



Brillouin DSTS System for Pipeline Monitoring

OZ Optics ForeSight™ Brillouin DSTS Interrogator

Distributed Strain and Temperature Sensing instrumentation equipment provides an effective means to monitor all types of pipelines. The monitoring of corrosion, strain, leaks and intrusion with the same interrogator is possible when using Brillouin Scattering Technology, provided strain and temperature can be measured separately from one another.

PERFORMANCE MONITORING*

- Strain Detection
- Leak Detection
- Security Detection
- Corrosion Detection
- Local and remote control, recording and reporting

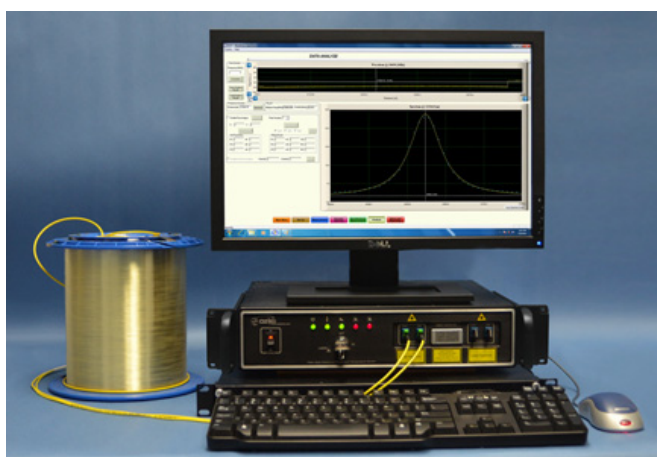
PRECISION

- Real-world performances
- Strain Detection: $\pm 10 \mu\epsilon$
- Temperature: $\pm 0.5^\circ\text{C}$

SPEED

- Standard Model: 3-7 minutes
- High Speed Model:
 - 15 seconds to 3 minutes,
 - 1 second dynamic monitoring
 - Disaster warning mode
- Optional: Fire detection mode

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Solution Requirements

Successful implementation of DSTS systems for pipeline monitoring will require several elements to work in conjunction with each other:

- Equipment Housing
- Non-condensing humidity facility
- AC Power
- Sensing Fiber: GeoDetect®
- Optional: Interfacings to a SCADA or other monitoring system
- Optional: External optical switch enables multiple fiber monitoring with a single unit.
- Professional installation team

Historically, Brillouin measurements were unable to distinguish between strain and temperature. The OZ Optics ForeSight™ Brillouin DSTS interrogator provides three methods to independently measure strain and temperature. ForeSight™ is proven in corrosion monitoring due to its high precision and ability to separately measure strain and temperature.

Typical fiber application methods are listed below:

- A helical wrap of fiber optic cable provides the maximum coverage of the pipeline. This approach is suitable to measure strain, and temperature. From the precise strain measurement, corrosion can be inferred. Alternate installation methods exist.
- TenCate GeoDetect® is a composite geotextile fabric with multiple fiber optic lines embedded into it. The geotextile provides an excellent interface with the earth and protection of the fiber during installation. As geological changes occur, stain is captured by the geotextile fabric and propagated to the sensing fiber. Intrusion detection and geological strains are most easily captured using this system. Since temperature sensing fibers are also installed, leak detection is provided based upon proximity to the pipeline. It also acts as an absorption media should the pipeline leak. Corrosion monitoring requires a slightly strained installation against the surface of the pipeline.
- Use of an optional optical switch allows many sensing fiber runs to be monitored via one ForeSight™ Brillouin DSTS.

*OZ Optics reserves the right to change any specifications without prior notice.

