Fotech solutions

Case Study

Onshore Cable Faults

Locating faults on underground power cables: minimizing time, cost and damage

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 cable networks - allowing operators to rapidly target cable faults and employ pre-emptive maintenance, saving both time and money.

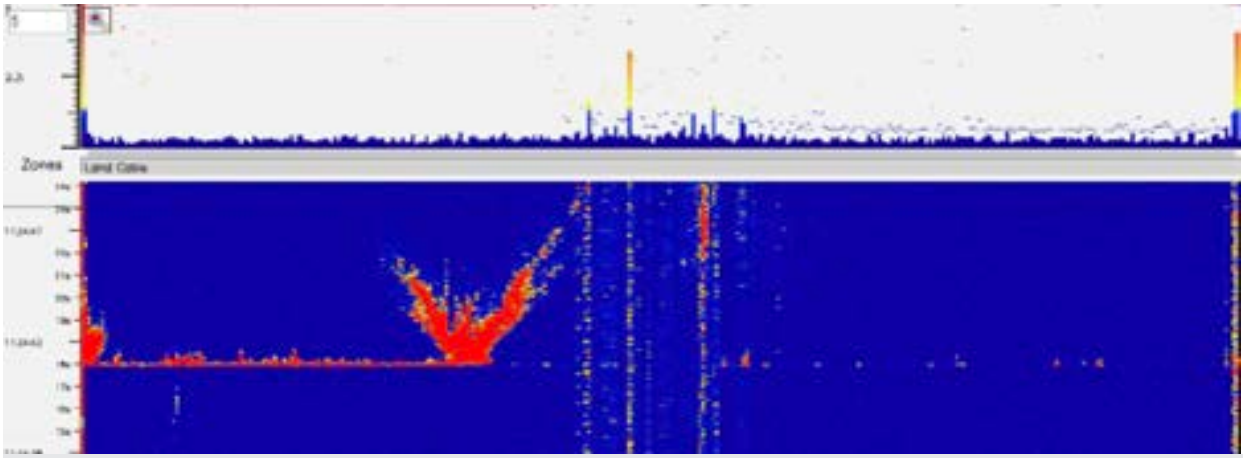
Locating faults on underground power cables: minimizing time, cost and damage

Although less visible than their overhead counterparts, faults on underground cables caused by water damage, ground movement, or accidental interference such as excavation can be serious, sometimes resulting in fire or electrocution.

One problem often associated with underground power cables is the difficulty of identifying the location of this damage and resulting faults along a network. Traditional methods for finding these faults involve significant resources, can take several hours, and can even cause further damage to cables – all leading to increased losses and associated costs.

Case study – detection and locating cable faults

In 2015, Fotech's Helios DAS monitoring platform was used to investigate a fault in a 150kV cable in an underground conduit between two electrical power substations.



Helios DAS waterfall display (Acoustic energy in time along the length of the cable): The 'power-up' and flashover test as monitored by the Helios DAS. The "V" shape signature pinpoints the location of the cable fault (image 1).

The conduit contained three power cables – one for each phase – and the Helios DAS was connected to a fibre cable located next to the central power cable, converting it into a highly sensitive acoustic and vibration sensor.

To locate the area of the fault, engineers conducted a flashover test, recording acoustic data for fifteen seconds prior to and ten seconds after the test. Each flashover test created a clear, high amplitude signal that was readily identifiable by the engineers. The Helios DAS real-time display (Image 1) showed a clear and unique "V-shape" signature caused by the vibration of shockwaves travelling in both directions along the affected cable. The center of this "V" pointed directly to the location of the cable fault.

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.

Initial analysis narrowed down the fault location to a 7m section, with further analysis pinpointing its location at 4,536m. This coincided with joints in each of the three power cables.

Confident in the knowledge provided by Helios DAS of precisely where the cable fault was located, the repair team were able to quickly excavate the cable at this location, where they discovered a severely damaged joint. Diagnosis of the problem revealed the joint had been flooded by water, which had penetrated the cable via a link box positioned nearby.

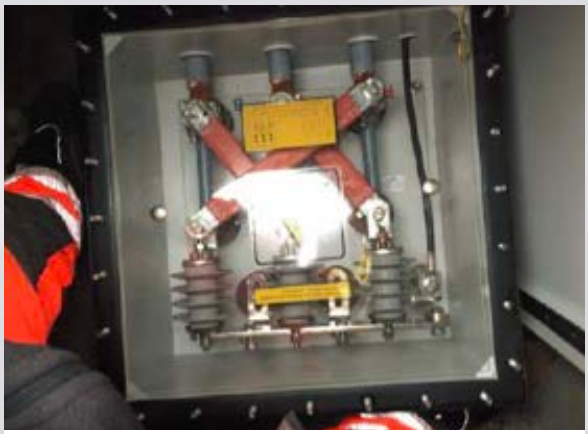
Because flashover tests carry a high risk of secondary damage to an already compromised line, the ability of Helios DAS to capture data and immediately locate the precise location of a fault and with a single test was invaluable.

Without DAS, the engineers would have needed to apply several flashovers while they visited numerous locations along the cable route to try and manually detect it. This would have taken significantly more time, added to the risks of a safety incident, and worsened the damage to the already degrading cable - limiting the cable's lifespan.

By harnessing the power of Fotech's Helios DAS monitoring platform the operator had the information they needed to rapidly identify and pinpoint the fault - limit these risks, saving both time and money.

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

Cable joint with visible damage found at the location of the fault (image 2 - courtesy of Energinet)



Water penetrated this link box and flowed into the joint where the fault eventually occurred (image 3 - courtesy of Energinet)

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@fotechsolutions.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