Brochure

NITRO FIBER SENSING

Pipeline Leak Detection

Monitoring pipelines presents numerous challenges for operators, with leak detection being one of the most critical. The speed at which potential leaks are identified directly impacts the response time. This is especially important for large-diameter oil and gas pipelines, where higher flow rates can amplify the effects of leaks.

Traditional leak detection methods, such as Mass Balance Systems (MBS), are designed to detect leaks equivalent to 1% of the pipeline's flow. Although this threshold seems low, it can take several hours for the leak to affect the flow rate and trigger an alarm.

Even a minor leak in a large pipeline, which can transport between 100,000 to 1,000,000 barrels per day, can quickly escalate into an environmental disaster. Consequently, pipeline operators are adopting new technologies to gain faster and more comprehensive insights into their assets. By obtaining more actionable information, operators can improve pipeline maintenance and prevent potential disasters.

The NITRO Fiber Sensing Distributed Acoustic Sensing (DAS) technology creates an invisible 'smart barrier' along the entire pipeline, capable of automatically detecting leaks within minutes.

Aging infrastructure, where corrosion, damage, and potential ruptures are more likely, poses significant risks. This is particularly crucial for the oil and gas industry, which operates a vast global network. Some pipelines have been in service for 40 to 50 years, making them more susceptible to degradation.

Corrosion and damage due to age degrades pipelines and increases the likelihood of ruptures occurring.

For pipeline operators, a DAS-based solution can monitor extensive pipeline networks, potentially spanning hundreds of thousands of kilometers and covering the entire route. It can identify a range of acoustic signals from leak incidents. Advanced edge computing, machine learning and heuristic detection algorithms developed through many years of field experience are used to analyze this data, providing high-confidence alerts by identifying multiple simultaneous leak characteristics. These characteristics include the acoustic 'burst' from the initial rupture and the on-going disturbances caused by leaking product.

During trials, DAS technology has proven to detect a leak when only 30 liters of water has spilled from a pipe. For commercial pipelines, this would equate to 0.1% of the flow rate, detected within minutes. In comparison, a large-diameter pipeline using a Mass Balance System with a 1% flow rate alarm could result in tens of thousands of gallons being spilled before detection.

While no single monitoring approach offers a complete solution, DAS has proven essential in enhancing the efficiency and effectiveness of leak detection systems. When combined with traditional methods, pipeline operators gain greater confidence in monitoring and maintaining the integrity of their pipelines.

Detecting leaks remains a significant challenge for the oil, gas, and utility industries. Rapid detection and response are crucial to minimizing damage. However, the extensive and often remote nature of pipeline networks makes effective monitoring inherently difficult.

Consequently, DAS has become a crucial component of pipeline monitoring strategies globally. It is versatile enough to be deployed in harsh environments, densely populated areas, and remote locations that have traditionally been challenging to monitor with conventional methods.

To find out more, visit viavisolutions.com/fibersensing to learn more about distributed fiber optic sensing.

DAS has become a key component of pipeline monitoring strategies worldwide.

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