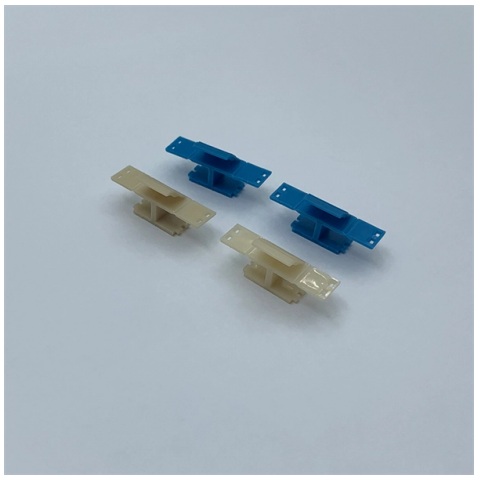
Practical Applications of Fiber Optic Sensors in the Netherlands



Overview

The company uses advanced fibre-optic sensing technology with applications in two core critical sectors for European strategic autonomy: Energy and Underwater Security.

Key Takeaways

Fiber optic sensors in the Netherlands are widely applied in structural health monitoring, environmental sensing, industrial processes, and medical diagnostics, leveraging their high sensitivity, immunity to electromagnetic interference, and ability to operate in harsh environments.

Structural Health Monitoring

In the Netherlands, fiber optic sensors are extensively used to monitor infrastructure such as bridges, tunnels, and dams. These sensors measure strain, displacement, temperature, and pressure in real time, enabling early detection of structural issues like cracks, joint expansion, or post-seismic damage. For example, multipoint optical extensometers and distributed temperature monitoring systems are deployed in tunnels and dams to ensure safety and longevity of critical infrastructure.

Environmental and Industrial Applications

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Dutch research institutions, such as TNO, develop fiber optic sensors for environmental monitoring and industrial process control. These sensors can detect chemical composition, pressure variations, and acoustic signals in challenging environments, including underwater hydrophone systems for ocean monitoring. Their immunity to electromagnetic interference and resistance to corrosion make them ideal for hazardous or extreme conditions, such as chemical plants or offshore installations.

Medical and Healthcare Applications

Miniaturized fiber optic sensors are applied in medical diagnostics and in-vivo pressure sensing. Their small size and high sensitivity allow precise monitoring of physiological parameters without interfering with the patient's body.

TN

O has developed systems that integrate sensors with read-out and data processing algorithms for high-accuracy measurements in medical applications.

Smart Systems and Io

T Integration

Fiber optic sensors in the Netherlands are increasingly integrated with smart monitoring systems and IoT networks. This enables distributed sensing over large areas, real-time data analytics, and predictive maintenance in industrial and urban infrastructure. Multiplexing capabilities allow multiple sensors to operate along a single fiber, providing cost-effective and scalable monitoring solutions.

Advantages Driving Adoption

The practical adoption of fiber optic sensors in the Netherlands is driven by their lightweight design, small size, high sensitivity, and immunity to electromagnetic interference. They can operate in high-temperature, high-pressure, or electrically hazardous environments, making them suitable for applications where traditional sensors fail. In summary, fiber optic sensors in the Netherlands are applied across infrastructure monitoring, environmental sensing, industrial process control, and healthcare, with research institutions like TNO leading the development of advanced systems that exploit the unique properties of optical fibers for high-precision, reliable measurements.

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The company uses advanced fibre-optic sensing technology with applications in two core critical sectors for European strategic autonomy: Energy and Underwater Security.

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Fibre-optic sensing for application in oil and gas wells

The fibre-optic sensing technologies discussed in this thesis are tailored to upstream applications, although they also offer significant potential for application to downstream.

Fiber optic monitoring during construction projects

Examples include long railway tracks, quay structures, and bridge constructions, as well as applications in the energy sector for monitoring cables and pipelines.

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This paper conducts a systematic analysis of the sensing mechanisms in fiber-optic pressure sensors, with a particular focus on the performance optimization effects of fiber structures

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Fiber Optic Sensors: Science and Applications

This Special Issue of Photonics aims to collect original research and review articles on the latest principles, technological innovation, new applications, and new challenges in the field of fiber optic

DTSX3000 Distributed Temperature Sensor

What Is Distributed Temperature Sensing? Distributed temperature sensing (DTS) measures temperature distribution over the length of an optical fiber cable using

Battery Management System for Electric Vehicles:

Currently, the following types of current sensors can be singled out as those typically used in battery packs: current shunt sensors; Hall effect sensors;

EWSHM 2026 – 12th European Workshop on Structural Health

The session also welcomes studies on the assimilation of diverse sensor technologies—fiber optic, resistive, piezoelectric—into structural systems to provide real-time insight into mechanical behavior.

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Optical Fiber Sensors and Sensing Networks: Overview of the Main

Optical fibers provide sensing solutions for many types of applications and environments with high performance. The design of the fiber sensors can take advantage of one or several optical

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Optical fiber sensors represent a rapidly advancing technology with substantial applications across various fields, particulary in the biomedical domain. The unique properties of

Optical Fiber Sensors: Working Principle, Applications, and Limitations ...

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Recent progress in numerous sensing fields, including environmental, industrial, and biomedical are discussed for each class of fiber-optic sensors. The review highlights the methods

Optical fiber sensors: review of technology and applications

But there is now a lot of information about optical sensors as well as many classifications and applications. There are also some developments in a scientific research yard.

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