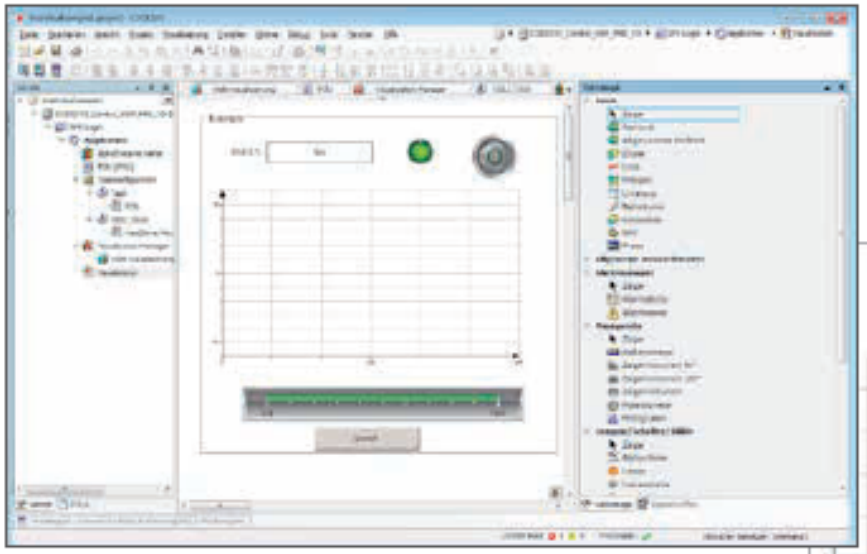
Soft-plc CoDeSys

Control/WebVisu PC/Win7/8 Driver .NET / LV Control/WebVisu

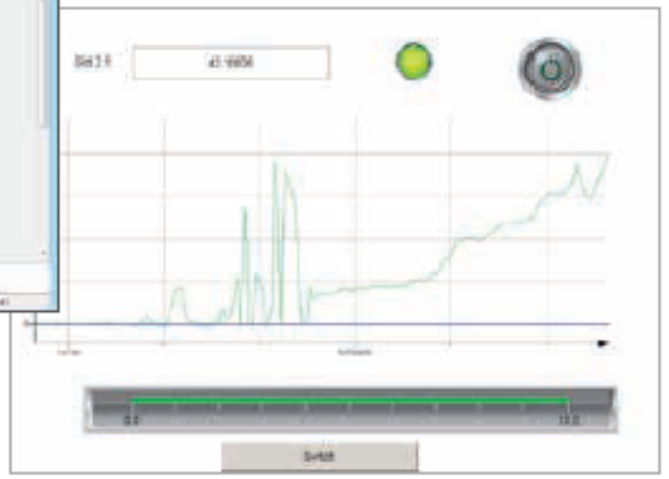
PMX

Operating System + Applications

Customized automation solutions designed acc. IEC61131



CODESYS programming environment



CODESYS web visualization

CODESYS engineering

Professional engineering from IEC 61131-3 applications for specialists and software engineers – from ladder diagram to UML in one expandable platform.

CODESYS visualization

Creation of professional visualization interfaces, fully integrated into the PLC programming system. Display on the target device, on a PC or in the web browser.

CODESYS fieldbus

Integrated fieldbus support in the IEC 61131-3 tool (i.e. the CANopen interface is supported in PMX). You can receive CAN data (CAN master) or send CAN data (SDO/PDO mode).

