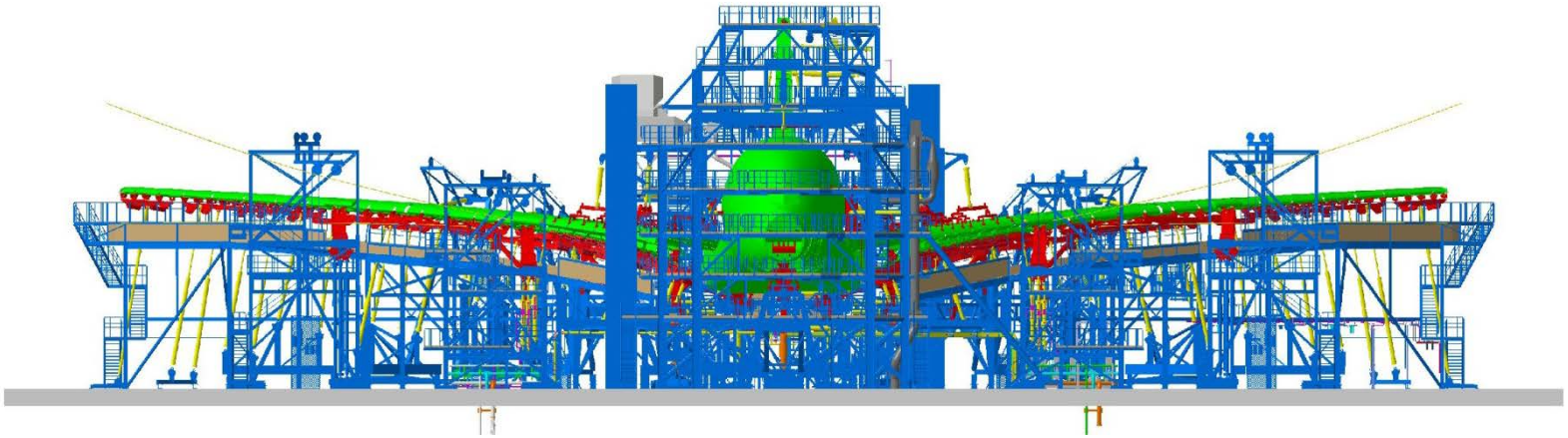
Welcome to the webinar
‘Simplifying Large Channel Count DAQ Systems’

The webinar starts at 10 a.m. CET



Speaker

- Rolf Mendel
  Senior Project Manager
  Measurement systems with high channel counts
- Graduate Telecommunications Engineer
- 36 years experience in Test & Measurement

Rolf Mendel

V-SK Key Applications
HBM Test & Measurement

Phone: +49 6151 803 332
Email: rolf.mendel@hbm.com

Overview

1. Configuration process for structural tests with large channel numbers

2. Data sources for configuration data

3. Building blocks and workflow options for configuration:
   - TEDS configuration for transducers
   - Manual input of configuration data
   - Test point plans and merge procedure
   - Import of configuration data from database or Excel sources

4. Configuration Examples for the different workflows

5. Verification of configuration
   - Minimizing human error
   - Features supporting automated check procedures

1) Configuration process for structural tests

- Planning/Design of Test
  - Static, Durability, component
  - Definition of load spectrum
  - Calculation of expected parameters like strain...
  - ...
- Definition of test components
  - Definition of sensors e.g strain, displacement, load...
  - Location of sensors
  - Sensor wiring
  - Network and Power infrastructure
  - ...
- Definition of Configuration Parameter
  - Expected values of parameters during test
  - Calibration data for transducers
  - Parameter data from test department (gage factor, location, ...)
  - ...
- Configuration of Test
- Verification of Test

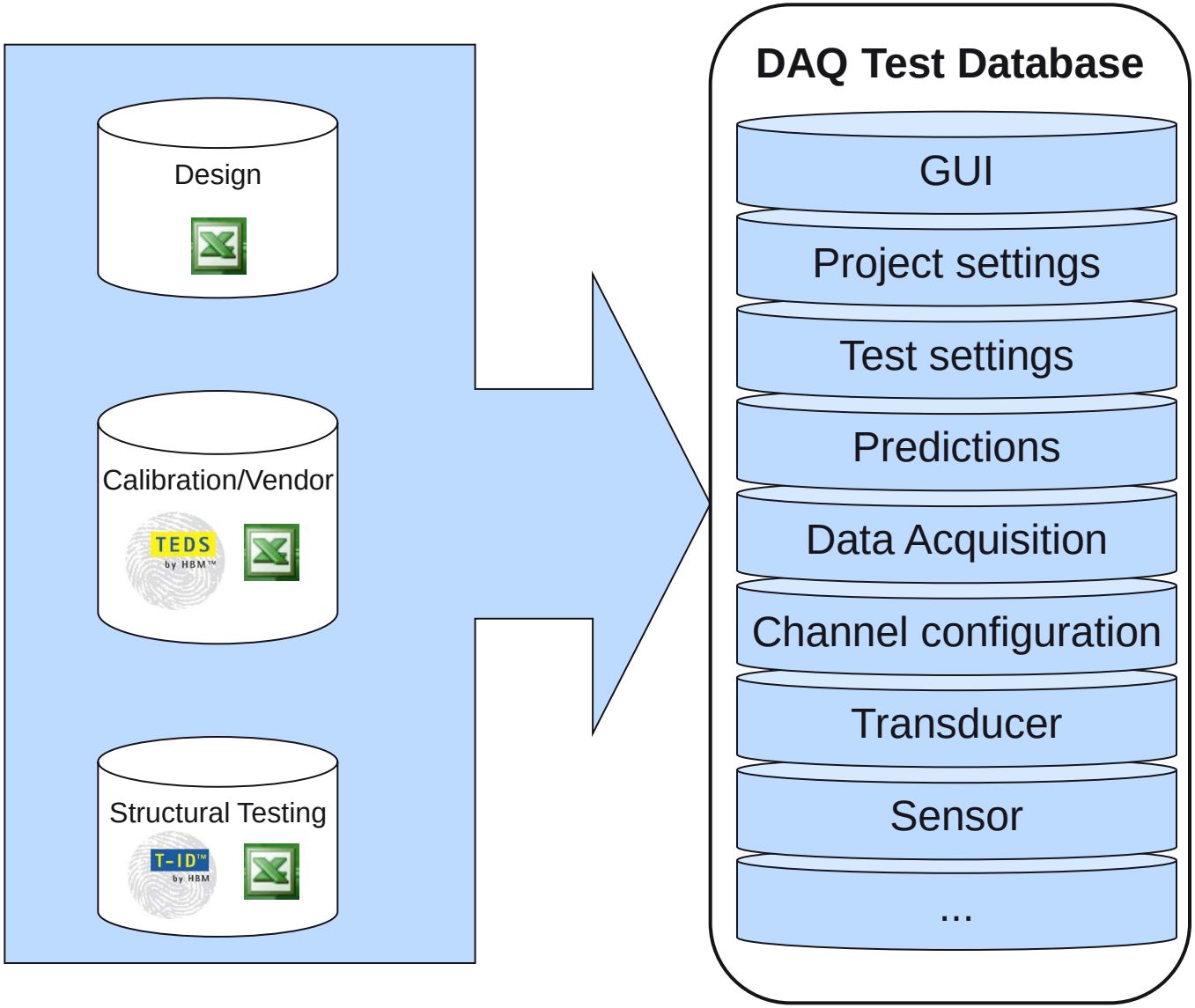
2) Data sources for configuration data

1. Design department:
   - Identification of sensors
   - Expected values of sensors during test operation (e.g. strain at 100% load)
   - Required calculated values as rosette calculations

2. Calibration department or data from vendor
   - Calibration data for transducers (Serial number, Scaling etc.)

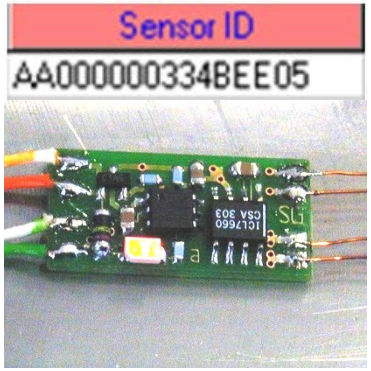
3. Test department
   - Names/ID’s of sensors
   - Sensor data: Gage factor, Scaling information, Filters, Pictures, ...
   - Comments

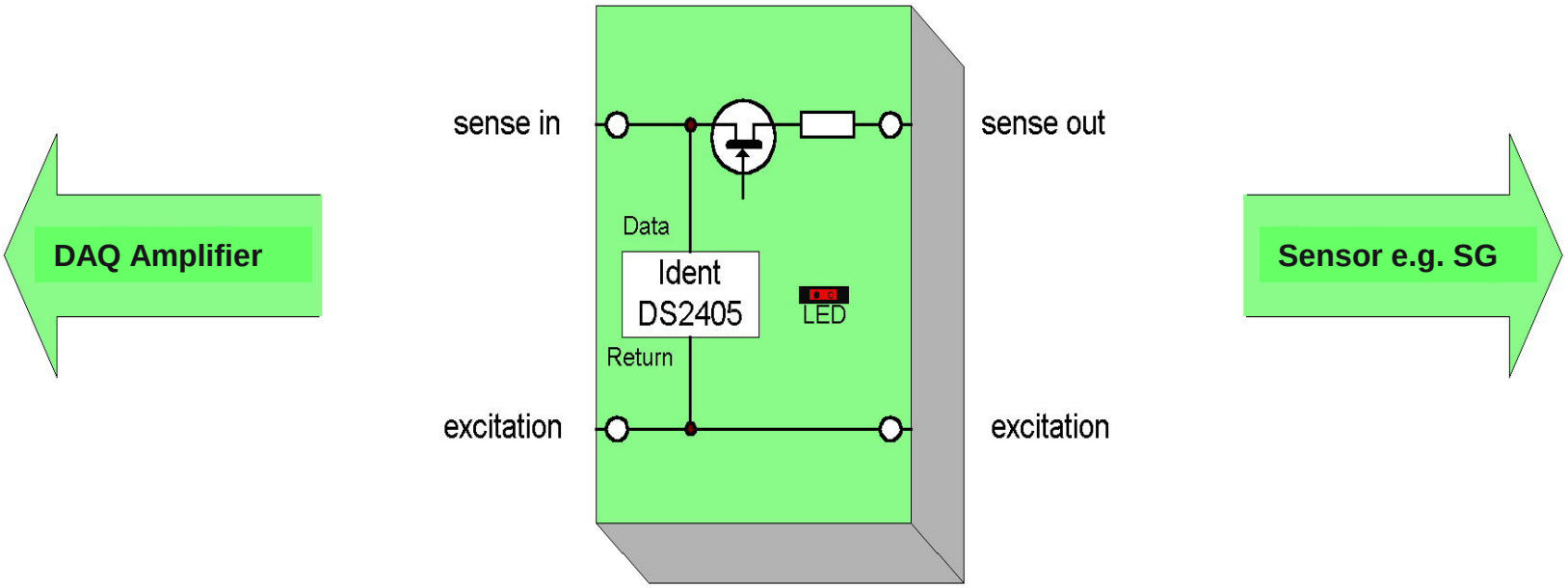
2) Data sources for configuration data



- Manual input of configuration data
- Create test point plans and later merge with hardware databases
- Import of configuration data from database or Excel sources (e.g. using T-ID)
- TEDS configuration for transducers

