

Worldsensing equipment helps to preserve historic Welsh rail bridge

Country

United Kingdom

Project type

Rail

Sector

Bridge monitoring

Main product

Tiltmeters and crack meters

Context

All railways need to be carefully monitored to ensure the integrity of the structures that support heavy, fast-moving trains. It is particularly important for historic, ageing infrastructure such as the Hawarden Bridge – a railway bridge over the River Dee in Wales.

Opened in August of 1889, the Hawarden was originally the largest swing bridge in the UK. Its central section was able to rotate 90 degrees, allowing tall ships to safely pass on the river below. By 1960, ship traffic gradually ceased and the moving span of the swing bridge was welded shut.

Over the years, the Hawarden's frequent movement between its open and closed positions had caused operating stresses on the brickwork of its abutments. By the 2000s, it had further degraded due to harsh conditions – primarily saltwater and weather – that it had been exposed to since it first opened.

In 2009, cracks in the brickwork of the Hawarden Bridge were determined to be of aesthetic concern only. Nevertheless, the bridge operator was keen to increase the monitoring frequency using automated equipment to ensure the bridge's continued integrity, especially with rising concerns around issues such as climate change and ageing infrastructure.

Solution

Since the bridge is accessible to the public, the operator decided not to use total stations, as they might have been subject to vandalism. Instead, they opted for robust Worldsensing.

The installation comprises:

- 6 tri-axial LS-G6-TIL90-X / WiSOS480 wireless tiltmeters
- 3 crack metres
- 2 data loggers
- A solar-plus-battery-powered gateway installed around
- 200 metres away from the bridge, in a location out of reach from the public.

Data from the monitoring system is relayed every six hours from the gateway, via 4G mobile, to Worldsensing's connectivity management tool CMT Edge. From here, the company can assess the performance of the network and its devices in real time.

Processed data from CMT is streamed via secure 128 bit AES end-to-end encrypted communications to a data visualisation software part of portfolio. This cloud-hosted software provides instant remote access to the Hawarden's sensor data and provides powerful insights on the current condition of the bridge. With custom alarms and notifications, the engineers can be immediately notified if sensor readings are outside of the normal range.

Benefits

The monitoring system used on the Hawarden Bridge has proven to be a robust, reliable solution for monitoring the bridge's structural health. At device level, the Worldsensing technology in use is discrete yet robust, and with newly released lithium-manganese batteries, it can work for up to 25 years without any need for maintenance.

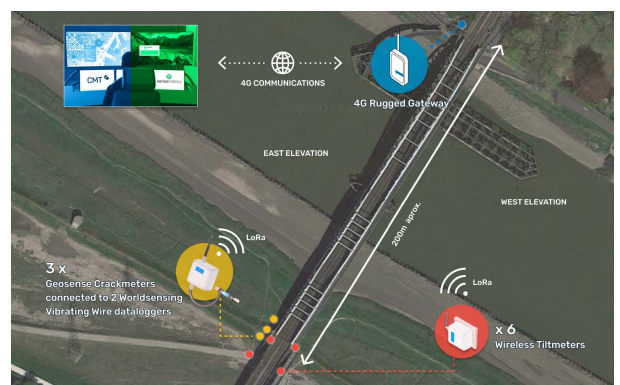
In terms of software deployment, the combination of CMT integrated with the visualisation software gives the monitoring company a complete network and data management solution with control network performance from a dedicated user interface and a robust data visualisation tool to assess the bridge's structural health at all times.

While they will be carrying out quarterly check-ups, having the technology in place spares the expense of having to do more frequent manual evaluations of the bridge and provides more regular updates than would be cost effective with on-site visits.



Advantages

- Wireless monitoring avoids the need for regular site visits, reducing the cost of monitoring.
- Discrete devices with robust casings minimise the likelihood of damage from vandalism.
- Battery power allows devices to operate for years on end without maintenance.
- A versatile visualisation software allows correlations and critical alerts to be created for both the tilt and crackmeter data.



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