Customized web based machine visualisation and operation

CODESYS web and target visualization via Ethernet

Process control through on-site web visualization

PMX, the modular CODESYS PLC controller with integrated visualization

Simple remote maintenance with smart phone and micro or HTML5 browser

Transparent monitoring from plant control room or machine PC

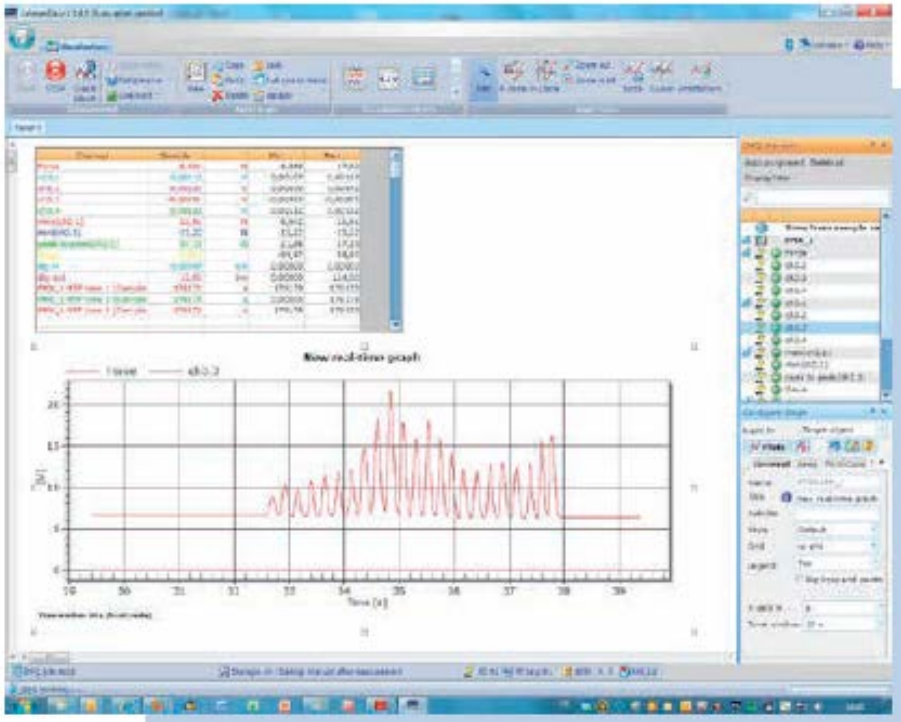
Ethernet (TCP/IP) HMI solutions

HMI panel

- Operation
- Service
- Documentation

ETH

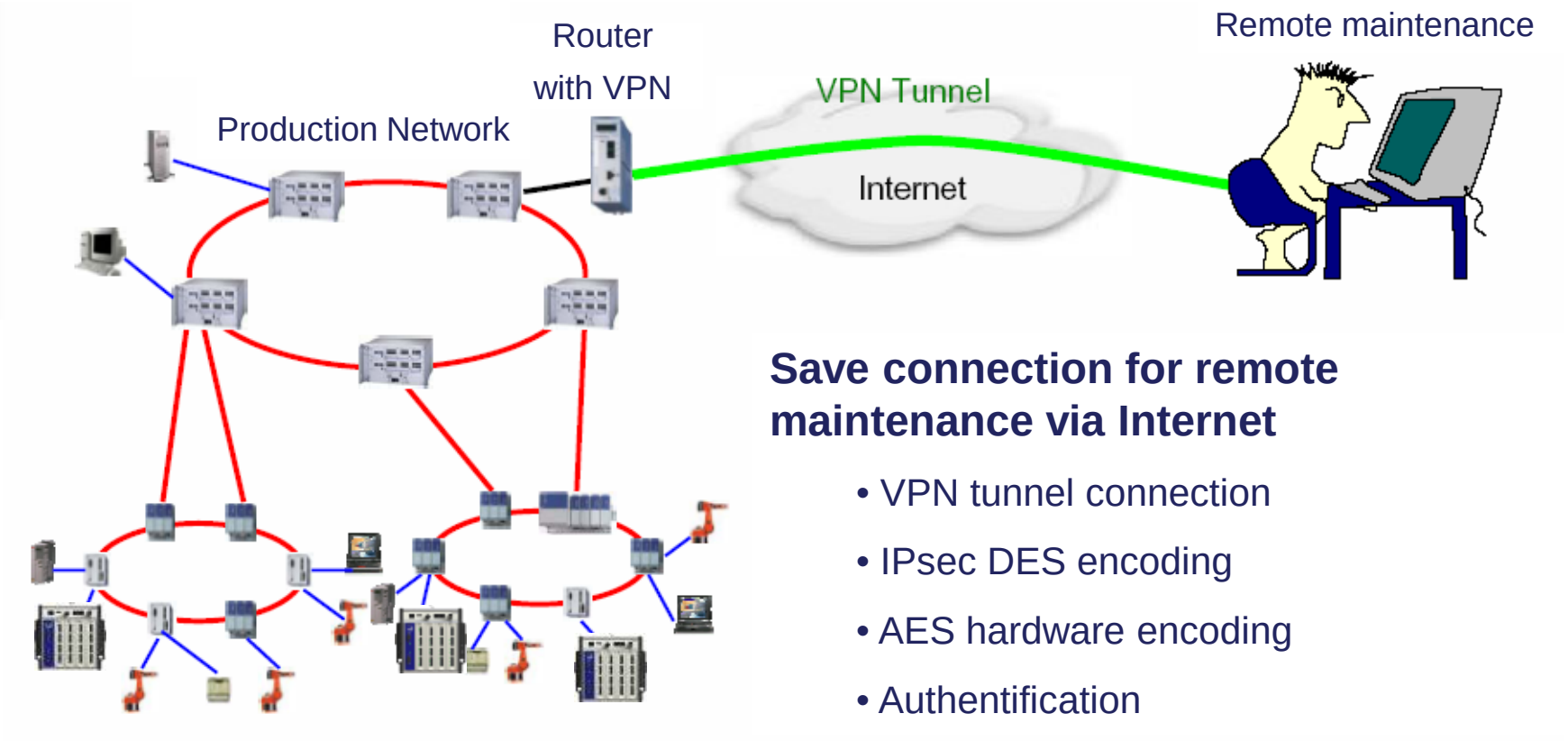
PC based data analysis



catman

- Professional software for visualization, storage and analysis of PMX measurement data, internal PMX computing channels and digital inputs/outputs
- Easy PMX system and channel configuration (sensor database, TEDS editor, sampling rate, filter, etc.)
- Start recording measured values via PMX digital inputs (pre/post trigger, cyclic storage, long duration measurement, etc.)
