Data reading during structural testing

FOCUS ON
Puente vehicular Hisgaura, Colombia

Hisgaura Bridge is the tallest structure in Colombia and with its 128 stays is the largest cable-stayed bridge in South America.
Located along the Curos-Málaga road (Department of Santander), it spans the space over a steep and hazardous area which recorded constant road's closures. With a length of 580 metres above the ground level, it connects Malaga with the Curos sector. The bridge has four bearings, two lanes (one for each direction) and two pedestrian walkways on each side.
Furthermore, a dedicated substation provides the necessary lighting and the preventive technology to monitor the infrastructure's behaviour.

Since 2017, Sisgeo LatinoAmerica has been entrusted with several activities including supply, instruments installation and maintenance, data management and report during the construction step.
During the bridge construction, an array of instruments was supplied and installed, including: mono-axial and biaxial tiltmeters, vibrating wire strain gauges, thermometers and OMNIAlog dataloggers. In this phase all the data were acquired manually.

Once the structure has been finalized, Sisgeo LatinoAmerica was in charge of the testing, managing the static and dynamic load tests.
During the testing, high precision topographic levelling, automatic total stations as well as triaxial accelerometric systems have been deployed.

At this stage, the data from all instruments installed so far have been acquired automatically through OMNIAlog dataloggers. The dataloggers were also made capable of acquiring the outputs of the load cells installed at the suspension bridge cables, provided by another company.
The large amount of data was managed, displayed and processed with the real-time management platform, named AIDA Iot, powered by Field S.r.l.
The tests carried out and the results obtained have been documented in the final report, which describes in details the activities carried out, the instruments and systems used as well as the results both in numerical and graphical form.
All the documentation was then transferred to the designers and contractor for the interpretation and analysis of the entire package of geotechnical, geometrical and structural data.

Viaduct on Egnatia, Odos Highway - Greece

Dom Luis I Bridge, Porto - Portugal

Bridge over the Po river
Mi-To Bridge - High-speed railway - Italy

REFERENCE *PROJECTS*

Europe

Strait of Messina Bridge project - Italy
Morandi bridge - Italy
Torino-Milano high speed railway - Italy
Milano-Bologna high speed railway - Italy
Rio-Antirio bridge - Greece
Third Millennium bridge, Zaragoza Expo - Spain
Los Santos bridge, A8 highway - Spain
Braila bridge - Romania
S. Benedetto Po bridge - Italy
A3 Salerno-Reggio Calabria motorway - Italy
Metsovo bridge - Greece
A22 Brennero highway
SMS 2A railway project - Norway
Quadrilatero Umbria-Marche road project - Italy
Jonica Main Street n.106 - Italy
Napoli-Bari railway - Italy
Ring road monitoring, Stevio highway - Italy

Asia & Oceania

3rd Bosphorus bridge, Northern Marmara highway - Turkey
North East link project - Australia
Central Railway station, Sidney - Australia
Tavrida Street project - Russia
Railway road, Astana - Kazakhstan
Monorail Vivo Center - Singapore
THSR C250/220 project, Kaohsiungt - Taiwan
Major Road Victoria projects - Australia
Metronet rail project - Australia
Cross River rail - Australia
Asia transition box - Turkey
Anatolian-Karayollari motorway - Turkey
Iroads-road 2 project - Israel
Can Tho bridge - Vietnam

