

Fiber Optic Sensing System (FOSS)

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NASA Armstrong's Fiber Optic Sensing System (FOSS)

FOSS is a shape and strain sensing system offering real-time processing and lightweight, flexible, robust operation

The system can be used to determine:

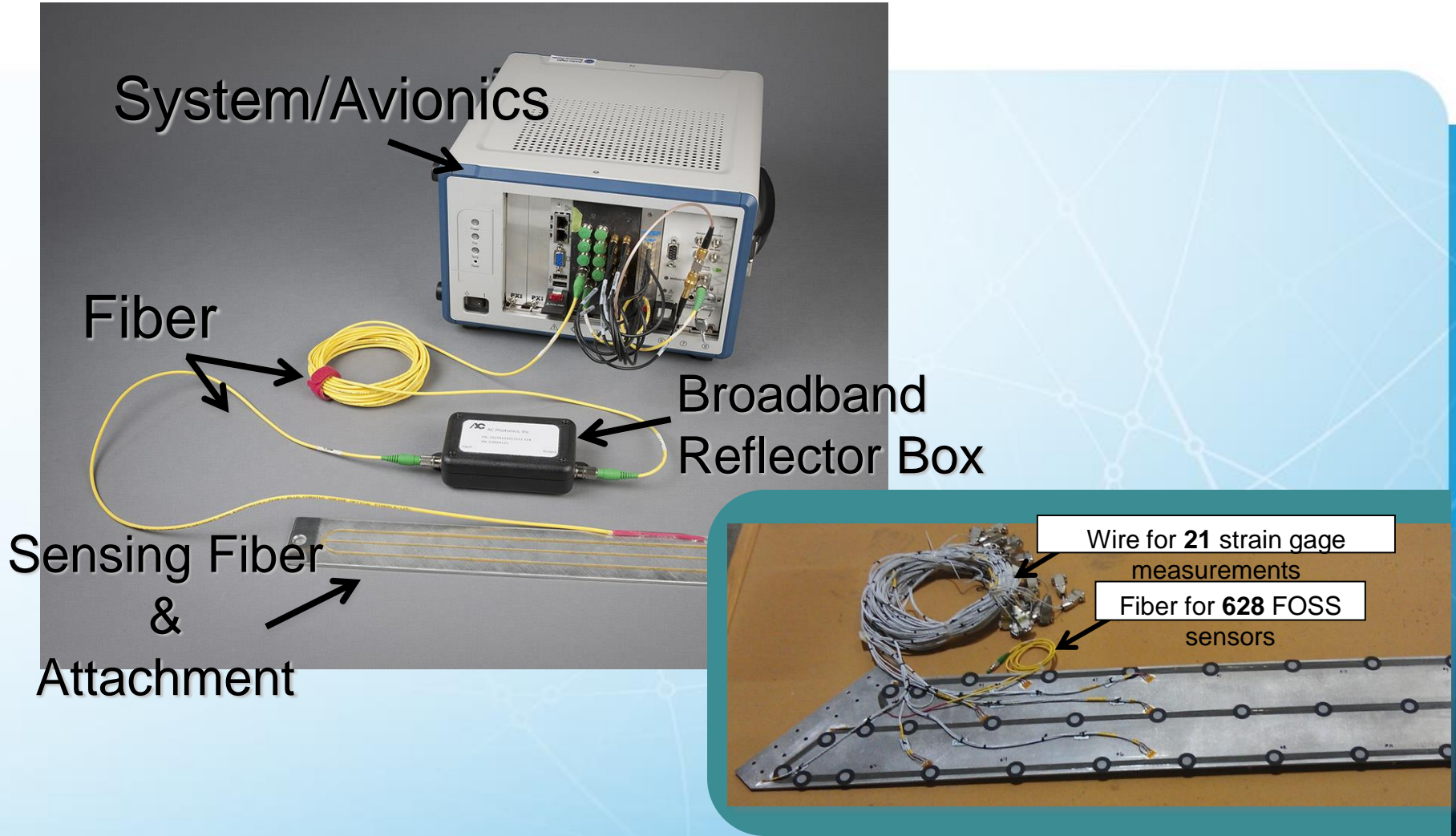
- 2D and 3D shape
- Temperature
- Liquid level
- Pressure
- Loads



Parameters can be measured alone or in combination



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For the first time ever, real-time strain measurements can be used to:

- Determine the shape of an aircraft's wing
- Monitor the structural integrity of buildings, off-shore structures, oil rigs and pipelines
- Determine the liquid vs. gas levels in tanks and cryogenic applications
- Ensure precise placement of the tiniest catheters and drilling bits



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The FOSS approach employs fiber Bragg grating (FBG) sensors and optical frequency domain reflectometry (OFDR) sensing

Traditional Strain Gage	NASA's FOSS Approach
Bulky and heavy	Streamlined, lightweight
One measurement per wire	Thousands of sensors on each hair-like fiber
Standard processing	Real-time, fast simultaneous processing up to 100 scans per second

Patents and Awards for NASA Armstrong's FOSS

The FOSS portfolio is owned by NASA Armstrong. It includes 6 patents and 1 patent pending:

U.S. Patent No.	Title
7,520,176	Method for Real-Time Structure Shape-Sensing
7,715,994	Process for Using Surface Strain Measurements to Obtain Operational Loads for Complex Structures
8,700,358	Method for Reducing the Refresh Rate of Fiber Bragg Grating Sensors
8,970,845	In-Situ Three-Dimensional Shape Rendering from Strain Values Obtained Through Optical Fiber Sensors
8,909,040	Method and Apparatus of Multiplexing and Acquiring Data from Multiple Optical Fibers Using a Single Data Channel of an Optical Frequency-Domain Reflectometry (OFDR) System
9,009,003	Apparatus and Method for Elimination of Polarization-Inducing Fading in Fiber-Optic Sensor System

Awards

2013 R&D 100
Award

2014 FLC
Excellence in
Technology
Transfer Award

NASA 2014
Invention of the
Year Runner-Up

Market Size/Impact for NASA Armstrong's FOSS

*Analysts estimate
that the market for
fiber optic sensing
could reach
\$4 billion by 2017*

Source: ElectroniCast
(<http://optics.org/news/4/6/17>,
June 2013)

FOSS is applicable to many markets, notably:

- Aerospace and aeronautics
- Oil and gas
- Medical/Surgical
- Cryogenic applications
- Wind energy



Seeking Licensing Partners for NASA Armstrong's FOSS

NASA Armstrong is actively seeking licensing partners for the FOSS technology in key target markets.

Armstrong strives to make the licensing process simple and offers support to walk you through the process through our Technology Transfer Office.



Contact Us to Learn More about NASA Armstrong's FOSS Portfolio

Technology Transfer Office NASA's Armstrong Flight Research Center

Go online:

<http://www.nasa.gov/offices/ipp/centers/dfrc>

Call:

661.276.3368

Or visit us today at

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