- Powerful data analysis (signal-to-signal, zoom, magnifying glass, ruler, min/max, cut to size, eliminate outliers, etc.)
- Create reports and export measurement data and displays automatically (to Microsoft Word, Excel)

Remote maintenance and diagnostics



Save connection for remote maintenance via Internet

- VPN tunnel connection
- IPsec DES encoding
- AES hardware encoding
- Authentification

- Support of local service
- Saves time and money (reduces travelling times)
- Enables additional benefit with predicted maintenance

Functional testing – automated workpiece control

Ethernet (TCP/IP)

PLC contol

Industrial Ethernet I/O´s

Analog out

OPC-server

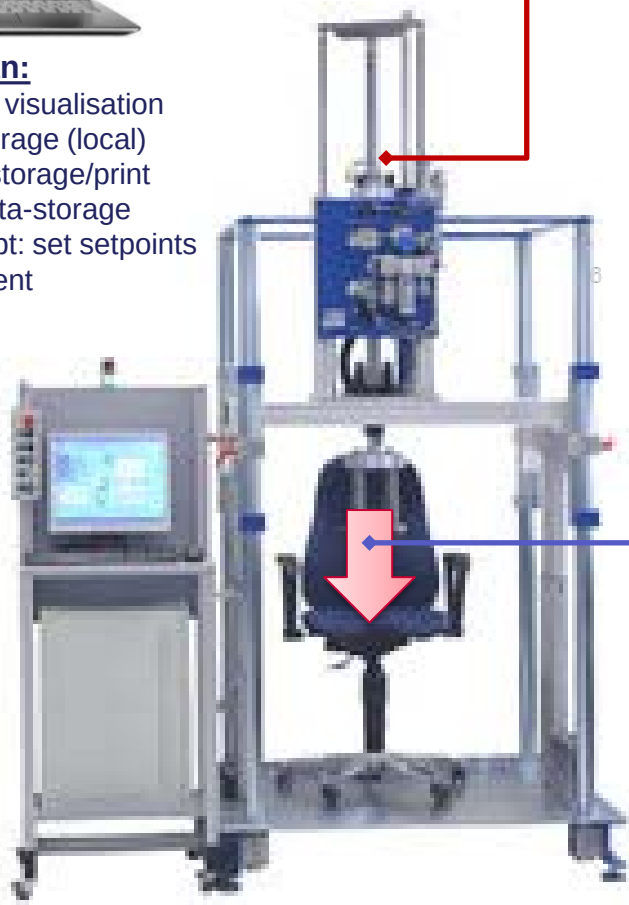
CoDeSys

PC / Catman:

- Process visualisation
- Data storage (local)
- Report storage/print
- SQL/ data-storage
- Cat-script: set setpoints
- OPC-client

Control/ Real-time:

- Start/ Stop
- Speed
- Run Test-curves
- Error controls:
  - Machine
  - PMX
  - User handling
- Start/stop store meas. curves



Sensors: force, displacement,torque…

PMX:

