

# THE CONTINUOUS MONITORING OF INFRA- STRUCTURAL OBJECTS

Information-based decisions due to  
the predictability of maintenance

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Infra **SENSOR**  
SOLUTIONS

# UNIQUE

There are numerous ways to gain insight into the physical condition of infrastructural objects and structural installations. However, the way Infra Sensor Solutions does this is UNIQUE. We use fibre optics to monitor the objects, giving an accuracy down to a micrometre.

## STRUCTURAL HEALTH MONITORING

The name says it all; the structural monitoring of the physical condition of infrastructural objects or civil engineering installations. Subjecting your car to an annual test, having your health checked regularly, checking an aircraft for safety before every flight, these have become the thing to do. However, it is not so common for (railway) bridges, flyovers, tunnels and other infrastructural objects, such as GSM masts, electricity pylons and wind turbines to be regularly tested.

### The most important advantages of our solution:

- ✓ Real-time information
- ✓ No power supply required at the measurement location
- ✓ Insensitive to failure (no interference)
- ✓ Online access based on a TCP/IP link
- ✓ Accurate to the micrometre
- ✓ An unprecedented amount of information from one sensor
- ✓ No resources required for on-site inspections
- ✓ Large distance between the object and the measurement unit (50 Km)
- ✓ Predictability of planned maintenance

### What can be measured?

- |                                 |  |
|---------------------------------|--|
| ✓ Time                          | ✓ Vertical speed of bridges / flyovers |
| ✓ Speed of passage              | ✓ Wear                                 |
| ✓ Deflection                    | ✓ Cracking                             |
| ✓ Settlement/ movement          | ✓ Material fatigue                     |
| ✓ Recovery to original position | ✓ Loading                              |
| ✓ Changes                       | ✓ Weight                               |
| ✓ Vibration                     | ✓ Temperature                          |
| ✓ Influence of use              |  |

### Examples of applicability:

- |   |   |
|---|---|
| ✓ Deflection of (railway) bridges   | ✓ Temperature monitoring (fire detection) in tunnels                  |
| ✓ Monitoring electricity pylons and wind turbines at the critical flexing point | ✓ Monitoring the structure of aqueducts, sluices and quays            |
| ✓ Effects of an increase in traffic on roads, bridges and flyovers              | ✓ Measuring traffic flows on provincial and local roads and motorways |
| ✓ Monitoring the structure of tunnels and sewer systems                         |   |

### What can you expect from us?

- ✓ 24/7 monitoring
- ✓ Integration in existing service centre
- ✓ Immediate alarm when a threshold is exceeded
- ✓ Reporting and availability in accordance with SLA, including data analysis
- ✓ Once-only set-up fee agreed in advance
- ✓ Fixed monthly fee (therefore, no surprises later)

Service provision



The result: we can detect the smallest changes that are invisible to the naked eye. The enormous increase in vehicle weights, the number of transport movements and the intensity of use of existing bridges, flyovers and tunnels make it increasingly desirable for the managers to test the previously defined standards against what happens in practice.

This guarantees safety and by building up statistics, it is possible to predict when maintenance will be required.

Electricity pylons, wind turbines and GSM masts are subjected to high, weather-induced forces. Changing weather conditions and the installation of dishes (which catch more wind) on GSM masts result in an additional physical load at specific positions. To guarantee stability and safe operation, the recommendation is to fit these installations with sensors that allow them to be checked at any desired moment of the day.

By gaining insight into the physical status of the objects, as owner or manager you can make timely interventions to prevent worse deformation. Checks can be made as the measurement data are available real-time and can be remotely accessed.

As a customer, you have no hardware costs (CAPEX). Infra Sensor Solutions relieves you of all concern and includes these elements in its service.





## Predictability of maintenance

We frequently read that bridges and flyovers are facing overdue maintenance, simply because there is no money to perform this maintenance. Postponing maintenance for a year is a budgetary solution for many municipalities, provinces, water boards and Rijkswaterstaat (Directorate General of Public Works and Water Management). Possibly this will not be harmful, but there is a lack of certainty. Infra Sensor Solutions specialises in measuring and clarifying the 'health' of infrastructural objects and installations. Using our fibre-optics based sensors, the status of such an object can be ascertained at regular intervals, in real time, 24/7. It is a type of thermometer for infrastructural objects. Possibly, maintenance can be postponed for yet another year. **Predictability! That is what it's all about.**



## Damage and safety

Cracking that is invisible to the naked eye often means that an object is wearing or being overloaded. Damage that when detected and addressed early can prevent significant overall maintenance or replacement costs. Moreover, early detection also prevents unnecessary risks for general (traffic) safety. Detection and warning is easy to realise by implementing a Structural Health Monitoring solution from Infra Sensor Solutions. When an Infra Sensor Solutions SHM solution is directly incorporated into an object during construction, the increase in the total price of the object is almost negligible. Installing our solution at a later stage can still provide significant savings during the Management and Maintenance stage.



## Detection of wear

Due to the increase in the use of railways and roads, the growth in traffic flows, the increase in weight per transport movement, et cetera, the existing bridges, flyovers and tunnels are subjected to ever-increasing loads. This means increased wear.

When, for instance, the deflection or vertical acceleration of metal or concrete components increases during traffic passages, the object no longer returns to its original values, cracks are formed that are (almost) invisible, or material fatigue occurs, safety can be jeopardised. Therefore, there are sufficient reasons to periodically check the 'health' of these objects. Infra Sensor Solutions can arrange this.

**Prevention is better than cure!**



We would like to demonstrate to you the many possibilities of Structural Health Monitoring (SHM)



measuring = knowing

Please ask us for a demonstration

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