T-ID – HBM Identification module



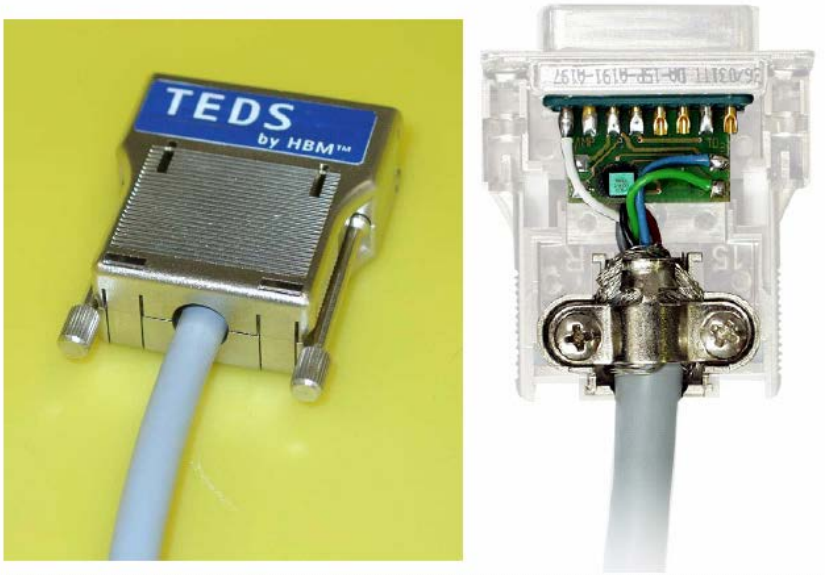


TEDS – Transcducer Electronic Datasheet

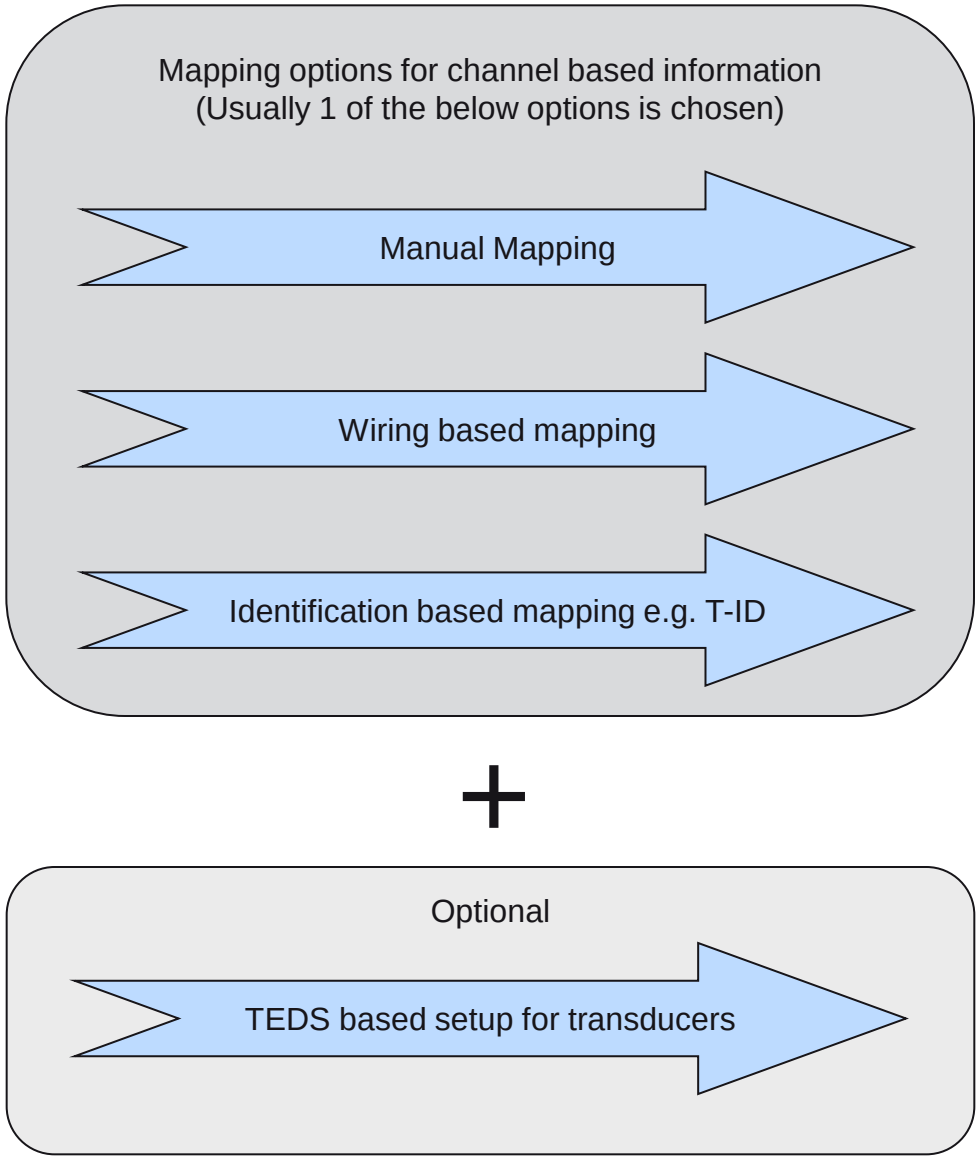
- What is TEDS?

  - an IEEE standard to make sensors smarter (IEEE1451)
  - a self describing sensor data sheet stored on a EEPROM chip
  - a 1-wire protocol to communicate between data acquisition and TEDS chip
  - a standard of different templates and the language to describe this information

TEDS Properties	Values
Manufacturer ID	30
Model Number	4
Version Number	2
Version Letter	B
Serial Number	246
Sensitivity @ reference condition	5.000000E-7 V/N
High pass cut-off frequency (F hp)	5.000000E-3 Hz
Stiffness of transducer	1.000000E+6 N/m
Mass below gage	1.000000E-1 g
Sensitivity direction (x,y,z)	x
Transducer weight	1.000000E-1 g
Transducer Electrical Signal Type	Voltage Sensor
Mapping Method	Linear
AC or DC Coupling	AC
Polarity (Sign)	Positive
Reference frequency (F ref)	3.500000E-1 Hz
Reference temperature (T ref)	1.500000E+1 °C
Calibration Date	1/1/2004
Calibration Initials	SAA
Calibration Period (Days)	0 days
Measurement location ID	0
User Data	This i3

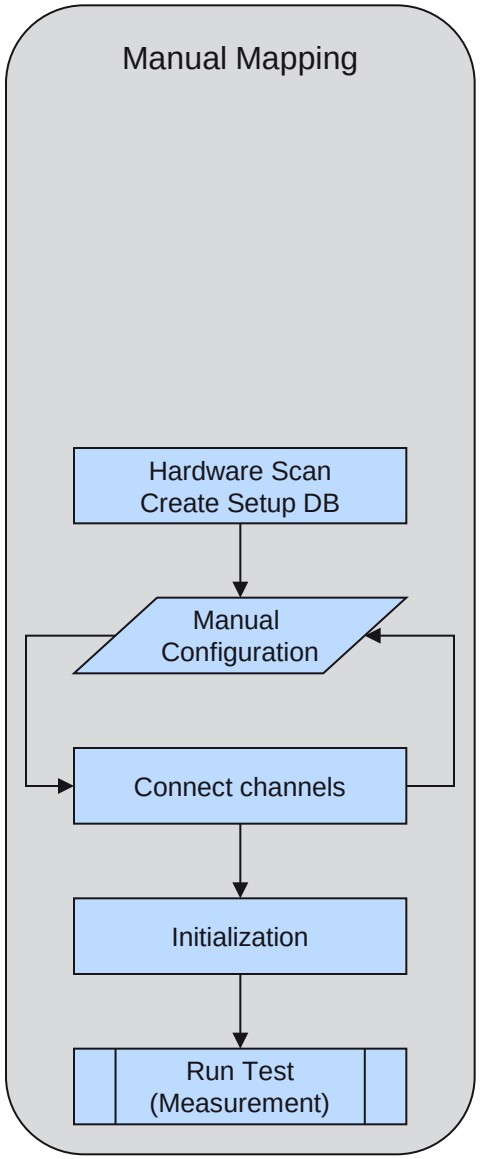


3) Overview: Building blocks and workflow options for configuration

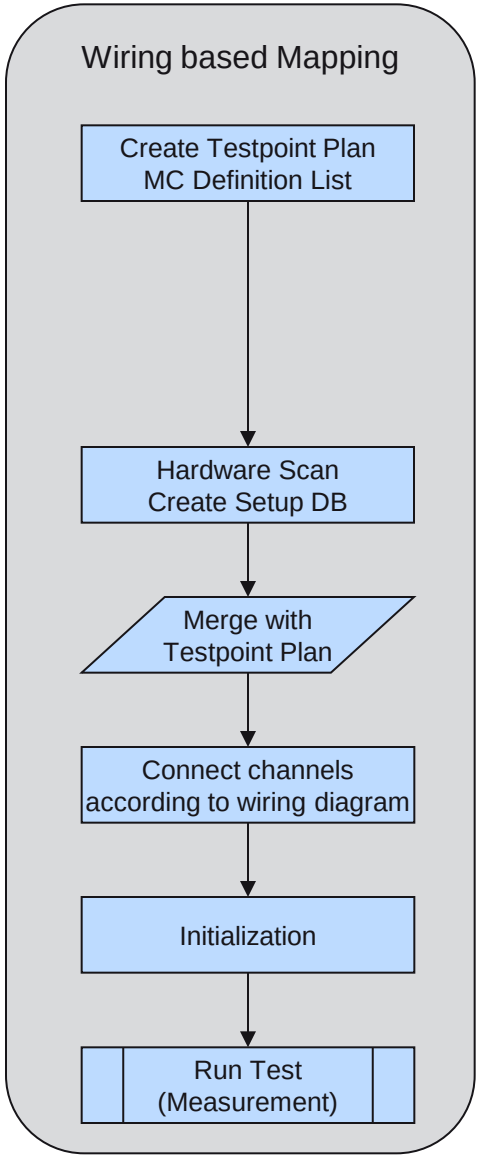


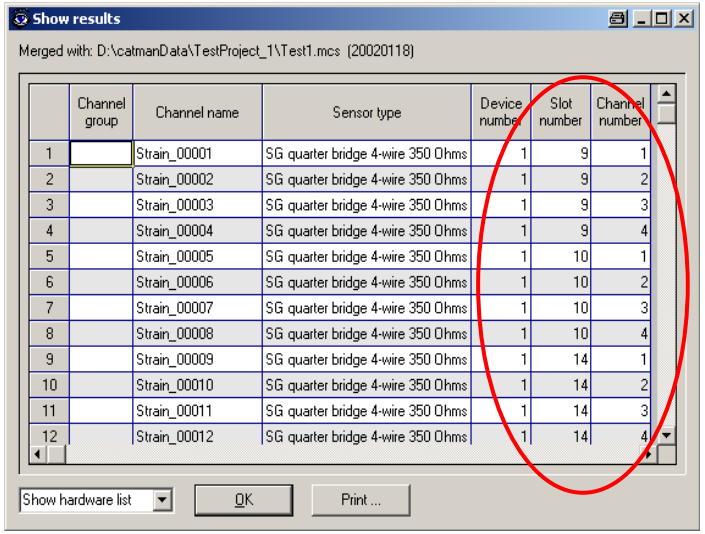
3) 1. Manual input of configuration data

