Welcome to the “Introducing the New Circular Shaft Torque Transducer” Webinar

The presentation will begin at 1pm EST

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If you have a question, please send it to the host using the “Q&A” function. Questions will be answered at the end of the presentation.

Host: Shannon Hicks
Presenters: Mark Minda & Bart Morrick

Organizational Information

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New Circular Shaft Torque Transducer

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HBM
Brüel & Kjær

Mark Minda

Business Development Manager
HBM Torque Products

Lebow Products Inc.

Honeywell
Sensing & Control
Lebow Products Inc.

HBM

History

32 Years In Torque & Force

15 Years
1 Year Repair Technician
2 Years Service Supervisor
1 Year Int'l Sales Manager
11 Years Midwest - Sales Manager

1 Year
Worldwide Torque Manager

16 Years
2 Years Michigan \ Ohio Sales
14 Years BDM Torque Products
Michigan Direct Torque Sales

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Agenda

1. History of Circular Shaft Torque Transducers
2. Introduction of the HBK Model T210
3. Improvement Highlights
4. Calibration
5. Markets

What's out there in Rotary Torque?

Standard Products (R&D and ASSEMBLY)

- Compact Circular Shaft
- **Small in Size**
- Lower Accuracy
- **Low Price**

- Circular Shaft
- Larger in Size
- **Higher Accuracy**
- Medium Price

- **Bearingless Flange**
- **High Performance**
- Higher Price

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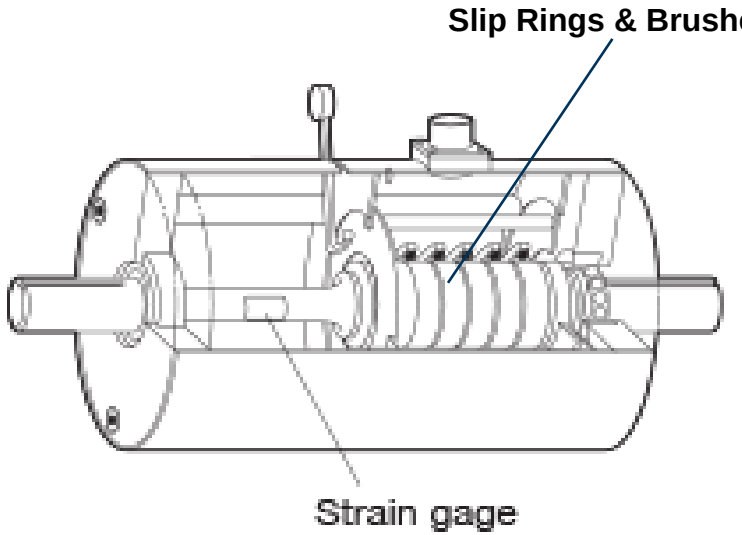
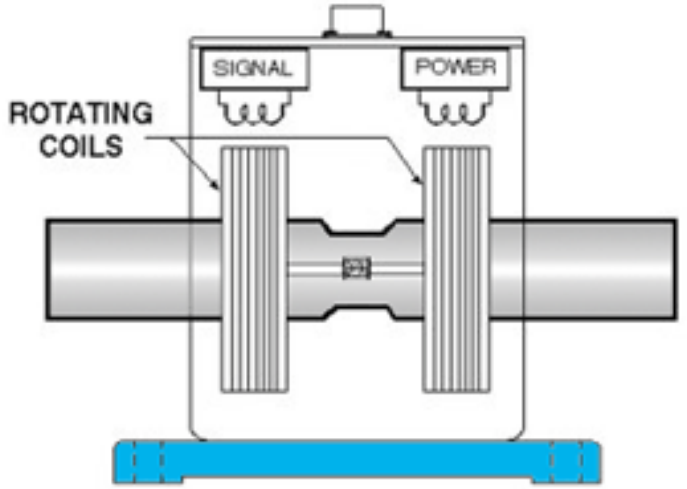
History – Rotating Torque Transducers
Slip Ring Type
1970's



- Bearings Wear Out
- Brushes Rub on Slip Rings creating Brush Dust
- About 10,000 rpm limit
- AC or DC Strain Gage Conditioner needed
- Capable of High Response times

