

ASPHALT PAVEMENTS

REINFORCING ASPHALT LAYERS IN ROADS
AND TRAFFICKED AREAS



› Tensar® asphalt reinforcement applications – an intelligent solution to the demand for road durability.

Tensar Technology – Proven Practical Solutions and the Know-How to Get Them Built

Based on the characteristic properties of Tensar® geogrids, Tensar Technology is widely adopted for ground stabilisation, soil, aggregate and asphalt reinforcement problems, delivering real savings in cost and time. We can help you apply Tensar Technology to improve the bottom line on your project.



Helping You Deliver Increased Value from Your Roads Maintenance Budget

Tensar asphalt reinforcement applications have been demonstrated to increase the service life of roads and thereby save money over the full life-cycle. Tensar applications can provide a significant reduction in construction costs over traditional methods.

Tensar asphalt reinforcement applications comprise a range of products which have been successfully installed in many countries and in a range of climates.

With over 30 years experience, Tensar offers you a solution to suit the conditions and requirements of your project. Tensar asphalt reinforcement applications have been designed to address structural pavement issues such as fatigue cracking and reflective cracking. Tensar asphalt reinforcement applications can also provide resistance to rutting and mitigate cracking due to differential settlement during road widening projects.



Common structural pavement problems, surface rutting, fatigue and reflective cracking.



Use Our Experience for Your Projects

TENSAR® PROJECT SERVICE

Tensar is your partner with the necessary experience and competence to provide a customised service that meets the specific requirements of your project. We develop efficient and economical solutions that suit your individual needs. Our staff are happy to assist you in all areas covering technical, design and construction support.

FROM THE CONCEPT STAGE TO FINAL CONSTRUCTION, WE OFFER YOU THE FOLLOWING RANGE OF SERVICES

- ▶ Comprehensive advice on products and applications
- ▶ Application suggestion for specific construction problems
- ▶ Competent technical support
- ▶ Customised information and training programmes

YOUR BENEFITS:

By selecting the appropriate Tensar solution, proven benefits can include:

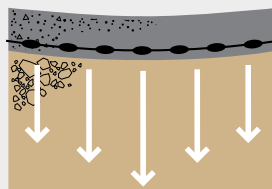
- ▶ Significantly reduced reflective and fatigue cracking
- ▶ Reduced rutting
- ▶ Extended pavement structural life
- ▶ Quick installation
- ▶ Long-term cost savings compared with traditional rehabilitation methods
- ▶ Durable and efficient solution
- ▶ Technology proven over more than 25 years of experience
- ▶ Delivery through Tensar or through our network of specialist installers and distributors



STRUCTURAL REINFORCEMENT

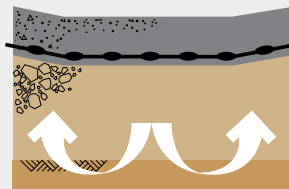
Tensor®
 Reinforcement
 Applications Address
 7 Major Pavement
 Failure Mechanisms.

ASPHALT FATIGUE RESISTANCE



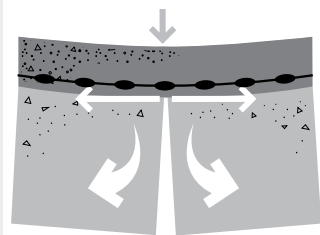
Asphalt reinforcement products can provide fatigue resistance by controlling crack initiation and/or propagation in asphalt. Pavement life may be increased or pavement thickness may be reduced.

SUBGRADE DRIVEN RUTTING



Asphalt rutting due to subgrade strain can be mitigated by reinforcing the asphalt layer.

BENDING

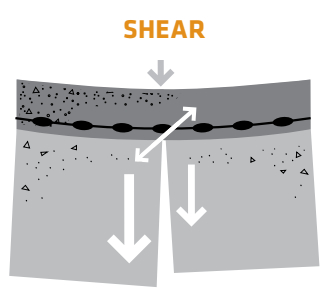


Asphalt reinforcement products can improve fatigue resistance of asphalt subjected to bending movement by delaying the onset of cracking.

