

WHAT IS DISTRIBUTED STRAIN SENSING?

Distributed Strain Sensing (or DSS) is a fiber-optic sensing technology providing spatially resolved elongation profiles along a fiber-optic sensing cable. By combining multiple sensing cables at different positions in the asset cross-section, DSS is used to compute the asset (device under test) elongation (strain), shape (bending radius and bending direction), twist, etc.

HOW DOES IT WORK?

The DSS device sends laser light into an optical fiber. Part of the light is in-elastically backscattered (its wavelength is changed) to the device where it is analyzed. Since inelastic backscattering depends on local strain, the characteristics of the backscattered light provide a measurement of the strain in the fiber. The time delay of the returning light with respect to the excitation is used to obtain spatially resolved strain information.

WHAT APPLICATIONS USE DSS?

A few examples of DSS applications include direct attachment to pipelines for ground movement monitoring (landslide, subsidence) or deformation monitoring (upheaval /lateral buckling). For subsea umbilical and offshore power cable, DSS provides elongation, bending and fatigue monitoring during installation or operation. In civil engineering, DSS is used for bridge, pile monitoring, and excavation work (asset stability as well as for geo-technology investigation such as subsidence, landslide, etc.).

WHAT ARE THE BENEFITS OF DSS?

DSS requires the installation of a specifically designed strain sensing cable that efficiently couples asset deformation (changes) to the sensing fiber within the cable. The strain can then be used to compute deformation and fatigue of the asset, likewise external perturbation, allowing early warning signs of threats. A DSS system is immune to electromagnetic perturbations and safe for ATEX environments. A single DSS may monitor thousands of locations spread up to 65 km (40 miles) from the device. Many devices can be configured to operate in two directions, effectively doubling the coverage.

WHO ARE THE FOSA DSS SUPPLIERS?

[Electronic and Optical Sensing Solution \(EOSS\)](#), [FEBUS Optics](#), [Hifi](#), [Luna Innovations](#), [OZ Optics](#), [Prysmian](#), [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, and public presentations 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>.