	Name	Sensor type	Exc	Filter	Gage
1-1-1	SR01	SG quarter bridge 3-wire 350 Ohms	1 V	Be 5 Hz	2
1-1-2	SR02	SG quarter bridge 3-wire 350 Ohms	1 V	Be 5 Hz	2
1-1-3	SR03	SG quarter bridge 3-wire 350 Ohms	1 V	Be 5 Hz	2
1-1-4	RR01A	SG quarter bridge 3-wire 350 Ohms	1 V	Be 5 Hz	2
1-1-5	RR01B	SG quarter bridge 3-wire 350 Ohms	1 V	Be 5 Hz	2
1-1-6	RR01C	SG quarter bridge 3-wire 350 Ohms	1 V	Be 5 Hz	2
1-1-7	nc_01	SG quarter bridge 3-wire 350 Ohms	1 V	Be 5 Hz	2
1-1-8	nc_02	SG quarter bridge 3-wire 350 Ohms	1 V	Be 5 Hz	2



3) 2. Test point plans and merge procedure

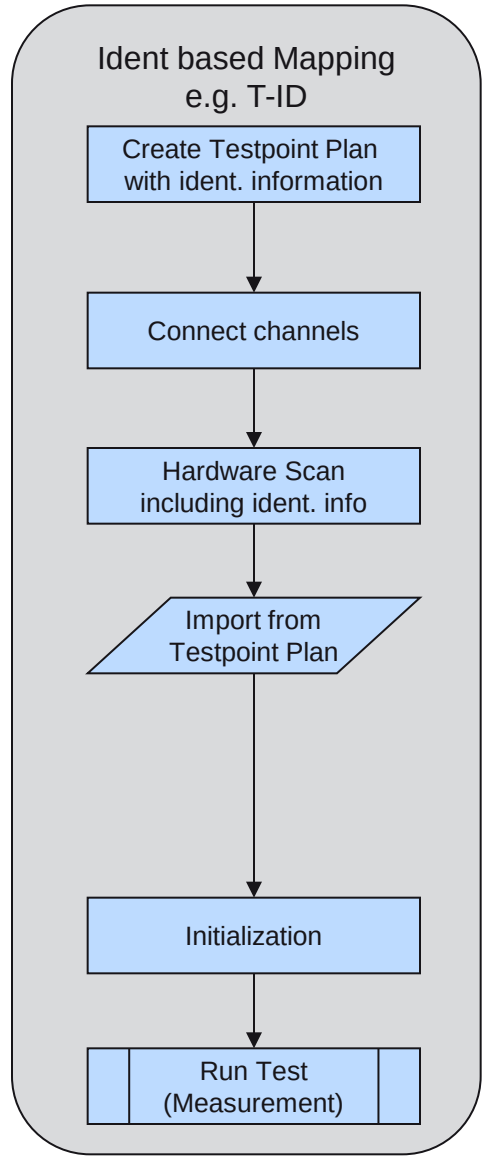




	Channel group	Channel name	Sensor type	Device number	Slot number	Channel number
1		Strain_00001	SG quarter bridge 4-wire 350 Ohms	1	9	1
2		Strain_00002	SG quarter bridge 4-wire 350 Ohms	1	9	2
3		Strain_00003	SG quarter bridge 4-wire 350 Ohms	1	9	3
4		Strain_00004	SG quarter bridge 4-wire 350 Ohms	1	9	4
5		Strain_00005	SG quarter bridge 4-wire 350 Ohms	1	10	1
6		Strain_00006	SG quarter bridge 4-wire 350 Ohms	1	10	2
7		Strain_00007	SG quarter bridge 4-wire 350 Ohms	1	10	3
8		Strain_00008	SG quarter bridge 4-wire 350 Ohms	1	10	4
9		Strain_00009	SG quarter bridge 4-wire 350 Ohms	1	14	1
10		Strain_00010	SG quarter bridge 4-wire 350 Ohms	1	14	2
11		Strain_00011	SG quarter bridge 4-wire 350 Ohms	1	14	3
12		Strain_00012	SG quarter bridge 4-wire 350 Ohms	1	14	4

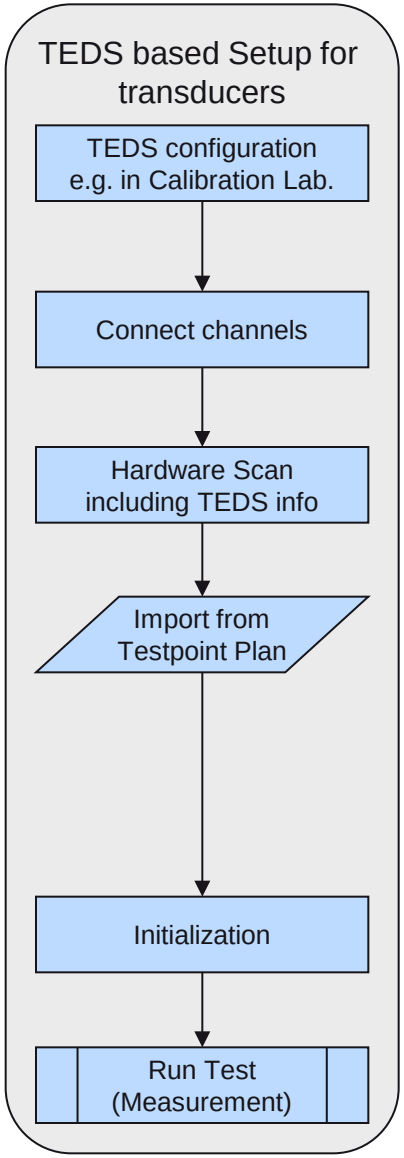
3) 3. Import of configuration data from database or Excel sources

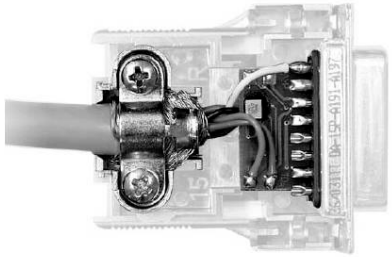
Sensor ID
AA000000334BEE05
4200000033494F05
5F000000336B0105
C10000003319E205



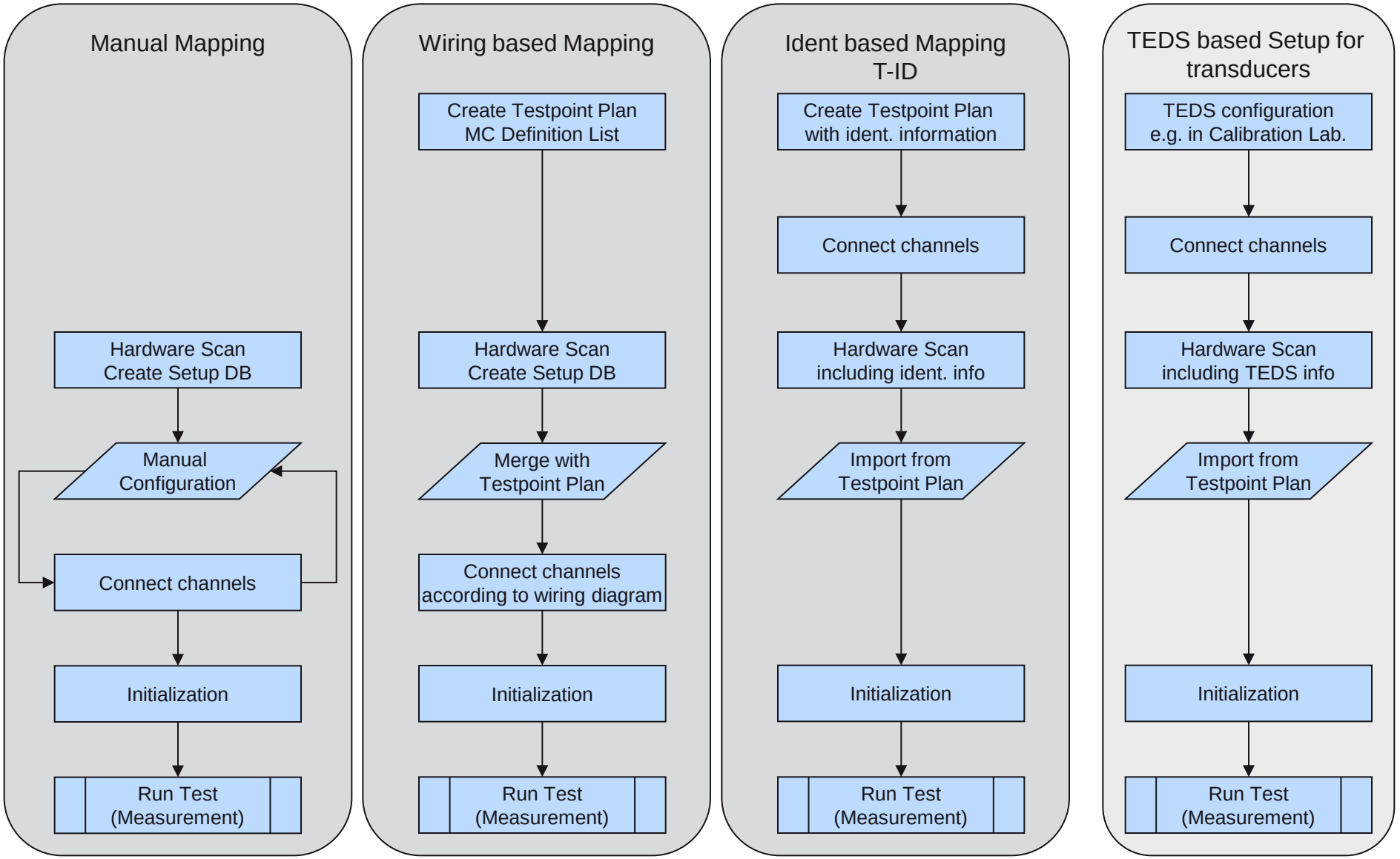
T-ID™ by HBM

3) 4. TEDS configuration for transducers

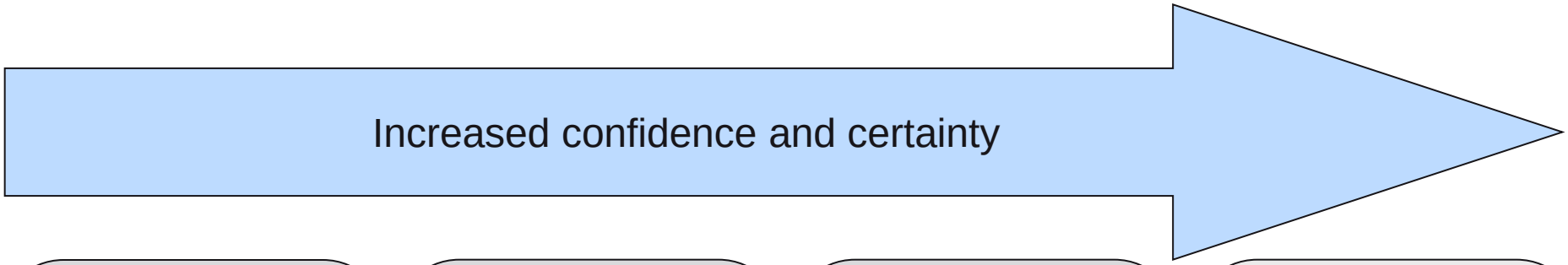




3) Overview: Building blocks and workflow for configuration



3) Overview: Pros and Cons



Manual Mapping

Pros
- Simple workflow process
- No specific format of customer data needed

Cons
- High probability of transcription errors
- Mapping of sensors and amplifier channels difficult
- Transcription of configuration data from customer files to DAQ database very time consuming
- Frequently changing setups difficult to handle

