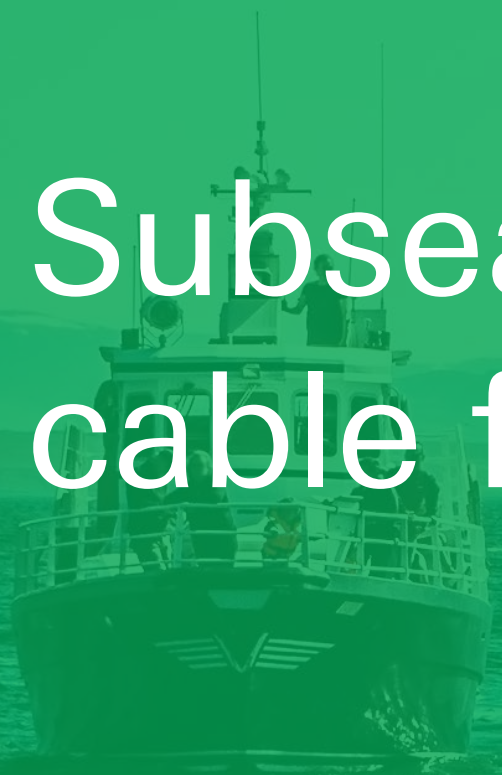
Fotech solutions

Case Study

Subsea cable faults

Locating faults on subsea power cables: Minimizing downtime and repair costs



A Launchpad company from bp

bp

Distributed Acoustic Sensing (DAS) technology delivers the monitoring platform needed to gain comprehensive and real-time visibility of the integrity of offshore networks – **allowing operators to target repairs and employ pre-emptive maintenance.**

Locating faults on subsea power cables: Minimizing downtime and repair costs

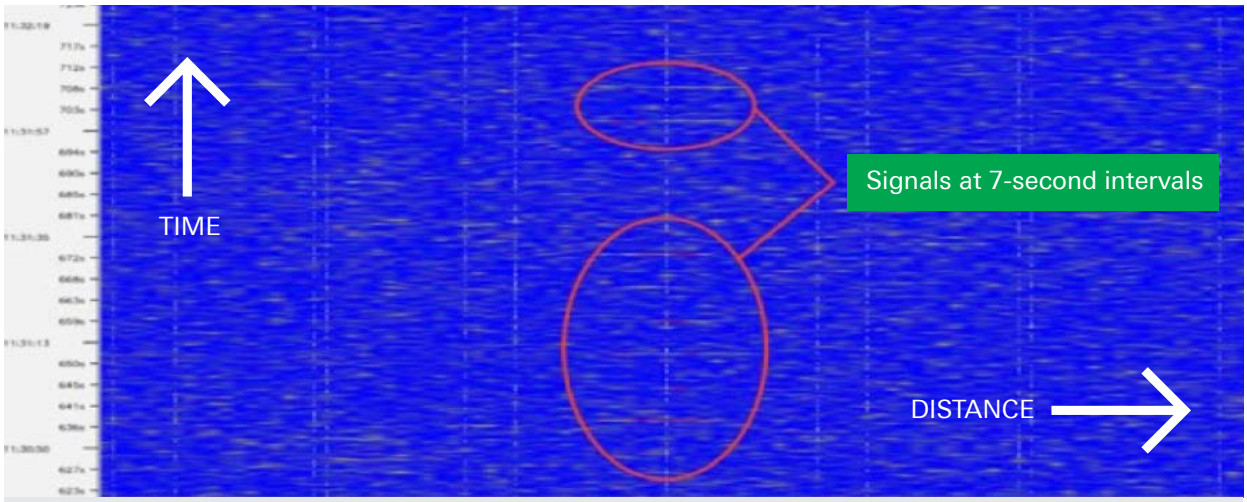
Around the world, the case for offshore wind energy as a mainstream power source is being won. And as subsea cable deployments increase, the pressure on operators to significantly enhance the robustness of these crucial subsea cable networks continues to grow.

These cables are designed to be in place for a long time, but the sea bed is a hostile environment. Even though cables are buried, seafloor currents can erode the protective layer of sea bed – exposing cables to the sea. This causes cables to drift, causing strain and damage which can ultimately result in the cable breaking through fatigue. Cables may also suffer electrical damage caused by arcing if the cable insulation fails. And of course, there is the risk of cables being damaged accidentally in a 'strike' incident.

These cable networks are vital – but they are also vulnerable and expensive to repair when something does go wrong. The threats to these undersea cables are many and varied.

