sensornet

CASE STUDY

Strain evaluation in aerial telecoms cable

Sensornet system confirms integrity of overhead telecoms network

Sensornet's unique fibre optic technology has proved its ability to run accurate health checks on the condition of telecommunications cables integrated into overhead electric power lines.

Energis, a major communications company in the UK and Ireland, called in Sensornet to measure strain on a selection of fibres which form the backbone of its high-speed optical telecommunications network infrastructure. Originally installed up to 10 years ago, the fibres are either wrapped around existing ground wires on overhead power cables, or use a more recent design in which the optical fibre forms the core of the wire itself.

The telecommunications company wanted an accurate assessment of the health of the cables following a number of years' exposure to wind and weather – and to ascertain whether any of the cables were approaching the industry's guideline figure of 2,000με (0.2%) as the limit for long-term strain on installed fibre. Sensornet's distributed temperature and strain sensor (DTSS) equipment successfully measured the strain on a total of 212km of telecommunications fibre and proved that 97% of all measured fibre was strained to less than 1,000με, and no fibre was strained beyond than 1,350με. This gave Energis confirmation of the integrity of its strategic fibre optic network.

Testing the integrity of overhead fibre wrapped around power cables

The Distributed Difference

A unique feature of Sensornet DTSS equipment is its ability to measure strain and temperature simultaneously and independently without the cross-sensitivity experienced by other instruments.

The system measures strain and temperature every metre along the entire length of an optical fibre, rather than at a series of discrete points.

The Sensornet DTSS used to perform the health check on these telecommunications cables has been designed to measure the full Brillouin spectrum of light at every metre along the fibre, with realtime analysis enabling both the strain and temperature to be calculated independently at all points. During the health check, the system provided a 30με strain resolution over a distance of 10km, and produced accurate results within a measurement period of less than 30 minutes. A finer resolution – below 10με – is now possible.

The system is housed in a rugged field-transportable rack-mountable box with inbuilt PC, which includes a network connection, flip-up monitor, keyboard and an uninterruptible power supply.

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THE SENSING ADVANTAGE

During the health check, Sensornet surveyed a sample of fibres at various points in the telecoms network and confirmed that none were experiencing excessive strain. The first part of each test consisted of a series of measurements taken by the high-resolution optical time domain reflectometer (OTDR) built into the Sensornet DTSS system. This provided a trace of the reflected and backscattered light along the length of the fibre, and was followed by the measurement of the Brillouin spectrum – the most important part of the test.

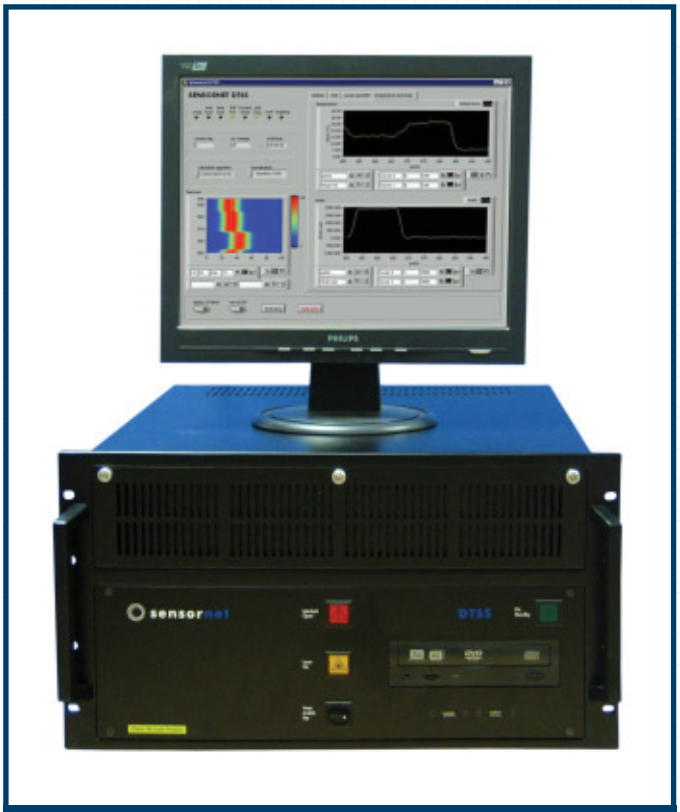
Detailed Analysis

A detailed analysis of data from the 212km of optical fibre measured by the Sensornet DTSS showed that levels of strain in all the fibre tested were well below the industry's guideline figure of 2,000με for fibre intended for a 40-year installed life. The Sensornet health check reassured the telecommunications company of the condition of the fibre within its core telecoms network – and provided a testament to the excellent installation of the network ten years earlier. Energis is delighted with the results of this 2004 survey, following on from a similar fibre health check survey in 2003. In total more than 420km of their network has now been measured, revealing no fibre under excessive strain.

Dynamic Strain Capability

The DTSS now also incorporates Sensornet's unique technology that allows fast, fully distributed measurements of strain at acquisition rates of up to 10Hz. This is a unique capability, being able to achieve real-time measures of strain at all points along the fibre. This will enable the introduction of distributed optical fibre sensors into a range of new applications. Dynamic strain applications include: dynamic monitoring of deep water risers for fatigue predictions; perimeter security detection systems; dynamic monitoring of large structures such as bridges; and dynamic structural railway monitoring.

For more information on Sensornet's range of distributed sensing solutions please contact a Sensornet representative.



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