Wiring based Mapping

Pros
- Preliminary setup possible lowering possibility of transcription errors
- Quick configuration of frequent changing setups
- Working with different DAQ system configurations possible with minimal effort
- Increased utilization of DAQ System (net operating hours)

Cons
- Manual Mapping of sensors and amplifier channels can still cause errors
- Data to be input using predefined vendor format

Ident based Mapping

Pros
- Preliminary setup possible lowering possibility of transcription errors
- Quick configuration of frequent changing setups
- Working with different DAQ system configurations possible with minimal effort
- Automated procedure minimizing probability for mapping errors
- Maximum utilization of DAQ System (net operating hours)

Cons
- Additional HW necessary (e.g.T-ID board)

TEDS Setup for transducers

Pros
- Setup data tightly assigned to transducer
- Quick configuration of frequent changing setups
- Automated setup and e.g. check for calibration validity possible.
- Maximum utilization of DAQ System (net operating hours)

Cons
- Additional HW necessary (TEDS transducers and DAQ system supporting TEDS)

4) Configuration Examples:

1. Example: Manual mapping
2. Example: Wiring based mapping
3. Example: Ident based mapping e.g. T-ID
4. Example: TEDS based setup for transducers

4) Example: Manual input of configuration data

	Name	Sensor type	Exc	Filter	Gage	Bridge	Wiring comp.	Electrical zero	Physical zero	Electrical nom	Physical nom	Engineering
1-1-1	SR01	SG quarter bridge 3-wire 350 Ohms	1 V	Be 5 Hz	2	1	NA	0	0	4000	4000	µm/m
1-1-2	SR02	SG quarter bridge 3-wire 350 Ohms	1 V	Be 5 Hz	2	1	NA	0	0	4000	4000	µm/m
1-1-3	SR03	SG quarter bridge 3-wire 350 Ohms	1 V	Be 5 Hz	2	1	NA	0	0	4000	4000	µm/m
1-1-4	RR01A	SG quarter bridge 3-wire 350 Ohms	1 V	Be 5 Hz	2	1	NA	0	0	4000	4000	µm/m
1-1-5	RR01B	SG quarter bridge 3-wire 350 Ohms	1 V	Be 5 Hz	2	1	NA	0	0	4000	4000	µm/m
1-1-6	RR01C	SG quarter bridge 3-wire 350 Ohms	1 V	Be 5 Hz	2	1	NA	0	0	4000	4000	µm/m
1-1-7	nc_01	SG quarter bridge 3-wire 350 Ohms	1 V	Be 5 Hz	2	1	NA	0	0	4000	4000	µm/m
1-1-8	nc_02	SG quarter bridge 3-wire 350 Ohms	1 V	Be 5 Hz	2	1	NA	0	0	4000	4000	µm/m

	Name	Max. prediction	Upper trigger	Lower trigger	Tolerance %	Software scaling	Zero enable	Zero value	Auto CAL	Ref. x channel	Sensor ID
1-1-1	SR01	4000	0	0	0		ON	798.271	OFF		AA000000334BEE05
1-1-2	SR02	4000	0	0	0		ON	789.625	OFF		4200000033494F05
1-1-3	SR03	4000	0	0	0		ON	379.792	OFF		5F000000336B0105
1-1-4	RR01A	4000	0	0	0		ON	671.271	OFF		C10000003319E205
1-1-5	RR01B	4000	0	0	0		ON	1343.44	OFF		7B00000033572005
1-1-6	RR01C	4000	0	0	0		ON	899.2291	OFF		2300000033663D05
1-1-7	nc_01	4000	0	0	0		ON	0	OFF		8E00000052EDEA72
1-1-8	nc_02	4000	0	0	0		ON	0	OFF		8E00000052EDEA82

	Name	Ref. x channel	Sensor ID	Sensor description	Descriptor file	Comment	Slot	Amplifier	Connector	Serial number
1-1-1	SR01		AA000000334BEE05				1	ML 801	AP 814	099474020112;097176007
1-1-2	SR02		4200000033494F05				1	ML 801	AP 814	099474020112;097176007
1-1-3	SR03		5F000000336B0105				1	ML 801	AP 814	099474020112;097176007
1-1-4	RR01A		C10000003319E205				1	ML 801	AP 814	099474020112;097176007
1-1-5	RR01B		7B00000033572005				1	ML 801	AP 814	099474020112;097176007
1-1-6	RR01C		2300000033663D05				1	ML 801	AP 814	099474020112;097176007
1-1-7	nc_01		8E00000052EDEA72				1	ML 801	AP 814	099474020112;097176007
1-1-8	nc_02		8E00000052EDEA82				1	ML 801	AP 814	099474020112;097176007

4) Example: Test point plans and merge procedure

- Input of all test specific transducer and S/G parameters
- Meaningful definable default values
- Includes channel grouping
- Definition of look-up tables for Sensor Type

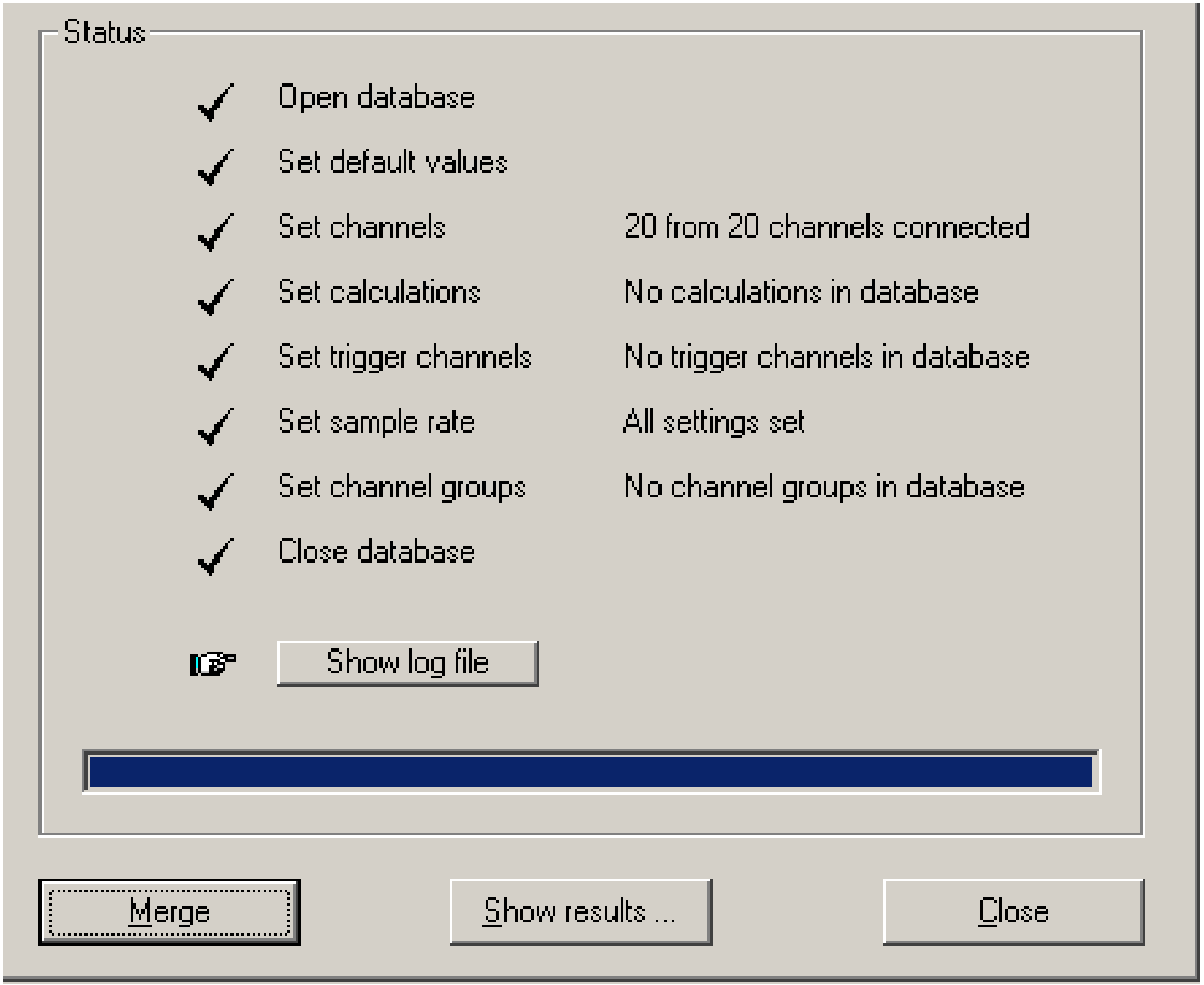
DefList.tmp - MC Definition List V1.9 © by HBM

