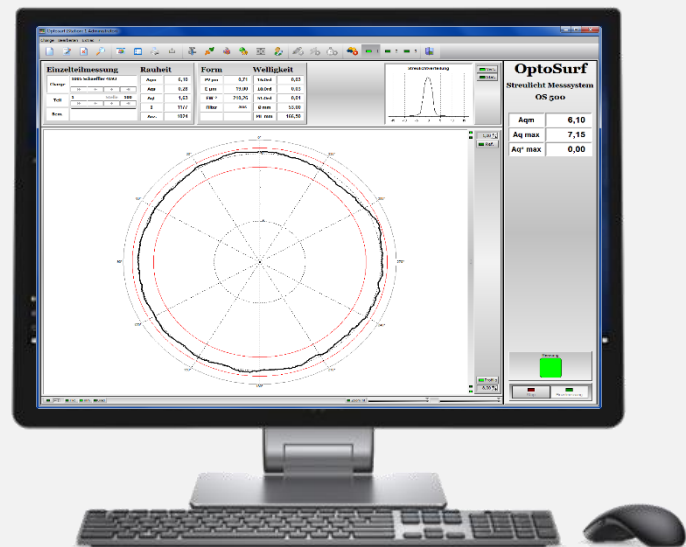


OptoShaft TT

Mobile measuring station



Optical Surface Measurement

- Roundness
- Waviness
- Roughness

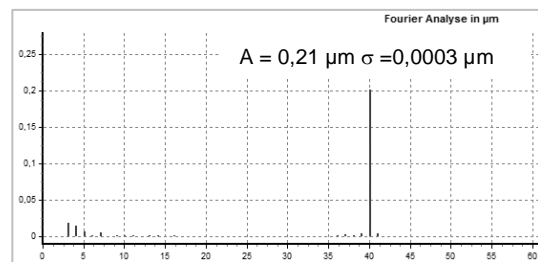
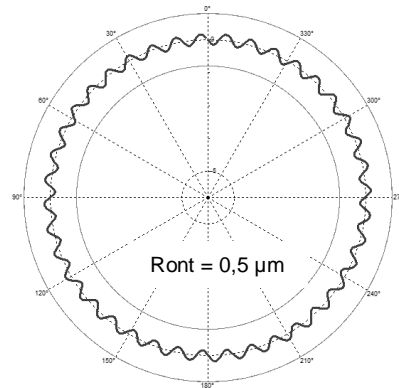
With the OptoShaft TT, the user receives a compact, versatile measuring device for development as well as for the shop floor. This device is suited for fast measure of roundness, waviness and roughness of various components. By using the scattered light sensor OS 500, precise submicrometer measurements can be performed even in harsh environments.

Applications

Roundness- and waviness measurement

The roundness measurement with the scattered light sensor is based on angle measurement. This means that local form angles are measured on the circumference. Through integration and subsequent LSC calculation, this results in an absolute roundness profile that is comparable to high-precision tactile measurements. Roundness deviations down to $0.1 \mu\text{m}$ can be measured. ISO Gauss filters are used for the waviness calculation. The detection limit for fine waviness is in the range of $0.01 \mu\text{m}$.

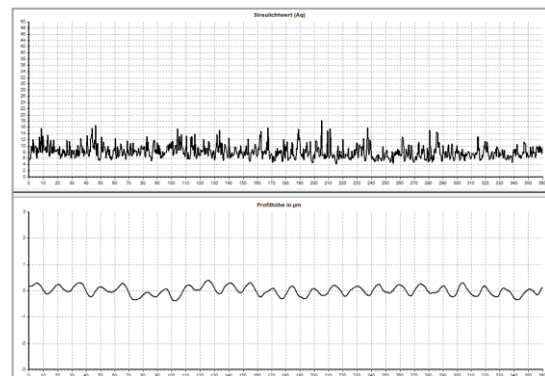
The system can be calibrated using certified waviness standards.