America & Africa

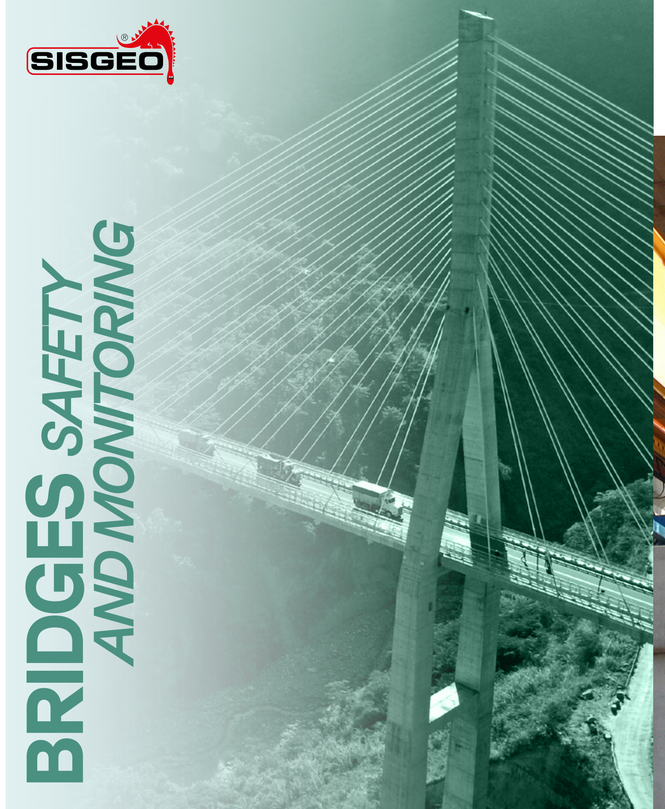
Hisguara bridge - Colombia
Nichupté bridge - Mexico
Ferrocarril Norte - Brazil
Cucuta-Pamplona 4G highway - Colombia
Puerto Cabello-La Encrucujada railway project - Venezuela
Pumarejo bridge - Colombia
Gautrain Park station - South Africa
Wadu Kuf bridge - Libia

DISCOVER OUR WORLD
ON WWW.SISGEO.COM

SISGEO HEADQUARTER
Via F. Serpero 4/F1 - 20060 Masate (MI) - Italy
Tel. +39-02.95.76.41.30
info@sisgeo.com

SISGEO

BRIDGES *SAFETY AND MONITORING*



Milan to Bologna high-speed railway viaduct - Italy

BRIDGES *SAFETY AND MONITORING*

Bridge monitoring is essential for ensuring the safety of the public who use the bridge, as well as for reducing the maintenance costs and extending the lifespan of the bridge. By detecting potential problems early on, bridge operators can take preventive measures to avoid catastrophic failures and costly repairs.

The sensors and monitoring systems can measure a variety of factors, such as vibration, temperature, humidity, deformations, tilting and strain. This data can be analysed to detect changes or anomalies that could indicate potential issues with the bridge structure.

Monitoring *purposes*

Public safety of transportation networks

Detecting and alerting to potential structural issues

Assessing the bridge's condition

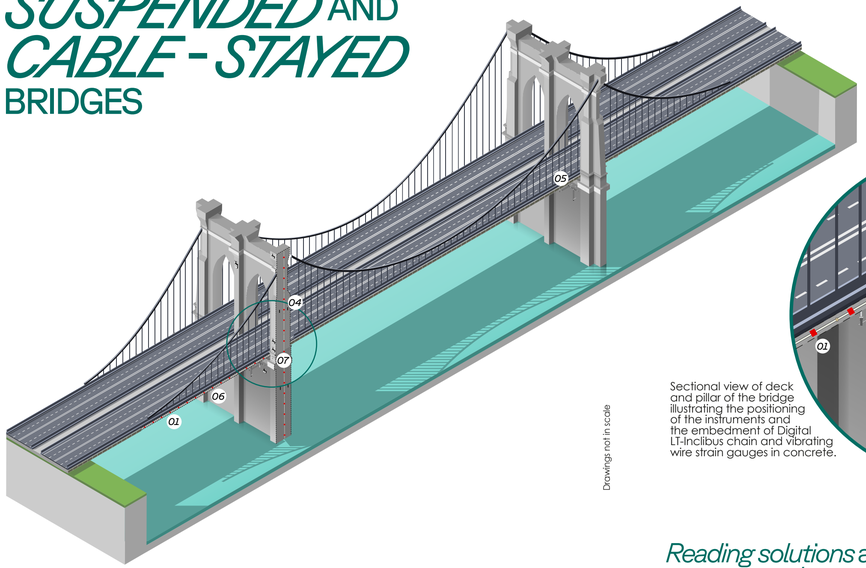
Providing early warning of potential hazards

