What is a tailings fiber optic sensor



Overview

Fiber optic distributed sensing system for monitoring of tailings. Such fiber optic distributed sensing systems allow storage facilities to be monitored.

Key Takeaways

Tailings fiber optic sensors provide real-time, high-resolution monitoring of dam stability, strain, temperature, and acoustic activity to prevent failures and enhance safety.

Overview

Tailings dams, used to store mining waste, are often constructed from earth or rock and can be prone to instability, leakage, or collapse. Fiber optic sensors are increasingly deployed along these structures to continuously monitor their integrity. These sensors act like thousands of distributed measurement points, capturing strain, temperature, and acoustic signals across the dam, enabling early detection of potential failures and operational anomalies (Silixa Ltd.),.

How Fiber Optic Sensing Works

Fiber optic sensing relies on sending light pulses through an optical fiber. Variations in the fiber caused by strain, temperature changes, or vibrations scatter light back to a recording device, known as an interrogator. Techniques include: Distributed Acoustic Sensing (DAS): Detects vibrations and seismic activity using Rayleigh backscattering, providing continuous, high-resolution monitoring over long distances (Water Power Magazine),.

© 2026 FD SOLUCIONES OPTICAL SYSTEMS - All rights reserved

Distributed Temperature Sensing (DTS): Measures temperature variations along the fiber to detect seepage or thermal anomalies. Distributed Strain Sensing (DSS): Uses Brillouin or Rayleigh backscatter to measure strain and deflection within the dam structure (HAWK Fiber),. These methods allow operators to monitor the entire dam structure, including subsurface regions, which are difficult or costly to instrument with conventional point sensors.

Applications and Benefits

Early Warning Systems: Fiber optic sensors can trigger alarms via SMS or email when abnormal changes are detected, allowing timely intervention before failures occur (Silixa Ltd.),. Structural Health Monitoring: Continuous data acquisition enables trend analysis, identification of increasing seepage zones, material changes, and structural variations (OptaSense),. Environmental Protection: Monitoring ensures compliance with safety and environmental standards by detecting leaks or shifts in dam materials.

Operational Efficiency: Real-time monitoring allows dams to be managed optimally without requiring additional manual data collection.

Commercial Implementations

Several companies provide fiber optic monitoring solutions for tailings dams: DamPulse™ (Silixa Ltd.): Offers ultra-high-definition distributed temperature, strain, and acoustic measurements with real-time alerts and tomographic imaging of the dam structure. Luna Innovations: Provides fiber optic sensors that monitor strain, temperature, and seismic activity, offering a permanent “heartbeat” of the dam for early warning and operational insights. Praetorian Geological Stress Detection System (HAWK): Uses fiber optic cables inserted into boreholes to detect field strain and deflection, pinpointing the location and depth of potential structural issues.

Curdworth Sludge Lagoon (UK): Combines DTS and Distributed Temperature and Strain Sensing (DTSS) to monitor water content, flows, and deformations in embankments.

Conclusion

Tailings fiber optic sensors are a critical technology for dam safety, providing continuous, high-resolution monitoring of structural and environmental parameters. By integrating strain, temperature, and acoustic sensing, these systems enable early detection of anomalies, reduce the risk of catastrophic failures, and support efficient and safe dam operations.

© 2026 FD SOLUCIONES OPTICAL SYSTEMS - All rights reserved

Article Content

Fiber optic distributed sensing system for monitoring of tailings ...

Such fiber optic distributed sensing systems allow storage facilities to be monitored with long, accurate, continuous and precise data for geotechnical diagnostic purposes. This contribution

Face sheet...

Such fiber optic distributed sensing systems allow the storage facilities to be monitored with long, accurate, continuous and precise data for geotechnical diagnostic purposes.

Distributed fibre optic sensing in Swedish dams and tailing storage ...

Distributed fibre optic sensing (DFOS) is now widely applied both in hydropower dams and at tailing storage facilities (TSF) as it has the great advantage of providing high resolution information

Tailing Dams Fiber Optic Monitoring

This revolutionary technology allows monitoring tailing dams with fiber optic sensing cables inserted into the structure through drilled boreholes. These cables monitor field strain and deflection caused by

Tailings Dam Monitoring Systems | Silixa Ltd.

The system provides high quality distributed temperature, strain, and acoustic measurements in real-time, with a single optical fibre cable over the entire structure. With multiple monitoring techniques it

Distributed fibre optic

Distributed fibre optic sensing (DFOS) is now widely applied both in hydropower dams and at tailing storage facilities (TSF) as it has the great advantage of providing high resolution information

Tailings Dam Performance Monitoring by Combining Coda Wave ...

Here, we demonstrate a novel method for tailings dam monitoring by combining a type of fiber optic sensing known as distributed acoustic sensing with methods from passive seismology.

Seismic monitoring of tailings dams – Amira

The project will provide comprehensive monitoring of tailings dam walls in real time through the application of fibre optic sensing technology. Installation of the latest fibre optics technology in the

© 2026 FD SOLUCIONES OPTICAL SYSTEMS - All rights reserved

Fibre optic sensing for dam monitoring

As the fibre is the sensor, measurements can be taken along the full length of the fibre optic cable enabling operators to gain detailed information along the entire dam.

Tailings Dam Monitoring with Fiber Optics | OptaSense

Enhance the safety and integrity of tailings storage facilities with OptaSense''s fiber optic sensing technology. Our solution provides continuous, real-time monitoring

Reflective

Fiber Optic Sensor Cables Industrial Fiber Optics manufactures a line of plastic reflective fiber optic sensor cables. Each part number for these cables includes one reflective cable. It is used by either

Fiber Optic Sensors | Suppliers

A fiber optic sensor is a device that uses optical fibers to detect and measure physical, chemical, biological, or environmental parameters. Unlike traditional electrical sensors, fiber optic sensors

What are Fiber Optic Sensors : Advantages and Disadvantages

Explore advantages and disadvantages of fiber optic sensors, including their immunity to EMI, high sensitivity, and limitations like high cost and complex setup.

Fiber optic distributed sensing system for monitoring of tailings ...

A fiber optic distributed sensing system allows the monitoring of parameters useful to determine the short- and long-term behaviour of the structure in response to the external actions, including, eg

Tailings Dam Performance Monitoring by Combining Coda Wave ...

AbstractAdvances in distributed fiber optic sensing technologies are enabling new methods to monitor changes in tailings dam performance. Distributed acoustic sensing (DAS), a

Top Companies in Distributed Fiber Optic Sensors 2034

Top Companies in Distributed Fiber Optic Sensors 2034 The top companies in distributed fiber optic sensors market are shaping a rapidly evolving ecosystem driven by infrastructure digitization, energy

PowerPoint Presentation

© 2026 FD SOLUCIONES OPTICAL SYSTEMS - All rights reserved

State of DFOS technology “The global distributed fiber optic sensor market is expected to grow at a compound annual growth rate of 6.5 % from 2024 to 2030 to reach USD 2.53 billion by 2030.”*

Fibre optic sensing for dam monitoring

Sweden''s pioneering approach Measurements based on Distributed Temperature Sensor (DTS) monitoring give information along the entire dam with high spatial resolution and high

Related Video Reference

This video was associated with the source search result. Verify technical details against current product documentation and project requirements.

Contact Us

Continue your research online:

Website: https://fdsoluciones.es
Technical inquiry: https://fdsoluciones.es/project-enquiry.html

This document is for preliminary research. Verify specifications against current standards, product documentation and project requirements.

© 2026 FD SOLUCIONES OPTICAL SYSTEMS - All rights reserved