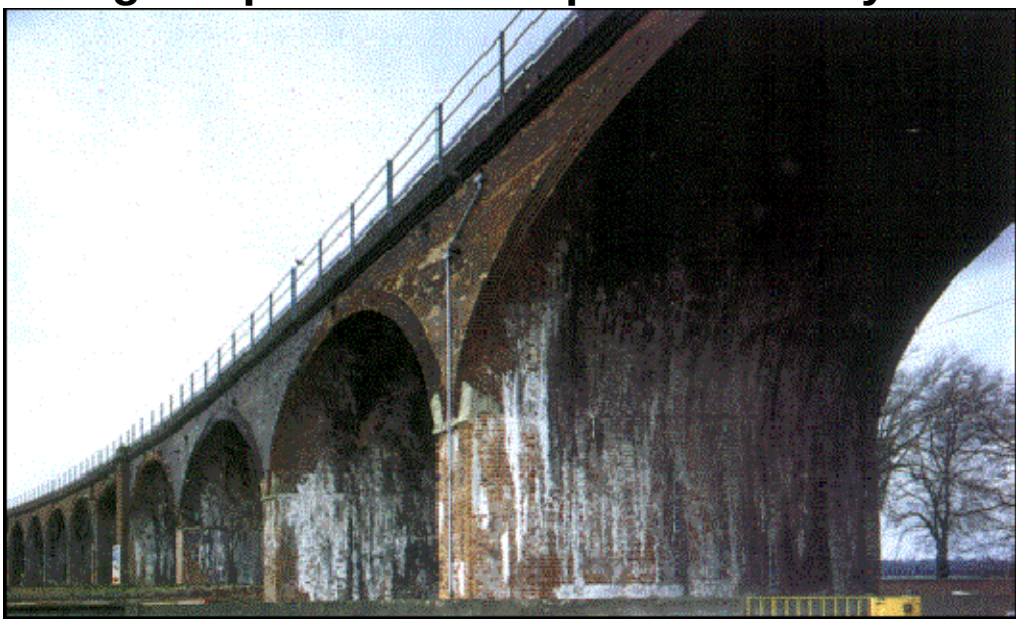
Bridge Repairs Use Unique Anchor System

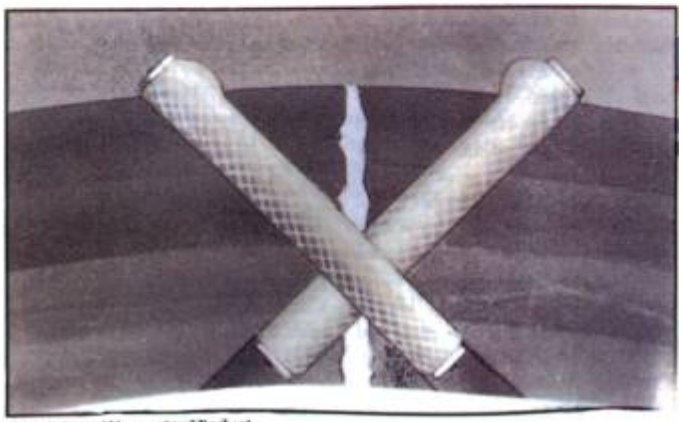


Here we look at British Rail's use of the unique Cintec anchor system in the repair of the River Kennet Bridge at Reading and the Worcester Viaduct.

The Worcester viaduct, which comprises sixty-five brickwork arches, has suffered from water penetrating its structure, saturating the clay fill material. A lack of sufficient drainage has led to the spandrel walls being forced away from the intrados arch, creating longitudinal cracks close to the edge of the viaduct. This problem has been exacerbated by freezing and thawing.

Water penetration has also contributed to cracking at the springing of some spans and delamination of external parts of some columns.

Kennet Bridge.



Detail from Worcester Viaduct.

Following the failure of previous attempts to restore the integrity of the structure using conventional steel plates, British Rail approached Cavity Lock Systems to discuss using Cintec anchors to provide an effective repair for the structure.

Cintec anchors is the first cementitious fixing system that can be effectively used to tie across cavities. This is achieved by containing the grout in a special fabric sock.

The resulting system comprises a steel section in a mesh fabric sleeve into which specially developed grout is injected under pressure. The anchors are suitable for a variety of materials, including precast and no fines concrete, masonry, hollow and thermal blocks.

British Rail is carefully monitoring the performance of the Cintec system. To date 10 arches of the viaduct have been repaired and there are plans to extend the programme, reinstating further arches. British Rail are also now using the Cintec System for further projects.

Remedial work on the River Kennett bridge-located on the main line from Paddington to Reading comprised stabilising the north side wing wall and adjoining spandrel wall and stitching and filling cracks in the brickwork.

The repair involved tying the north side wing wall to the original buried wing wall with 9.5Manchors. The spandrel wall was anchored back to the corresponding buried spandrel wall.

A preliminary contract was let to establish the anchor capability. Two Cintec Harke test anchors were designed, comprising 25mm diameter high tensile steel reinforcing bars with separate grout feed pipes for the rear 5m and the remaining length, so that the buried wing wall alone could be test loaded. A drill hole of 76mm diameter was adopted to allow for the grout feed pipes and cover.

A rotary drag bit was used to drill through the saturated fill material. Percussive rotary drilling was used to drill through the brickwork. The anchors were installed manually without difficulty and the rear 5m then grouted. Required test loads of 10 tonnes were achieved and satisfactorily monitored for up to 24 hours. Loading and reloading the anchor at lower load had shown essentially elastic behaviour. Finally, the test anchors were grouted up completely.

A protective tape on the anchors was used for corrosion resistance and the anchors in the wing wall were required to penetrate the buried wing wall so that a grout plug was formed at the back of the wall.

The Cintec system is set to make a major impact on the refurbishment market. Commentators are suggesting that it makes significant improvement on many of the methods of anchoring and fixing in current use. This system is efficient and cost effective to use.