APSENSING.

Liquid Pipeline Monitoring System

The Challenge

Achieving the performance required by **modern pipeline leak detection management** can be a challenge and often requires both **internal and external leak detection aystems (LDS)**. Additionally, in many parts of the world, **third party interference (TPI)** and pipeline theft are the most common causes of leaks and pipeline ruptures.

The Innovation

AP Sensing's distributed fiber optic sensing technology transforms a fiber optic cable into a continuous sensor used to monitor and protect pipelines from threats such as TPI or pipeline theft. This technology is also used to protect other long assets including power cables, railways and perimeters.

Our systems, utilizing Distributed Temperature Sensing (**DTS**) and/or Distributed Acoustic Sensing (**DAS**), qualify as both internal and external pipeline leak detection methods as per **API 1175 - Pipeline Leak Detection Program Management**. SmartVision leak detection software using DAS is also an **API 1130 Computational Pipeline Monitoring (CPM) LDS** for both CPM Acoustic and CPM negative pressure wave (NPW) methods.

AP Sensing's DAS and/or DTS can be used as a stand-alone leak detection system, or supplementary to other systems in order to improve leak size threshold, reduce detection time and to improve leak location.

The Technology

AP Sensing's 2P Squared DAS is a true phase-based DAS which enables quantitative measurements of vibration and strain amplitude over extended distances along the sensor cable. Our DAS technology offers significant improvements for signal-to-noise ratios, as well as a longer sensing range. Our DTS

SmartVision project overview of sulfur pipeline

system delivers reliable temperature readings and detects changes rapidly, even in acoustically noisy environments. LDS software uses DTS measurements together with smart algorithms to calculate if the temperature variations around the pipeline are consistent with a leak event, disregarding normal temperature changes caused by the weather, day-night variations, pipeline operations and other causes of thermal transients.

AP Sensing's pipeline leak detection software uses machine learning and artificial intelligence (AI) techniques to process the input from our DTS and/or DAS. AI provides the capability to detect leaks by analyzing the effects that leaks have on the environment, such as temperature changes, acoustic signals and vibrations alongside other patterns. It can also detect the effect of leaks inside the pipeline, like negative pressure waves.

Addressing LDS Metering, Hydraulic & NPW Concerns

AP Sensing's DAS and DTS technologies do not rely on pressure/flow metering, and are not affected by pipeline hydraulic conditions like slack flow, multiple phases, or transients.
DTS provides a unique solution for leak detection in partially-filled pipelines, open channels and thermally insulated pipelines; it provides precise temperature monitoring along the pipeline.

DAS-based LDS software enables operators to monitor the position and direction of NPWs created by leaks. Unlike pressure sensor-based NPW, DAS can sense the onset and track the progress of the NPWs over many kilometers, solving the reliability issues typically encountered by the NPW method.

DAS and / or DTS are often paired with our SmartVision asset visualization and management software in order to visualize pre-defined subsections of the pipeline route, integrate all data, historically analyze points of interest, and display event GIS coordinates.

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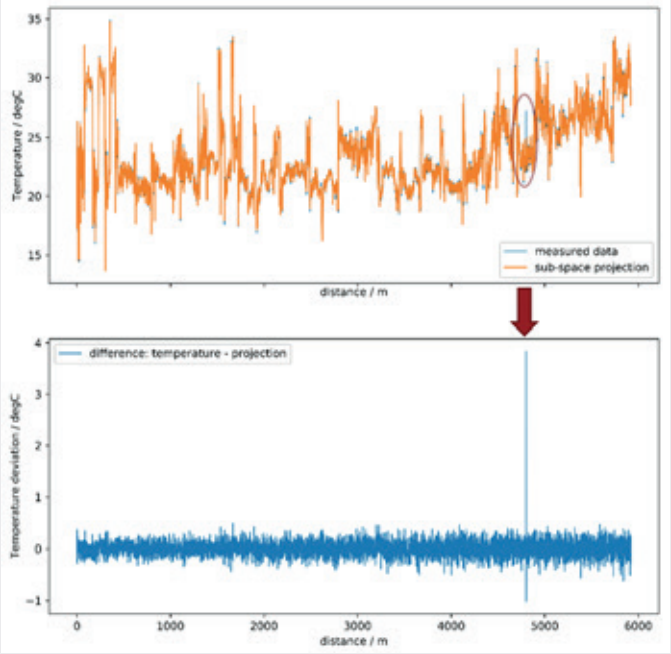
Passion for Plants.
For every unit sold, AP Sensing plants 100 trees.

Why AP Sensing?

- Industry-leading monitoring solution that offers fast response times, excellent accuracy and low maintenance.
- Fully customizable solution tailored to project specifications and customer needs.
- No drift and no recalibration thanks to patented single reciever design and inherent strain insensitivity (no strain cross-talk).
- All product variations are fully certified and in compliance with internationally recognized standards.
- Our experience and proven deployment in all regions in the world – our project reference list is extensive and comprehensive.
- Easy system integration through flexible protocols and interfaces.
- World-class service, support and training.



AP Sensing leak detection using machine learning algorithms

More Information:
+49 7031 309 6610
www.apsensing.com
info@apsensing.com