Building and Protecting American Infrastructure Through Optical Fiber

ofs | FURUKAWA SOLUTIONS

The Importance of Fiber Optics

- FBA and RVA Market Research documented that fiber broadband is considered the best service delivery method in terms of speed and reliability
- Individuals highly valued high-speed broadband to provide access to medical care (71%), independent living for seniors (70%), and home safety (69%) among the highest applications
- As of June 2023, an estimated 52 million locations in the United States are serviceable by fiber, roughly 46% of the country

SOURCE: Doug Mohney of Fiber Broadband Assocation, "Fiber Preferred by Nearly Two-Thirds of U.S. Consumers" *January 4, 2024*

OFS has Deployed ~5 Billion Kilometers of Optical Fiber*

~6,504

Round Trips from Earth to Moon

*as of OFC Plenary Talks 2024

What are BEAD and BABA?

- **BEAD: Broadband Equity, Access and Deployment**
- Bipartisan Infrastructure Law
- To fund high-speed internet infrastructure deployment across the United States
- BEAD program aims to ensure that everyone in America has access to affordable, reliable, high-speed internet

BABA: Build America, Buy America Act

- Enacted as part of the Infrastructure Investment and Jobs Act
- Establishes a domestic content procurement preference for all federal financial assistance for infrastructure projects
- Iron, steel, and manufactured products must be produced in the United States

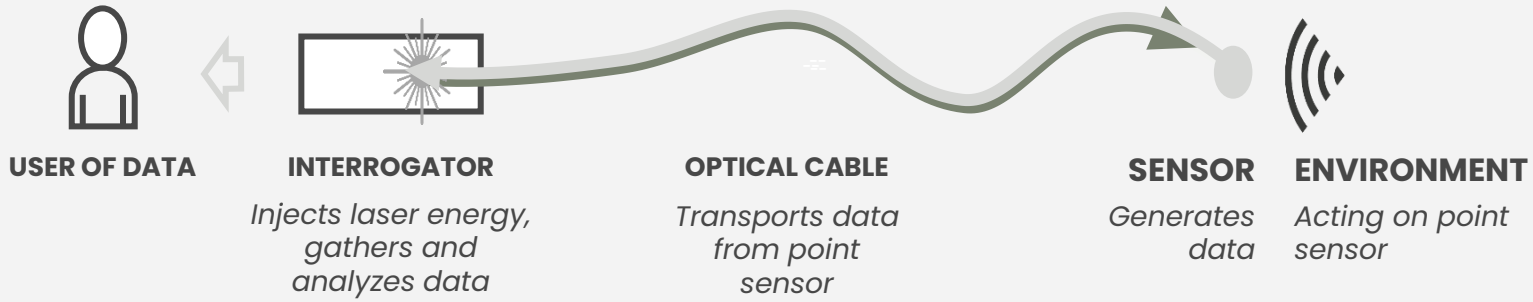
Leading Manufacturer of Optical Fiber & Fiber Optic Cable in the USA

At OFS, we specialize in manufacturing high-quality optical fiber and fiber optic cables at our advanced facilities in the USA. Our state-of-the-art manufacturing ensures superior quality and reliable performance for your infrastructure projects. Our locations in the United States are:

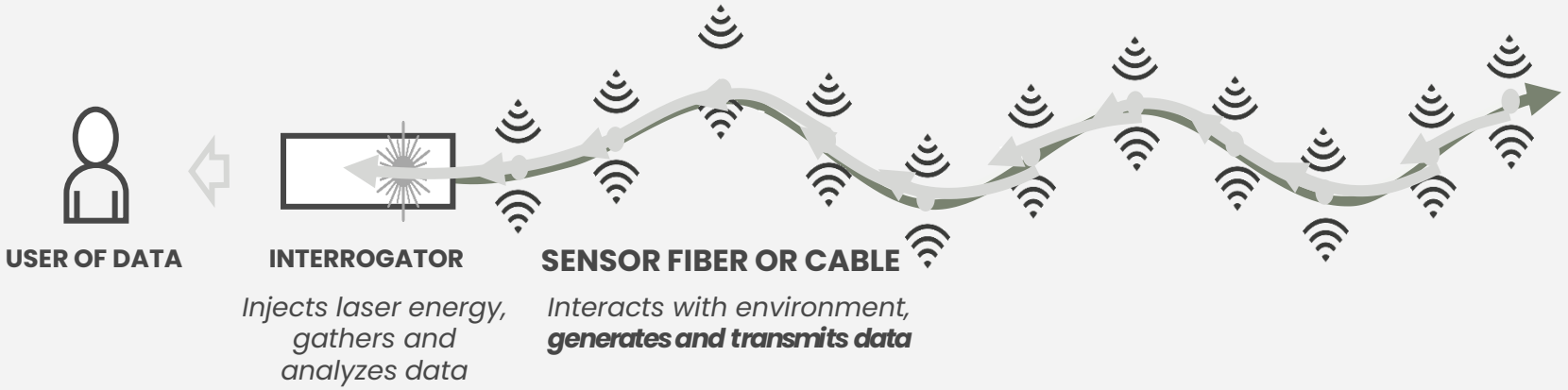
- Norcross, GA
- Carrollton, GA
- Avon, CT
- Somerset, NJ
- Sturbridge, MA

