Recommendations for the Specification of Calibration Intervals

Introduction

As required in the QM-Norms, the control of testing apparatus must determine a calibration interval for each test and/or measuring instrument. This description shall give an assistance to the user of strain gauge torque measuring instruments, which should be considered in many cases when defining the calibration interval.
The user of the torque measuring instrument is however responsible for the determination of the exact calibration interval. In seldom cases it can be quite meaningful to deviate from this.

Evaluation of Test Intervals at First Output

These are experience values for the test interval, which are determined for the first operational period of the sensor as a target value for the adherence of the accuracy of the measurements. Only corresponding measuring values from repetition calibrations can give e.g. statements regarding stability and change of performance of the measuring equipment.

Determination Criteria

The determination of the calibration intervals usually depends on following points:

- Overload of the sensor
  Bending moment, lateral forces, forces while mounting and disassembly (Offset in disassembled condition has changed more than 0.5 %).
- Oscillations
  by torsional vibrations large overloads can appear, which will damage the sensor. (View the measuring signal of the sensor with the oscilloscope)
- Drift of the sensor for offset and nominal value (at regular tare of the sensors the offset drift can easily be overlooked.
- Environmental conditions
  heavy temperature fluctuations
  pollution of the sensor
- Handling
  frequent mounting and disassembly of the sensor
- In-built calibration signal
  the measured value should be in the range of the accuracy indication

An examination is generally indicated according following points:

- Overload
- Heavy offset drift in disassembled condition

Determination of Calibration Intervals

Field of application	First interval new sensor	After Calibration	
		Result ok	Result not ok
Laboratory conditions	1 year	1 ½ years	½ year
Normal application	1 year	1 ½ years	½ year
Hard application	½ year	1 year	¼ year

Actions for trust-improvement in the measurement:

- Comparison measurement with an additional sensor
- Plausibility control of the measured values
- control the offset of unloaded sensor

Rating of Calibration Results

For the rating of the sensor following points of the calibration are important:
Offset of the sensor (without tare) max. deviation 1 %
Characteristic value of the sensor (accuracy class acc. manufacturer e.g. max. deviation 0.1%)
Hysteresis determined from increasing series and decreasing series (see indication in data sheet, e.g. 0.1%)

Evaluation of the Test Intervals for Re-Test (Dynamic Sampling)

For economical reasons (lowering of calibration costs) it is meaningful to arrange calibration cycles according to experiences from preceding calibrations.
Appropriate methods are represented in appendix A of ISO 10012 part 1.
Example:
If the result of a re-test shows that the measuring instrument has changed less than **50%** of the permissible wear span it is acceptable that the next calibration interval can be **increased** by max. **50%** of the initial interval.
Example:
If the initial interval is defined for 12 months, then the calibration interval (if ok) can be increased to 12 months + 50% of 12 months = **18 months**
If the measured values are within this 50 % mark during the next calibration, it can be increased to **24 months** (18 months + 50% of 12 months).
Note:
For torque sensors the calibration interval should be 26 months max. (DIN51309).

Important:
When determined that the permissible wear span has been reached and/or exceeded, the period of utilization until the next calibration is to be halved.

The respective initial interval and the actual valid test interval are to be logged for each measuring instrument in the measuring instrument index file.

Norms for calibration interval:
ISO 9000; DIN 51309; DIN ISO 10012 part 1