File Edit Channels Merge Help

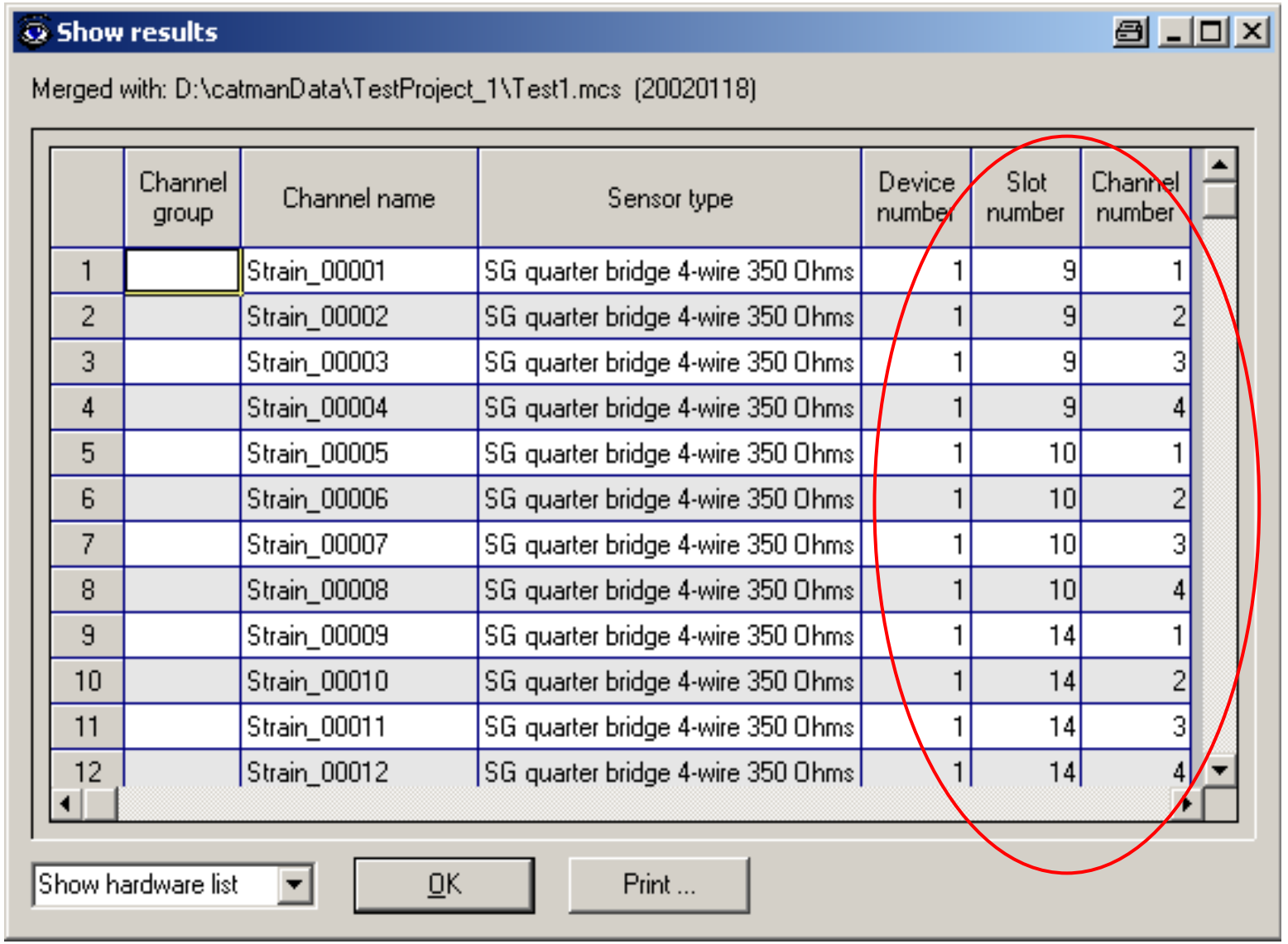
Show all

	Channel group	Channel name	Sensor type	Engineering unit	Electrical nominal	Physical nominal	Fast rate	Active	Store	Zero enable	Electrical zero	Physical zero	Gage factor	Young's modulus [N/mm²]	Poisson's ratio	Transverse sensitivity [%]	Uexc [V]	Manual input value	Zero value	Comment	Shunt nominal
1		Strain_00001	SG quarter bridge 4-wire 350 Ohms	µm/m	100.000000	100.000000	☐	☑	☐	☑	0.000000	0.000000	2.00	72000	0.300	0.00	1.00	0.000	0.000000	(72000,0.300,0.00)	0.000
2		Strain_00002	SG quarter bridge 4-wire 350 Ohms	µm/m	100.000000	100.000000	☐	☑	☐	☑	0.000000	0.000000	2.00	72000	0.300	0.00	1.00	0.000	0.000000	(72000,0.300,0.00)	0.000
3		Strain_00003	SG quarter bridge 4-wire 350 Ohms	µm/m	100.000000	100.000000	☐	☑	☐	☑	0.000000	0.000000	2.00	72000	0.300	0.00	1.00	0.000	0.000000	(72000,0.300,0.00)	0.000
4		Strain_00004	SG quarter bridge 4-wire 350 Ohms	µm/m	100.000000	100.000000	☐	☑	☐	☑	0.000000	0.000000	2.00	72000	0.300	0.00	1.00	0.000	0.000000	(72000,0.300,0.00)	0.000
5		Strain_00005	SG quarter bridge 4-wire 350 Ohms	µm/m	100.000000	100.000000	☐	☑	☐	☑	0.000000	0.000000	2.00	72000	0.300	0.00	1.00	0.000	0.000000	(72000,0.300,0.00)	0.000
6		Strain_00006	SG quarter bridge 4-wire 350 Ohms	µm/m	100.000000	100.000000	☐	☑	☐	☑	0.000000	0.000000	2.00	72000	0.300	0.00	1.00	0.000	0.000000	(72000,0.300,0.00)	0.000
7		Strain_00007	SG quarter bridge 4-wire 350 Ohms	µm/m	100.000000	100.000000	☐	☑	☐	☑	0.000000	0.000000	2.00	72000	0.300	0.00	1.00	0.000	0.000000	(72000,0.300,0.00)	0.000
8		Strain_00008	SG quarter bridge 4-wire 350 Ohms	µm/m	100.000000	100.000000	☐	☑	☐	☑	0.000000	0.000000	2.00	72000	0.300	0.00	1.00	0.000	0.000000	(72000,0.300,0.00)	0.000
9		Strain_00009	SG quarter bridge 4-wire 350 Ohms	µm/m	100.000000	100.000000	☐	☑	☐	☑	0.000000	0.000000	2.00	72000	0.300	0.00	1.00	0.000	0.000000	(72000,0.300,0.00)	0.000
10		Strain_00010	SG quarter bridge 4-wire 350 Ohms	µm/m	100.000000	100.000000	☐	☑	☐	☑	0.000000	0.000000	2.00	72000	0.300	0.00	1.00	0.000	0.000000	(72000,0.300,0.00)	0.000
11		Strain_00011	SG quarter bridge 4-wire 350 Ohms	µm/m	100.000000	100.000000	☐	☑	☐	☑	0.000000	0.000000	2.00	72000	0.300	0.00	1.00	0.000	0.000000	(72000,0.300,0.00)	0.000
12		Strain_00012	SG quarter bridge 4-wire 350 Ohms	µm/m	100.000000	100.000000	☐	☑	☐	☑	0.000000	0.000000	2.00	72000	0.300	0.00	1.00	0.000	0.000000	(72000,0.300,0.00)	0.000
13							☐	☐	☐	☐											

4) Example: Test point plans and merge procedure



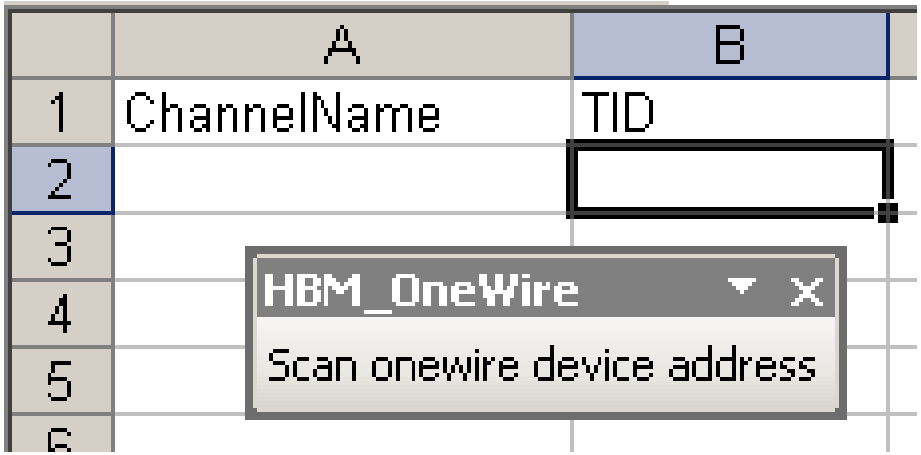
4) Example: Test point plans and merge procedure



	Channel group	Channel name	Sensor type	Device number	Slot number	Channel number
1		Strain_00001	SG quarter bridge 4-wire 350 Ohms	1	9	1
2		Strain_00002	SG quarter bridge 4-wire 350 Ohms	1	9	2
3		Strain_00003	SG quarter bridge 4-wire 350 Ohms	1	9	3
4		Strain_00004	SG quarter bridge 4-wire 350 Ohms	1	9	4
5		Strain_00005	SG quarter bridge 4-wire 350 Ohms	1	10	1
6		Strain_00006	SG quarter bridge 4-wire 350 Ohms	1	10	2
7		Strain_00007	SG quarter bridge 4-wire 350 Ohms	1	10	3
8		Strain_00008	SG quarter bridge 4-wire 350 Ohms	1	10	4
9		Strain_00009	SG quarter bridge 4-wire 350 Ohms	1	14	1
10		Strain_00010	SG quarter bridge 4-wire 350 Ohms	1	14	2
11		Strain_00011	SG quarter bridge 4-wire 350 Ohms	1	14	3
12		Strain_00012	SG quarter bridge 4-wire 350 Ohms	1	14	4

