INSTRUMENTATION SUPPORT FOR WCML UPGRADE

Since 2001 Fugro Structural Monitoring (FSM) has assisted several of the main contractors with their commitment to upgrade the West Coast Mainline.

MOWLEM - STRAIN MEASUREMENT CLYDE VIADUCT

Fugro Structural Monitoring (FSM) were requested by Mowlem, under the direction of Babtie Group Ltd., to perform strain monitoring on a bridge over the River Clyde near Crawford, Scotland. The purpose of the exercise was to examine the strains at various locations on the four main girders, due to trains passing over the structure, and determine whether the bridge could be considered as a continuous structure rather than comprising discrete elements. Monitoring of the bridge was performed in May 2001.

Twenty-one strain gauges were installed. The gauges were positioned longitudinally on the flanges of the beams to measure changes in strain parallel to the main axis of the girders.

Temporary signal cables were run from each gauge location to the east side of the bridge.

The cables were attached to the bridge using cable ties and cable tie bases in such a manner that they could be removed at a later date without the need for access equipment.

Monitoring was performed using signal conditioning and a data acquisition PC sampling each channel simultaneously at 200 Hz. The system provided continuous monitoring and was triggered to record data as a train passed over the bridge.

The level of strain measured was critical in assessing the degree of continuity and structural action.

WEST COAST ROUTE - BRIDGE RESONANCE STUDIES
Feb 2001 – July 2001

Over a period of several months, last year, FSM undertook bridge response measurements on four railway structures.

It is the experience of FSM that the measurement of structural deflection has two components which require different measurement techniques; quasi static deflection which occurs as the live load of the train passes onto and off the bridge and dynamic deflections that occur at all frequencies at which the train imparts energy into the structure.

Several different sensors were used to obtain the required information depending on access constraints. These included draw wire and LVDT displacement sensors, for quasi-static measurements and accelerometers for dynamic deflection measurements.

On one structure LVDT's were held in place on the underside of the bridge using spring loaded aluminium poles. Accelerometers were clamped in place using magnetic bases.

The data was gathered and analysed using suitable signal conditioning modules and FSM's own proprietary data capturing software, SIMS-NT.

The reported results gave the client a better understanding of the effect of different train speeds and loads on the bridge structures.

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