



# Brillouin DSTS System for Intelligent Dam and Levee Monitoring

## OZ Optics ForeSight™ Brillouin DSTS Interrogator

Distributed Strain and Temperature Sensing instrumentation equipment provides an effective means to monitor earthworks, dams and levees. Load strain, geological shifts, temperature, inferred flow, structural integrity, and even rodent infestations can be measured or monitored via the same interrogator when using the ForeSight™ DSTS Brillouin OTDA.



OZ Optics ForeSight™ Brillouin DSTS

### PERFORMANCE MONITORING\*

- Strain Monitoring
- Integrity Assurance
- Temperature Measurement
- Flow Mapping
- Local and remote control, recording and reporting

### PRECISION

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

### SPEED

- Standard Model: 3-7 minutes
- High Speed Model:
  - 15 seconds to 3 minutes,
  - 1 second integrity mode

For more information on any of our products or services please visit us on the Web at: [www.ozoptics.com](http://www.ozoptics.com)

### Solution Requirements

Successful implementation of DSTS systems for tailings dam or other earthworks projects will require several fields of engineering to work with each other:

- OZ Optics DSTS Equipment
- Non-condensing humidity facility
- AC Power

Geological engineering services

Professional fiber installation team

Optional: Interfacings to a SCADA or other monitoring system

Optional: External optical switch enables multiple fiber monitoring with a single unit.

The OZ Optics ForeSight™ Brillouin DSTS interrogates multiple measurement modes to provide localized cable strain and temperature data along the entire fiber length. ForeSight™ is proven in leak and flow mapping by monitoring temperature precisely. These high precision measurements with the ability to separately measure strain and temperature are crucial to properly monitor variables caused by separate and simultaneously occurring events. Additionally, the DSTS performance allows it to operate in disaster monitoring mode; alarming on temperature shifts and strain load changes associated with pending structural failure.

The type of monitoring is determined by the effects that one desires to observe. For example:

- Monitoring of very tiny signals allows strains associated with small geological shifts to be measured. The DSTS can be used to accurately identify the location of these shifts.
- Monitoring of larger signals allows more accurate modeling of the integrity of the structure. This makes it easier to measure subsequent shifts, which may result from chemical degradation, man-made damage, or loss of integrity due to biological destruction.
- Monitoring of very large signals allows easy measurement of shifts in position, overtopping, and integrity.
- Long-term performance and post-event analysis assure the structural integrity.

\*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 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 goal of the measurement. For example; during a heavy rain event, disaster monitoring provides 1 second measurement speed. In daily monitoring an accurate measure will typically take one and a half minutes. Depending on set-up, the high speed model produces accurate results in 15 seconds to 3 minutes.

Multiple channel configurations via the internal switch gives installers the option of using over 20 additional channels via external optical switches. Control is provided via the interface of the DSTS System.

For optimal performance, OZ Optics recommends the use of professionals from three fields: geological engineering services, fiber optics sensing technology, and fiber cable integration & installation. OZ Optics specializes in making the best Brillouin sensing technology in the world. Geological services companies should be contracted to provide installation guides to match the goals of measurement to real-world conditions. A professional installation crew is likewise required to assure proper bonding and installation of the sensing fibers.

## A typical layout for Tailings Dam monitoring is shown:

