Filling the cracks

Howard Robinson from the Road Surface Treatments Association (RSTA) discusses crack sealing and joint repair systems for road surfaces

Over the past few years a number of crack sealing and joint repair systems for road surfaces have been developed to repair and reinstate the road surface in a safe and serviceable condition, to protect the road surface from premature degradation and hence enhance pavement service life.

The RSTA has published a new code of practice (2013) on these systems to assist procurers and installers on how to obtain high quality installations. This new guide represents best industry practice for the selection and application of crack sealing and joint repair systems to maximise their performance and durability. To ensure client side acceptance it has also been peer reviewed by the Association of Directors of Environment, Economy, Planning & Transport (ADEPT).

Crack sealing and joint repair systems are essential to:

- **Reduce water ingress into the pavement surface and sub-surface layers**
- **Reduce pavement damage by hydraulic pumping and freeze/thaw action**
- **Reduce erosion by tyre interaction with a damaged surface or open joint**
- **Reinstate the road surface to its original profile**
- **Maintain skid resistance and texture depth.**

To obtain the best results it is necessary to give careful consideration to the deterioration method, the traffic density and whether movement is present, before selecting the appropriate product. There are a number of HAPAS approved systems now available and the Guidelines Document for the Assessment and Certification of

Types of products and repairs

Products generally fall into two broad categories:

- **Cold applied thermoset resins e.g. methyl methacrylate (MMA)**
- **Hot applied thermoplastic resins and/or bituminous materials.**

There are three main types of repairs shown below and overleaf:

Grades within certificate categories

All three types of treatment can be described as either flexible or high modulus.

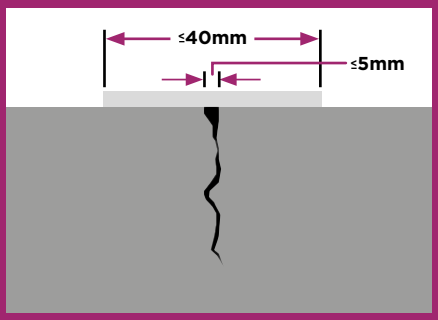
Flexible inlaid systems are categorised as Grade F and the stiffer high modulus systems are categorised as Grade H. Grade F should be used where movement is anticipated and Grade H where no significant movement is expected, but greater rutting resistance is required.

For overband and fill and overband systems the difference is not so well defined so the designer must consult the product's HAPAS certificate before deciding which system to specify.

(Diagrams reproduced with kind permission of the BBA, from the Guidelines Document for the Assessment and Certification of Crack Sealing Systems for Highways, Figure 1, October 2010.)

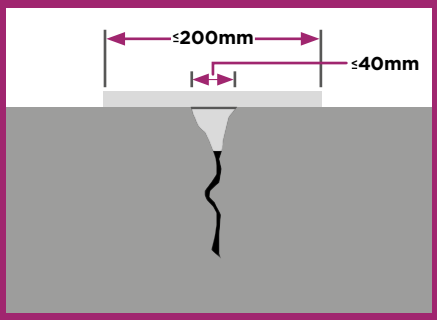
Overband

Simple overbanding systems for repairing joint or crack widths up to 5mm wide, with a finished bandwidth ≤40mm.



Fill and overband

Fill and overband systems are tested and approved for joints and cracks up to 40mm wide including; single part products with a single fill



Crack Sealing Systems for Highways (October 2010) describes four product categories: overband, fill and overband, inlaid single and inlaid multiple).

The code of practice identifies the important aspects of crack sealing and joint repair processes, provides guidance on the selection of the most appropriate treatment in each location and refers to other relevant documents to give practical guidance on achieving high quality.

Suitable applications

The presence of a crack or open joint in a road surface may be due to a number of factors which include:

- **Thermal movement in the surface course**
- **Structural movement in the lower layers**
- **Lack of compaction/cold joints/lack of a vertical seal between adjacent asphalt mats in highway construction**
- **Lack of compaction/cold joints/ lack of a vertical seal in utility reinstatements and highway patch repairs.**

Left untreated, cracks and open joints in the pavement allow water ingress into the asphalt layers and ultimately into the pavement foundation. Water ingress, hydraulic pumping action and freeze thaw will all create further damage to the pavement and ultimately shorten the effective working life of the road surface.

Timely intervention using crack sealing and joint repair systems can both seal against the ingress of water and reinstate the surface profile, skid resistance and texture depth to acceptable levels to prolong the life of the pavement.