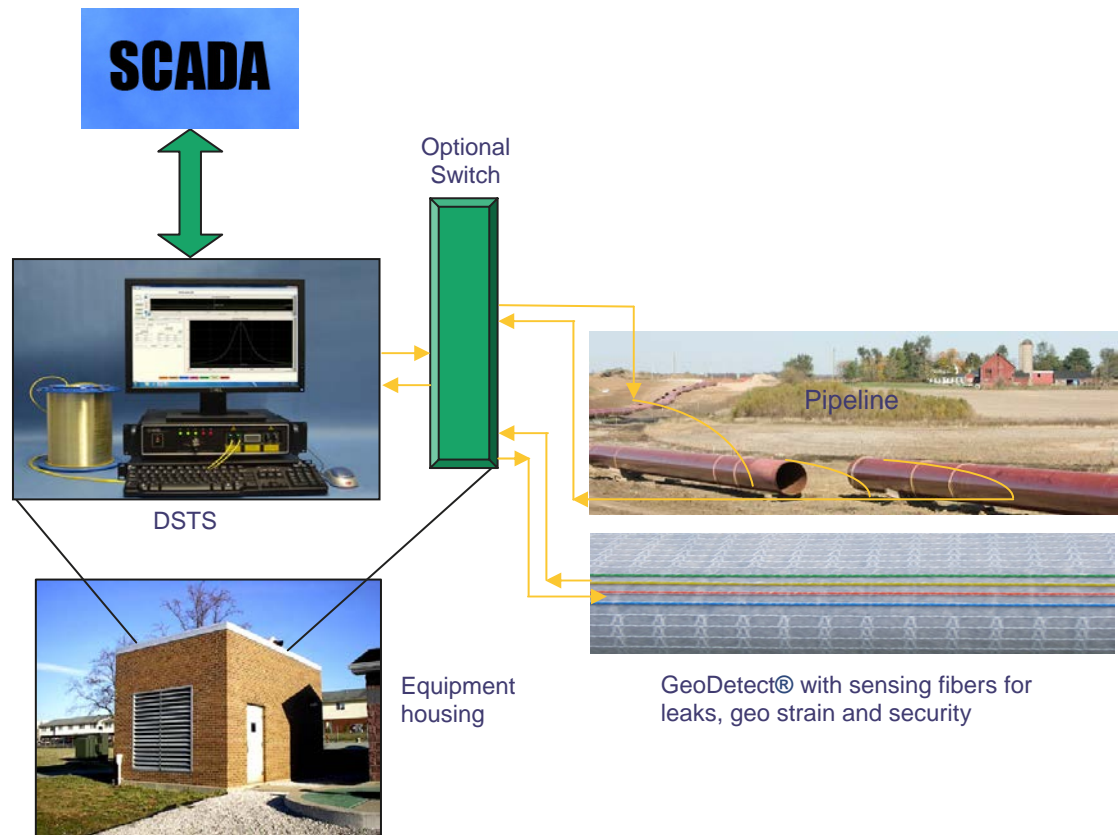
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The OZ Optics ForeSight™ DSTS interrogates, measures, logs, and generates alarms and reports based upon the project's initial setup. No further re-calibration is necessary. It is capable of interfacing via a Remote Database Access (RDA) to a Supervisory Control And Data Acquisition (SCADA) system. Interfaces on the DSTS include Ethernet, USB and RS232.

Measurement time can vary by model. The standard model will take a nominal measurement in 3 minutes and a long range, wide metric measurement in 7 minutes. The high speed model produces the same results in 15 seconds to 3 minutes. Measurement quality is not impacted. OZ Optics' quality of measurement allows the normal speed model be used for corrosion detection on critical pipelines. Optionally, any model is capable of providing 10 cm spatial resolution for up to 2000 m of sensing fiber.

Multiple channel configurations can include an optional internal 1x2 switch with each ForeSight™ DSTS System. Additional external optical switches are available from OZ Optics that are controlled via the interface of the DSTS System.

A typical layout for pipeline monitoring is shown:



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**Global Leader in Fiber Optic Products
Since 1985**

219 Westbrook Rd., Ottawa, Ontario, CANADA, K0A 1L0 E-mail: sales@ozoptics.com
Tel: +1-613-831-0981 Fax: +1-613-836-5089 Toll Free: +1-800-361-5415