

OptoInspect 3D-Flex

Manually Guided System for Flexible 3-D Digitization



Articulated measuring arm with split beam sensor



Split beam sensor

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Manually guided systems for measuring 3-D coordinates can be employed extremely flexibly whenever geometric features have to be measured on differently shaped objects. Conventionally, a tactile sensor head is used to determine individual measuring points. A larger number of measurements, e.g. to digitize a free form surface, involves a great amount of work.

However, the measuring system *OptoInspect 3D-Flex* developed at the Fraunhofer IFF makes it possible to digitize complete surfaces very rapidly. A split beam sensor mounted on the sensor head of the measuring arm measures the geometry of the object of measurement without contact. Current measurement data is instantaneously visualized on the display for purposes of monitoring the measuring process. Data storage in various formats ensures smooth subsequent processing in other applications.

The measuring system's great flexibility gives rise to a wide variety of applications.

The Measuring System

The optical sensor consists of a camera and a line laser and operates on the split beam principle. The vertical contours of the laser line projected on the object surface are digitized at a preset clock speed. Very high clock speeds are achieved by using a camera with integrated hardware-based image processing.

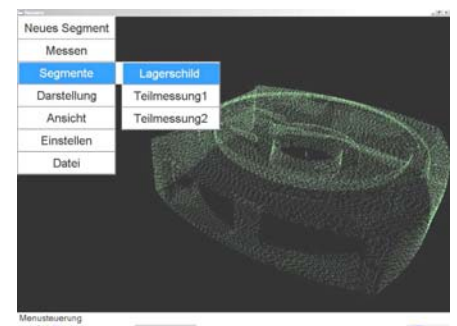
An articulated measuring arm made by Faro Technologies Inc. is used as the kinematic system for determining the optical sensor's position and orientation. The sensor is integrated in the measuring head of the arm.

Synchronous collecting of the sensor's 3-D data and sensing of the position of the measuring arm make it possible to digitize a surface in the form of a point cloud while the sensor is moving.

By visualizing the measured point clouds, the software allows monitoring the measuring process. The software is controlled by using the controls in the grip and by moving the measuring arm. In addition, functions are available for preprocessing and for exporting and importing measurement data.

System Features

- Flexible and rapid measurement of the widest variety of objects
- Measuring volumes: Hemispheres with a radius of 500-1600 mm (dependent on measuring arm)
- Range of sensor measurement:
Line width: 70 mm
Depth range: 40 mm
- Clock speed: max. 120 split beam/s (max. 1536 3-D points/split beam)
- Measurement uncertainty: $< \pm 100\mu\text{m}$ (dependent on measuring volume)



Measurement software screenshot