LUMIKER

Technological Applications
Structural Monitoring

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RDT company

LUMIKER

We are a company formed by industrial and telecommunications engineers with experience in the **electrical sector**. For several years we have been investigating the different sensor technologies **in optical fiber** as **Faraday, Bragg, Brillouin, Raman and Rayleigh.**

We have multiple patents that allow us to obtain real time measurements of any asset.

Three years ago, we developed CAMOS for high voltage cables being the first company in the world to locate, predict faults by monitoring cable variables.

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Mission & Vision

- ✓ Society to be more efficient in Energy Management by using Photonic Systems.
- ✓ Improve Costumer OPEX with the best Asset Digital Monitoring Technology.
- ✓ Transfer Knowledge to our ecosystem with our turnkey Optic, Sensing and Electronic Solutions.

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TEAM

Benjamin Rosende
CEO& Founder RDT Group
Meng Industrial Engineer

Javier Bengoeceha
CTO & Innovation Director
MEng Teleco. Engineering

Izaskun Saratxo
SW Leader
Meng Teleco. Engineering

Juan Luis Garcia
Mechanical Leader
Meng Mech. / Beng Chemical Eng.

Daniel Bueno
HW Leader
Meng Automation & Electronics

Susana Valdivielso
Procurement & Admin Leader
Degree in Technical Administration

David Bengoechea
Project & Industrialization Leader
Meng Materials & Mechanical

Manuel Muñoz
Managing Director
Meng Aerospace with French

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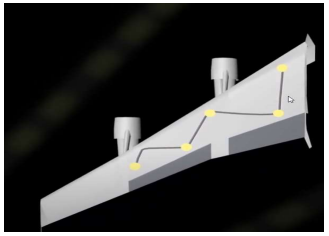
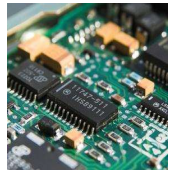
CONVENTIONAL SENSING IN AIRCRAFT

