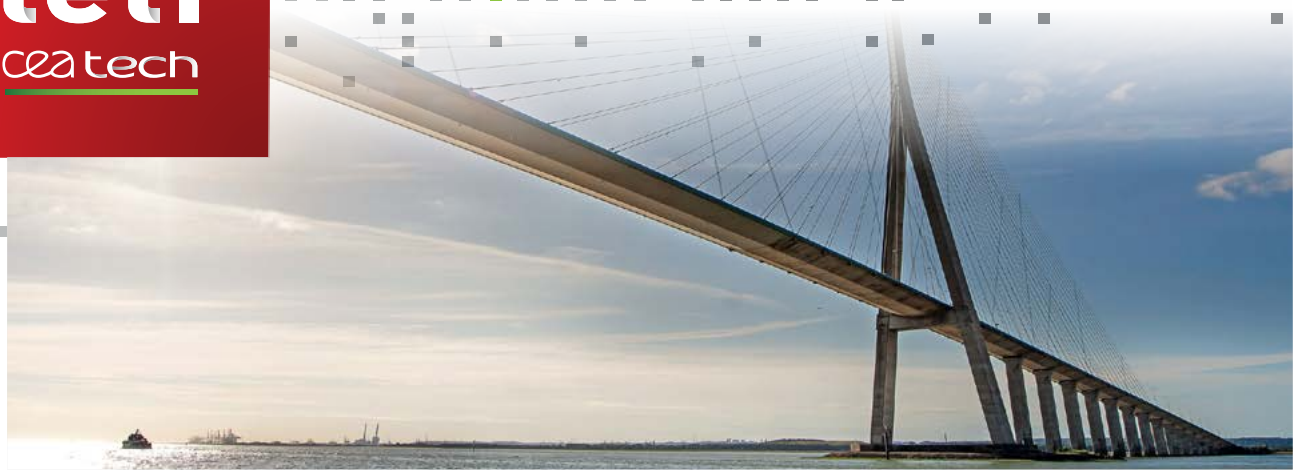

SHAPE CAPTURE

INFRASTRUCTURE MONITORED BY A MEMS-BASED SENSOR NETWORK CAPTURING SHAPE INFORMATION.

WHAT IS SHAPE CAPTURE?

A MEMS sensor network linked to specific mathematical algorithms can give the shape of a structure in real time and for years. Structural shape can be:

- a tracker of structural variation in time
- a detection alarm reporting unusual changes
- a system for measuring geometrical parameters for comparison with structural simulations and monitoring

Installation simplicity, compactness and adaptability are just some of the system's advantages.

This solution is now being adapted for several application including flexible pipes with TechnipFMC and concrete members with Consolis.

APPLICATIONS

Shape capture has multiple applications in:
Civil Engineering :

- Tunnels > altered tunnel shape indicates structural changes within the surrounding ground
- Railways > traffic flow can be improved by instrumenting a specific section to monitor change
- Bridges, roads, etc.

Marine renewable energy:
monitoring structural profile is a key parameter in evaluating the real stresses, to which underwater cables and wind turbines are subjected.

Buildings, boats, etc.

WHAT'S NEW?

This technological solution is suitable for a wide range of applications because the system can be installed for just a few weeks or for several years. Accuracy can be as high as 1 mm/m. Its main advantages are:

- High accuracy of MEMS sensors
- Ease of installation
- Adaptability of number of electronic nodes according to surface profile to be instrumented

HOW DOES IT WORKS?

A number of MEMS sensors (accelerometers, magnetometers, gyrometers) are deployed over a structure based on a predesigned geometrical distribution. Data are acquired, then combined by specific algorithms to reconstruct the structural shape and record vibrations. The application's key parameter is extracted for the specific structural case.

WHAT'S NEXT?

The technology is currently being industrialized by Morphosense, a Leti startup founded in August 2016.

Morphosense builds and markets unique sensor networks for installation on structures to be monitored in the short or long term. The structure is connected and the system records all the Morphosense indicators to provide an exhaustive scan of its structural health.
Morphosense also offers a comprehensive range of services based on continuous, real-time data recording and custom dashboard display including, for example:

- 3D deformation
- Modal frequency
- Spectral analysis

The receiving client company pays a monthly subscription under a Morphosense service contract for a fixed term. Morphosense delivers a periodic report featuring the key parameters jointly defined with the client.

In the near future, the system will be complemented with further developments in the area of interoperability, advanced data processing and communication. Morphosense is already working with Leti in relation to its calibration principle and enjoys the research institute's full expertise acquired over many years.

KEY FACTS:

- Expertise: 10 years of CEA know-how
- Several patents on fundamental technology and on applications
- Several publications
- Contribution to several world conferences (EWSHM, IEEE, etc.)

INTERESTED IN THIS TECHNOLOGY?

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