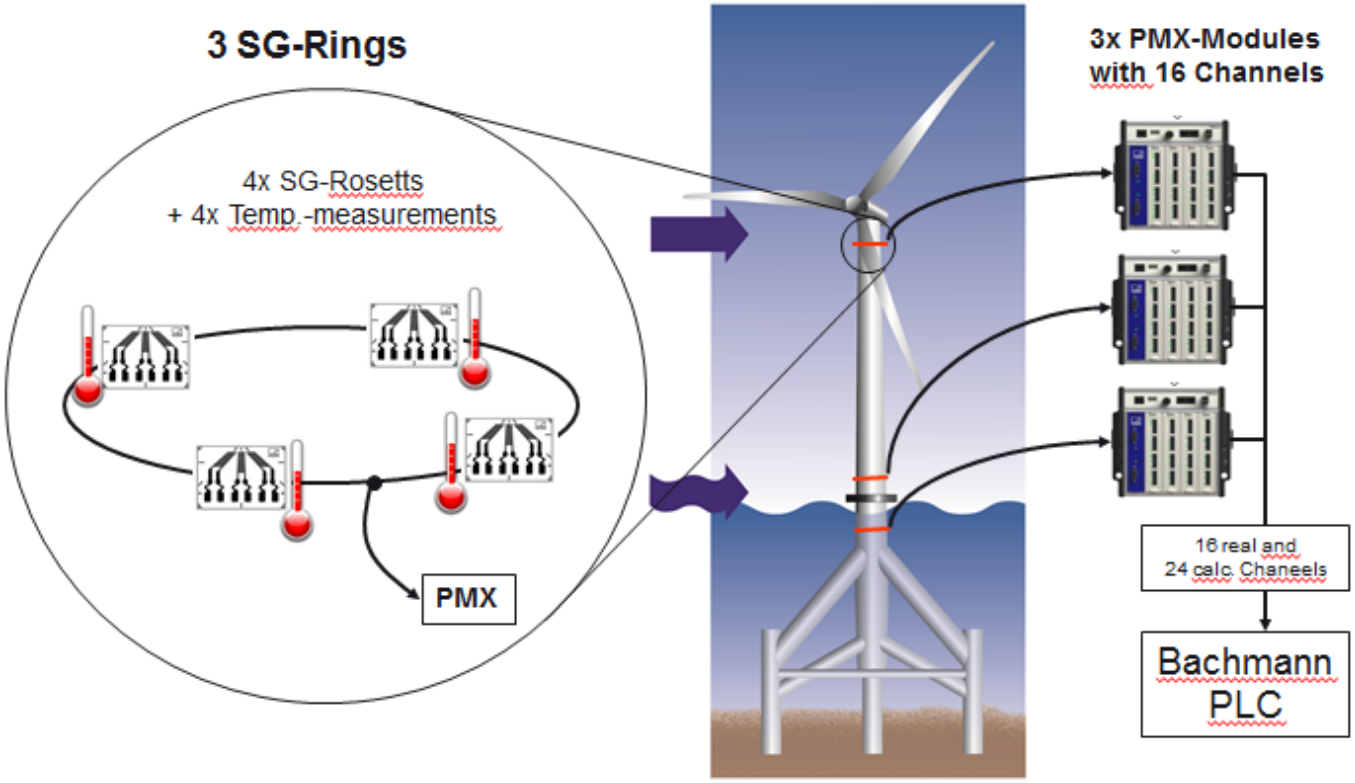
- Real-time meas.each channel
- Peak-meas.(50µs)
- Limit-evaluation (50µs)
- Tolerance-band evaluation
- Mechanical-work calculation
- OK / NOK-Counters
- Self-control functions
- Signalisation

From component testing to production monitoring

Test stand for Gear-boxes

- Power measurement and quality control at Gear-boxes
- Measuring values: Torque, Rotational speed, angle of rotation, pressure, temperature
- Real-time condition-monitoring in a test-cell via and real-time automation via Industrial Ethernet
- PC Data logging of row-data, real-time calculations on site for evaluation
- Customer benefits : End-of-Line test wit improved Quality control, modern interfaces, easy-to-use PMX web browser

Structural monitoring of energy plants



Inputs:
3x strain, 1x Temp-compensation SG

Outputs:
sigma1, sigma2 phi, tau(max.