History – Rotating Torque Transducers
Non Contact Type
1980's



- Bearings Wear Out
- Non-Contact
- About 25,000 rpm limit
- AC Strain Gage Conditioner needed
- Response times around 300Hz

- Himmelstein
- Honeywell
- PCB

Smaller Size
Square Drive & Circular Shaft

Fastener & Tool Testing \ Automation
Not as Accurate, Lower in Price < $4k

Slip Ring Square Drive

Non-Contact Self Amplified Square Drive

Non-Contact Self Amplified Circular Shaft

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History – Rotating Torque Transducers
Non Contact Analog Telemetry Type
1990’s

100Nm – 10KNm
Aimed at the Powertrain Market
Engine, Gearbox, Axle Testing

History – Rotating Torque Transducers
Non Contact Digital Telemetry Type
2000’s

T40B **T12HP**

High Performance

High Price Very High Price

Why still make a Circular Shaft Torque Transducer?

1. Very difficult to make bearingless transducers below 100Nm
2. Lower Price Option
3. Can be Small in Size
4. Lower Rotating Inertia…. Circular shaft can Weigh less

Nicolet TECHNOLOGIES

LDS TEST AND MEASUREMENT

GOULD

HBM

LDS Nicolet

Bart Morrick

Application Engineer

HBM Torque Products, Sensors & Data Acquisition

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HBK's Past Solutions

0.1Nm to 1,000Nm

Model T4, T5

Slip Rings

Model T22

- Lower Accuracy
- No Encoder

Model T21WN

- Medium Accuracy
- Encoder 360 ppr

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Specification Overview

- Shaft Torque Sensor
- Three Sizes – nine ranges
  - 0,5 / 1 / 2 N·m
  - 5 / 10 / 20 N·m
  - 50 / 100 / 200 N·m
- Speed / angle measurement system included
- Replacing T21WN
- Development & Production @ HBK-Germany

- Performance of a traditional rotary transducer
- Size and price of a compact torque transducer

T210 Shaft Torque Sensor

The all-round torque measurement solution

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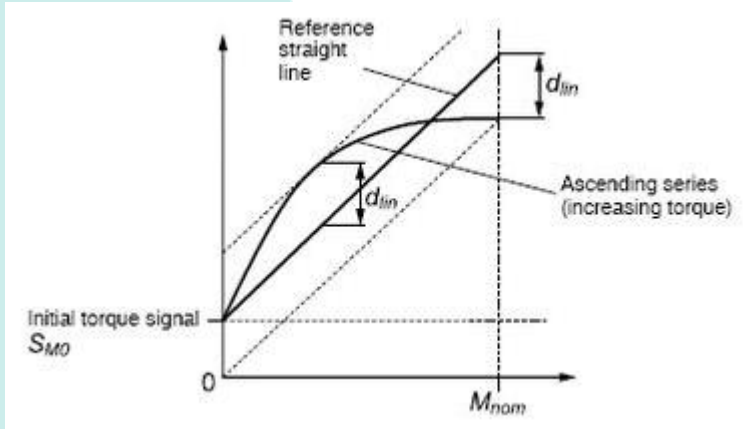
Competitor Comparison

	HBM - NEW T210	Comp. 1	Comp. 2	Comp. 3
Nominal RPM	30k, 20k, 14k	12k, 9k, 7k	10k, 8k, 7k	25k, 15k, 7k
Linearity \ Hysteresis	0.05% fs	0.2% fs	0.5% fs	0.05% + 0.1% fs
TC Zero	0.1% per 10'k	0.2% per 10'c	0.3%' per 10c	0.15% per 10k
TC Span	0.1% per 10'k	0.2% per 10'c	0.3%' per 10c	0.1% per10k
Repeatability	0.05% fs	0.2% fs	???	???
Max Temperature	-20'c to +85'c	80'c	60'c	60'c
Bandwidth (-3dB)	1KHz	3KHz	1.5KHz	5KHz
Output	+\-10vdc, 10KHz	+\-5vdc	+\-10vdc	+\- 10vdc, USB
Speed Output	Option 512ppr	Option 2x360ppr	Standard 60ppr	240pp to 2000ppr
IP Rating	40	40	40	40