Sensors | Weight | Communications | Power Supply



Processing



Electronics

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PROBLEMS

Self-Powered Systems +

Hard to establish correlations

Limited Cloud Process

LIMITED COMMUNICATIONS

LIMITED INFORMATION

IMPOSSIBLE TO UPDATE REMOTELY

Electronic Components +

DAMAGE

HIGH COST OF MAINTENANCE

RECURRENT OUTAGES

FAILURES DUE TO EMI & OTHER BAD WEATHER EVENTS

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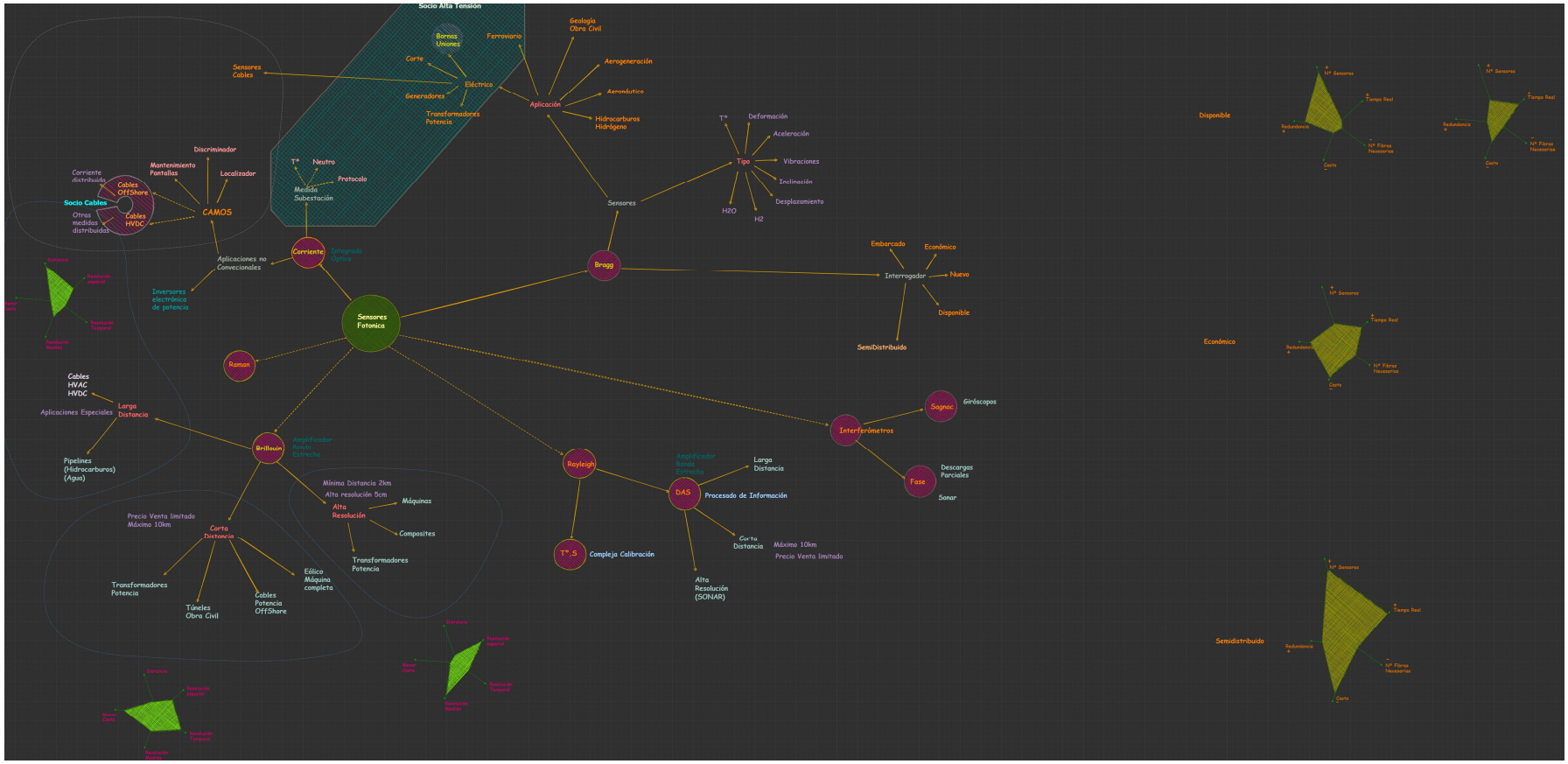
Technologies vs Product Map



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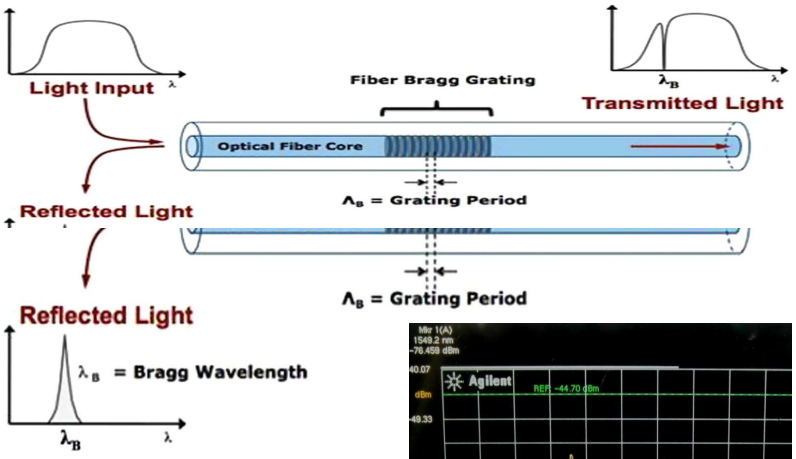
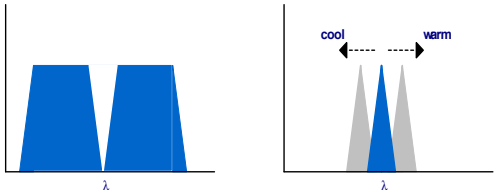
Lumiker Bragg

BRAGG

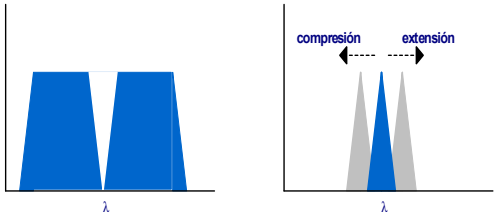
- Any modification of grating period, changes the Bragg wavelength.
  - 10pm -20pm /°C
  - 1pm / 1 microStrain
- It is possible to place numerous sensors in the same optical fiber (<30).
- Between the interrogator and the sensors there may be several kilometers (<20km), linked with a single mode standard optic fibre (G652).



