

THE SUREST WAY TO
DETECT THE PRECISE
LOCATION OF ANY
LEAK EVENTS IN REAL
TIME ON LONG
DISTANCE PIPELINES

Sensornet's Digital Pipeline Leak Detection system is an extremely versatile leak detection solution that is used to detect both liquid and gaseous leaks in the following industrial applications:

- Gas transmission and distribution
- LNG pipelines and tanks
- Oil transmission and distribution
- Steam pipelines
- Industrial processes (e.g. ethylene, ammonia, sulphur)
- Water pipelines

CLOSE THE MONITORING GAP

With conventional technology there is a gap between what you believe is occurring along your pipeline and what is actually happening. This information gap can result in a delay in you discovering and locating leaks. Such delays can prove critical and can lead to potentially expensive and hazardous situations. Sensornet's revolutionary technology overcomes the limitations of measurement technologies available today to close the monitoring gap and improve system integrity and safety.

MONITORING GAP WITH EXISTING TECHNOLOGY

Leaks are not detected until the amount of leakage is large. By this time significant environmental damage may already have occurred. Even when conventional systems detect a leak, they are not able to pinpoint the location – leading to further delays and further expenses due to loss of product.

Certain leak detection and inspection systems are used on an intermittent basis. If a leak occurs in between inspections, this will not be detected and critical safety levels may have been reached.

SENSORNET DIGITAL LEAK DETECTION

Sensornet's Digital Leak Detection system is extremely sensitive and able to detect leaks of less than 1 litre. With the regular updates the system provides you will be notified while the leak is still manageable.

Leaks can be pinpointed to within 1m with this technology. This rapid location minimises response time, and any potential excavation expenses in order to find and repair the leak.

This technology is a permanent monitoring solution and continuously monitors at all points along the pipe at all times – providing complete pipeline integrity.

DIGITAL PIPELINE LEAK DETECTION – APPLICATION GUIDE

BENEFITS OF DIGITAL PIPELINE LEAK DETECTION

Digital Pipeline Leak Detection provides benefits at all levels of the organisation.

Benefits at Operational Level	Benefits to Asset Manager
<ul style="list-style-type: none">Any leaks will be detected quickly thus minimising risk to operations personnel. The optic signals used for the leak detection are extremely low power and incapable of igniting flammable gases making it suitable for use in hazardous zones.The sensing element is an intrinsically safe passive sensing cable with a design life of over 30 years, therefore high reliability and low maintenance.Leaks as small as litres can be detected, allowing action to be taken early before leaks grow larger and cause potentially major catastrophes. Additional sensors can be used to monitor the structural integrity of the pipeline, alerting the operator to any movement in the pipeline that could potentially lead to mechanical failure.System is fully automated and so lowers operating costs with less risk of human error. Can interface with existing SCADA and industrial control system using standard protocols (OPC, Modbus, electrical relays).	<ul style="list-style-type: none">Improve safety of infrastructure and for personnelEnhance system reliability through reduced downtime and reduced inspection timeLower risk of environmental damageImprove productivity

PRINCIPLE OF MEASUREMENT

FLUID OR GAS DETECTION

The system is based on temperature measurements using distributed fibre optic sensing technology and can be used to detect both liquid and gaseous leaks.

In the event of a gaseous leak the temperature drop due to the expansion (Joules Thompson effect) is instantaneous and can be considerable (can be greater than -100°C). The system provides measurements from every 10 seconds and such rapid detection is essential in the case of potentially explosive gases.

In the effect of liquid leakage (e.g. oil, water) the temperature change is less pronounced, however the key is in the sensitivity of the system which can detect changes as small as 0.01°C . Using temperature measurements the system cannot only detect leakage but with calibration and advanced interpretation algorithms, it can quantify leaks down to litre accuracy.