Enhancing maintenance efficiency

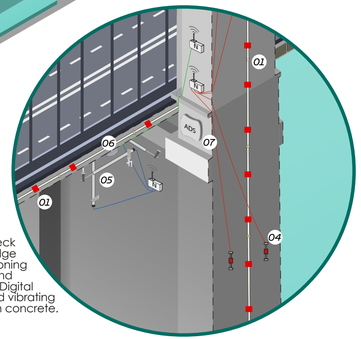
Improving long-term plannining

BRIDGES_SAFETY AND MONITORING_EN_00_09.2023

SUSPENDED AND *CABLE - STAYED* BRIDGES



Drawings not in scale



Sectional view of deck and pillar of the bridge illustrating the positioning of the instruments and the embedment of Digital LT-Inclibus chain and vibrating wire strain gauges in concrete.

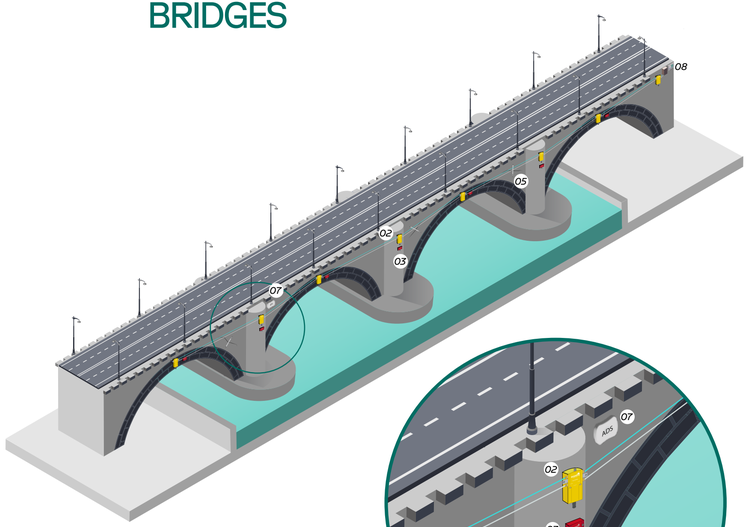
Reading solutions and *data collection*

The readout units and dataloggers are an essential part of the monitoring system. The readouts are needed during the installation procedures, in order to check any instruments before and after their installation, or when an automatic monitoring solution is not required. MIND readout is the new portable multichannel readout unit able to read and store data from both digital and analogue instruments, via its MIND App.

Dataloggers and wireless solutions are ideal for the automatic and remote monitoring in any geotechnical conditions. OMNIAlog and WRLog dataloggers offer precise measurement and reliable data acquisition from various sensor types and gauges supporting vibrating wire, MEMS and digital sensors, and all major geotechnical instruments. Sisgeo can also offer a dedicated service for data/measurement management from automatic and manual monitoring systems called AIDA IoT(powered by Fleld Srl).

The electric signals of the instruments are captured by the Data Acquisition Units, sent to a Server and later imported to a dedicated Database, where they are divided by project, instruments and measurements. Data are then converted into engineering units, validated, processed and represented in charts and table format.

ARC BRIDGES



INSTRUMENTS

01 Digital LT-inclibus	Check of deck and pillar horizontal/vertical displacement
02 Digital H-Level settlement system	Differential settlement monitoring of structures
03 Digital tiltmeter	Tilt monitoring of the structures
04 Vibrating wire strain gauge	Check the stress conditions of concrete mass or steel structures
05 Vibrating wire crackmeters	Monitoring of the cracks opening
06 Electric anchor load cells	Monitor the load applied to tendons

READOUT AND DATALOGGER

MIND redout

OMNIAlog multichannel datalogger

WR Log wireless system

STRUCTURAL HEALTH MONITORING SYSTEM

07 Ad-Signum solution	Continuous monitoring of the global structural state and event detection

BRIDGES SAFETY AND MONITORING
www.sisgeo.com

DISCOVER
ALL THE PRODUCTS