Rotating Speed

14k RPM **20K RPM** **30K RPM**

Linearity \ Hysteresis



0.05% of Full Scale Combined

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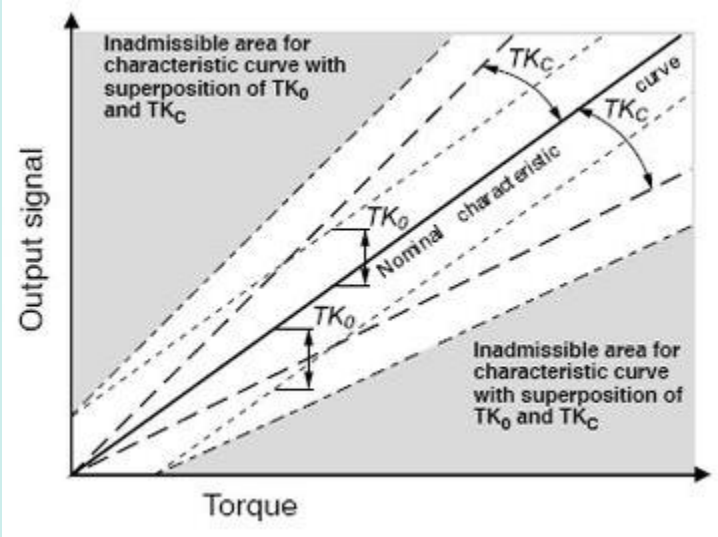
Repeatability

0.05% of Full Scale

Tc Zero & Tc Span



0.10% of Full Scale \ 10º kelvin
Tc Range: +10ºc to 70 º c
Operating Range: -20 º c to 85 º c

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Three Outputs and Shunt Signal!

1. +\- 5KHz for Torque
2. +\- 10vdc for Torque
3. 512 ppr for rpm or angle
4. 50% Shunt Signal

MBC
Bellows coupling for torque transducers

SPECIAL FEATURES

- Compensation of axial, radial and angular shaft displacement
- High torsional stiffness
- Minimal restoring forces
- Zero play
- Simple installation
- Standard types in stock
- Available with customized diameter

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VK20A

Junction box

Special features

- For connecting T20WN, T21WN, T22 torque transducers
- Integrated control signal triggering with T20WN
- 14 ... 30 V DC supply voltage range
- IP65 degree of protection per EN60529
- EMC-tested per EN61326-1 through HBM shielding design

Torque transducers can communicate with:

TIM-EC or PN
Digital Bus

MP-85
Torque to Turn

PMX
Multi Channel
Amplifier

Data Acquisition for the T210

Quantum
MX 460

E-Drive
Power Analyzer

Calibration

- Each transducer comes with a test report – similar to the one included with T21WN
  - Results from end-of-line test
  - Steps: 0 – 50 – 100 – 50 – 0
  - Clockwise (CW) & counterclockwise (CCW)
  - Sensitivity
  - Linearity deviation
  - Linearity deviation incl. hysteresis
  - Relative hysteresis

- Certified Calibration to be offered through K-CAL-T
- Options to be planned during the start-phase
  - D = DakkS / DKD calibration certificate for torque
  - W = Working standard calibration for torque


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Hottinger Brüel & Kjaer GmbH
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Akkreditiertes Kalibrierlaboratorium nach
DIN EN ISO/IEC 17025:2018
Mitglied im
Deutschen Kalibrierdienst
DKD
51309
Kalibrierschein
Calibration certificate
MUSTER / SAMPLE
Kalibrierzeichen
Calibration mark
2020-08
Gegenstand
Drehmomentaufnehmer
Torque Transducer
Hersteller
Hottinger Baldwin Messtechnik GmbH, DE-Darmstadt
Typ
T21/5 kN-m
Eigentümer
Muster GmbH, DE - 12345 Musterstadt
Datum der Kalibrierung
2020-08-03
Sample / Muster

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Take Aways of the T210

1. Accuracy\ Performance of a rotary transformer
2. Price and Size of a compact torque sensor
3. 30k rpm in the smaller capacities
4. Built and calibrated in Darmstadt
5. 512 ppr encoder is standard
6. T22 will still be available

T22 with Couplings

Common Applications

1. R & D – Low Capacity…. Example: Electric Tools
2. Automation – Torque to Turn
3. Electric Motor Testing – Smaller Versions
4. E-Drive – Small Electric Vehicles

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Thank You

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