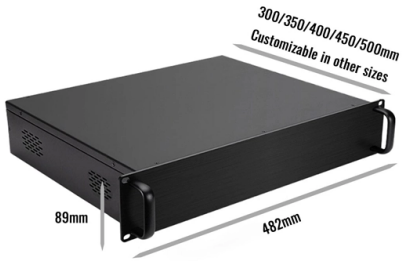
Fiber Optic Sensor for Roughness Measurement



Overview

The fionec RMP surface roughness measuring station is based on a high-precision fiber-optic measuring device for a standards-compliant evaluation of roughness parameters.

Key Takeaways

Fiber optic sensors enable fast, high-precision, non-contact measurement of surface roughness, suitable for microstructures and production-line inspection.

Overview

Fiber optic sensors for surface roughness measurement use light-based, non-contact technology to evaluate surface profiles and roughness parameters. These sensors typically consist of a light-emitting fiber and multiple light-receiving fibers arranged coaxially, allowing precise detection of surface variations by analyzing reflected light intensity and interference patterns. The technology is capable of measuring standard roughness parameters such as Ra (mean roughness), Rz (mean roughness depth), Rk (core roughness depth), and Rmax (maximum roughness depth).

Working Principle

The measurement process generally involves: Calibration with reference samples to establish correlations between light intensity and surface gap distance. Determining maximum intensity positions for the reference surfaces to set the probe at optimal measurement distance. Monitoring the reflected light intensity from the target surface.

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Calculating roughness values based on pre-established correlations between intensity and surface roughness. This method allows on-line monitoring of machined surfaces in real time, making it suitable for integration into production processes. AdvantagesNon-contact measurement avoids surface damage and is ideal for delicate or micro-structured surfaces.

High speed and frequency: Fiber optic sensors can measure at speeds up to 10 mm/s and frequencies up to 20 kHz, significantly faster than tactile probes. Miniaturized probes: Diameters as small as 50 µm allow access to micro-drilled holes and small cavities down to 0. 1 mm.

Automatic signal optimization ensures consistent readings on heterogeneous or technical surfaces. Standards-compliant: Measurements conform to DIN EN ISO standards for roughness evaluation.

Applications

Precision turned parts and rotationally symmetrical components. Integration with CNC machines, coordinate measuring machines, or automated testing systems for inline quality control. Microstructure inspection using techniques like white light interferometry combined with fiber-optic probes.

Integration and Customization

Fiber optic sensors can be implemented as stand-alone measuring stations or integrated into existing manufacturing lines. Built-in hardware and software interfaces allow robotic loading, automated data acquisition, and real-time analysis, enabling high-throughput inspection without slowing production. Custom solutions can be developed to meet specific metrological challenges, including complex geometries or high-speed production environments.

In summary, fiber optic sensors provide a highly accurate, fast, and non-destructive method for surface roughness measurement, making them ideal for modern precision manufacturing and quality assurance applications.

Article Content

Roughness Measuring Station – Non-contact precision | fionec fiber

The fionec RMP surface roughness measuring station is based on a high-precision fiber-optic measuring device for a standards-compliant evaluation of roughness parameters.

Measuring surface roughness with high accuracy | fionec fiber optics

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In contrast with tactile measuring devices, fiber-optic sensors from fionec do not affect or damage the surface of the test specimens. This makes it possible to perform roughness measurements even on

Fiber optic tactile sensor for surface roughness recognition by

The fiber optic tactile sensor, which is based on the Fabry-Perot interferometer principle that allows a functional single-point detection structure and enables SRR, is the subject of this study.

High precision reflective seven-core optical fiber surface roughness

However, traditional fiber optic surface roughness sensors have low integration and low measurement accuracy. In order to solve these problems, we present high precision reflective seven-core optical

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Fiber optic sensor | PDF

Fiber optic sensors have many advantages over traditional electronic sensors such as immunity to electromagnetic interference, small size, and ability to operate in hazardous environments. They

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The proposed sensor demonstrated strong selectivity towards NH4+ over common cationic interferents. Furthermore, the reported FO-LPSR sensor offered a comparable measurement

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Based on this scenario, this work presents a D-shaped optical fiber-based refractive index sensor to detect adulteration of olive oil caused by the addition of canola, corn, cotton, soybean and

Fiber Optic Sensors | KEYENCE America

Fiber optic sensors are compact because the detection circuit is located in the amplifier, allowing for detection even in narrow spaces. Installation and

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