Based on fibre optic sensing technology, Sensornet’s Distributed Temperature Sensing (DTS) system provides a revolutionary cryogenic monitoring solution that can instantly locate a temperature event anywhere in a cryogenic process plant such as an LNG terminal. The technologically advanced range of Sensornet DTS systems can be used for the following Digital Leak Detection and Thermal Profiling applications:

- LNG loading and unloading pipelines
- LNG storage tanks, spill channels and impounding basins
- Compressed CO2 pipelines
- LPG/Ethylene storage tanks and pipelines
- Cool down monitoring of pipes and storage tanks

CLOSE THE MONITORING GAP

With conventional technology there is a gap between what is thought to be occurring throughout your installation and what is actually happening. Sensornet’s revolutionary technology overcomes the limitations of measurement technologies available today to close the Monitoring Gap.

DIGITAL THERMAL MONITORING

Sensornet’s DTS system is an intrinsically safe, extremely sensitive system with the capability to detect minute temperature changes and therefore the underlying conditions like pipeline or tank cool down and leakage. Temperature events can be rapidly detected (down to 10 seconds) and pinpointed to within 1m anywhere within the process using this Sensornet DTS technology. This rapid location minimises response time and minimizes downtime typically required to find and interrogate the events.

Sensornet’s DTS technology offers a permanent monitoring solution and continuously monitors all points along a cryogenic pipeline and vessels at all times. With the ability to fully integrate into the plant SCADA/DCS, Sensornet DTS systems provide complete integrity, and leave no room for uncertainty.
BENEFITS OF DIGITAL CRYOGENIC TEMPERATURE MONITORING

Digital cryogenic temperature monitoring provides benefits at all levels of the organisation.

<table>
<thead>
<tr>
<th>Benefits at Operational Level</th>
<th>Benefits to Asset Manager</th>
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<tbody>
<tr>
<td>• Leaks will be detected rapidly and mitigating action can be taken immediately thus minimising risk to operations personnel and equipment.</td>
<td>• Improve safety of infrastructure and for personnel. Excellence in safety leads to lower insurance and litigation costs and results in enhanced reputation for your company.</td>
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<tr>
<td>• Improved plant operation, allowing monitoring system maintenance schedule to be aligned to other safety integrity systems in the plant.</td>
<td>• Increased safety integrity level up to SIL3 provided using Sensornet DTS systems to fulfil legislation and planning purposes.</td>
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<tr>
<td>• The sensing element is an intrinsically safe passive sensing cable with a design life of over 30 years – therefore high reliability and low maintenance.</td>
<td>• Enhance plant reliability through reduced downtime and reduced inspection time.</td>
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<tr>
<td>• System is fully automated and so lowers operating costs with less risk of human error. Can interface with existing SCADA and ESD or Fire &amp; Gas control system using standard protocols (e.g. OPC, Modbus, electrical relays).</td>
<td>• Lower nuisance alarms results in increased security and improved productivity.</td>
</tr>
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</table>

PRINCIPLE OF MEASUREMENT

LEAK DETECTION USING TEMPERATURE

The system is based on temperature measurements using distributed fibre optic sensing technology. Distributed Temperature Sensors (DTS) are unique in that the fibre optic itself is the sensor and there are no active components or moving parts within the sensing cable.

Using the DTS system in conjunction with Sensornet’s fibre optic sensing cable a full temperature profile is obtained along the entire length of the cable, with measurement points down to every 1 metre (e.g. for a 5km cable you will have 5,000 independent measurement points.

In the event a cryogenic leak occurs within the process plant, there will be a significant temperature drop (typically greater than 100°C). When the cryogenic fluid comes into contact with the sensing cable this will be detected instantly (down to 10 seconds) and pinpointed to within 1m. Because the location of the leak can be detected instantly, rapid action can be taken to mitigate any risk and control the situation.

Use of this versatile technology is recommended in EN1473:1997 para 13.1.4 (Cold Detection).

COMPLETE PROCESS PLANT COVERAGE

Multiple cables can be operated by one DTS acquisition system. Thus complete coverage of an entire terminal (e.g. pipelines, tanks, channels, basins) can be achieved by running multiple cables from one acquisition unit based in the control room.

Temperature drop during simulated leak in an LNG pipeline

Entire leak detection coverage of an LNG terminal
To close your monitoring gap, call +44 20 8236 2550 or visit www.sensornet.co.uk
SENSORNET PROVIDES THE COMPLETE SOLUTION

Sensornet offers a turnkey solution for cryogenic temperature process monitoring including a full suite of hardware, engineering design, installation, project management and interpretation services. 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 sensing cable and termination and junction boxes. All components are environmentally certified and approved for use in hazardous areas.

The sensing cable is specifically designed to provide maximum protection to the sensing fibre and has specialist coatings to operate at cryogenic temperatures as low as -200°C.

SYSTEM INTEGRATION

The Sensornet Digital Leak Detection system is equipped with automated intelligent alarm algorithms which are calibrated to the particular operating conditions. These algorithms are based on a combination of absolute temperature changes, rate of change and deviation from average conditions. Using this combination of algorithms the sensitivity of the system can be optimised while eliminating false alarms. The process can be zoned for operator convenience and in the event of an alarm both the location and specific zone within the process will be flagged.

The Sensornet leak detection system can be fully integrated into the ESD and FGS control system. As standard, Sensornet interfaces using OPC / Modbus protocols or hardwired electrical relays although specific protocols can be customised for specific customer applications.

SAFETY & RELIABILITY

Sensornet systems are built and designed to the highest standards and safety levels to provide the most safe and reliable system available today. The sensing cable itself is manufactured from only passive components and so immune to the effects of vibration and EMC interference. Typical design lives of the cable are greater than 30 years. The Sensornet DTS systems have a laser safety rating of 1M and the optical power levels are below the EUR 16011 EN (1994) standard and so the sensing cables are suitable for use in hazardous zones. With regards to overall system reliability the Sensornet DTS system has been independently certified up to Safety Integrity Level 3 (SIL 3).

PROJECT MANAGEMENT

Sensornet teams are equipped to manage an entire monitoring project right through to its handover. We operate to the highest standards of quality; our solution is, after all, about increased safety and security. Sensornet is ISO 9001 accredited and meet all Health & Safety Executive requirements.

MAINTENANCE AND SUPPORT

As a part of the Tendeka family, Sensornet has an international client base and operates in all of the major industrial markets. Sensornet services numerous international projects and has offices and support centres in Europe, North America, Middle East, West Africa and Asia-Pacific. We offer post-installation maintenance service options to ensure continuous piece of mind.

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 America, Middle East, West Africa & Asia-Pacific – please see our website for details www.sensornet.co.uk

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