Innovative environmental technology to identify pipeline damage in muddy water

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Jasper Agbakwuru has developed a device which helps identify pipeline damage.

Jasper Agbakwuru's PhD studies yielded a device small enough to be held in both hands, which can be carried down to the seabed by a remotely operated vehicle (ROV).

It could overcome current problems faced in identifying leaks from pipelines lying in rivers or on the seabed, determining the exact location and size of the damage and establishing what has caused it.

The usual solution today is to send down divers, who can see little in

muddy water. Their findings can be difficult to interpret for engineers on the surface.

Clean water

Once the ROV has found its target, Agbakwuru's device begins its work by turning on a light and spurting clean water from a [nozzle](#) to clear away the sand and mud.

An underwater camera then starts up, allowing the experts on the surface to study every centimetre of the pipeline. That lets them quickly find the answers they need.

Pipeline problems

A great many pipelines have been laid over the years from various installations on the Norwegian continental shelf to Norway and to various other European countries.

While the North Sea basin itself is relatively clear, bottom waters close to the coast and in harbour areas can contain much more muck.

The problem is even greater in other parts of the world, with many coasts affected by large volumes of sediment being carried out to sea. Pipelines may also lie on naturally muddy riverbeds.

Zero visibility

Visibility around a pipeline is virtually zero under such conditions, says Agbakwuru. "That means you can't see the damage properly or decide how best to deal with it."

It is also hard to measure the size of a hole in the pipeline and exactly how much oil is escaping. Measuring the pressure drop in the line provides a guesstimate, but is not an accurate method.

Industrial interest

Agbakwuru's PhD work was sponsored Shell, and Helge Skjæveland, technology adviser at the oil major's Norwegian arm, confirms that it regards his results as highly interesting."

He has an interesting background, with experience from oil production in Nigeria, and a burning commitment to environmental protection and cleaner production.

"The equipment he's developed could potentially help to locate oil leaks from pipelines in muddy or unclear water at a very early stage, so that the discharge can be halted and cleaned up fast."

Core area

"Reducing discharges from oil and gas production is a core area for our research and development activities in Norway," Skjæveland adds. "We're now looking at whether the new device can be utilised on Norwegian pipelines.

Agbakwuru has published several scientific articles and presented his technology at a number of specialist international conference.

He defended his thesis in the faculty of science and technology at UiS in May, where his supervisors have been professors Ove Tobias Gudmestad and Torleiv Bilstad.

Preparing patent

Prekubator TTO, the technology transfer office at the UiS, has supported Agbakwuru in such areas as preparing a patent application.

"The team which includes him and Gudmestad is an interesting one, and has shown that it's possible to teach, research, publish and innovate," says Prekubator TTO head Anne Cathrin Østebø.

Development work continues, and the next step is to add wireless transmission of audio signals from sensors attached to the actual pipeline. These will be able to detect sounds from possible leaks or sabotage.

Provided by University of Stavanger