

Article Overview

Fiber optic displacement sensors (FODS) provide precise, non-contact measurement of linear or lateral displacements, ideal for structural monitoring and industrial applications.

Overview

Fiber optic displacement sensors use light transmitted through optical fibers to measure the relative movement between two surfaces. They are highly sensitive, immune to electromagnetic interference, and suitable for harsh environments, making them ideal for applications in North Macedonia's industrial, civil, and research sectors ().

Key Technologies

o Fiber Bragg Grating (FBG) Sensors

- o Measure linear displacement using two FBGs in a push-pull configuration for temperature compensation.
- o Suitable for monitoring bridge piles, building walls, and retaining structures.
- o Ruggedized for long-term deployment and reusable across projects ().

o Intensity Modulation Sensors

- o Use transmitted or reflected light intensity to detect displacement.
- o Can measure axial and lateral micro-displacements with nanometer precision.
- o Often implemented with multimode plastic fibers and silicon photodiodes for high sensitivity ().

o Non-Contact Modular Sensors

- o Provide dual-channel measurements for simultaneous monitoring.
- o Automatically compensate for changes in reflectivity, ideal for vibration analysis, fuel injector timing, and ultrasonic horn displacement ().

Advantages

- o High sensitivity and precision: Capable of detecting micro- and nano-scale displacements.
- o Environmental robustness: Resistant to corrosive, high-temperature, and EMI-prone environments.
- o Long-distance measurement: Multiple sensors can be deployed along a single optical line.
- o Safety: Intrinsically non-explosive, suitable for hazardous zones like oil rigs or gas storage ().

Applications in North Macedonia

- o Civil Engineering: Monitoring structural integrity of bridges, retaining walls, and buildings.

- o Industrial Machinery: Measuring vibration, alignment, and displacement in manufacturing equipment.
- o Energy Sector: Deployment in hydroelectric plants, electrical transformers, and offshore installations.
- o Research and Development: Precision displacement measurements in laboratories and experimental setups.

Implementation Considerations

- o Installation: Sensors can be bolted or integrated into structures; proper alignment is critical for accuracy.
- o Data Acquisition: Requires compatible software and electronics to record and analyze displacement signals.
- o Maintenance: Fiber optic sensors are low-maintenance but should be checked for physical damage or connector integrity.
- o Supplier Options: International suppliers like HBM, MTI Instruments, Philtec, and SCAIME provide sensors suitable for deployment in North Macedonia (). Fiber optic displacement sensors offer a reliable, precise, and versatile solution for monitoring structural and mechanical systems, making them highly applicable for both industrial and civil projects in North Macedonia.

Fiber optic displacement sensor (FODS) with two asymmetrical inclined fibers is studied theoretically and

The development of displacement sensors is essential in the physical sensor field as the other physical sensors can be

The proposed fiber optic displacement sensor guarantees a stable reflected signal acquisition for application in real

Abstract This paper highlights a novel and simple approach for two-dimensional displacement sensor's design based

In summary, fiber optic displacement sensors are versatile tools for measuring distance and displacement with high

Fiber optic linear displacement sensor is ideal for real-time monitoring of civil engineering structures, structural monitoring of aircraft,

The Republic of North Macedonia saw a significant increase in proximity and displacement sensor import shipments in 2024, with top

Discover the OBDI Bragg grating displacement sensor offered by Scaime, a fibre-optic displacement sensor able to measure

This article reviews specifically the advanced fiber optic displacement sensing techniques that have been developed in the past two

This paper reports a fiber-optic displacement sensor based on a Michelson interferometer using the spectral

In this paper, we report fiber optics sensor with sub-nanometric resolution and wide bandwidth. It relies on an increase

Abstract This paper describes a miniature optical displacement sensor with millimetric range and nanometric

Abstract The design of a fibre-optic sensor able to measure high-precision angular displacements is presented. The sensor has a

This chapter discusses fiber optic and integrated optic sensor concepts. Force, displacement, and acceleration sensors are closely

Philtec designs and manufactures precision fiber optic displacement sensors for non-contact measurement

TELEKS is the first private-owned company to provide services for implementation of telecommunication infrastructure in Macedonia,

Web: <https://millstraining.co.za>

