

ZEB-REVO Handles Hazardous Surveys



Britannia Bridge is the sole rail link for passengers travelling between Anglesey and mainland UK across the Menai Strait. Stuart Cadge from GeoSLAM recounts a unique survey of the bridge structure.

First opened in 1850, the original structure of the Britannia Bridge was gutted

by fire in 1972, but was rebuilt as a single tier steel truss arch bridge with a second tier added to cater for increased road traffic. Inspection of the bridge is carried out every twelve years, and it proves a complex and challenging project.

Inaccessibility

The task was to carry out an internal survey of the bridge columns, consisting of 25m deep voids, only accessible via very restricted hatches. It was too dangerous to lower individuals into the space, so it quickly became apparent that the structure would be impossible to survey using traditional methods - including terrestrial scanning.

Amey, infrastructure support service provider, chose GeoSLAM's ZEB-REVO, a handheld, lightweight, mobile indoor mapping tool, for the job, and the companies worked together to create bespoke technology to lower the scanner down into the core of the structure to check for any damage resulting from the ferocious tides which run through the Menai Strait.

Scanning with ZEB-REVO

With the methodology confirmed, the lowering device was built to securely combine the ZEB-REVO scanner head and datalogger together. The scanner head was targeted in the direction of travel towards the bottom of each pier. A rope was then threaded through the eyelet at the top of the lowering device and securely attached to a tripod positioned above the narrow access hatch.

Once the equipment was positioned, the ZEB-REVO was initialised at the manhole opening of each pier. During start up, the device needs to be kept completely still in order for the inertial measurement unit (IMU) to ascertain its position. The tool was then gradually lowered down into each pier to scan the entire internal structure. Through existing bridge drawings, the Amey team knew the approximate depth of each internal column, and with an indoor range of 30m – depth was no issue.

After sufficient data had been collected, the scanner was drawn back up to the surface and returned to its starting position for de-initialisation. Each survey took no longer than ten minutes to complete, and the data was processed onsite in thirty minutes.

Healthy Piers

With an average accuracy level of +/- 15mm, the challenge of such a narrow structure did not limit the ZEB-REVO's effectiveness. The 3D scans allowed Amey to undertake a more comprehensive evaluation of the physical internal 'health' of the piers. They were also able to assess what debris had sunk or drifted to the bottom of the voids – particularly crucial given the twelve-year gap between each assessment.

Ultimately, the inspection indicated that both piers are currently in good order, with minimal movement detected. However, the examination reports also helped plan for the future of the bridge, contributing to Amey's wider assessment of Britannia Bridge's structural integrity and understanding the maintenance needs required on a short and long-term basis.

This article was published in Geomatics World November/December 2017

