The IMEKO TC3, TC5, TC22
Joint Conference in Helsinki, Finland
May 30th to June 1st 2017
Measurement facing new challenges!

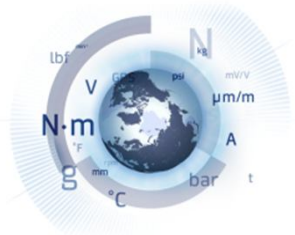
Constantly turning digital

Building a bridge into the future

Presentation as part of the round table discussion
“Digitalization- the content of the digital value: Is it reliable?”

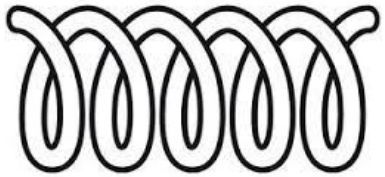
referring to the 50th anniversary of IMEKO Technical Committee on Mass, Force and Torque TC3, founded in 1967

Collected by:
HBM - Hottinger Baldwin Messtechnik GmbH
Dr. - Ing. André Schäfer
Business Development Manager
High-Precision Measurement Chains

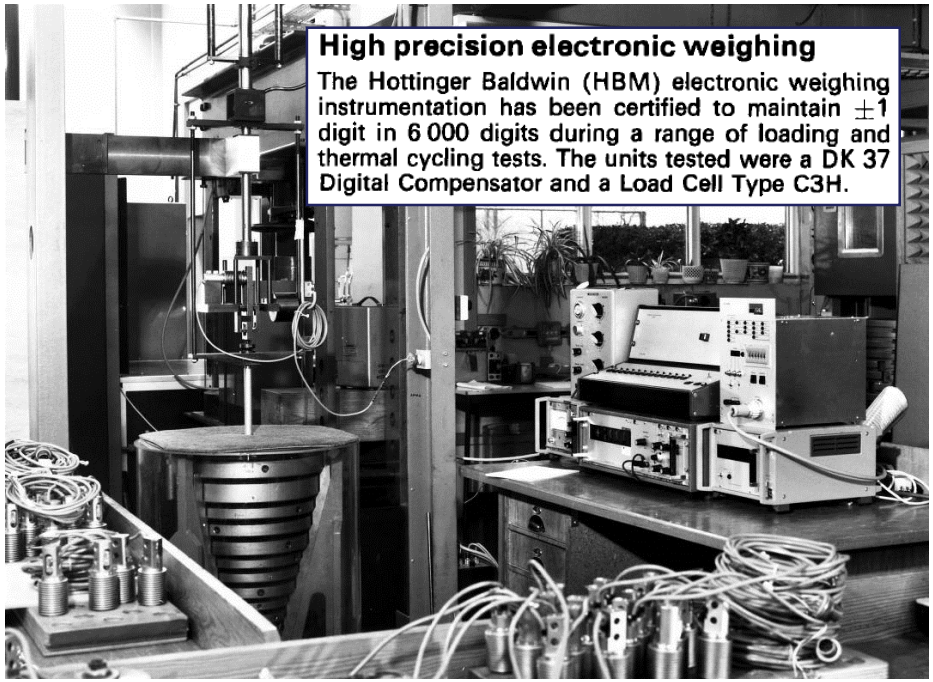


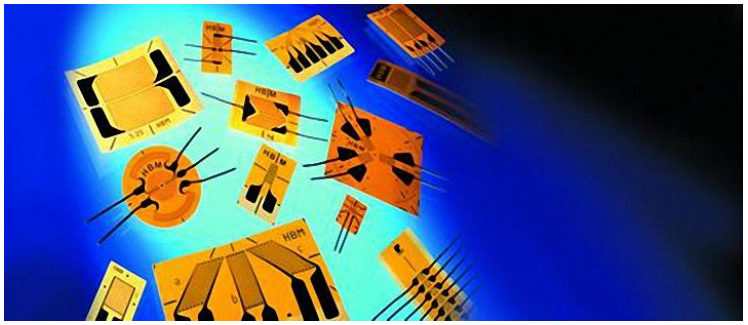
In 1950 - HBM was founded

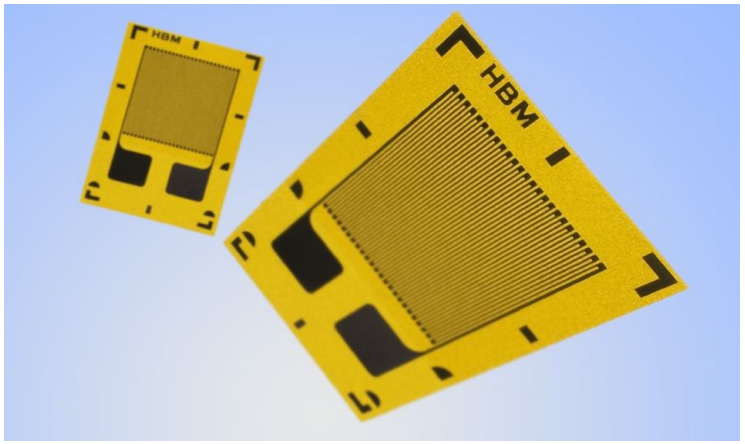
The founder Karl Hottinger



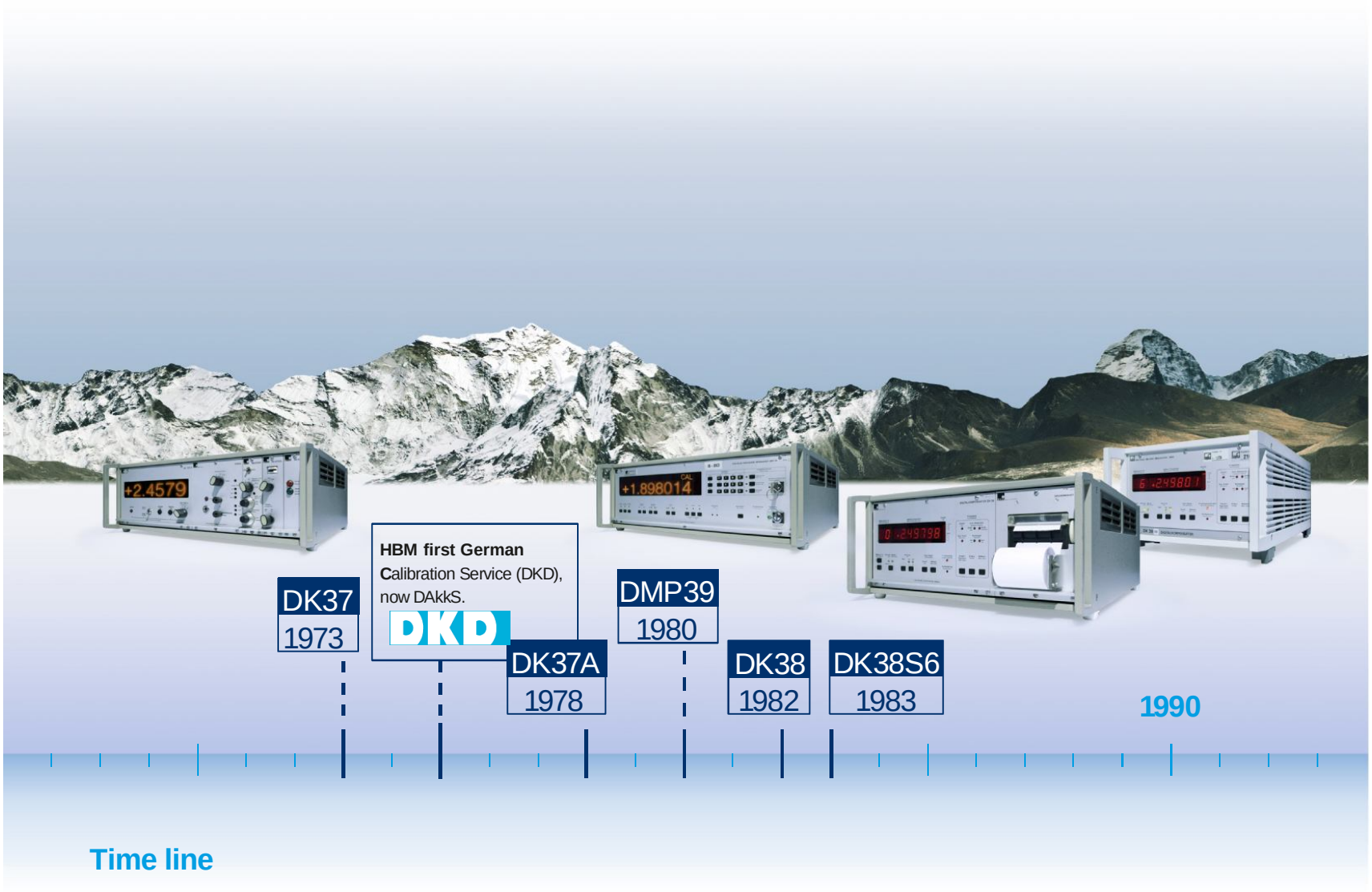
Production of strain gauges allowing precise load & force measurement



