FIBRE OPTIC LEAK DETECTION SYSTEM FOR LNG REGASIFICATION PIPELINE FOR PETRONAS GAS BERHAD IN THE STRAIT OF MELAKA, MALAYSIA

Fig.1: An offshore section of the export pipeline

THE PROJECT

Project Owner: Petronas
EPC Contractor: Ranhill-Worley & Muhibah

SCOPE OF WORK

The scope of the project was the provision of a non-intrusive cryogenic leak detection system for the 8km LNG pipeline at the Petronas LNG regassification plant in the strait of Malaka.

SENSORNET SOLUTION

The fibre optic sensing cable is installed onto the LNG Delivery and Recirculation lines in a redundant ring topology to ensure full pipeline coverage is maintained as shown below in figure 2.

The sensing cable contain polyimide fibres within a 3.2mm double walled 316 Stainless Steel jacket, which provides good thermal conductivity and mechanical protection. The cable is attached to the pipeline using Sensornet's proprietary UPVC "top hat" and stainless steel spring banding. This method of cable installation provides mechanical protection and ensures the sensing cable maintains constant contact with the pipeline during cooldown and warmup cycles of the LNG pipeline. Sensornet Sentinel™ DTS leak detection system in a standard rack system is installed in the site control room. The Leak Detection System's alarm relay module is connected directly to the plant's Emergency Shutdown system.

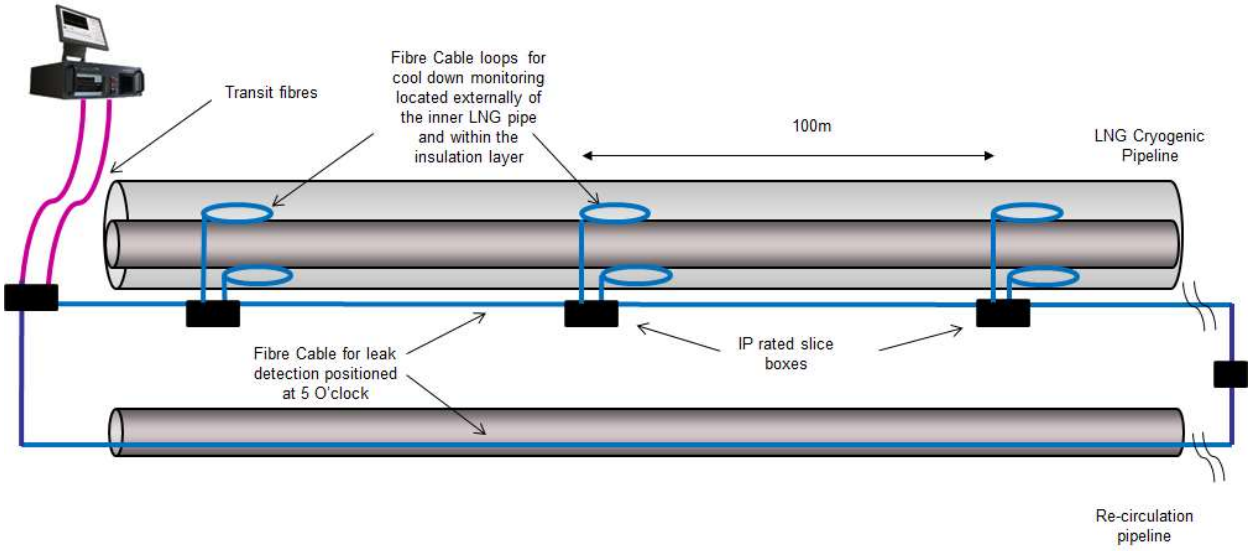

Fig. 2: Cool Down Monitoring for main Cryogenic LNG pipeline using 10m upper and lower loops located every 100m (section for one loop)

Fig.3: Cryogenic fibre optic cable installation on pipeline

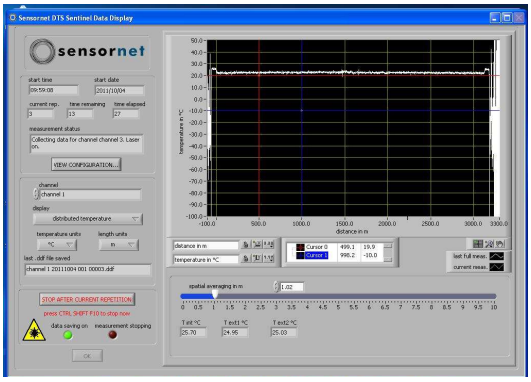

Fig.4: Pipeline section temperature trace

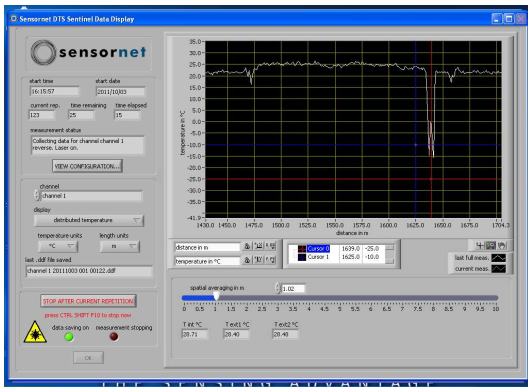

Fig.5: Simulated Leak Test temperature trace

BENEFITS TO THE CLIENT

The Sensornet Leak Detection System (LDS) is capable of detecting an LNG leakage at any point throughout the length of the pipeline and interfaces directly with the existing site Fire & Gas panel to initiate closure of selected valves by the Emergency Shutdown control to isolate inventory. There are six cool down loops (CDL) placed along the 900mm pipe to monitor the initial pipe cooldown and subsequently, the differential temperature between the top and bottom part of the pipe during operation.

The DTS is configured to initiate an audio-visual alarm should the pre-determined temperature thresholds or temperature step changes be detected, indicating inventory leakage from the confinement of the pipeline.