



HoloTop NX

3D-Sensor for multi-axis systems

Measuring large areas fast and with micrometer precision

HoloTop NX measures the topography of component surfaces directly on multi-axis systems such as industrial robots, machine tools, and coordinate measuring machines. The optical sensor detects the surface over a large area with sub-micrometer precision.

Components critical to safety – e.g. for aerospace technology, medical technology or automotive engineering – must be produced with an accuracy of a few micrometers. Even cutting-edge processing machines are often unable to reliably deliver such a level of accuracy. The digital holographic measurement system HoloTop NX enables micrometer-accurate quality control of precision components directly on multi-axis systems.

Extension to coordinate measuring machines

In component manufacturing, unfavorable trajectories or even minor wear to tools can lead to component geometries which do not conform to the specifications. Quality control thus involves precise measurement of the components. Typically, coordinate measuring machines in special measuring rooms separate from the manufacturing process are used for this purpose. The process is slow and complicated, and only random samples are possible.

Measuring the workpiece in place

Thanks to its compact design, the digital holographic measuring system HoloTop NX enables 3D inline measurements directly in multi-axis systems. The sensor can be installed on a

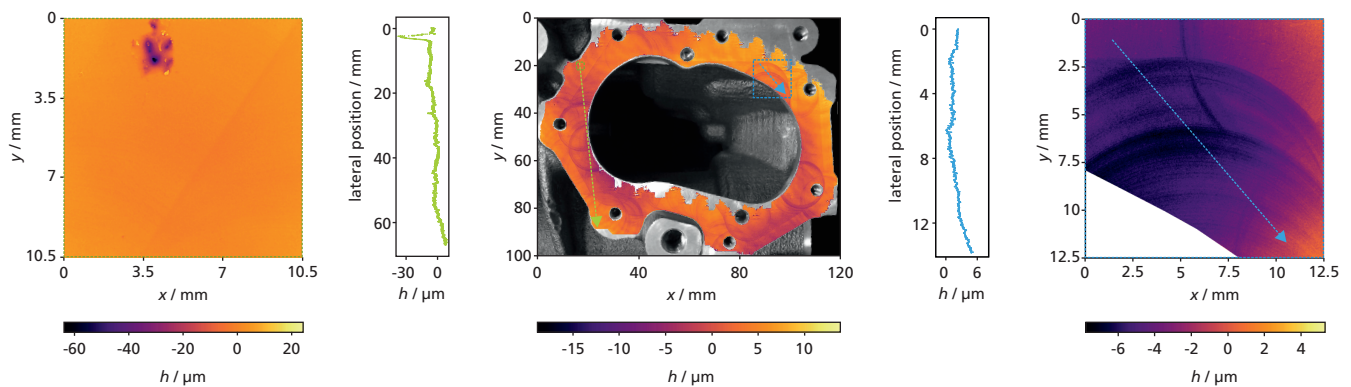
number of different platforms. Using multi-wavelength digital holography, HoloTop NX maps the topography even of rough object surfaces with interferometric accuracy. The sensor captures an area of $12.5 \times 12.5 \text{ mm}^2$ within 500 ms. Even deviations of a few micrometers can be measured directly during manufacturing and reworked as needed. The acquired images are processed particularly quickly, while data preprocessing guarantees good robustness to vibrations.

HoloTop NX makes it possible to detect rejects at an early stage, to identify process errors and correct them directly in the manufacturing process. Thanks to its modular design, the measuring system can be used with a wide range of carrier systems. For example, the system has already been successfully used on machines from Hermle, Hexagon and Stäubli.

HoloTop NX Overview

Technical data

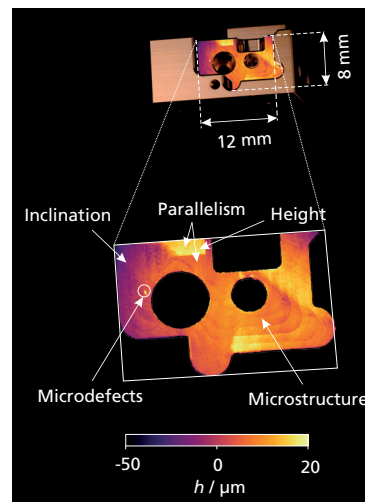
- **Dimensions**
 $\varnothing 125 \text{ mm} \times 180 \text{ mm (D} \times \text{H)}$
- **Resolution**
 3008×3008 measurement points
- **Detection area**
 $12.5 \times 12.5 \text{ mm}^2$
- **Reproducibility**
axial $< 1 \text{ } \mu\text{m (1 } \sigma)$
- **Measurement time**
 $< 500 \text{ ms}$
- **Working distance**
up to 300 mm



Sealing surface of a reworked casting material. The machine tools' axes allow several measuring fields to be combined to form an overall measurement (center). In this way, milling paths and flatness (right) as well as local defects (left) in the micrometer range can be reliably detected over a large area.

Measuring macroscopic topography with microscopic accuracy

The tactile measurements or optical probes, which are currently commonplace, are severely limited by the number of measuring points and the significant measuring time that this entails. Furthermore, these methods have a very limited capacity to measure complex structures such as gradients, deep grooves, high edges or holes. Optical alternatives generally require a separate measurement system, meaning that workpieces must be repeatedly set up after inspection. HoloTop NX sets new standards here – the sensor is fully integrable and boasts a very large working distance, a large measuring range and high measuring accuracy.



HoloTop NX maps the component surface in the fraction of a second with micrometer accuracy directly in the machine tool (as in the example of a heat sink for laser assembly). Alongside the geometry, relevant surface parameters such as micro-defects and micro-structures as well as the height, parallelism and inclination of surfaces can be measured simultaneously.

Advantages

- Measurement of macroscopic topographies with accuracies into the sub-micrometer range
- Axial measurement range of a few millimeters
- Complete quality control in the workpiece holder – no need for new set-up
- Lower costs thanks to automatic inspection in the machine tool
- Inline measurements in an industrial setting thanks to short measurement time
- Roughness measurements even in hard-to-reach functional areas

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