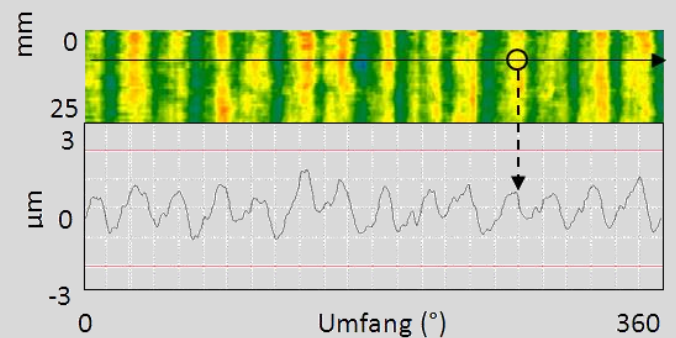


Waviness

Fast measurement in production



Measuring chatter marks in the sub-micrometer range

The bearing seats of transmission shafts and engine shafts are subject to high requirements relative to roundness, roughness and waviness. In this regard, waviness results in noise generation and increased roughness results in wear. Because the formation of these chatter marks cannot be predicted in the grinding process, a 100% test of formal tolerance can contribute to avoiding an installation of faulty components in gearboxes and engines.

The scattered light measuring technology can also be used in difficult environments. It is possible to measure roundness in the range of 1-3 µm in one second, and in this process, detect periodic waviness components with amplitudes of 0.01 - 0.5 µm. An additional roughness measurement enables control of the grinding machine. If needed the entire function surface can also be measured (photo top right).

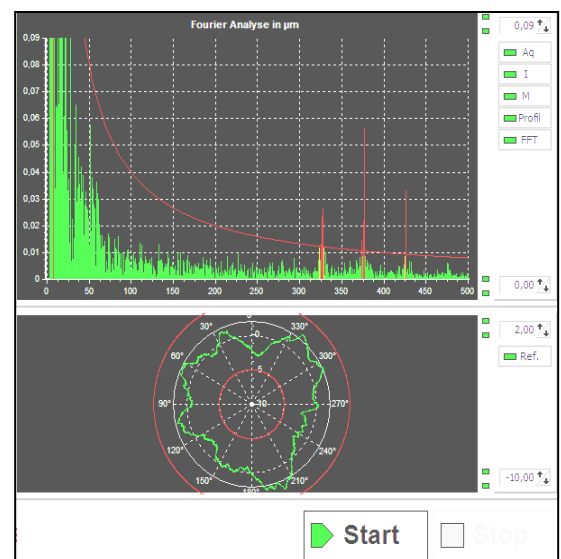
Results with scattered light sensor

The OS 500 can be mounted on any precision axes. For equidistant measurements an encoder signal is necessary for sensor triggering. OptoSurf offers an appropriate solution with its automatic shaft measuring machine, OptoShaft 12. Depending on the diameter, up to 4,096 measurement points (local inclination angle of the surface) can be detected, which the software converts into a roundness diagram. Via a Fourier analysis, periodic components are determined (order and amplitude) and output as a diagram or as numeric value. Because the measurement method also allows simultaneous detection of the roughness of the surface, you automatically obtain continuous roughness information on the circumference. The particularity of the scattered light method in this regard is detection of the roughness in the direction of machining. This results in valuable indications on the dynamics of the grinding machine and the function of the surface relative to friction. The characteristic value A_q can be compared with the peak-to-valley values R_a or R_z at known manufacturing processes, if correlation measurements are executed with a profile device beforehand. However the A_q value also reacts to changes in surface texture and defects through incorrect dressing and problems with the coolant.

The example on the right shows the measurement of a transmission gear shaft with chatter marks in the 370th order and an amplitude of $0.05\text{ }\mu\text{m}$. Roundness (Peak to Valley) PV is $2.49\text{ }\mu\text{m}$.



OptoShaft 016



Roundness and FFT results