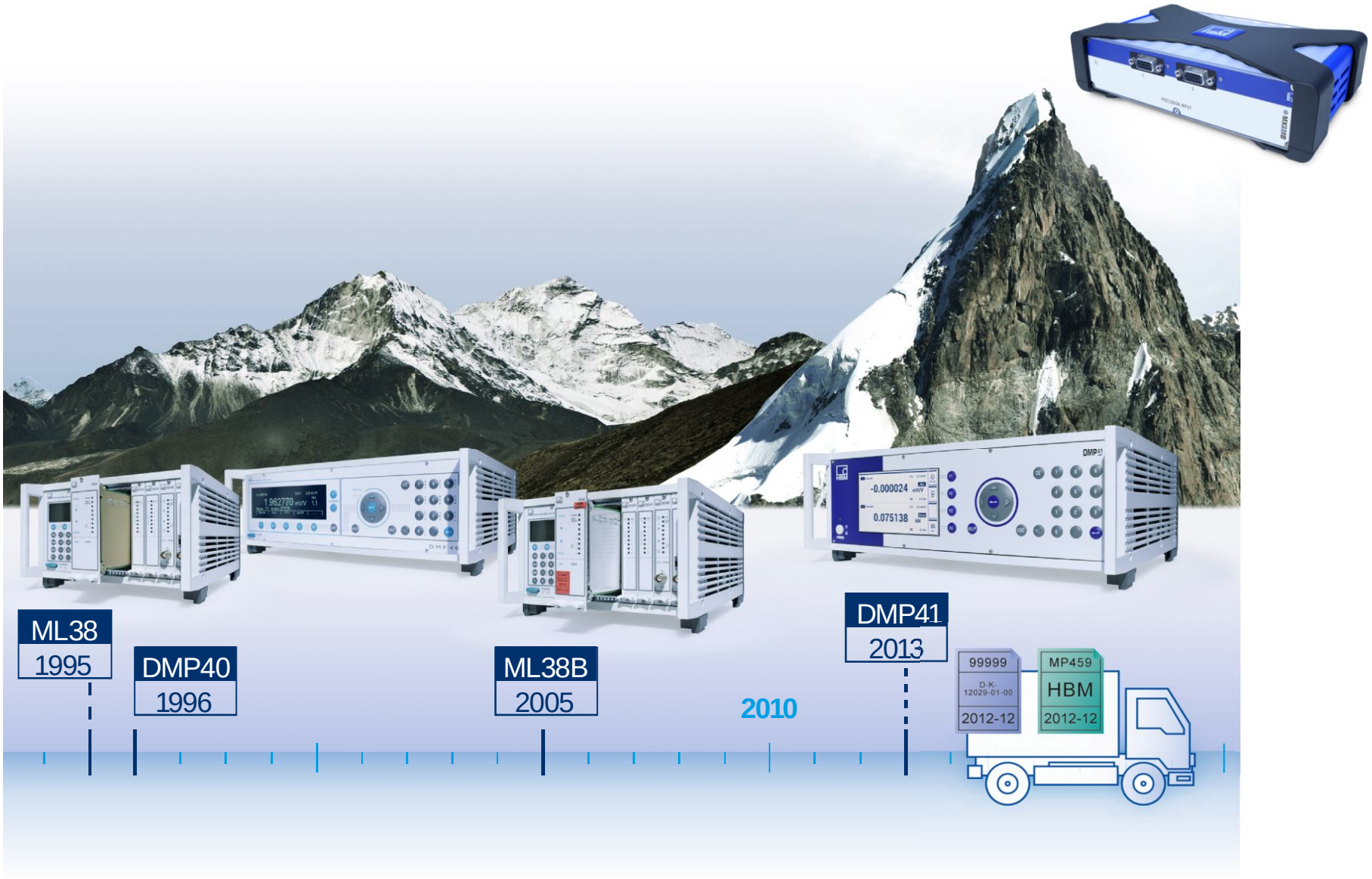




History of HBM Precision instruments: time line until 1990



History of HBM Precision instruments (II): time line until today



Important milestones in the history of HBM precision instruments

Digital compensator
DK 38S6

The origin of the DMP series – HBM's flagship

Wolfgang Loesche,
artist from Cologne

…reflected even in arts at at national metrology institute PTB in Brunswig

Manfred Kreuzer,
former head of R&D at HBM

Manfred Peters,
former vice president of PTB

Amplifiers turn digital

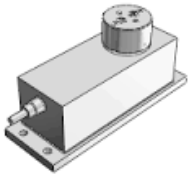
Different Amplifiers of the KWS family

alpha 3000

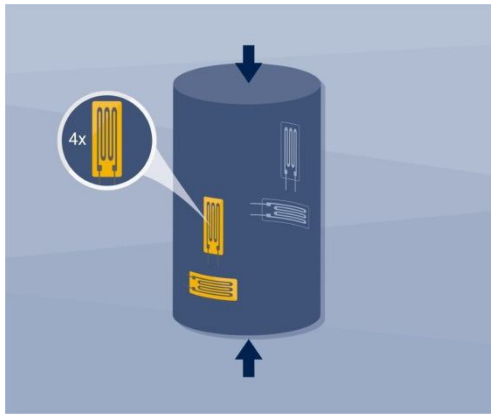
DMC

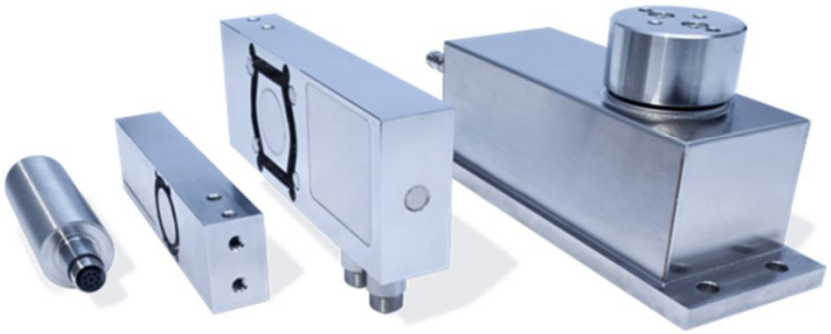
MGCplus

QuantumX



Load cells and force transducers turn digital

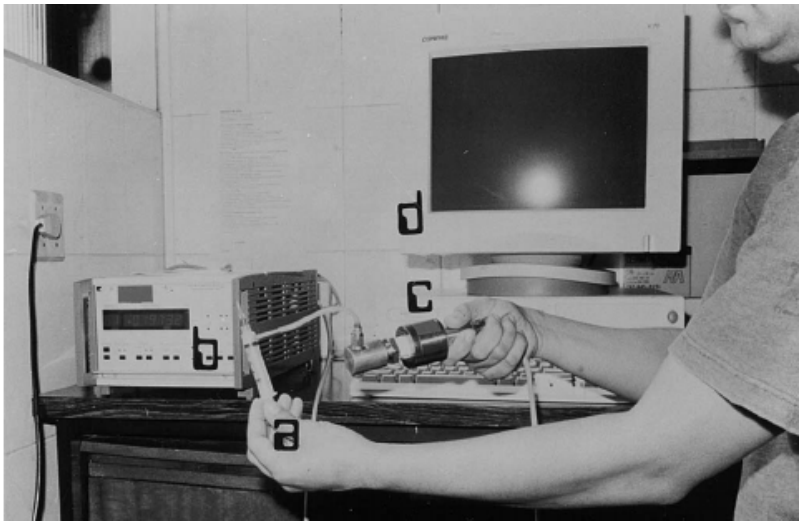


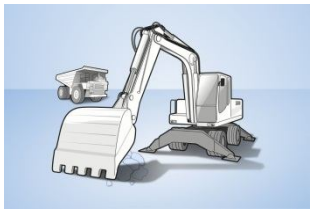


Torque transducers turn digital

Torque transducer T30FN **T10F** **T12HP**

Pressure transducers turn digital





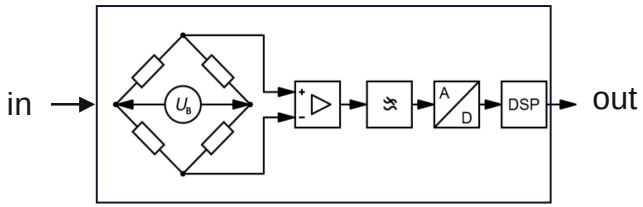