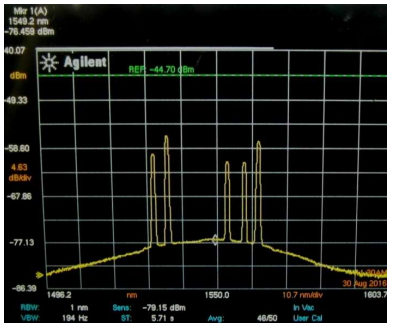
$$\lambda_b = 2n_{ef}\Lambda$$

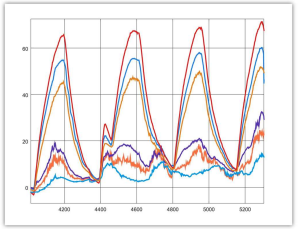


Temperature Measurement are manufacutrd
In order for the light to change pitch due to temprature variations.



ON the contrary to measure Strain, the temperatura effect on the light is Compensated.





Proposed Technology for Wing Monitoring

BRAGG

Optical Box

Light Emitter and Receiver

LK Patent – Multiplexer.

Can read from X Fibres, N different Sensors

Bragg Optic Sensors

Temperature, Strain, Pressure…

TELEMETRY
TEST CPU

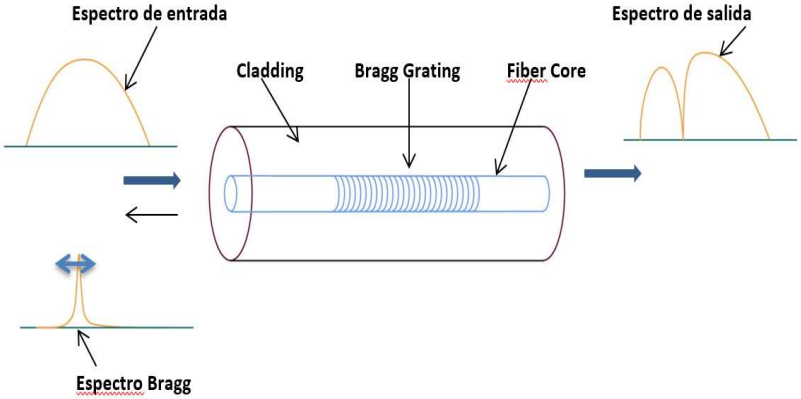
CPUs & Interrogators

Signal Treatment & Processing

Remote Connections

Local HMI Connection | Display

CLOUD &
DATA
Management



Bragg Networks *are sensors on optical fiber for the measurement of deformation, vibration, temperature, inclination and other parameters.*

A Bragg network is a mm /nm periodic or aperiodic disturbance of the effective refractive index in the core of an optical fibre, over a certain length of, for example, a few mm or cm.

Benefits of BRAGG technology for Wing:

- ✓ Measurement of ANY Variable.
- ✓ Passive & Di-Electric +(Always Works)
- ✓ Continuous Real-Time monitoring.
- ✓ Electromagnetic Resistant.
- ✓ Easy to Install & Small ins Size (Curing Cycle in Composites).

