

Highway Bridge SHM

Project	Monitoring of strain, displacement and temperature on a post-tensioned concrete bridge constructed in the late 1960s. The bridge forms part of the UK's motorway network and carries slip road traffic at a busy intersection. The sensor system is being used to monitor the behaviour of the bridge following recent remedial works.
Client	Transport Research Laboratory Ltd and UK Highways Agency
Date	2007/2008
Location	M56 Motorway, Cheshire, UK
Sensors	SmartPatch, SmartBridge, SmartTemp
Attachment	Surface attachment to the concrete bridge deck (prior to being overlaid with road surface) and soffitt.
Interrogator	16-channel W5 system (used for both static and dynamic monitoring)
Images	 <p>Top from left: View of bridge from the M56 motorway, installation of sensors on the bridge deck, close up of deck displacement sensors Bottom from left: Soffit sensors installed, data available from site computer, typical web utility screen showing bridge health</p>
Results	<p>The bridge is to be continuously monitored for a multi-year period using a network of 84 displacement sensors, 48 strain sensors, and several temperature sensors. Sensors were fixed both to the bridge deck and soffitt. The sensors on the bridge deck were fixed in place, prior to the road surface being re-laid.</p> <p>Data is transmitted via a DSL connection to a remote website enabling the client to remotely monitor the status of the sensor network at any time. In its normal mode of operation the system monitors the quasi-static state of the bridge and uploads sensor data to the website at preset intervals throughout the day. The system is also able to automatically capture dynamic data at a rate of 250 Hz should pre-set trigger levels be exceeded.</p> <p>Data from the system will be compared with results obtained from a third-party Acoustic Monitoring System also installed on the bridge.</p>
Further information	The monitoring system allowed the operating life off the bridge to be safely extended a further 2 years before its eventual demolition.