Proposed Subject to be dealt I: General requirements

Digitalization increases complexity.

Sensors with built-in amplifiers, ADC, signal conditioning allow a reduction of complexity of measurement.

That includes the possibility of **reduction of uncertainty** by combining analogue signals with digital compensation algorithms. Sensing **auxiliary quantities**, such as temperature or humidity, may again improve the overall behavior, by using them for compensation.

Challenge to metrology: The **compound of transducer and amplifier** in one block (black box) has to be **traced back**.



Proposed Subject to be dealt II: Considering the dynamic aspect

As HBM has been participating IND09 "Traceable Dynamic Measurements of Mechanical Quantities" as well as now running project SIP09 „**Dynamic calibration**- Support of Impact“ these topics are known to us.

The higher productivity requirement to the factory of the future, leads to the need of much **faster production processes**.

Thus quantities varying over time of measurement and a dynamic view, as well as consideration of digital signal conditioning (filtering) is necessary and standards for dynamic calibration have to be developed.

Proposed Subject to be dealt III: Different digital standards necessary

Nowadays - over all branches - of industry there many digital standards. They can be divided into three groups: **Field busses**, **Industrial Ethernet** and **wireless communication**.

We may imagine that the thousands of sensors employed in industrial field from specialized providers for certain quantities, who are following **different digital standards**. This especially leads to the problem of different delay times of the measured values.

Thus harmonization, and especially time synchronization, of these digital standards is a must.

Thank you!

HBM worldwide

Dr.-Ing. André Schäfer
HBM -Hottinger Baldwin Messtechnik GmbH
Business Development Manager
High-Precision Measurement Chains
Im Tiefen See 45, D-64293 Darmstadt, Germany