

CASE STUDY



Crude Oil Pipeline Leakage Detection

Mittelplate Island, Germany

Project Overview

Mittelplate is Germany's largest oilfield and is located in the ecologically-sensitive Wadden Sea (a national park). Due to the sensitive environment and the need to protect its biodiversity, the highest level of safety standards needs to be met to monitor two specialty pipelines between the island and the mainland. The operators selected a fiber optic-based Distributed Temperature Sensing (DTS) solution from AP Sensing for monitoring and leakage detection.

Solution

A single AP Sensing DTS device was installed to monitor the full eight kilometers of pipeline between the island and the mainland. The route is connected by a series of floating excavation platforms.

The DTS unit was securely installed in a remote control room on the offshore platform. The fiber optic sensor cable was deployed along the length of the transport pipeline. Crude oil has a temperature of around 65 °C when it is first extracted and around 35 °C when it arrives at the mainland station, with seasonal differences.

At the beginning and end of the installation, the pipeline runs through specially-prepared trenches. Most of the rest of the route sections were realized with horizontal directional drilling (HDD), which had a length of up to 1,400 m each.

After the installation was completed, the pipeline was buried in the mud flats at a depth of 5 m near the construction trenches and up to 20 m in the HDD areas.

Background

- Pipeline monitoring and leakage detection for Germany's largest oilfield
- Highest level of safety standards needs to be met due to the ecologically-sensitive environment

Solution & Benefits

- One Distributed Temperature Sensing (DTS) unit monitors the full eight kilometers of pipeline
- AP Sensing's SmartVision for easy and intuitive supervising of all critical landmarks
- Machine Learning Transient Algorithms (MLTA) to detect even the smallest leaks
- 24 / 7 real-time data



The sensor cable itself was pulled through five HDD sections, therefore a highly robust sensor cable was selected with double-armored protection. This not only ensured a safe installation, but also continuous operation in case the pipeline rolls or shifts, which can alter the cable's position e.g., from the top to the bottom of the pipeline.

Benefits

AP Sensing's unique intelligent alarming algorithms, called Machine Learning Transient Alarm (MLTA),



are included in the database and alarming software of SmartVision. SmartVision enables the operator to monitor the entire asset at a glance. Furthermore, MLTA identifies abnormal asset behaviors that would otherwise remain hidden within the temperature traces captured by DTS systems. The implementation of the MLTA technique allows for the isolation of thermal transients along the monitored asset, enabling fast and reliable alarming. Configuring these algorithms to the pipeline conditions makes it possible to detect even very

small leaks quickly and to accurately identify their location. Therefore in case of an emergency, the operator is immediately informed and is able to quickly consider appropriate countermeasures preventing enormous damage.

Thanks to AP Sensing's Distributed Fiber Optic Sensing solution and the expert design, integration and commissioning of this complex pipeline leakage project, valuable assets and a highly sensitive environmental region are protected.



For more information:

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