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# DISTRIBUTED TEMPERATURE SENSING:

## *The Future of O&M*

### ARE MONITORING SYSTEMS THE FUTURE OF O&M?

Monitoring systems have been utilized by offshore wind facilities in the United Kingdom for years. Strain gauges, accelerometers and other sensors are programmed to monitor loads, vibration, fatigue stress, temperature and corrosion, enabling turbine owners, investors and operations managers to systematically evaluate and assess the health and the condition of structures and cables. These condition monitoring systems provide early warnings of possible failure, giving key stakeholders an opportunity to take quick action and avoid the high costs of repair and retro-fit.

Domestic wind project owners and operators can learn a lot from these early adopters as there is a clear business case for the implementation of monitoring systems here in the United States. Thermal monitoring systems can be used on existing wind power facilities to analyze collection systems, detect failing assets, verify geotechnical engineering and provide financial due diligence support. On new projects, they can optimize the size of collection system conductor and verify warranties post-construction.

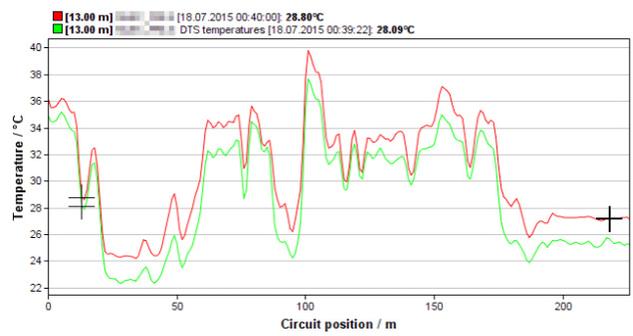
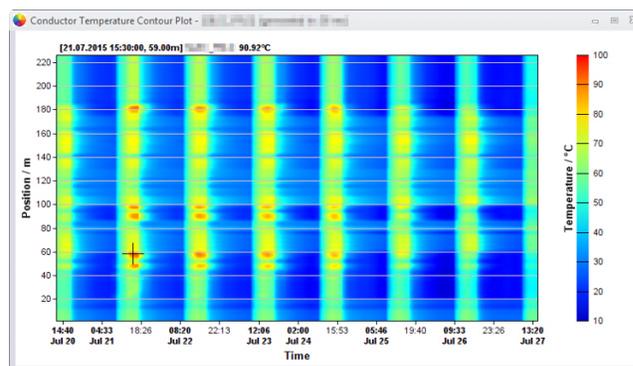
### NOT ALL SYSTEMS ARE CREATED EQUAL

Not all monitoring systems are equal, so it is important to compare the different features before investing in this sophisticated technology.

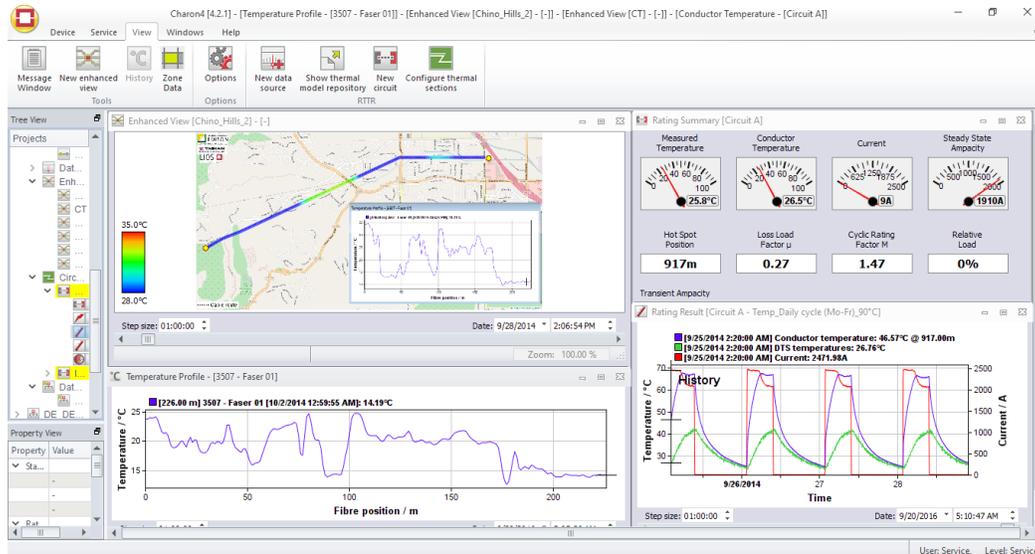
Conventional temperature control systems have significant limitations with respect to speed, accuracy and resolution of monitoring. That's because they only capture data gathered

from individual sensors and gauges, measure single values at specific locations and take measurements at pre-determined points.

Distributed sensing, however, offers a more efficient way to monitor changes in temperature and pressure. Using an optical fiber as a sensor, distributed temperature sensing (DTS) systems



**Pictured above: DTS visualization of conductor temperature profiles**



**Pictured above: the Real-Time Thermal Rating (RTTR) Interface displays network data in a user-friendly dashboard**

capture real-time readings of temperature and strain along the entire length of the fiber as one continuous profile. This makes it easier to detect hotspots and keep a close watch on conductor temperature.

DTS systems measure and monitor underground transmission and distribution power cables and overhead transmission lines over long distances. Long range systems can continuously monitor and predict cable load and core temperature over single-ended lengths of 40 miles, so fewer DTS units are required per installation as compared to conventional systems.

## DEPLOYING A CUSTOMIZED MONITORING SYSTEM

A reputable consultant will be able to combine infrastructure design experience with the latest tools and technologies to recommend a thermal monitoring solution capable of managing your critical assets. It is important to select a partner who will perform an initial assessment to determine your specific O&M needs, then allocate resources to design, coordinate and install your solution. Lastly, look for a professional with expertise in alert system implementation. You will want to receive advanced notification of possible network failures.

The final step of the deployment process involves the setup of a Real-Time Thermal Rating (RTTR) interface. This interface serves as a dashboard where network data captured by your monitoring system is displayed in user-friendly charts, so you can track facility health, infrastructure performance, O&M recommendations and equipment capacity.

If you do not have a dedicated resource reviewing this data in-house, you may want to outsource this work to a third party. Some Asset Optimization consultants can bundle installation and on-going monitoring/reporting into a single deployment package.



## ABOUT ULTEIG

Ulteig Engineers, Inc. delivers comprehensive design engineering, program management and technical and field services that strengthen infrastructure vital to everyday life.

Ulteig's footprint spans the nation and provides its expertise in multiple Lifeline Sectors®, including power (both electric utilities and renewables), transportation, water and oil and gas, to a wide range of

public and private clients. To learn more about Ulteig and how we can enhance the quality and efficiency of your next wind or solar project, visit [www.ulteig.com](http://www.ulteig.com).



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