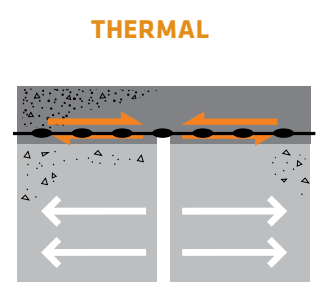


➤ Tensor® asphalt reinforcement applications can be used over concrete to mitigate reflective cracking problems.

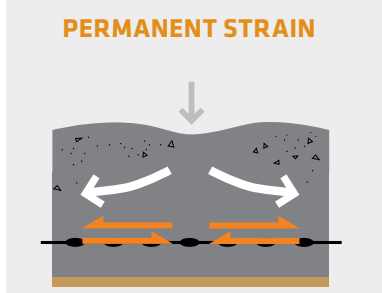
REFLECTIVE CRACKING **ASPHALT RUTTING** **DIFFERENTIAL SETTLEMENT**



Asphalt reinforcement products can reduce cracking by improving asphalt shear resistance and load transfer capabilities.
(Excessive vertical shear movements will necessitate pre-treatment for asphalt reinforcement to be effective.)



Asphalt reinforcement products can reduce cracking due to thermal expansion and contraction of the substrate.



Asphalt reinforcement products can reduce horizontal strain at the reinforcement layer interface to improve resistance to asphalt rutting.



Asphalt reinforcement products can mitigate cracking due to differential settlement.

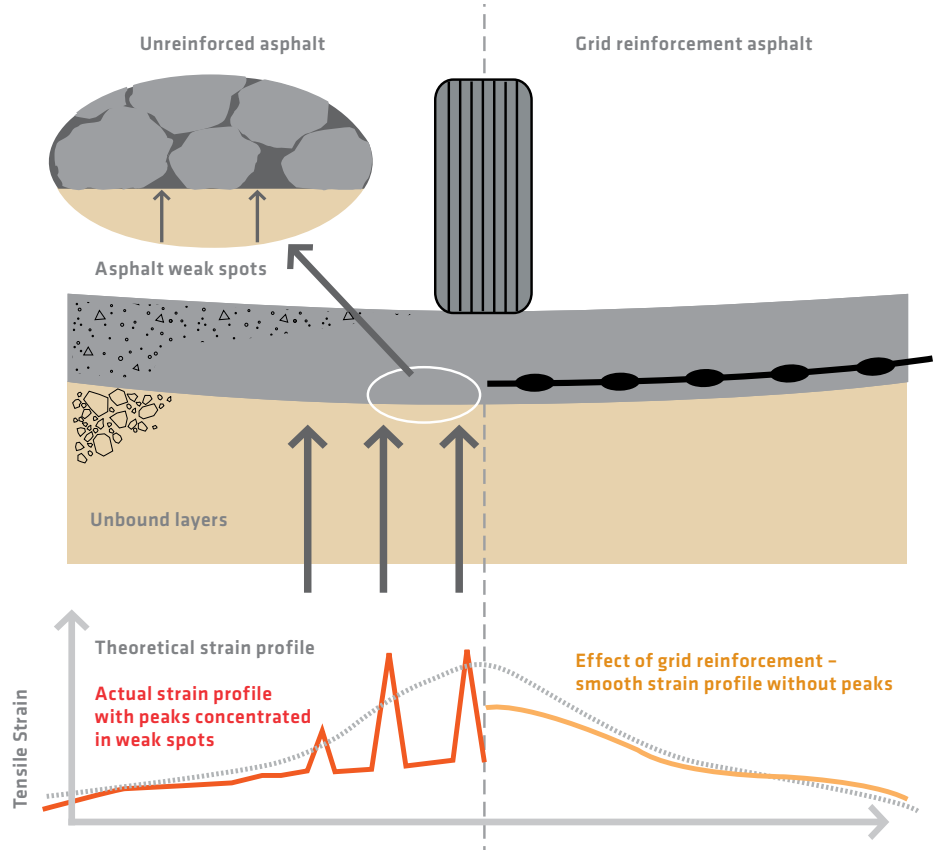


➤Tensor® asphalt reinforcement applications can provide long-term cost savings compared with traditional restoration methods.

