Bridge Structural Monitoring

Industries: Geodesy / Construction
Application type: Monitoring

Description

As part of a historic bridge-widening project, two steel bridge truss sections measuring 528 feet in length and

Fig 1: Huey P. Long Bridge, Mississippi River

weighing 2700 tons, were built on shore, transported on barges, and simultaneously lifted 130 feet to be set in place on the Huey P. Long bridge in New Orleans. HNTB Corporation, the infrastructure solutions firm responsible for the project, required a real-time, remote monitoring system to measure truss distortions and to eliminate over-stressing, or buckling, of the truss during the transport, lift, and setting operation. This remote monitoring system was developed through collaboration between Applied Geo-Mechanics, Inc. and Laser-View Technologies.

A total of ten laser distance sensors (five on each truss) were used to measure out-of-plane truss distortion. All the sensors were hard-wired to a data logger and transmitted to a laptop computer with multiple display panels under the bridge deck.

Data was continuously transmitted and updated approximately every five seconds, under constant review. Decisions for controlling lift were based on a graphical representation of truss tilt and deformation was developed to monitor these real-time truss tilt / deflection measurements.

The laser-based monitoring system was vital to the lift operation. The project engineers were able to use it in real time to know exactly what was happening with the lift, making it possible to make "on the fly" adjustments to the attitude of the truss without slowing down the operation. According to John Brestin, Vice-President and Bridge Group Director at HNTB, the system also allowed monitoring of the truss while it

Fig 2: Mounted Sensor

was sliding laterally into position over the bearings, which was as critical, if not more critical, to monitor than the lift itself.

Customer advantage

- Easy installation thanks to visible laser beam
- Operation in the largest temperature range (-40°C to +60°C) possible
- Measuring ranges up to 500 m on reflective foil
- Accuracy ± 1 mm
- Maintenance-free operation

Dimetix Sensors – the solution for applications with high precision requirements

Thanks to the clearly arranged product portfolio the evaluation of a suitable Dimetix distance laser sensor is simple and uncomplicated.

Dimetix sensors offer numerous features, which are integrated in each and every device as standard, including, among others, various interfaces like SSI, RS-422/485, RS-232 and 2 digital outputs.
Optionally, the Industrial Ethernet interfaces PROFINET, EtherNET/IP and EtherCAT are also available. Furthermore, all devices are IP65-protected and impress with a weight of less than 500 grams!

Particularly noteworthy, however, is the accurate measurement of 1 millimeter over distances of up to 500 meters, even under the most extreme conditions. This is possible with the sensors of the types DPE, DEN and DEH.

No less interesting are sensors of types DAE, DAN and DBN. Preferably, they can be used for projects which do not require a range over 500 meters or are cost-sensitive.

	DPE-10-500	**DPE-30-500**	**DEN-10-500**	**DEH-30-500**
PARTNUMBER	500630	500636	500637	500638
SPECIFICATION				
Typical accuracy $\cong \pm\,2\sigma$	± 1 mm	± 3 mm	± 1 mm	± 3 mm
Mensurierung range on natural surfaces	0.05…~100 m	0.05…~100 m	0.05…~100 m	0.05…~100 m
Measuring range on reflective foil	~0.5…500 m	~0.5…500 m	~0.5…500 m	~0.5…500 m
Max. measuring rate	250 Hz	250 Hz	50 Hz	50 Hz
Operating temperature	-40…+60°C	-40…+60°C	-10…+50°C	-10… +60°C

	DAE-10-050	**DAN-10-150**	**DAN-30-150**	**DBN-50-050**
PARTNUMBER	500633	500632	500634	500635
SPECIFICATION				
Typical accuracy $\cong \pm\,2\sigma$	± 1 mm	± 1 mm	± 3 mm	± 5 mm
Mensurierung range on natural surfaces	0.05…~50 m	0.05…~100 m	0.05…~100 m	0.05…~50m
Measuring range on reflective foil	~40…50 m	~40…150 m	~40…150 m	
Max. measuring rate	50 Hz	50 Hz	50 Hz	10 Hz
Operating temperature	-40…+60°C	-10…+50°C	-10…+50°C	-10…+50°C