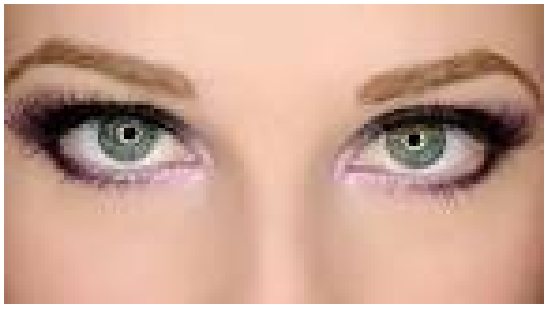
4xPX455 (4 rosette-calculation) / 8 peak-values)

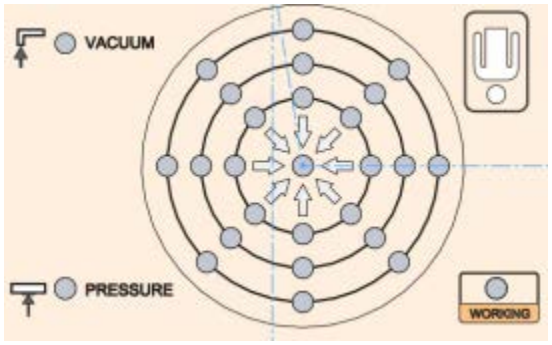
Sum:
16 real + 34 calculated channels

Condition monitoring on wind turbines

- Realisation of several SG sensor technologies
- Real-time condition-monitoring due to rosette and shere-stress calculations (with temperature compensation)
- Data logging on site for service or via Web-Server on remote stations
- Option for Industrial Ethernet integration into the machine control

Application in medical machine control





Laser cutting machines for eye lens correction

- Precise and robust force (SG multicomponent) measurements for adjusting the laser optic
- Calculated channels provide polar coordinated of the resulting force as digital and analog output, and can be equipped for redundancy measurements
- Customer gets rid of old and unprecise SG-measurement and increase efficiency of the operation

PMX – future proofed technology

- Powerful computing core provides capacity for innovative hardware and software solutions / real-time interfaces (future-proof)
- Plug-in cards permit use of superior measurement technology for medium- to high-performance applications (e.g. higher accuracy, new sensors)
- High-performance measurement with 24bit A/D, min. 0.1% , typ 0.05 accuracy
- Quick data acquisition with 2/3/6 kHz bandwidth per channel /400kMV per PMX
- Running as stand-alone unit or in automated systems
- Generating calculated real-time channels for computation
- Field modules allow channel counts up to 30 channels per unit
- Up to 20 stations via synchronization systems => 600 channels
- Creating software/ automation solutions with internal soft PLC
- Attractive Price / performance ratio

More detailed information

→ www.hbm.com/pmx

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Measurement technology in production

In **production**, using test and measurement equipment correctly is key to guaranteeing optimal quality. Modern test and measurement equipment in production helps users produce more efficiently and detect errors at an early stage. You will find the major topics and trends in our collection of articles:

White papers on Industrial Process Control

Extended application possibilities for modern torque measurement in test benches – with PMX

The PMX amplifier system also enables you to acquire torque and to automate your test bench. This technical article describes how this works and what benefits there are.

Failsafe press monitoring - measurement technology as an efficiency driver

The more precisely force is applied in presses, the higher is the quality of the molded parts. Increasing their presses' accuracy is one of the most important challenges for manufacturers of presses and pressing machines.

Spoilt for choice: piezoelectric or strain gauge based force transducers?

Two principles have become dominant in force measurement: Piezoelectric sensors and strain gauge (SG) based force transducers. When is which principle appropriate?

New HMI Software Solutions for Process Monitoring: A Modular System

Operability and functional control - it is just these requirements that HBM addresses with the new HMI software solutions of FASTpress Suite.

Plug and play in production monitoring: Intelligent sensors ensure rapid setup times and drastic cost savings

The "Transducer Electronic Datasheet" (TEDS), which has proved itself consistently in test bench technology, offers interesting options for minimizing setup times, particularly in the manufacturing environment.

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HBM Webinars

Please see a list of all HBM webinars below.

Upcoming HBM webinars

Title	Date	Time	Vacancies
High-speed Data Acquisition in Strain Measurement and Dynamic Material Testing Applications	Oct 30, 2014	10:00 AM CET (Amsterdam, Berlin, Paris)	
How Mechanical Stress Testing of Materials Validates Finite Element Analysis (FEA)	Nov 04, 2014	2:00 PM ET	
Strain gauge measurements on PCBs	Nov 10, 2014	10:00 AM CET	
Simplifying Large Channel Count DAQ Systems	Nov 11, 2014	10:00 AM CET	
Integration of torque sensors into automation environments using TIM-EC	Nov 12, 2014	10:00 AM CET	
Efficient planning, commissioning and operation of industrial test stands using PMX	Nov 13, 2014	10:00 AM CET	
Power measurement on wind turbine generators	Nov 14, 2014	10:00 AM CET	

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Seminar Calendar

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

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