

## BRIDGES and VIADUCTS Monitoring Systems



Monitoring systems play a fundamental role both during the construction phase and the lifetime of bridges and viaducts.

During the construction phase they enable the verification of design hypotheses, while during the lifetime improve the structures management and ensure safety.

Monitoring can be used also for ageing structures to assess their structural condition and integrity. Furthermore it is possible to observe the evolution of possible damages caused by catastrophic events. Understanding their behaviour help implementing measures and repair strategy.

Bridges and viaducts involve structural elements such as piles and beams or the subsoil around and under foundations.

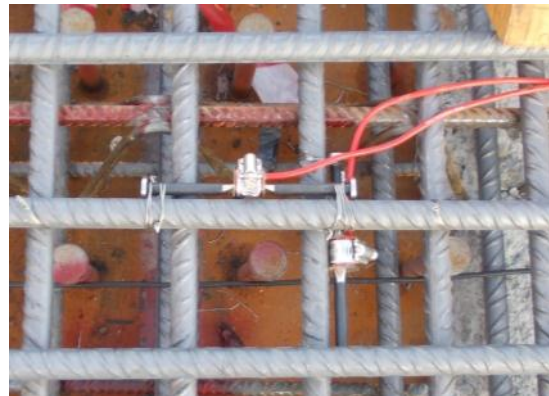
**I&C Italia** offers the following professional services:

- design and planning of monitoring systems
- installation of sensors and data acquisition systems
- testing of sensors and data acquisition systems
- web data management (**web monitoring on line**) through our web site [www.iecitalia.it](http://www.iecitalia.it)
- data analysis and technical reporting
- real-time performance monitoring and regular maintenance



During the construction phase the following instruments can be used to understand the behaviour of the structures:

- **Vibrating wire strain gauges** for the measurement of strain in steel structures
- **Temperature sensors**



*Embedded vibrating wire strain gauge*

During the life the following instruments can be used to monitor the structural elements (piles, beams, decks):

- **Surface tilt sensors** for monitoring rotation and deformation
- **Electrolevel sensors** for surface deformation monitoring
- **Crackmeters** or **jointmeters** for monitoring displacements and movements
- **Fiber optic sensors**
- **Reflective targets** and **prisms** for topographic surveys
- **Accelerometers**



*Fiber optic sensor mounted on bridge deck*

It is also possible to monitor subsoil conditions to understand the interaction between soil and foundations:

- **Inclinometers** for vertical profiling of ground deflection
- **Piezometers** for ground water elevations monitoring
- **Incremental** or **magnetic extensometers** for monitoring settlement in foundations



*Drilling operation for inclinometer and piezometer installation*

Ingegneria & Controlli Italia S.r.l.

*Sede legale*

*Sedi operative*

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