Case study - detecting and locating cable faults

In late 2015, offshore cable operators identified a fault in their cable infrastructure for an offshore windfarm. Seeking to expediate mitigation and their repair activities the operator employed Fotech's distributed acoustic sensing (DAS) technology, Helios DAS, to identify the fault and pinpoint its location.



Faint signals identified in the DAS sound-field generated by 3kV flashover tests at 7-second intervals.

The Helios DAS technology was connected to an optical fibre integrated inside the three-core subsea power cable, converting it into a highly sensitive acoustic and vibration sensor.

A series of 3kV 'flashover' tests were carried out in seven and ten second intervals to locate the fault on the cable. Even though the response from the flashover tests were very weak the Helios DAS clearly identified each response and pinpointed the fault to 43,044.4m down the optical fibre.

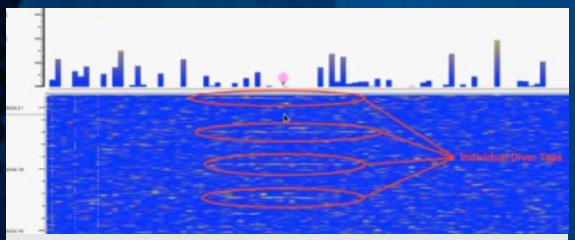
To correlate the location on the fibre with the geospatial location on the sea bed, a basic spatial calibration exercise was conducted – the dropping of a two-metric-ton anchor at a 10m offset from the cable, close to the area of the fault. These impacts were detected by the Helios DAS and the impact locations used to correlate with GPS data.

About DAS

DAS technology uses a single fibre optic cable to detect acoustic energy and vibrations, generated by activity around the cable. This information is then analysed by AI systems, which raise an alarm if unwanted activity is detected. This incredibly sensitive technology has the ability to pinpoint activity down to just five metres, and utilises optical fibres already present alongside power cables to detect these vibrations caused by threats, such as electrical arcing caused by insulation breakdown and cable strikes caused by accidental excavation activities, and then warns operators of these different threats. DAS has the ability to enable operators to act quickly providing the means to greatly reduce costs through early warnings and targeted maintenance.

Case study - detecting and locating cable faults

Diver tapping the exposed cable to precisely locate the fault (Courtesy of Energinet)



Diver tapping on the cable and matching the location of the electrical fault

This rapid and targeted approach enabled the divers to target the fault location and begin preparations for their repair activities. Once they had exposed the cable around the fault location by water jetting, they began a 'tapping' exercise on the cable to generate an acoustic signal. With the resulting 'DAS locations' the diver was directed along the cable to the exact location where the 'tapping' corresponded with the fault. The diver then marked the cable for cutting and repair.

While exposing the subsea cable, the divers quickly identified that there were no visible signs of flashover damage to the outside of the cable – demonstrating the need for invaluable information provided by the Helios DAS and ability to detect the unique vibrations caused by the internal breakdown of the cable.

By pinpointing the fault's location to <1m, the operator was able to minimise the section for cutting to only 3.5m in length – allowing the cable to be repaired more quickly with only one joint and sufficient slack in the cable to avoid the need for a new cable section to be added.

The repair works were carried out just in time – the weather deteriorated immediately after the repair work had been completed. If conventional fault finding and repair techniques had been employed, requiring a much longer time widow, the repairs would have been postponed, on this occasion, for at least another month. As a result of Fotech's Helios DAS technology, millions of pounds in lost productivity, repair and downtime were saved.

To find out more about Fotech's Helios DAS and 'Cable Integrity Monitoring Solution' can you visit **http://www.fotech.com** or contact the Fotech team at **team@fotechsolutions.com.**

Get in touch

Fotech has been a trusted partner to our customers for more than 10 years.

Serving a range of sectors and customers worldwide, we've helped optimise many different business processes, shaped decision making, reduce costs, and solved conventional challenges.

We're excited to answer your questions or share how we've helped solve problems similar to yours.

www.fotech.com

team@fotech.com

+44 1252 560 570

Head Office

Titan House
Redfields Industrial Park
Church Crookham
Hampshire
GU52 0RD
United Kingdom
Phone: +44 1252 560 570

Calgary Office

Suite 280
700 6th Avenue SW
Calgary
T2P 0T8
Canada
Phone: +1 403 852 5696

New Jersey Office

120 East Main Street
Suite 143
Ramsey
New Jersey 07446
USA
Phone: +1-281-220-3566 X 500