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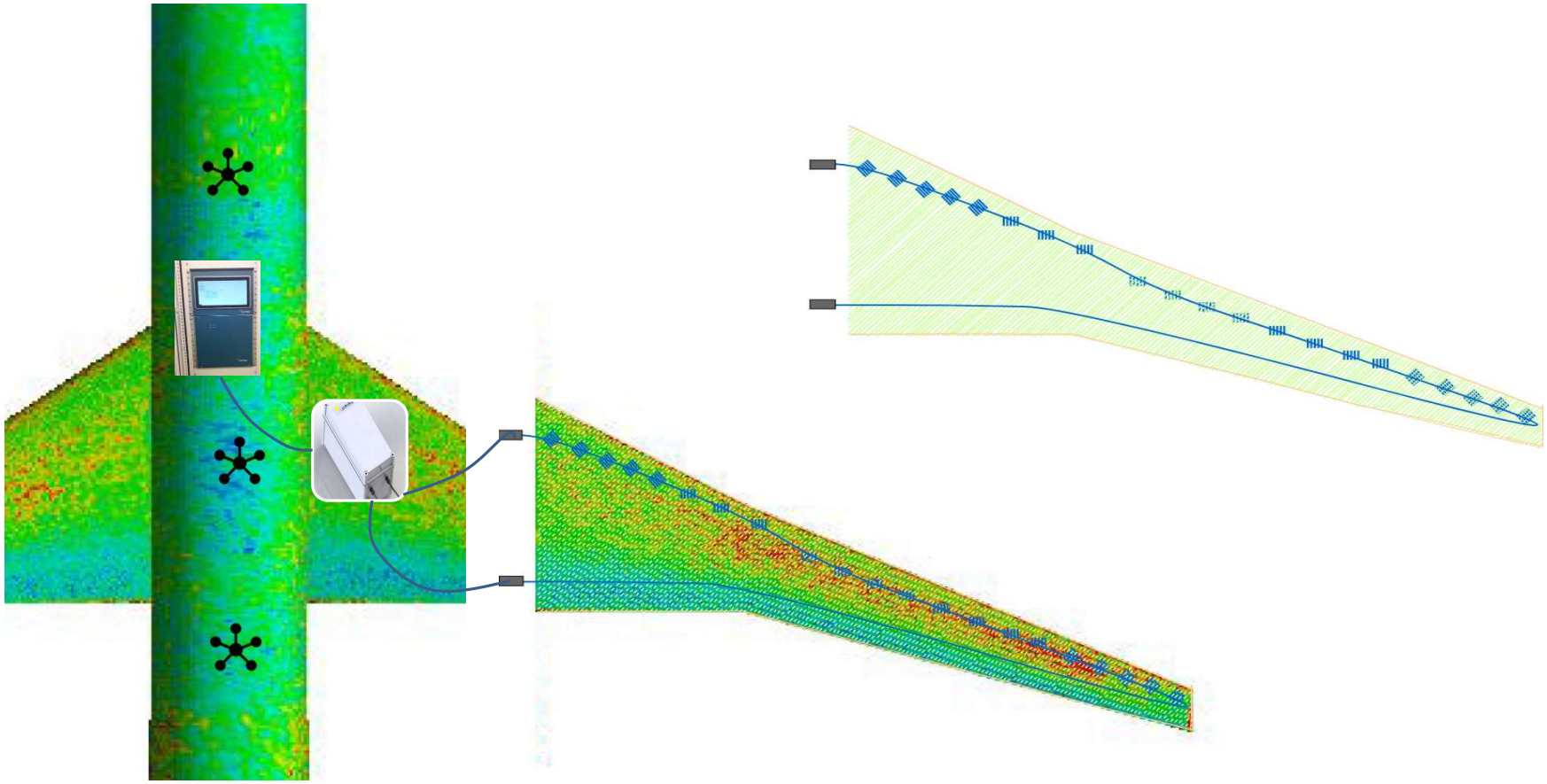
Proposed Technology for Wing Semi Distributed Monitoring

