About us

SHM System are experts in providing measurement solutions for geotechnics and civil engineering. The team consists of scientists and engineers each with over 10 years of experience in the design and implementation of long-term structural health monitoring systems.

SHM System provides measurement support for R&D departments of the largest construction companies in Europe - more than 100 measurement systems have been designed and implemented over the last 6 years. We support our partners at every stage of the project process, from the idea through design and installation to the analysis of measurement data. Thanks to its own research and development department, SHM System has launched and patented a number of world-class innovative measurement solutions, including the design and production technology of composite optical fibre sensors Composite-DFOS.

Do you have any questions? Contact us:

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SHM SYSTEM

Three Times Better

Composite-DFOS
Fibre Optic Sensors

WWW.SHMSYSTEM.PL

Technology that crosses borders

Introducing the Composite-DFOS fibre optic sensor technology: EpsilonRebar and 3DSensor. We created it to take full advantage of the breakthrough possibilities of DFOS (Distributed Fibre Optic Sensing) technology.

DFOS has changed the traditional way of understanding measurement - it has created the ability to observe the distribution of phenomena over the entire length of fibre, which can be thousands of meters long. COMPOSITE-DFOS sensors change the way DFOS technology is used in SHM systems. The innovative construction of the sensors ensures the effectiveness of the strain transfer along the optical fibre, which is an integral part of the sensor. The unique shape ensures perfect cooperation between the sensor and the surrounding structure, and the specially developed composite guarantees the largest possible measuring range up to the strength limit of the glass measuring fibres.

Composite-DFOS brings all the advantages of the DFOS technology and more... 3 times more:

Total range

Monolithic Structure

Measurement Identity

First of all

Total Range

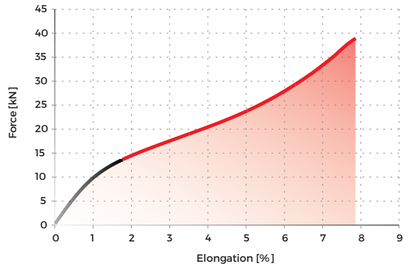
Use of the full measurement range of optical fibres

Get the most out of your options: full utilization of the optical fibre measurement range guarantees measurements even under large local strains such as within the cracks and fractures.

The first fibre optic sensors in the world to utilize the full measurement potential of optical fibres.

The unique sensor material enables strain measurements up to +/- 4% (total measuring range 80,000 με).

EpsilonRebar sensor during strength tests.
Limit strain: 2.5%.



Force-elongation plot for 3DSensor core during the strength test.
Limit strain: >7%.

The optical fibre is integrated with the composite core of the sensor at the production stage, forming a homogeneous, monolithic structure

Secondly

Monolithic Structure

The uniform cross-sectional structure of the sensor guarantees an unambiguous transfer of real strains to the optical fibre

Use a reliable source of data measurement. By eliminating intermediate layers separating the fibre from the medium, you can be sure that the sensor readings accurately reflect the observed phenomena.

The world's first fibre optic sensors with no distorting layers or coatings.

The measuring fibre and the sensor form a homogeneous structure.

Concreting of EpsilonRebar sensors in prefabricated elements

Thirdly

Measurement identity

The integrity of a sensor with a monitored structure

As accurate as ever. Composite-DFOS sensors perfectly reflect the actual operation of the monitored object. The unique shape of the sensors makes them an integral part of the structure. It provides the highest quality of information about the state of the object and the ability to observe phenomena invisible to other fibre optic sensors.

The first fibre optic sensors in the world guaranteeing an unambiguous transfer of strains from the monitored medium (e.g. soil, concrete) to the optical fibre.

Excellent representation of the monitored phenomena thanks to:

A. adequate stiffness and ribbing of the EpsilonRebar sensor,

B. direct displacement measurement by 3DSensor.

Composite-DFOS sensors

With the DFOS (Distributed Fibre Optic Sensing) technology, the fibre optic sensor measures strains and temperature at any point along its entire length - up to 120 km. It replaces hundreds of thousands of individual spot sensors. DFOS is irreplaceable for the monitoring of phenomena occurring over long distances and in areas that even cover entire objects. The fact that there is no additional wiring, a large measuring range and miniature size of the sensors make DFOS suitable even for the most unusual solutions.

Vertical displacements [mm] visualization of suspended bridge span in Rzeszów, Poland

Sensors of the Composite-DFOS family: **Epsilon Rebar** and **3DSensor** is a:

- innovative technologies: Total Range, Monolithic Structure and Measurement Identity
- direct measurement of strains and displacements
- low sensor cost
- easy and fast installation
- high mechanical and chemical resistance
- resistance to electromagnetic interference
- unrivalled measuring range and excellent integration with the monitored medium (structure)
- reliability
- cooperation with any measuring technique (Rayleigh, Brillouin, Raman)

EpsilonRebar with a diameter of 6 mm. Sensors available in diameters from 4 to 28 mm

EpsilonRebar

The world's first monolithic strain sensor

Three times better:

Total range

Monolithic Structure

Measurement Identity

EpsilonRebar enables geometrically continuous measurement of strains of the surrounding medium (e.g. soil, concrete) over distances of up to 120 km. It takes the form of a composite rebar of any diameter. It is designed for direct embedding into the structural member, concrete or soil.

Application

Structural Health Monitoring of engineering structures

Geotechnical and hydrological engineering (i.e. slurry and retaining walls, piles, concrete columns, dams, embankments)

Line structures (roads and bridges, tunnels, railway lines, pipelines and others)

Measuring method: (Raman, Rei[illegible], Brillouin)

Spatial visualization of soil vertical displacements [mm] measured by 3DSensor.

3DSensor

World's first shape sensor for geotechnics and civil engineering

Three times better:

Total range

Monolithic Structure

Measurement Identity

3D sensor with cross-sectional dimensions 3x9 mm. Depending on the required measurement sensitivity, other sensor dimensions are available.

3DSensor is a sensor used to determine the vertical and horizontal displacements of building structures over distances up to 120 km. It is designed for direct placement in the measured medium, for example in soil or concrete. It enables the user to visualise the displacements of the medium in 3D space along its entire length.

Application

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Line structures (roads and bridges, tunnels, railway lines, pipelines and others