

# Bridge Repairs and Strengthening

Using a combination of slim, stainless steel ties, fixings and reinforcements, the Helibeam System is able to sympathetically overcome many commonly occurring structural faults in masonry arch bridges.

The Helibeam System successfully solves the problems of:

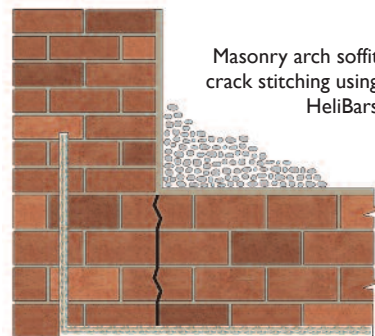
- Movement in the spandrel wall
- Separation of brick arch rings
- Cracking in the arch barrel
- Delaminated masonry
- Cracked piers, wing walls and abutments
- Cracked and unstable parapet walls
- Spalled brickwork
- Loose or cracked coping stones

Large numbers of the UK's 60,000+ masonry arch bridges are suffering from serious structural faults due to age, weathering and increasing loads and stresses. In addition, many are listed structures and so require concealed, non-disruptive repairs that leave the character and appearance of the bridge unaffected.

Unlike traditional repair methods, the Helifix Helibeam System does not use heavy duty tie bars and pattress plates, involve significant taking down and rebuilding or normally involve track or highway possession and closure. Independent tests demonstrated that the Helibeam System was capable of more than doubling the load capacity of a non-reinforced arch.



For full Product Information, Case Studies and downloadable Repair Details go to:  
[www.helifix.co.uk/applications/masonry-arch-bridge-repairs/](http://www.helifix.co.uk/applications/masonry-arch-bridge-repairs/)



A. Transverse Section



B. Soffit Plan



Masonry Arch Pinning of Debonded Bricks using DryFix



Masonry Arch Pinning of Separated Brick Rings using CemTies

## Advantages and Benefits of the Helibeam System

- Approved under the Link-Up Accreditation Scheme
- Independently tested by the Transport Research Laboratory
- Accepted by English Heritage and Network Rail
- Ideal for historic, listed and heritage structures
- Slim stainless steel one-piece helical products
- Fully concealed installation for non-disruptive repairs
- Repairs achieved through composite action with existing masonry
- Restores structural integrity without altering bridge's mode of behaviour
- Passive system, no additional stresses induced; allows normal structural movement
- Original appearance, character and detail of host fabric retained
- Minimal disruption to road or rail services
- Tested, proven, reliable, cost-effective

## Sympathetic Designed Repairs

Although the Helibeam System uses slim stainless steel helical ties and bars they have great axial strength combined with sufficient lateral flexibility to allow the structure to move naturally and therefore minimise additional stresses.

Repairs and strengthening are achieved by producing a composite action between the masonry and the system materials, as opposed to heavy duty rigid anchors which form a 'frame' inside the structure. In these cases the structural character of the bridge is completely altered which can lead to new stresses and future cracking.

## Structural Upgrades

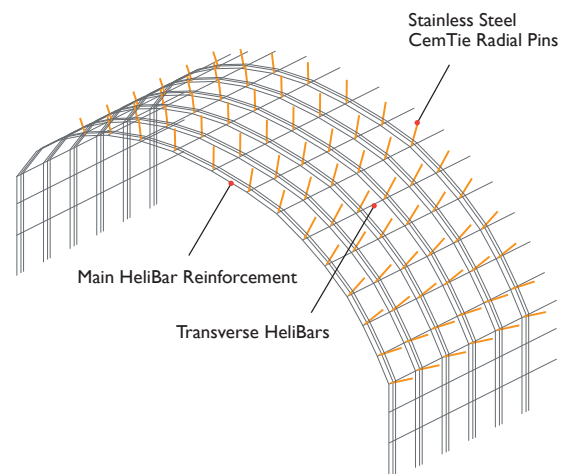
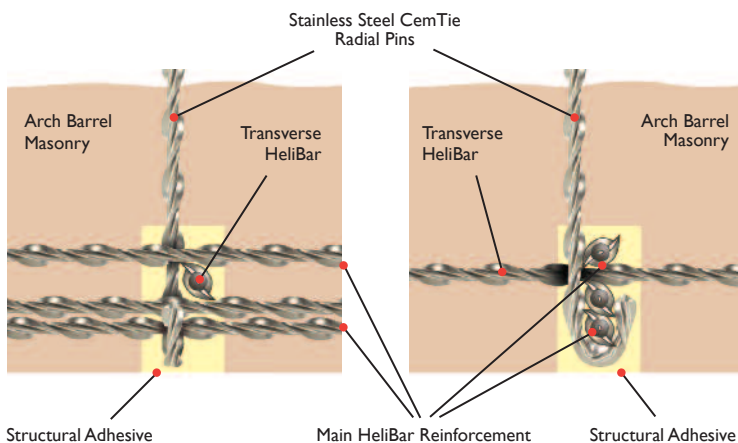
Many bridges, often built over 100 years ago, require strengthening and reinforcement to increase their load bearing capacity and enable them to meet the weight demands of modern road and rail transport. Helifix is able to undertake such projects to significantly enhance bridge capacity and enable them to comply with EU regulations for 40 tonnes highway loadings.



Our in-house engineers produce designs that match the exact needs of each individual bridge and avoid over design in achieving the required repairs or strengthening. With the various structural problems overcome, the total structure is reinstated and its overall strength enhanced but, significantly, structural behaviour and elastic response are not adversely affected.

Repairs are undertaken by our nationwide network of fully trained and approved installers. Work may be covered by 10 year insurance-backed warranties, in addition to normal product guarantees and cover provided for the designed repairs under the Helifix PI Insurance.

- A full structural survey and assessment of each bridge is carried out using the ASSARC computer software
- Appropriate repair and strengthening is designed, using the proven MARSYS software, to suit the individual needs of the bridge and the client. For bridges that are being upgraded beyond their original design capacity, the increase in soil pressure under abutments is checked to determine that it is within acceptable limits
- For the temporary condition, when the slots have been cut, the load capacity of the bridge is checked using ASSARC
- The required grid pattern is marked out on the bridge soffit
- Narrow slots are cut just 12mm wide and 40mm deep
- Services are avoided and environmental issues considered
- Radial stainless steel pins are installed throughout the grid
- Stainless steel HeliBars are installed into the slots
- The reinforcement is encapsulated with Marflex structural adhesive, a durable polyurethane resin with high bond strength, particularly to damp substrates, that is elastic and can be colour matched and coated with a layer of masonry dust taken from the slot cutting machine



A complete Bridge Strengthening design and installation package is provided in partnership with Goldhawk Bridge Restoration Ltd.

[www.goldhawkbr.co.uk](http://www.goldhawkbr.co.uk)



**HELIFIX**  
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