



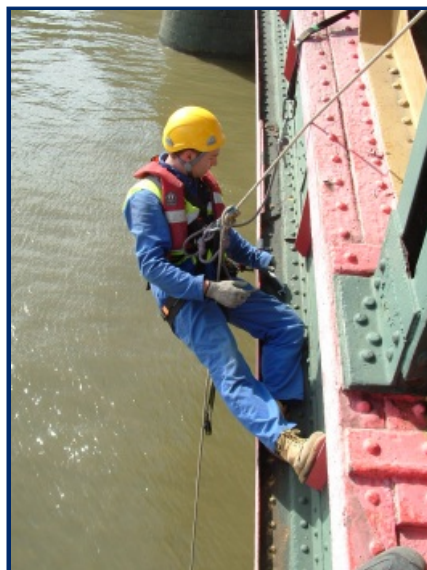
Blackfriars Railway Bridge is a five span, wrought iron arch structure which crosses the River Thames between Southwark and the City of London Boroughs. The bridge, constructed in 1886, supports five railway lines and a section of Blackfriars Station. Network Rail's Thameslink Programme team required confirmation of the structural behaviour of Blackfriars Bridge under short term loading (rail traffic) and long term loading (environmental effects) to aid the future design upgrade of the Thameslink route.

Mott MacDonald commissioned Strainstall UK Ltd carry out the technical design and installation of an extensive structural monitoring scheme for the bridge. The data captured from the monitoring scheme would be used by Mott MacDonald for comparison with their existing 3D finite element model of the bridge, which together would confirm how loads were transferred through the structure. In addition the information would be used to inform the asset owner, Network Rail South Eastern Territory, of the bridges behaviour and potential areas for future maintenance or strengthening.

The resulting system comprised of:

- 271 strain gauges for capturing strain data on key parts of the structure
- 48 inclinometers for monitoring rotational movement at some of the arch bearings, piers and abutments
- 8 linear displacement transducers for relative displacements of specific arch bracings plus monitoring of some masonry cracks
- 10 thermocouples
- Wind speed and direction sensors
- Tide level sensor
- CCTV camera for identification of train types during long term dynamic monitoring.

All of the above were linked into the PC based instrumentation system.



- Large dynamic monitoring system at 10 samples/sec from all sensors
- 271 strain gauges
- 48 inclinometers (0.2 arc secretary accuracy)
- 8 linear displacement (0.02mm accuracy)
- 10 thermocouples
- Wind speed and direction sensors
- Tide level measurement
- CCTV camera for train identification

Strainstall UK Ltd
Charlton Lane
Midsomer Norton
Bath
BA3 4BE

Tel: +44 (0)1761 414939
Fax: +44 (0)1761 416655
Email: info@strainstallbath.co.uk
Website: www.strainstall.com

Monitoring System

Structural Monitoring for Blackfriars Bridge

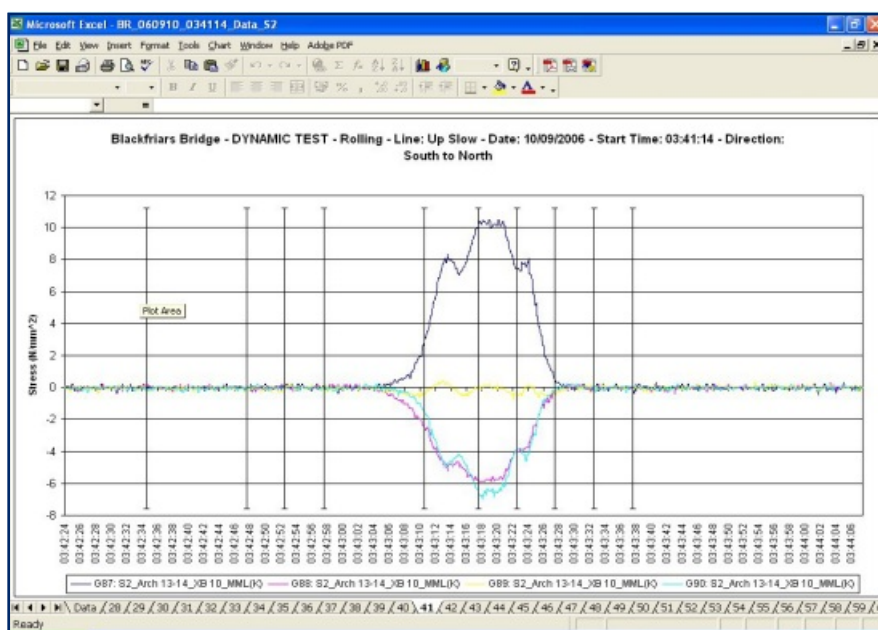


The World of Load Measurement and Stress Analysis

The installation was carried out with minimal interruption to train traffic as nearly all the access was from below deck level. To date the project has been successful with the required load test being completed on time. The quality of the data from the system has been very good and has proved successful in enabling the structural behaviour of the bridge to be understood and in validating the 3D computer model as an appropriate representation of this behaviour.



Sample CCTV image from a train event



Sample dynamic test data

Strainstall UK Ltd
Charlton Lane
Midsomer Norton
Bath
BA3 4BE

Tel: +44 (0)1761 414939
Fax: +44 (0)1761 416655
Email: info@strainstallbath.co.uk
Website: www.strainstall.com