BRAGG



LUMIKER BENEFITS

BRAGG

PASSIVE SYSTEM

RESISTANT TO ADVERSE ENVIRONMENTAL CONDITIONS & CORROSION

EXCELLENT ELECTROMAGNETIC COMPATIBILITY

NO MAINTENANCE REQUIRED

REAL-TIME MONITORING

MOREPOINTS OF INFORMATION FOR THE TEST

REMOTELY UPDATES

LESS WEIGHT

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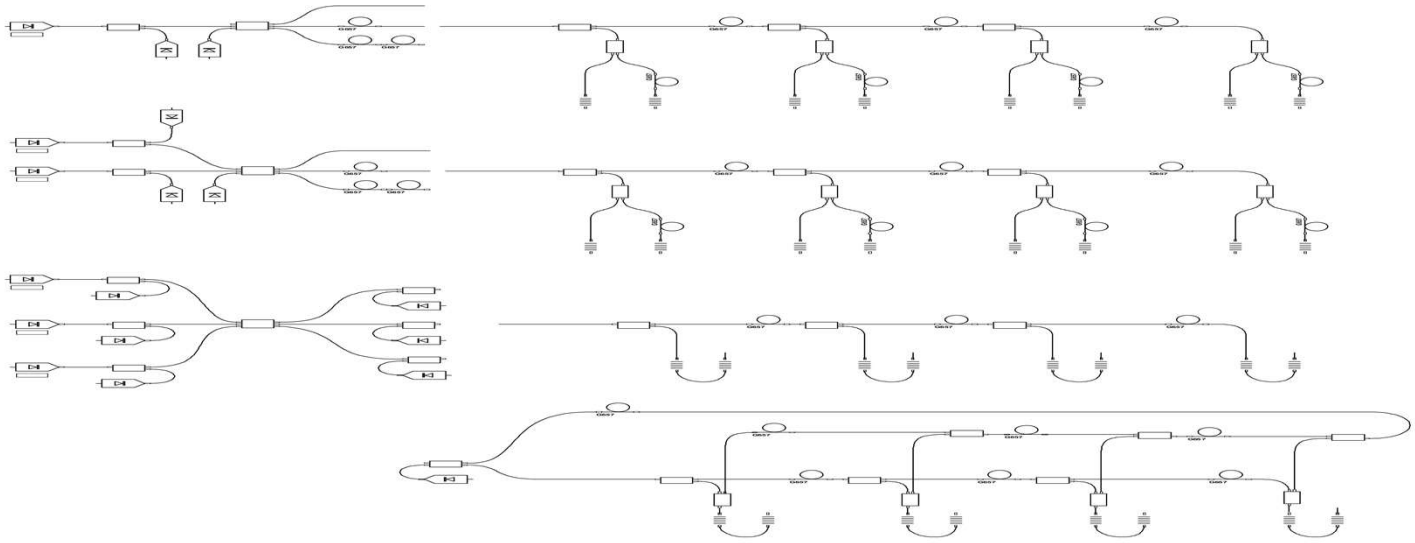
LUMIKER BENEFITS

BRAGG

Unlike Other Strain or Temperature Measurement methods, LUMKIER Bragg Products offers:

- A wide measurement range.
- Excellent linearity in the processed signal.
- Repeatability and “real” Real-Time data (1kHz).
- Reference Strain can last a lifetime without the need for recalibration (Pattern is permanently written
- Multiplexing of n Sensors with up to x fibre cables.
- Mounting Strain and Temperature Sensors in the same series, hence calibrating the received strain vs a temperature.
- Avoids Light Attenuation, and has redundancy.



LUMIKER INTERROGATORS

BRAGG

Common features to all models::

Wavelength measurement accuracy		±0.5pm
Data recording	physical media	file server Ethernet/PC/SD card
	recording time	1s PC and Ethernet (5s in LTS60 models) 10s SD card
Synchronism		SNTP
Real Time Clock (RTC)		YES
Language		Spanish, French, English, Italian
Sensors FBG	wavelength	3 nm gap
	bandwidth	0.3 nm
	Temperature range	-25ºC a +125ºC
Emitter: SLED	wavelength	1550nm
	bandwidth	±40 nm
	power	0 dBm
Linking fiber optical		G652
Fiber optical connections		SC/APC
Rear port communication	protocol	Modbus RTU
	physical media	FO multimode
Communication TCP/IP	protocol	FTP
	physical media	RJ-45 Ethernet
Front port communication	protocol	ASCII
	physical media	USB –type B
HMI		3,5" TFT LCD backlit 320x240 Touch display
Digital outputs	quantity	2+8, of signalling (optical fault and internal fault) and 8 configurable
	nominal voltage	250 Vac
	peak current	16 A in DC 30 A during 4 s
	operation time	< 8 ms
	reset time	< 6 ms
	connectors	Phoenix type 5,08 mm
Housing	dimensions	1 rack 2U x 49"x 355 mm
	weight	5 Kg
	material	aluminium
	IP	IP51
EMC	substation, in power supply and signalling	class 4
Climatic Tests	operation temperature	0ºC +50ºC
	storage temperature	-20ºC +70ºC
	humidity	Up to 95% non-condensing
Power Supply	auxiliary voltage	43 – 160 Vdc
	power	12W
	connector	Phoenix type 5,08mm

BRG128 MODEL

Model	BRGL02	BRGL04	BRGL08	BRGL16
nº fibre channels	2	4	8	16
nº FBG sensors	16	32	64	128