What is Distributed Fiber Optic Sensing (DFOS)?

Traditionally, sensing takes place at the end of an optical cable within a sensor. The fiber optics are just transmitting that data back to the source so it can be interpreted in a computer system called an Interrogator

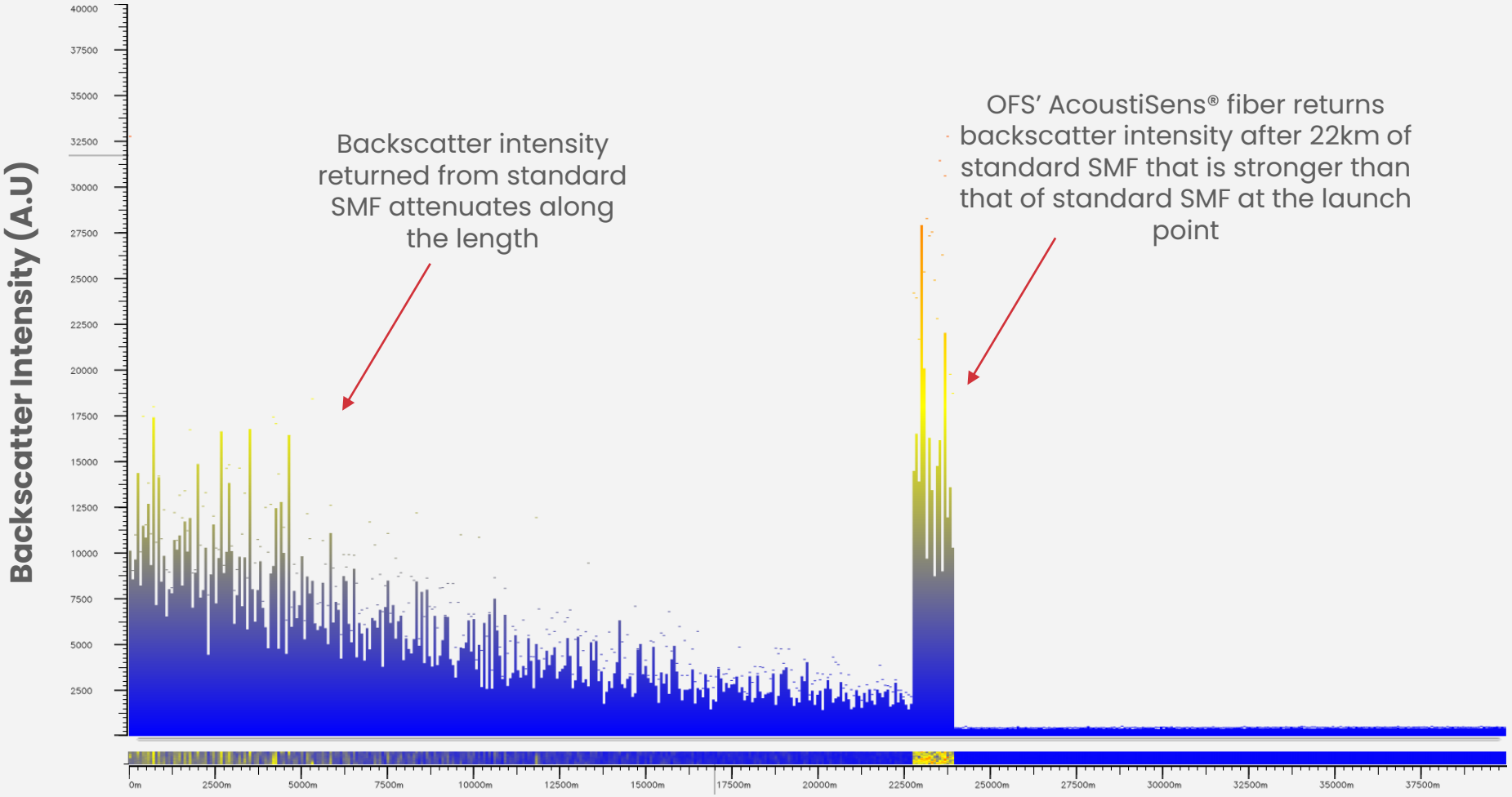


In distributed fiber optic sensing (DFOS) the optical fiber or cable both gathers the sensing information and transmits it back to the interrogator. You can collect data along the whole length of the fiber optics instead of just at one point in the end.