FULL PIPELINE COVERAGE

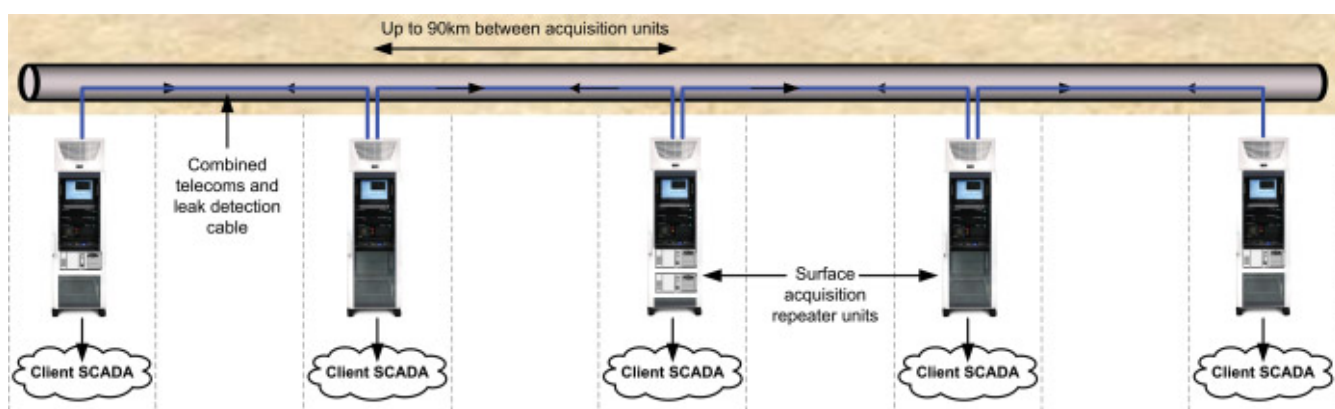
The leak detection cable is installed along the length of the pipeline and takes measurements down to every 1m along the cable length. The system can be used on long distance pipelines with repeater stations situated along the pipeline, providing full coverage of the pipeline with the ability to pinpoint the leak to within 1m.

STRUCTURAL INTEGRITY & INTRUSION DETECTION

In areas where structural movement is anticipated (e.g. subsidence, tectonic movement, landslides) structural integrity sensors can also be integrated into the system. This system is very sensitive and can detect very small strains (less than 10 micro strain), thus detecting any movements in the surrounding environment before this causes potential mechanical damage to the pipeline. This combined system providing a total pipeline integrity solution.

Depending on cable configuration, this system can also be utilised for intruder detection and the precise location of any intrusion can be pinpointed and communicated to the control centre.

LONG DISTANCE PIPELINE - SYSTEM OVERVIEW



INSTALLATION DETAILS

SENSING CABLE DESIGN

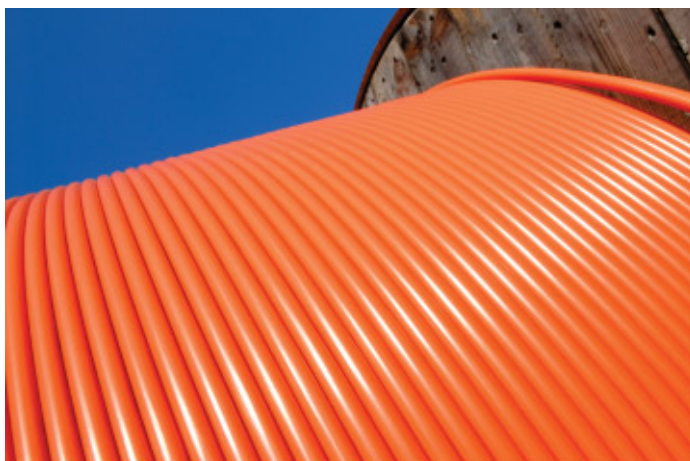
Sensornet has a range of sensing cables which are designed to provide the balance between achieving rapid thermal response while also providing maximum protection to the sensing fibre, even in the harshest of environments. According to operator request, Sensornet can incorporate additional fibres for telecommunications into the design of the sensing cable and thus reduce the need for an additional telecoms cable and reduce overall costs for the pipeline operator.

CABLE POSITIONING & INSTALLATION

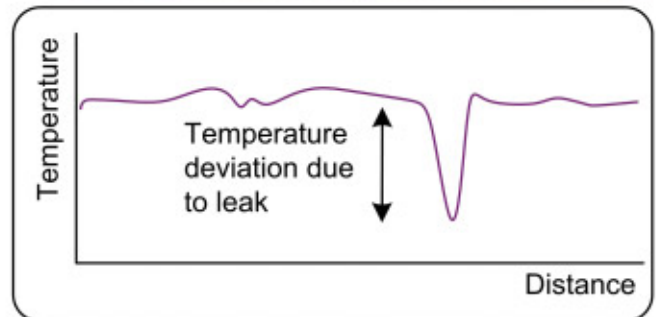
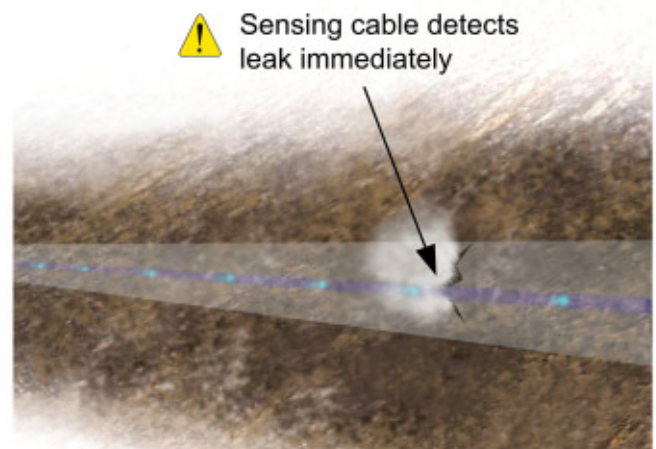
Each sensing cable installation is different and depends on various factors including the local environment, pipeline construction, product characteristics, location etc. Please contact your local Sensornet representative for more information regarding your particular requirements.