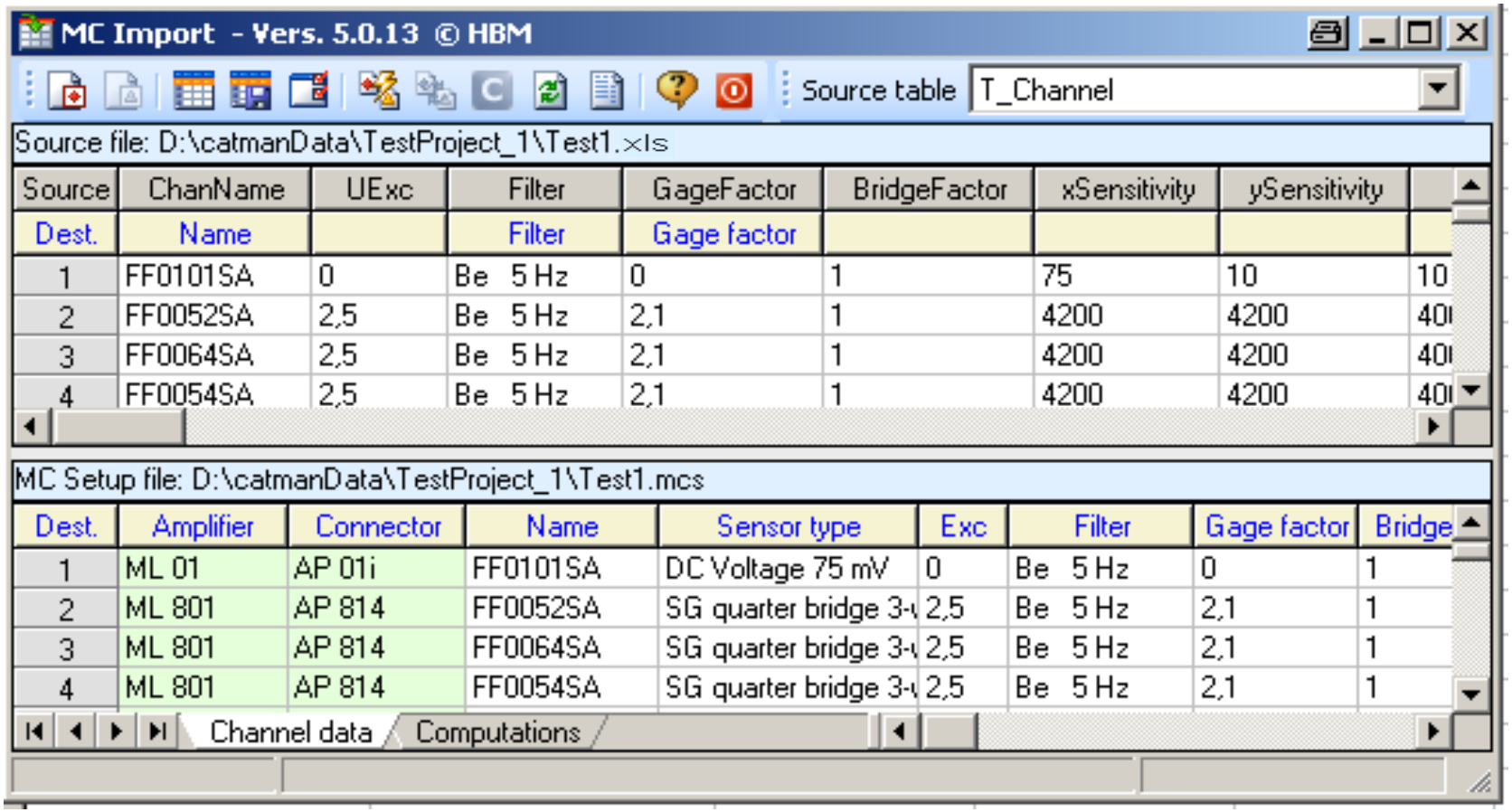
4) Example: Import of configuration data from database or Excel sources

- TID (Transducer Identification) can be read out and put into an MS-Excel directly with a USB-to-1-wire adapter
- TID code becomes part of the test database
- TID is part of the setup file
- Import can be done according to the TID codes



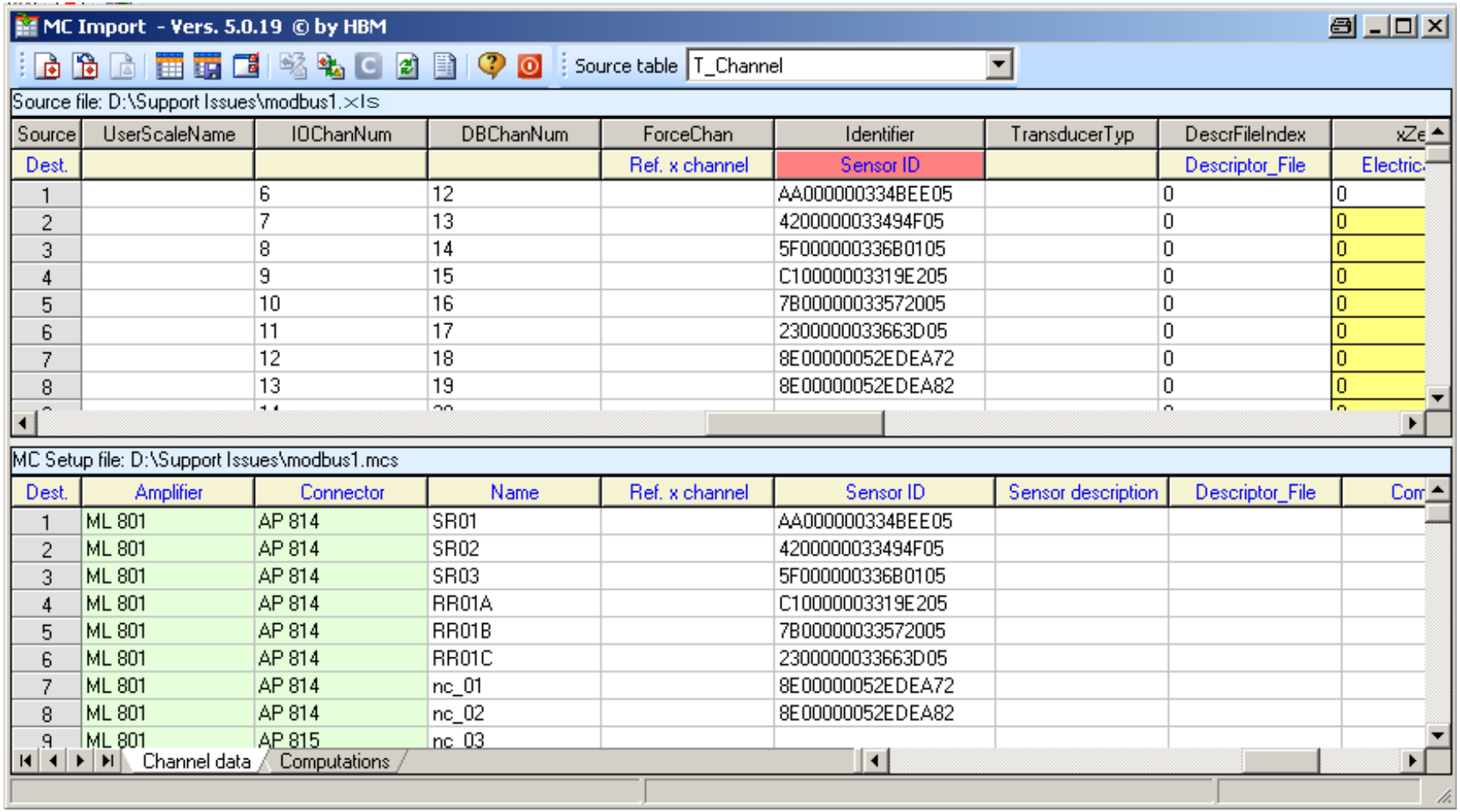
4) Example: Import of configuration data from database or Excel sources

- Assignment of source to destination columns
- Import data using drag & drop
- Update function available if source data have been changed



4) Example: Import of configuration data from database or Excel sources

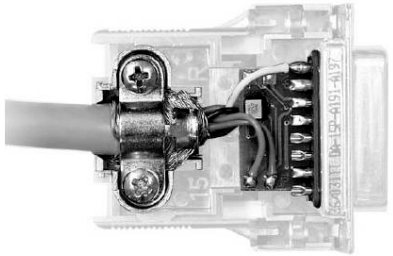
- Import with T-ID mapping



4) Example: TEDS configuration for transducers

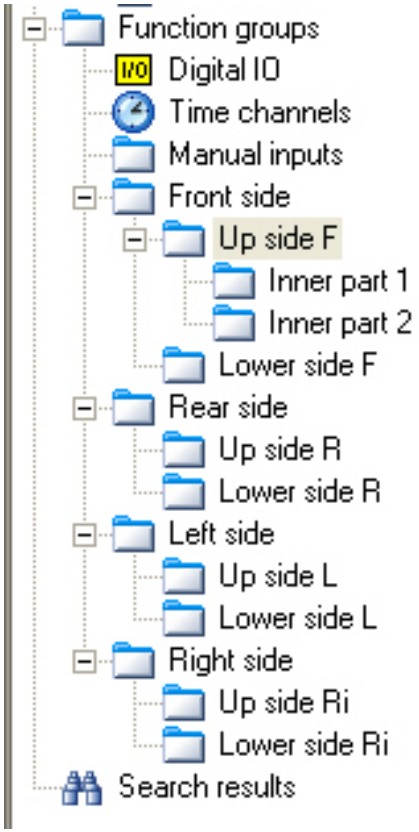
TEDS by HBM™

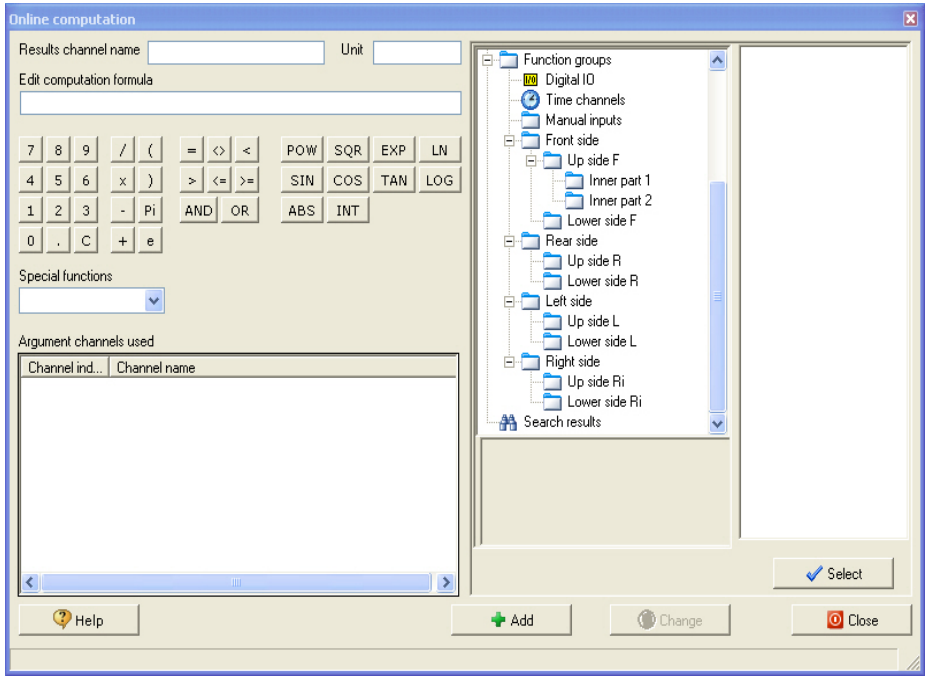
T-ID™ by HBM

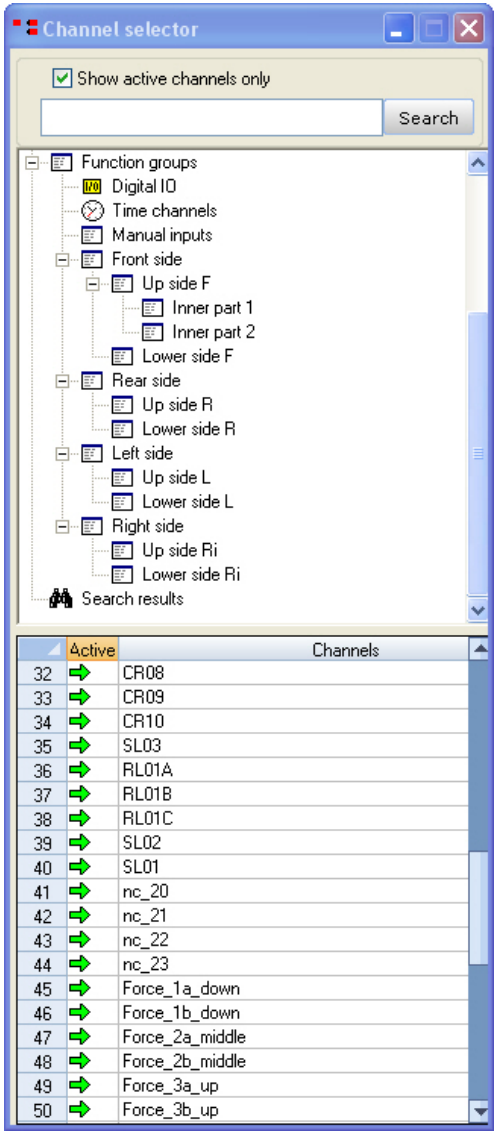


5) Verification of configuration

- Clearly arranged channel configuration







5) Verification of configuration

- Wiring check function
- Hardware internal shunt resistors
- Checking the whole system with one mouse click

