**STT – Shaft Twist Tester**

**Optical twist tester**

The Shaft Twist Tester is a device for the qualitative production-related twist testing of cylindrical surfaces. Twist structures with a twist depth of 200 nm and a period length of 20 to 500 µm can be imaged and thus reliably detected.

Twist structures are currently examined by the so called thread method or with profilometric analyses. Both methods are not suitable for fast usage in the production process or for a 100 % control. Therefore, a test tool was developed that meets these requirements and combines safe testing for twist structures with user friendliness.

The STT is placed on the test object. The examiner can immediately see from a stripe system in the field of view, the presence of spin structures on the surface of the finished component.

**Application background**

The sealing function of a shaft seal is essentially determined by twists structures. Once twist is present, there is a critical micro-pumping action when shaft starts rotating, which results in leakage or wearing out of the shaft sealing.

These twist structures can be precisely visualized by using the Shaft Twist Tester. An optical filter indicates the presence of twist structures on the test object and permits the estimation of parameters as twist depth and period length. The number of shown stray light stripes is an indicator for twists depth and their offset distance represents the period length.

The mapping of twist structures was previously only possible by using very elaborate and expensive systems for tactile metrology. A production-integrated testing could not be done with this method due to the high measuring times and the restrictive conditions of the measurement system. Alternatively, the thread method is used, but this method also depends on several conditions (for example, sewing thread material, thread size, attached weight or viscosity of the lubricant). A major disadvantage of the thread method is that it is not applicable for very small or very large twist structure.

**Function & Application**

- Lighting of the test sample with a laser diode
- Expression of fringes on periodic twist structures
- Separation of twist structures and surface roughness by optical filtering
- Qualitative assessment of the twist structure at a glance
Technical data

- Laser diode: $< 1 \text{ mW}$
- Shaft diameter: max. 300 mm
- Twist depth: from 200 nm*
- Period length: 20 to 500 µm*
- Dimensions: 275 mm x 27 mm x 77 mm
- Weight: 630 g

* Parameters are depending on roughness: Data for $R_z = 2 \mu$m

Results

The left figure shows the behavior without twist and the right figure with twist. The distance between the lines is an indicator for the period length.

Twist free mapping

Twist structure: Depth $D_t = 670 \text{ nm}$, Period $D_p = 60 \mu$m

Your benefit:

- Rapid quality control in production process
- Mobile on-site testing
- Instant feedback for optimization of processing parameters such as spark-out time, feed, dressers, grinding wheel replacement, etc.
- Reliable and cost effective alternative to thread methods and tactile twist measurement systems
- High reproducibility of test results
- Insensitive to environmental influences

We would like to inform you further about twist testing with the STT. Just contact us to solve your questions and individual problems. On request we are offering custom made types to suit your needs (for example integrated automation solutions).