



DIGITAL LNG PIPELINE LEAK DETECTION ASSURES HEALTH, SAFETY & ENVIRONMENTAL CONSIDERATIONS AT ISLE OF GRAIN LNG GAS IMPORTATION PLANT

The 4.1km pipeline corridor from the offloading jetty to the re-gasification plant consists of a 36" diameter LNG importation pipeline and a 14" diameter recirculation pipeline between the plant and the jetty on the Thames estuary. This project was aimed at implementing a fibre optic distributed temperature sensing (DTS) monitoring system that would relay signals to the client SCADA system to initiate emergency shutdown in the event of an LNG leak.

CLIENT REQUIREMENTS

In compliance with the Health & Safety Executive (HSE) requirements, the National Grid Isle of Grain LNG facilities requested that SensorNet provide a leak detection system to conform to Safety Integrity Level 2 (SIL2) or higher, providing 99% availability. The monitoring system would be non-intrusive, permitting the continued operation of the importation and recirculation pipelines during its installation and commissioning.

THE MONITORING GAP

Flow meters based on differential flow measurement are inadequate to provide the required leak detection monitoring for emergency shut down purposes due to their relatively long response time. Other monitoring methods are inadequate to provide distributed measurements over the entire length of the pipeline. A robust non-intrusive leak detection method is needed to provide the required safety integrity level.

THE SENSORNET SOLUTION

This system was designed with 2 cable loops and 2 instrumentation units, capable of 1 out of 2 voting (1oo2) to meet SIL2 requirements. Each DTS system provides bi-directional monitoring from either side of the loop. The 24-way relay modules provide hard wire contact relays to the client SCADA system in the following instances:

- System error
- Rate of temperature change exceeds a set temperature
- Minimum temperature exceeded
- Fibre break
- Instrument cabinet over heating

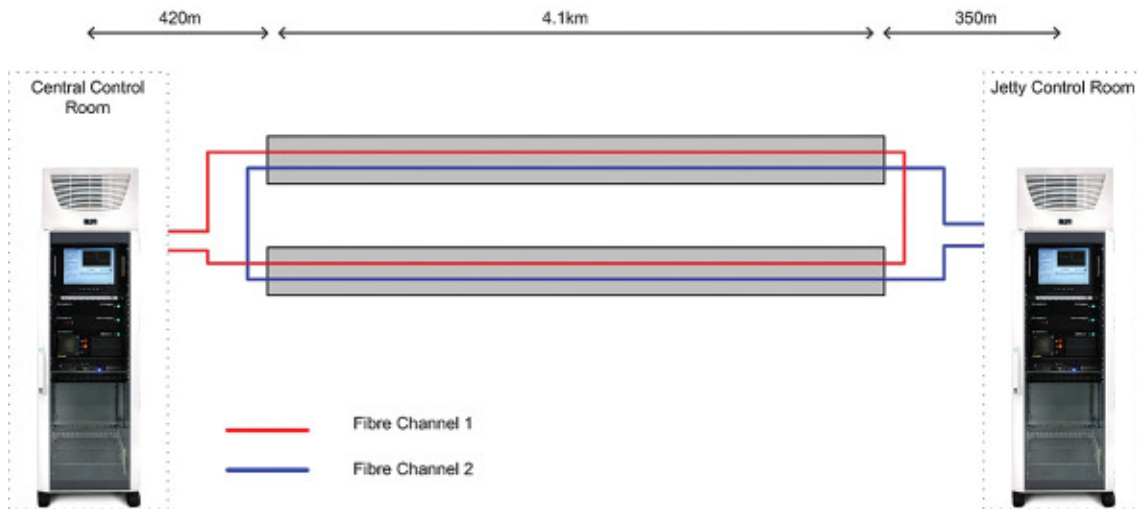
SUBSTANTIAL BENEFITS

The Sensornet solution provides a non-intrusive protection. This system was retrofitted by Sensornet installation engineers in an operational plant without having to shut down or stop operation. The independent fibre optic sensing cable loops covering both pipelines provide added resilience to the installation. Additional multiplexer channels ensure future expansion and flexibility. Sensornet included self contained test points at regular intervals on the cable loops. These test points will also be used after the site acceptance tests (SAT) for periodic testing.

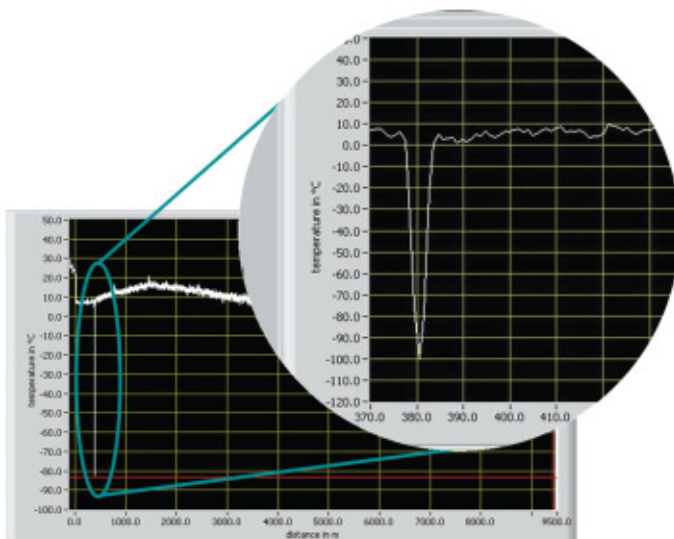
MEASURABLE PERFORMANCE

Sensornet mobilised and completed this project to meet extremely tight schedules. Sensing cables were installed in the pipeline corridor, within culverts and on the 750m jetty section using specialist access equipment. All works were completed within time frames stipulated by the client and the HSE.

The Sentinel DTS™-XR20 is optimised to provide temperature resolution of 0.1°C in 10 seconds along the entire length of the pipeline at 1.5m intervals. The high specification of the Sensornet Sentinel DTS™-XR20 allows the plant to monitor the pipeline with accuracy and integrity.



Fibre optic sensing cable layout and instrumentation in the plant central control room (CCR) and jetty control room (JCR)



DTS data viewer showing temperature drop during leak detection simulation at the site acceptance test (SAT)

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