MC Setup 6.1.40 D:\catmanData\TestProject_1\ML78_Test.mcs

File Actions Diagnosis Help

	Conn. plate serial number	Channel name	Reading MEAS (Net)	Reading absolute	Cable length comp.	Reading ZERO	Reading CAL	Reading shunt	Shunt nominal	Wiring OK/NOK (0,50%)	Error status
6-3-8	098777006	nc_15	OVFL		NA			NA	NA	NOK	GROSS OVERFL.
6-4-1-	300808007	CR01	0 µm/m	-2593 µm/m	1,00000			1993 µm/m	2000 µm/m	OK	No Error
6-4-1-	300808007	CR02	0 µm/m	-1823 µm/m	1,00000			1995 µm/m	2000 µm/m	OK	No Error
6-4-1-	300808007	CR03	0 µm/m	-1674 µm/m	1,00000			1994 µm/m	2000 µm/m	OK	No Error
6-4-1-	300808007	CR04	0 µm/m	-1212 µm/m	1,00000			1994 µm/m	2000 µm/m	OK	No Error
6-4-1-	300808007	CR05	OVFL		1,00000			OVFL	2000 µm/m	NOK	Hardware overflow,Sensor: Zeroing failed
6-4-1-	300808007	CR06	0 µm/m	-133 µm/m	1,00000			1994 µm/m	2000 µm/m	OK	No Error
6-4-1-	300808007	CR07	0 µm/m	-2014 µm/m	1,00000			1995 µm/m	2000 µm/m	OK	No Error
6-4-1-	300808007	CR08	0 µm/m	-1282 µm/m	1,00000			1995 µm/m	2000 µm/m	OK	No Error
6-4-1-	300808007	CR09	0 µm/m	-918 µm/m	1,00000			1995 µm/m	2000 µm/m	OK	No Error
6-4-1-	300808007	CR10	0 µm/m	-2126 µm/m	1,00000			1995 µm/m	2000 µm/m	OK	No Error
6-4-2-	410623012	SL03	0 µm/m	1237 µm/m	NA			1999 µm/m	2000 µm/m	OK	No Error
6-4-2-	410623012	RL01A	0 µm/m	816 µm/m	NA			2000 µm/m	2000 µm/m	OK	No Error
6-4-2-	410623012	RL01B	0 µm/m	847 µm/m	NA			1999 µm/m	2000 µm/m	OK	No Error
6-4-2-	410623012	RL01C	0 µm/m	1463 µm/m	NA			1999 µm/m	2000 µm/m	OK	No Error
6-4-2-	410623012	SL02	0 µm/m	1009 µm/m	NA			2000 µm/m	2000 µm/m	OK	No Error
6-4-2-	410623012	SL01	0 µm/m	1118 µm/m	NA			1999 µm/m	2000 µm/m	OK	No Error
6-4-2-	410623012	nc_20	OVFL		NA			OVFL	2000 µm/m	NOK	Transducer error,Sensor: Zeroing failed

HBM
measurement with confidence

Data Validation

MC Calibrator

MGCplus System

Real-time Data Acquistion

MD Server

Traceable Data Pool

MD Client

Configuration

MC Setup

MC Definition List

Assessment

MD Trend

MD Explorer

Assessed Snapshot Data

Exclusive Data

catman®

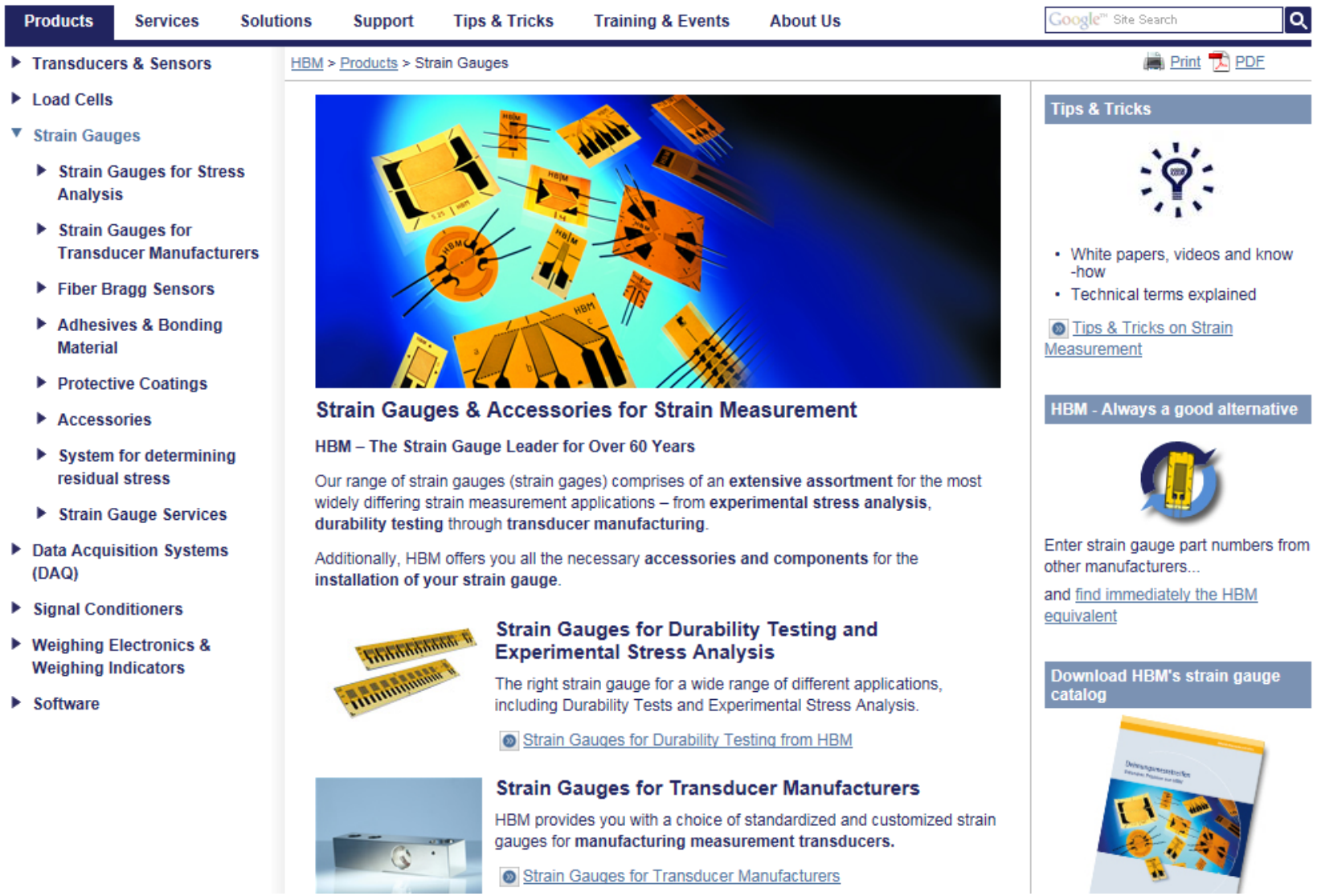
catman® Enterprise

Save costs and time with high channel count test systems with:

- Flexible data exchange with customer test setup files
- Import and export functionality with automatic channel assignment
- Use of TEDS and TIDs to increase safety in setup and configuration
- Avoid manual input of data as far as possible
- Use of automated channel and wiring check functions

