

Health-check for deep-sea pipelines

At present, controlling the condition of the continental shelf's transport arteries – the pipelines that carry oil and gas across the seabed – is a demanding and expensive task. But now a handful of research institutes and industrial companies from mid-Norway are about to do something about this state of affairs.

The Trondheim company SICOM is leading a group of mid-Norwegian industrial companies that have decided on making a joint effort. SINTEF is part of the team, which has persuaded the oil and gas companies and the Research Council of Norway to back a NOK 41 million project.

The three-year interdisciplinary project is the first phase of a major programme that aims to realise a concept that the project partners have called "SmartPipe". This will be a complete monitoring system that gathers and processes data from pipelines on the seabed.

Safety and transport capacity

SmartPipe will bring data up from the depths – data that could tell us something about the risk of pipeline leaks (mechanical loads, rate of corrosion, remaining wall thickness, etc.) The system will also send up information about flow conditions in the pipelines, so that it will act both as an environmental watchdog and as a tool capable of ensuring that the transport capacity of the pipelines is maintained at the highest possible level.

Important in the Arctic

"SmartPipe will be an important aid when oil and gas are being produced in sensitive environments like the Arctic. SmartPipe will also tell us whether a pipeline's life-cycle can be extended, and if so, what will be needed to do so. This is important when we remember that the useful lives of many oil and gas fields are being increased, so that they also need transportation systems with a longer lifetime," says SINTEF project manager Ole Øystein Knudsen.

Petroleum pipelines

The SmartPipe project deals with both pure gas pipelines and the pipelines for oil and gas transport that form part of every offshore subsea installation. More and more fields are being developed without platforms or production vessels. Oil and gas from such fields are carried together in the same pipeline on the seabed, either ashore or to platforms that have spare capacity.

Specialists from mid-Norway

Four mid-Norwegian companies are helping to implement the SmartPipe concept together with SINTEF.

The quartet consists of the Trondheim company SICOM, which is based on underwater communication systems, Danish-owned Force Technology, also from Trondheim and specialists in corrosion monitoring, the Trondheim company CorrOcean, which develops corrosion sensors, and Canadian-

owned Thermotite of Orkanger, which specialises in thermal insulation of subsea pipelines.

Started in 2004

SINTEF members include SINTEF Materials and Chemistry, SINTEF ICT and MARINTEK. SINTEF took the initiative to launch the project and will carry out large parts of it. The research institution has been working on the SmartPipe concept since 2003.

International interest

Four oil and gas companies are financing the project together with the Research Council of Norway: ConocoPhillips, BP, Shell and the Norwegian company Gassco, which is responsible for pipeline-based exports of Norwegian gas.

“Our aim is to develop a system that the participants in the project will be able to commercialise. The level of interest on the part of the oil companies makes it quite clear that we are talking about a future product with a global market,” says SICOM’s marketing director Lars Egil Mathisen.

Data from the whole length of the pipeline

At present, the petroleum industry has limited access to data about the state of health of its pipelines or about the flow conditions inside them. Current data capture is restricted to information from sensors located close to the wells, information from ROVs and data from intelligent “pigs” that are sent through the pipelines from time to time.

The sensors in SmartPipe will cover the whole length of the pipeline, and the information will be gathered throughout its working life. Some of the data will be used directly, while other aspects will be used as input for simulations and mathematical models.

Demanding job

“We are facing a demanding job. There are major challenges involved in bring power to the sensors and making the sensors and electronics sufficiently robust to withstand the pipe-laying process and the challenging seabed environment, not to mention bringing the data back to the control centres,” says Lars Mathisen.

The complete system will consist of a sensor package and communication equipment which will be integrated into the pipeline as a distributed system, as well as analytical tools that will transfer the data that have been read in. There will also be a database to store the information and software for presenting the results to the operator.

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