However, in order to select an appropriate system from those available, there are a number of considerations:

- *What has caused the defect?*

  If the sub-structure of the road has failed, then treatment of the surface course defect is unlikely to be successful over the long term. However, defects on the surface (thermal cracks and open joints) can be successfully treated and provide a long-term successful repair.

- *Is the crack or joint still moving significantly?*

  If the surface has been damaged by movement below from a predictable source for example reflective cracking through an asphalt surface course laid over transverse joints, then a repair should be undertaken that is capable of withstanding that ongoing movement.

  If however a joint is open due to erosion and not to movement then a judgement must be made on which system to specify.

Specification

The Specification for Highway Works (SHW) Clause 711 requires these systems to be HAPAS certificated and only installed by contractors approved by the certificate holder.

Installation/quality control

The installation and quality control procedures for all systems shall be in accordance with the HAPAS certificate for each system and the agreed method statement.

Service life

Regarding life expectancy HAPAS systems are classified as: >three years or >five years, but related traffic density is not specified. The system selected should reflect both the timescale required of the repair and the traffic density present on a particular site.

Where cracks have been caused by structural failure resulting in significant movement under traffic, it is not possible to predict a life expectancy for the repair. In structurally sound pavements where cracks or fretting joints are confined to the surface layer and not subject to further movement, the life declared in the system's HAPAS certificate should be achieved.

In wheel track zones, particularly those subjected to heavy goods vehicles, the expected minimum life of a repair is unlikely to be exceeded, while those outside the wheel track zone may exceed it. On more heavily trafficked roads the expected service life of the system may not be achieved.

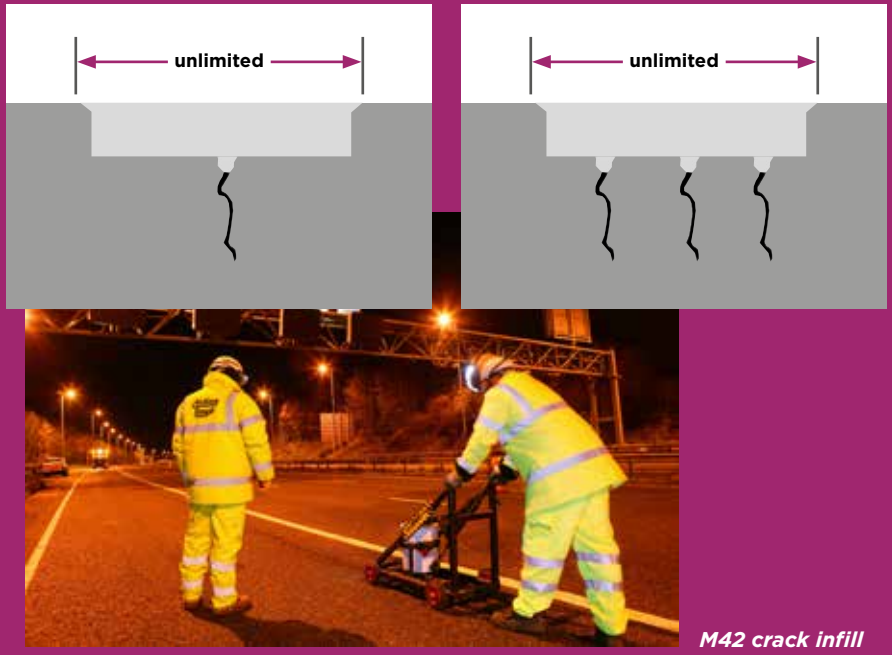
and overband application, single part products applied in two operations (fill and overband) and two component products applied in two operations (fill and overband). HAPAS testing and approval only extends to a maximum bandwidth of 200mm. The system is especially suitable where the road surface immediately adjacent to the crack is worn or fretted.

Cold applied systems require over scattering with 3mm high PSV aggregate, as part of the overband application, to meet requirements for initial texture depth and skid resistance values whereas hot applied systems generally do not. Cold applied systems also have aggregates throughout the body of the material for long term retained skid resistance.

Hot applied systems generally utilise softer resins. The skid resistant aggregates are contained within the surface layer of the system only and will also be covered by a thin film of resin, but this is quickly lost from the aggregate surface under traffic, providing appropriate skid resistance. Therefore an over scatter is not generally considered to be necessary.

Inlaid single or multiple cracks

Inlaid systems are approved for single and multiple cracks. They are installed by planing out a required recess depending on the system's specification. The product is then used to fill the recess flush to the surface and dressed with high PSV aggregate to provide texture depth and skid resistance.



M42 crack infill