Waviness standard. above: roundness. below: FFT Analysis

Simultaneously measurement

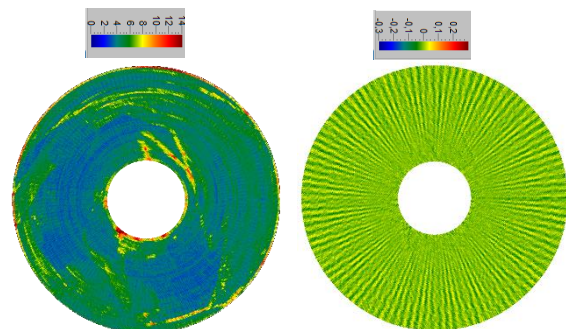
The OS 500 sensor offers the possibility to carry out roughness and waviness measurements at the same time. During one revolution the scattered light distribution is permanently analyzed in terms of the variance, which is the roughness Aq and the center of gravity, which corresponds to the waviness. This results in 2 profiles on the circumference. Interestingly, the special roughness parameter Aq can also be measured in the machining direction and here it correlates with the friction behavior of the surface



Above: roughness course Aq on 360° . 2048 single Aq -values.
below: waviness profile after 50 waves high pass filter.

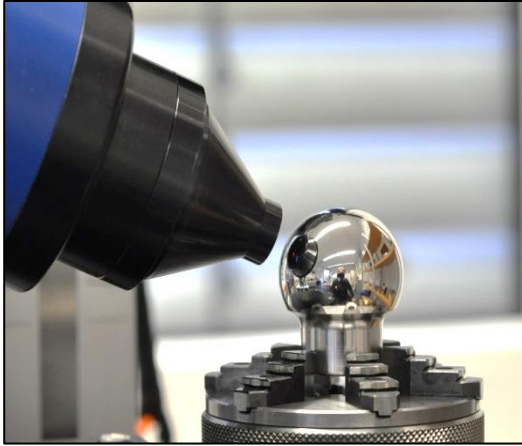
Area measurement

A big advantage of the fast measurement with the scattered light sensor is the full-surface measurement of the entire functional area. In one measurement, the roughness profile and the shape and waviness can be displayed. Inhomogeneities and defects can be identified and evaluated.

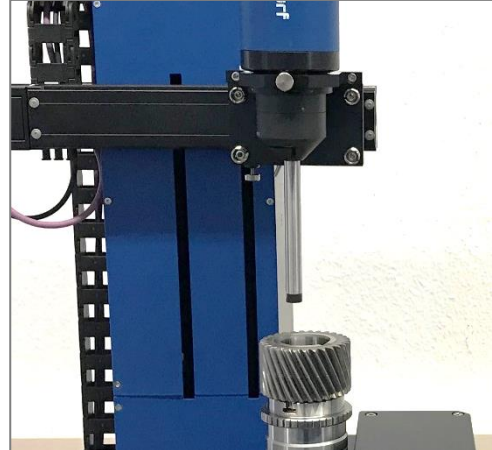


Area scan of a cone. Part see next page
left: roughness Aq . right: waviness (filter 15 waves)

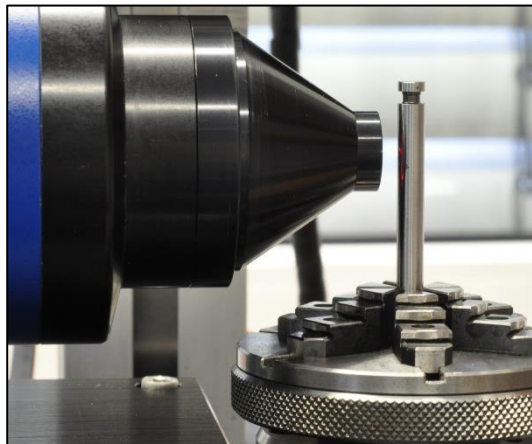
Examples of applications



Polished ball (artificial hip joint)
Roundness RONT= 0,23 μm , roughness Aqm= 3,2



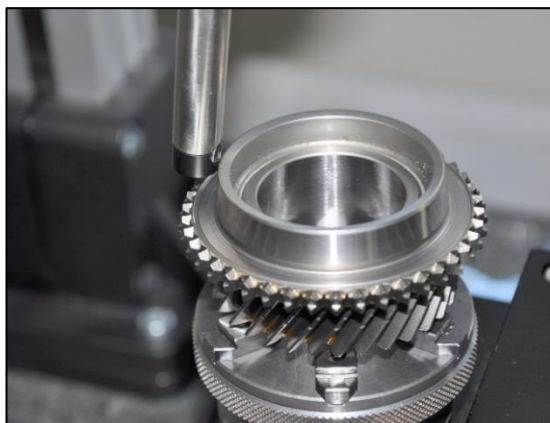
Gear shaft with inside bearing. Chatter mark detection



