

WHAT IS DISTRIBUTED STRAIN AND TEMPERATURE SENSING (DSTS/DTSS)?

Distributed Strain and Temperature Sensing (DSTS, also known as DTSS) is a fiber optic sensing technology that delivers spatially resolved measurements of changes to both strain and temperature at any point along the length of a fiber optic cable. This allows a single optical fiber to replace thousands of individual strain or temperature sensors.

HOW DOES IT WORK?

The DSTS/DTSS device sends laser light into an optical fiber. Part of the light is backscattered to the device, where it is analyzed. The technique uses methods such as Brillouin scattering, Rayleigh Scattering or special Fiber Bragg Gratings embedded in the fiber to observe strains and temperatures applied locally to the fiber. By accurately measuring the changes in the backscatter profile, the applied strain or temperature change can be calculated. To monitor strain or temperature, the sensing cable must be designed and installed so that the deformation or temperature of the asset being monitored is transferred to the fiber. Separate DSTS/DTSS can be implemented using a combination of fibers i.e., a loose jacketed fiber for temperature and a tightly coupled fiber for strain – either conventional fiber or special purpose FBG cables.

WHAT APPLICATIONS USE DSTS/DTSS?

DSTS/DTSS is commonly used for monitoring large structures, where changes in strain or temperature may be indicative of an impending failure. Pipelines, dams, levees, bridges, tunnels, roadways, and power lines are all structures that can benefit from DSTS/DTSS monitoring. Similarly, industrial process monitoring, as well as fire detection in large buildings or tunnels, can benefit from DSTS/DTSS measurements.

WHAT ARE THE BENEFITS OF DSTS/DTSS?

Depending on the installation, DSTS/DTSS can be optimized for monitoring strain, temperature, or both. This allows structures to be monitored over distances up to 65 km (40 miles) in a manner that is more cost effective than that of other technologies. Many devices can be configured to operate in two directions, effectively doubling the coverage.

WHO ARE THE FOSA DSTS/DTSS SUPPLIERS? [Electronic and Optical Sensing Solution \(EOSS\)](#), [FEBUS Optics](#), [Hifi](#), [Luna Innovations](#), [Prysmian](#), [OZ Optics](#), [VIAVI Solutions](#)

THE FIBER OPTIC SENSING ASSOCIATION (FOSA)

FOSA is the nation's premier trade association dedicated to fiber optic sensing technology. FOSA serves as the voice of the industry, providing comprehensive knowledge sharing, strong advocacy, and a unified vision for the future of fiber optic sensing. Through webinars, videos, white papers, public presentations, and public policy advocacy, the organization provides information on the use of fiber optic sensing to secure critical facilities, enhance public safety, and protect the environment.

FOSA Members include: AP Sensing, Corning, Ditch Witch, Dura-Line, Electronic and Optical Sensing Solution (EOSS), FEBUS Optics, Go!Foton, Graz University of Technology, Hifi, Indian Oil, Luna Innovations (LIOS, OptaSense, Silixa), NEC Corporation of America, Network Integrity Systems, Novacomm, OZ Optics, Prysmian (Omnisens), SAMM Teknoloji, Sensonic, Sintela, Smartpipe Technologies, Texas811, Underline, The University of California - Berkeley, VIAVI Solutions, ACI Monitoring, Optical Strategies, and Prop Systems. For further information, please visit <https://fiberopticsensing.org>.