

## In situ Stress Measurement and Monitoring



System installed 1996 for Hyder Consultants on behalf of Railtrack

Ynysforgan Viaduct is a multi span riveted steel girder bridge carrying the South Wales main railway line across the A4067 dual carriageway, a local road and a private road north east of Swansea. The client suspected that the bridge bearings were locked thereby restraining movement under temperature loading. This would induce stresses in the girders.

In situ stress measurements were undertaken at midspan positions on the webs. The technique used was the 'through thickness' strain relief drilling method. This provides the average stress at a given cross-section and is therefore representative of the true dead load stress condition. The measurements confirmed the presence of locked in axial stresses, of different magnitude in adjacent spans. These stress levels were used as datum values for use in the subsequent structural monitoring scheme.

The programme of testing and monitoring has provided the client with the following information in concise reports:

- Stress conditions within key structural elements under dead load conditions. These are compared with stresses calculated using the assessment codes.
- Global bridge deflections and strain responses due to known live loading conditions. Using the data, stresses due to live load can be derived and compared with those calculated using the assessment codes.
- Information regarding the bridge's responses due to temperature loading effects.

Strainstall's team of experienced engineers operate from offices in Cowes, Bath and Aberdeen (UK) and Tønsberg (Norway).



The programme of in situ stress measurement used the 'through thickness' drilling technique for true dead load effects.

The monitoring system comprises:

- Strain gauges
- LVDTs
- Temperature Sensors
- Proprietary data logging system suitable for unattended static condition monitoring

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