AUTOMATED MONITORING SYSTEMS
- FIBER OPTIC
- FBG TECHNOLOGY

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SYLEX --- Fiber Optics

▲ Fiber optic technology is the DNA of Sylex
▲ Production and development of new products

2019
Family owned company with 260 employees

2011
Introduction of FBG sensing and monitoring solutions

1995
Sylex foundation
Real life application examples

Interconnections
Fiber optics - CERN projects

**ALICE**
- In cooperation with Centre de physique des particules de Marseille
- Data center application

**ATLAS, CMS**
- In cooperation with Michigan State University
- Data transfer from detector to individual stations
Further examples

Novartis, data center, Switzerland
▲ Co-development and supply of interconnect solution for data centers
▲ Data processing during pharmaceutical development

FTTh, Belgian telecom
▲ Complex fiber optic infrastructure for Fiber-to-the-home
▲ Turn key solution co-development and supply

Alcatel Submarine
▲ Sub-sea cables interconnect solutions for base stations
▲ Turn key solution co-development and supply
FBG technology
Sensors & Sensing systems
FBG technology – Introduction

- Light serves as the signal carrier
- Market proven solution

- Technology advantages
  - System cost
  - All advantages from Fiber Optic
  - Plug&Play design
  - Applicable in harsh environment
FBG technology – Components of monitoring systems

SYSTEM SOLUTIONS
▲ Automated monitoring systems
▲ Tailored measuring systems

PRODUCTS
▲ Sensors
   ▲ Strain / Stress / Deformation
   ▲ Temperature
   ▲ Displacement
   ▲ Tilt
   ▲ Vibrations
   ▲ Pressure
▲ Data loggers (interrogators)
▲ Connection cables
▲ Analysis and Visualization SW

SERVICES
▲ Monitoring services (local and remote)
▲ Installation services
▲ Online data visualization
▲ Rental of instruments
Real life application examples

Sensors & Sensing systems
Tunnel monitoring  (Project 1)

Real time monitoring of deformations of the **sub-sea tunnel**
Built almost 30 years ago
More than 50km long, part of the structure undersea
Deepest point, almost 100m below sea bed
Total construction cost several billions

Constantly challenged structure
Changes in environment conditions
Movement of the sea bed or underlay
Increase in the background electromagnetic interference

Illustration image
Tunnel monitoring

Real time monitoring of deformations of the sub-sea tunnel construction

**Characteristics:**
- Simple and quick-to-install
- Scalable for further extensions
- EMI immune
- On-line monitoring with early warning for critical events
Sewer monitoring (Project 2)

▲ Development impulse – Sewer monitoring in London
▲ Existing sewers need to be instrumented while new tunnels are being dug
▲ Those old sewers date back hundreds of years
▲ All equipment needs to be ATEX rated

▲ The Tideway project is a “super-sewer” that is:
▲ 25km long
▲ 7.2m in diameter
▲ Running from Acton down to Abbey Mills
▲ A construction project valued at £4.2 billion
A cofferdam will be built directly opposite the sewer

Such works are likely to cause displacements

FEA analysis have been conducted

5 cross sections – each with 8 strain segments

Simplified segment replacement

24/7 online data access

Sewer monitoring  (Project 2)
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Monitoring of existing sewer system while parallel tunnel construction in progress
Water dam, Alps, Austria

▲ TU Graz
▲ Long gauge sensors: SC-01

Requirements:
▲ High sensitivity of strain measurements
▲ Long term stability over several years
▲ Chain-able configuration of sensors
Water dam, Alps, Austria
Pipeline monitoring, Cantiere Pedaso - Italy

Monitoring of a gas pipeline integrity

**Requirements:**
- Electrically passive monitoring system
- Fast and quick installation
- On-line access to measured data
- Modular system
Monitoring of pier integrity

**Requirements:**

- Robust sensor and cable design
- Extensometers with 1mtr gauge lengths
- Temperature compensated (integrated in sensor)
- Variable pre-strain setup during installation
Sea port, pier monitoring, Kazachstan
Dynamic analysis, vibration diagnostics

- 8 kHz sampling through all sensors
- 50 fm measurement repeatability
- Synchronous data acquisition from multiple instruments
Bridge “Podbiel”, Slovakia

Monitoring of temporary bridge – steel construction

Requirements:
- Autonomous system
- Installation during the traffic on
- Re usable sensors
- On-line access to measured data
Bridge “Starý most”, Bratislava

Long term monitoring of the bridge in use and during the build up

Requirements:

▲ Modular system continuously growing with the bridge under construction
▲ On-line access to measured data
▲ Early warning
Bridge “Starý most”, Bratislava
Bridge “Starý most”, Bratislava
Bridge SNP, Bratislava

Real-time long time bridge deck monitoring

Requirements:

▲ Scalability – expandable with new measuring points
▲ Remote measurement system administration
▲ Critical values early warning
Bridge SNP, Bratislava

Benefits:

- Real time information on bridge beams condition
- Ability to identify temperature, traffic and partially weather impacts
- Early warning for exceeded critical values
Structural analysis of industrial instrument

- Measurement of stability of the carrier holding the laser sources
- Experimental analysis focused on identifying possible causes of small inaccuracies of the laser system
- Measurement of two axial strain and temperature
Structural analysis of industrial instrument
Mechanical girder load test, Slovakia

Girder was loaded constantly and exposed to high corrosive environment. The aim of this testing was to verify which of actually available monitoring technologies will provide long term stable measuring results in this environment.

Our FBG based sensors (FFA-01) succeeded to survive this harsh environment for the entire length of testing with very stable measuring results confirming the suitability of fiber-optic technology for such long term monitoring projects in any industry.
Ship monitoring, Turkey
Ship monitoring, Italy

GLOBAL BEND SENSORS

Project originally supplied by FOS&S
Thank you for your attention

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