LUMIKER SENSORS

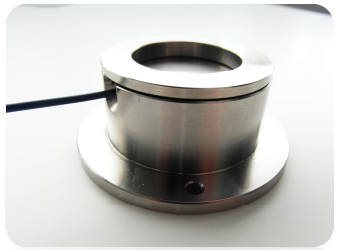
BRAGG

LUMIKER USES BOTH COTs & Up to Spec Developed Sensors depending on the use and if the Product is Existing or going to be Built:

- **To be Built Products:** Sensor is designed to be integrated during the manufacturing process, so the sensing application is embedded.
- **Existing Products:** Sensor is adhered to an external or internal Surface, leaving a section of the sensor free to be able to account for relative displacements.
- All the sensors can be pre-connectorized or fused with the fibre cable depending on the client requirements.



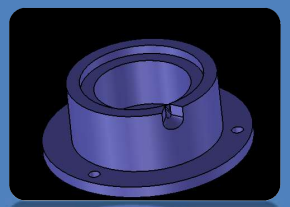




LUMIKER SENSORS

BRAGG

- LUMIKER USES BOTH COTs & Up to Spec Developed Sensors depending on the use and if the Product is Existing or going to be Built.
- LUMIKER Guarantees the offsite and onsite calibration between all sensing elements.

T310 High-Shock Proof Accelerometer	High Impact Accelerometer, can be placed qin sets of ones or in arrays (Up to 30) on the same fiber line. Uses ultra-precise FBGs to measure from 0Hz.	Wavelengths 1530 a 1570 nm, ±0.5 nm
		Frequency Range 1. a 3000 Hz
		Sensitivity > 4 pm/g
		Resolution < 2500 µg
		Impact resistance ±500g
		Precission < 1% Full Scale
		Pahse <±5º
		Axial Interference < 30dB
		AntiRust & PPT
		Dimensions 52 x 50 x 24 mm
		Weight 150 g
		Can be Adhered with Structural glue

LK110 Armored Cable FBG Array Sensor	FBG Cable with a sensor array (100) high sensitivity to monitor strain in semi-distrinbuted Monitoring Project.	Wavelenghts: 1460 a 1620 nm, ±0.5 nm
		Strain Senstivity ~ 8 pm/g
		With Temperature Compensation.

LUMIKER OBs

BRAGG

- LUMIKER has a specific winding (Patented) fibre of 3 channels which guarantees low fibre utilization and systemic redundancy.
- LUMIKER can multiplex a maximum of 9 FBGs arrays with 1 OB.

Wing Optical Fibre Monitoring

ADDITIONAL CHARACTERISTICS

LUMIKER technology makes it possible to reduce the use of existing fibre optics, through the installation of multiplexers that increase the number of optical transformers connected at the same time. It also includes the internal manufacturing of patented double braided fibre to have system redundancy.

Specifically Adapted & Calibrated Bragg Sensors for ease of installation, high precision and durability.

The Product is Standardized and Modular: The system consists of 3 elements (Processing unit, Optical Bragg Sensors and Multiplexers), the number and placement can be adapted depending on the specific needs and characteristics of each site. Each Sensing equipment can include special connectors to ease the assembly and disassembly of blades.

The system is passive, Atex and EMC and designed to last the same life as the facility not requiring any additional Maintenance Task, guarantee of a continuous non-stop monitoring.

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Take Away

Solution Economic Efficiency:

- ✓ Can adapt the interrogator in Cost depending on the Real-Time and nº of Sensors
- ✓ Increases the Number of Monitored Variables with the same CPU | Interrogation Equipment.
- ✓ Reduces Operational Cost (Passive Sensors).

Data Precision & Security:

- ✓ One Single CPU to interrogate all sensors, with integrated data treatment.
- ✓ Increases the precision, real-time and availability of data.
- ✓ Reduces errors associated with the use of multiple pieces of equipment.

Lumiker advantages:

- ✓ Increases linearity of provided data, and effectively eliminates “noise”.
- ✓ Uses redundant SLED interrogators improving the solution resiliency and reducing attenuation.
- ✓ Uses patented multiplex equipment to simplify the FTI Installation.
- ✓ Reduces Weight
- ✓ Provides end to end support, from the selection of the best solution to providing aftermarket data correlation services.

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CONTACT

LOCATION

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