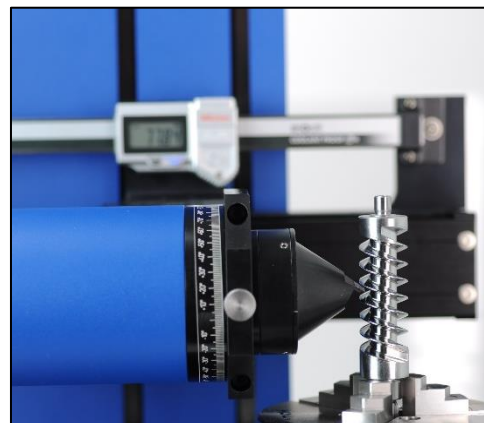
Pump piston (injection technique) Tolerance: RONT = 0,5 μm



CVT component friction surface (see page 2)



Transmission part, chatter mark detection

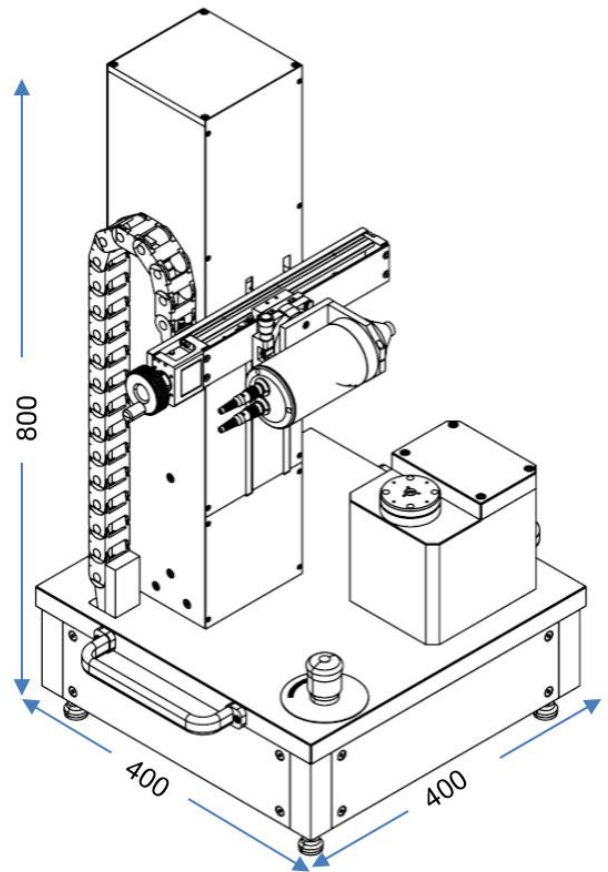


EPS worm. Roughness and waviness measurement along the entire flank by means of a small mirror adapter

Specifications

SYSTEM

Measurement principle	scattered light according to VDA 2009
Light source	LED 670 nm with 0.9 mm spot size Option: second spot with diam. 0.03 mm (Laser c1)
Parameters s.u.	Roughness Aq, roundness LSC, waviness FFT-Analysis
measurement speed	one circle measurement takes less than a 1 s.
Resolution	Roundness: < 0,2 μm , waviness < 0,02 μm , roughness < 0,1 μm (Rz)
rotary-table	runout < 1 μm , accuracy < 0,1 μm
z-Axis	motorized with spindle
x-Achse	manual (option with motor)
sensor axis	manual rotary table for sensor positioning 0°- 90° optional: goniometer for gear teeth
PC-System	Laptop or All in One PC Windows 10
Interface	SPS Profibus/-net on request
Calibration	with waviness standard \varnothing 30 mm, 0,1 μm Amplitude, 300 or 40 waves



Measurement values

Roughness	the roughness value Aq access horizontal and vertical information of the microstructure of the surface. For grinding and superfinish it correlates with Rz and Rk.
Roundness/ Waviness	The roundness and waviness measurement results are identical with high precision tactile systems. For waviness analysis ISO-filters are applied
Defects	by means of morphological filter technique defects as scratches or impact marks can be detected.