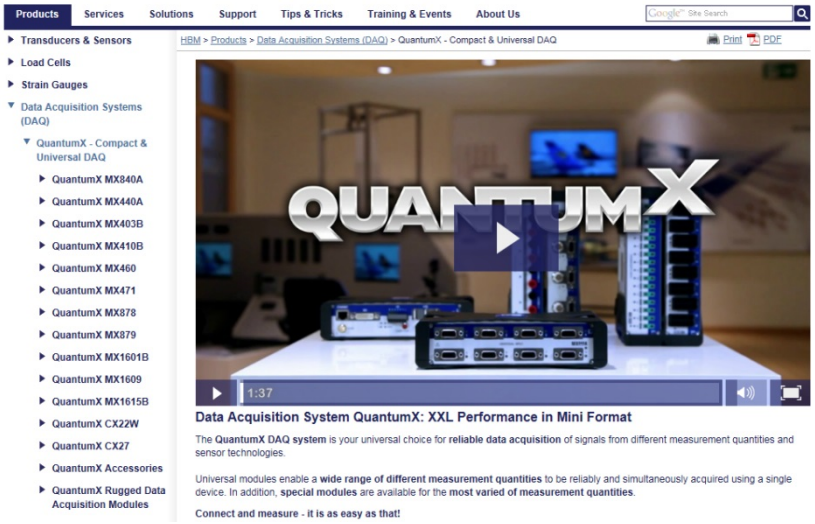
More detailed information

→ www.hbm.com/strain

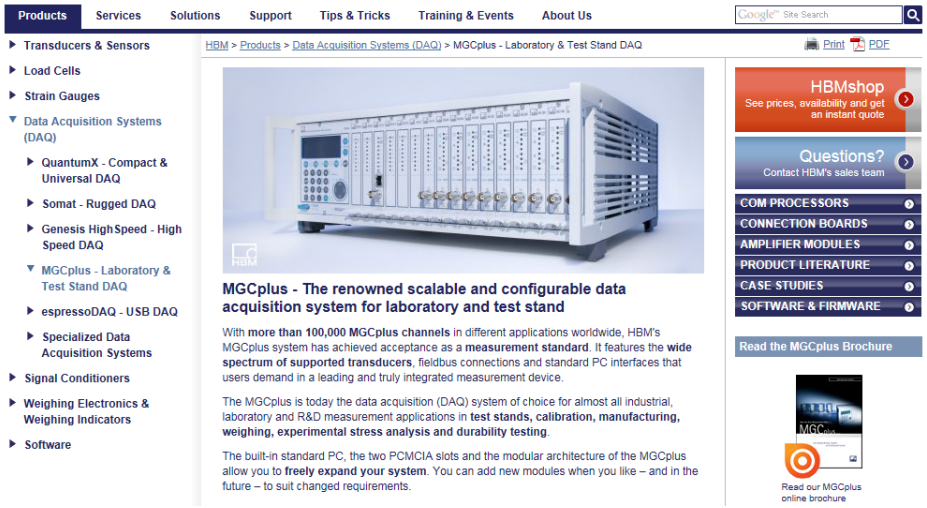


More detailed information

→ www.hbm.com/quantumx

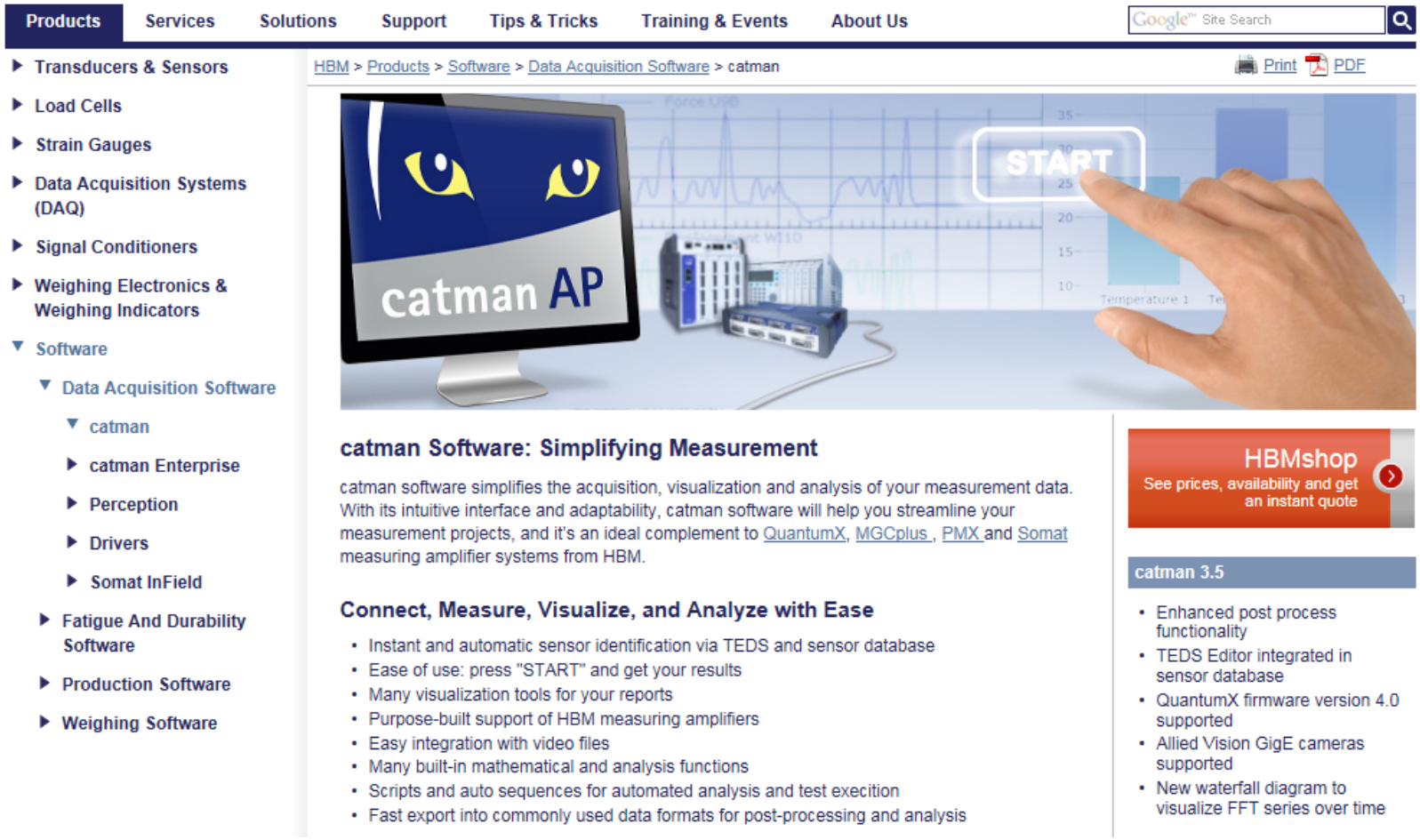


→ www.hbm.com/mgcplus



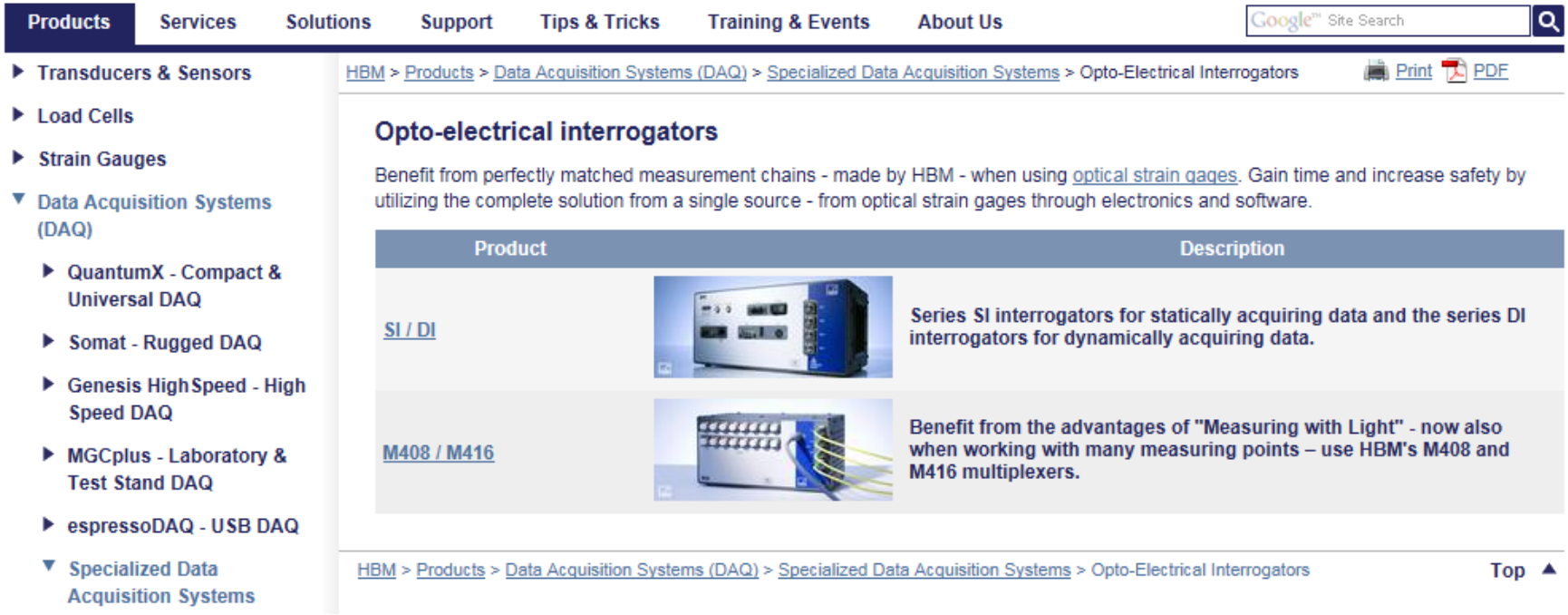
More detailed information

www.hbm.com/catman



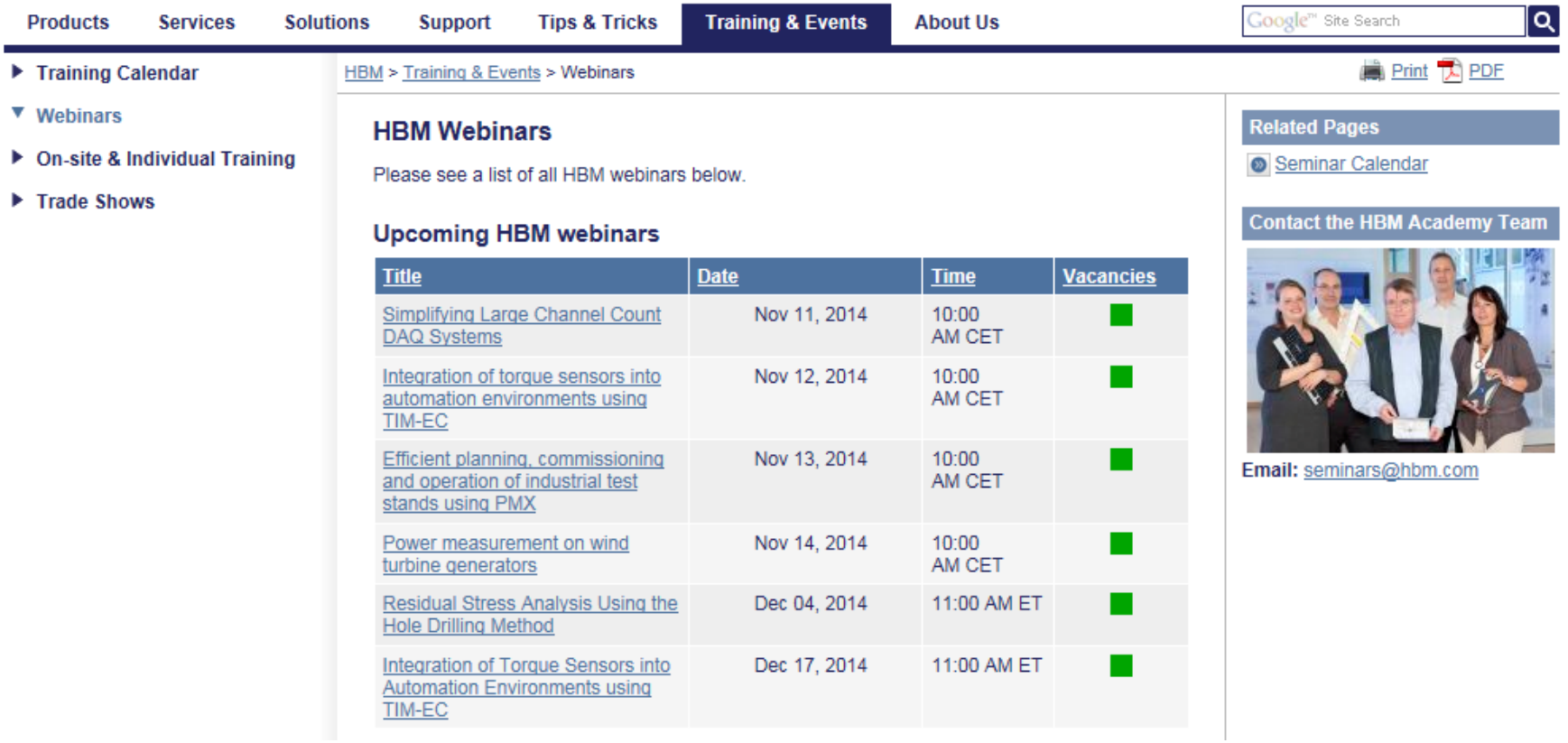
More detailed information

→ www.hbm.com/interrogators



More detailed information

→ www.hbm.com/webinars



Any questions?

- Please contact us for further questions.
  We look forward to your email: emarketing@hbm.com

- Or email the speaker directly: rolf.mendel@hbm.com