This is DFOS

Specialized Fiber Optics for DAS

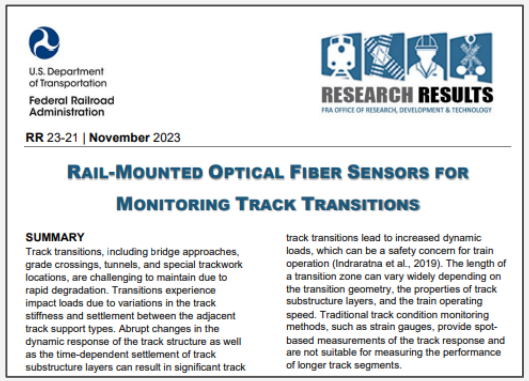


- Distributed Acoustic Sensing (DAS) using Rayleigh backscatter
- Engineered fibers move beyond standard fiber for increased sensitivity and range in DAS applications
- Other specialized sensing fibers modify optical characteristics for temperature and/or strain sensing.

Fiberoptic Sensing Applications in Infrastructure

Valuable across Industries

Rail



U.S. Department of Transportation
Federal Railroad Administration

RESEARCH RESULTS
FRA OFFICE OF RESEARCH, DEVELOPMENT & TECHNOLOGY

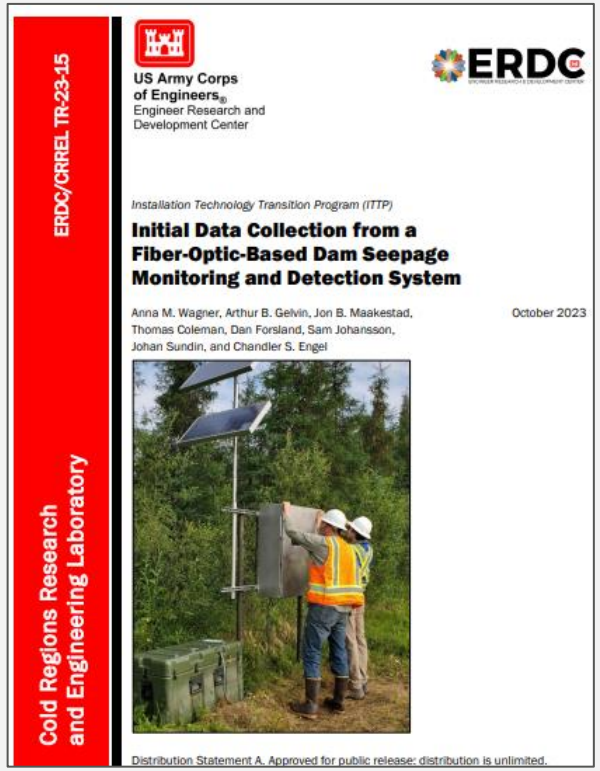
RR 23-21 | November 2023

RAIL-MOUNTED OPTICAL FIBER SENSORS FOR MONITORING TRACK TRANSITIONS

SUMMARY

Track transitions, including bridge approaches, grade crossings, tunnels, and special trackwork locations, are challenging to maintain due to rapid degradation. Transitions experience impact loads due to variations in the track stiffness and settlement between the adjacent track support types. Abrupt changes in the dynamic response of the track structure as well as the time-dependent settlement of track substructure layers can result in significant track track transitions lead to increased dynamic loads, which can be a safety concern for train operation (Indraratna et al., 2019). The length of a transition zone can vary widely depending on the transition geometry, the properties of track substructure layers, and the train operating speed. Traditional track condition monitoring methods, such as strain gauges, provide spot-based measurements of the track response and are not suitable for measuring the performance of longer track segments.

Dam



ERDC/CRREL TR-23-15

US Army Corps of Engineers®
Engineer Research and Development Center

ERDC

Cold Regions Research and Engineering Laboratory

Installation Technology Transition Program (ITTP)

Initial Data Collection from a Fiber-Optic-Based Dam Seepage Monitoring and Detection System

Anna M. Wagner, Arthur B. Gelvin, Jon B. Maakestad, Thomas Coleman, Dan Forsland, Sam Johansson, Johan Sundin, and Chandler S. Engel

October 2023

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Future: Combined data and structural sensing?