INTEGRATION WITH HEAT TRACE SYSTEM

A heat trace is a common element installed in pipelines for controlling the thermal environment. By combining DTS with heat trace elements, the heating process can be accurately monitored. The main benefit is that the process can be monitored more precisely resulting in a lower risk of waxy deposits forming or temperature ratings being exceeded. To ensure efficient installation, Sensornet works with heat trace manufacturers to provide an installation package. We also offer numerous other integrated solutions to ensure pipeline integrity.



IMMEDIATE LEAK DETECTION



To close your monitoring gap,
call +44 20 8236 2550
or visit www.sensornet.co.uk

SENSORNET PROVIDES THE COMPLETE SOLUTION

Providing the full suite of hardware, installation, project management and interpretation services Sensornet is able to offer a simple one-stop solution for your permanent monitoring requirements. As a part of our commitments to our ISO 9001 procedures we are dedicated to providing you with our utmost level of service at all times.

ENGINEERING DESIGN

The Sensornet team will design the entire engineering solution for you. This includes the system topology, fibre optic cable designs that can also support SCADA and telecommunications and all required ancillary components. All remote components are environmentally certified and approved for use in hazardous zones.

INSTALLATION SERVICES

Sensornet has highly trained personnel and equipment to perform fibre optic installations across a number of industries. Each specific installation requires specialised knowledge and equipment as well as dedicated fibre optic cable designs. Sensornet has built this knowledge over a number of years and together with installation partners is able to tackle the most challenging of installations.

SURVEILLANCE SERVICES

Not all systems require 100% real-time monitoring. Sensornet are able to provide some services as part of a regular surveillance package. This may include Pipe Stress, Ground Shift or Pig monitoring. The Sensornet Service Team will work with the client to perform regular monitoring and compile reports accordingly. Additional maintenance of all systems can be provided to ensure the tight detection tolerances are maintained and systems are operating satisfactorily. These can be achieved on site or remotely where network access can be granted.

PROJECT MANAGEMENT

The Sensornet team will manage your entire project right through to its handover. We operate to the highest standards of quality; our solution is, after all, about increased safety and security. We are ISO 9001 accredited and meet all current Health & Safety regulatory requirements.

For more details on the Sensornet system or for a custom engineered solution to your plant/pipeline specifications please contact your local Sensornet representative.

Sensornet has offices in Europe, North and South America, Middle East & Asia-Pacific – please see our website for details

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VISUALISATION AND INTERPRETATION

Each of the systems can be integrated into the client's DCS, SCADA or ESD. Integration into the client's control system allows alarms or average values to be displayed as part of the SCADA package. This can be achieved by OPC or Modbus protocols.

Alternatively the systems can be configured for use in standalone format. GIS maps can be used to highlight precise locations of events. These can also be integrated with intelligent hand-held devices to show location and type of alert and provide route information from the individuals' current location if required.

Bespoke interpretation software and data processing can be provided. This is tailored dependent upon the suite of packages and the levels of monitoring required.

SAFETY AND RELIABILITY

A key aspect to the implementation of any monitoring system is to minimize the number of false alarms. The Sensornet systems can be configured to detect only the events the client wishes to alert. Leak detection solutions use a number of algorithms to monitor rate of change and value of change against the ambient conditions. Only when the precise parameters are met will this be alerted. All Sensornet's solutions are built and designed to the highest standards and safety levels. The sensing cable itself is a passive component and is therefore suitable for hazardous rated zones and is immune to EMC interference. The leak detection system has been independently certified to Safety Integrity Level 3 (SIL3) and is suitable for integration into Emergency Shut Down (ESD) systems.