How do Grids Control Cracking of Asphalt?

FATIGUE CRACKING

In an unreinforced asphalt layer, strain is not evenly distributed but develops in peaks located at weak spots (such as decayed bitumen or voids) in the asphalt which can lead to the development of cracks. In reinforced asphalt, the grid can delay fatigue and reflective cracking mainly by providing stress absorption and strain dissipation, along with confinement that prevents strain build-up at these weaker spots.

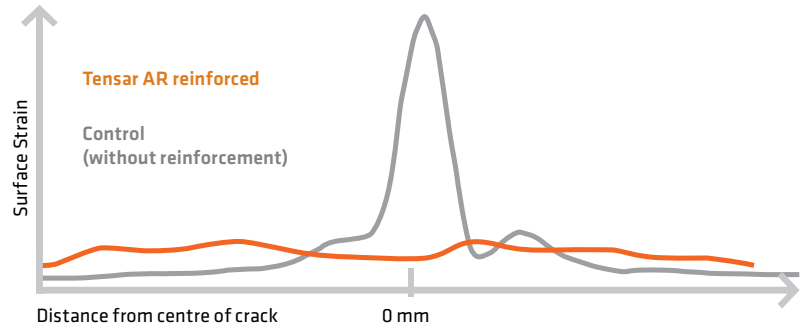
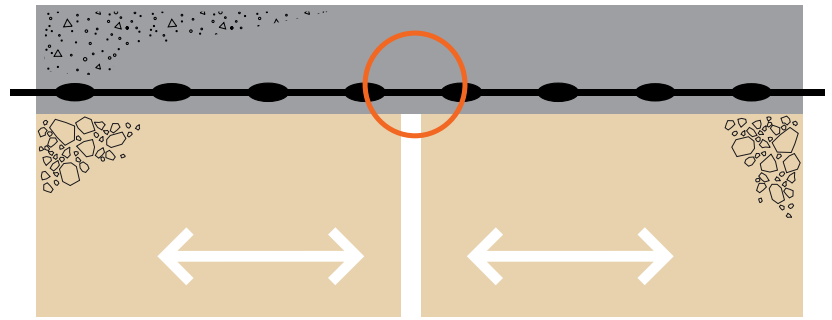


Grids help control the development of peaks in strain at the bottom of the asphalt layer.

THERMALLY INDUCED REFLECTIVE CRACKING

Reflective cracking in pavements is caused by peaks in strain centred over the crack or joints from lower layers. Independent research at the University of Nottingham has demonstrated that grid reinforcement eliminates peak strains, controlling thermally induced reflective cracking.

The University of Nottingham* thermal crack simulation apparatus was used in this investigation. The machine is composed of two concrete slabs, each 1 metre long by 200 mm wide, mounted on a mechanical device allowing for variable displacement between the slabs. The asphalt layer to be tested is built directly on the concrete frame. Thermal cracking is simulated by driving the two slabs apart from each other, therefore inducing tensile stress into the overlying asphalt. In this test, strain gauges were positioned with or without Tensar® AR reinforcement. Testing was carried out at -5°C and a crack movement amplitude of 2 mm.



Peak strains in the asphalt overlay are eliminated by the inclusion of Tensar AR, resisting the development of thermally induced reflective cracking.

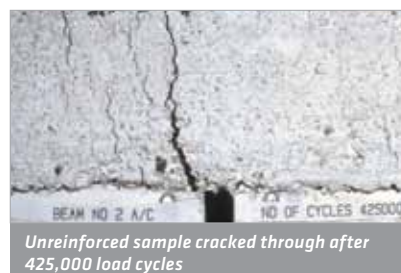
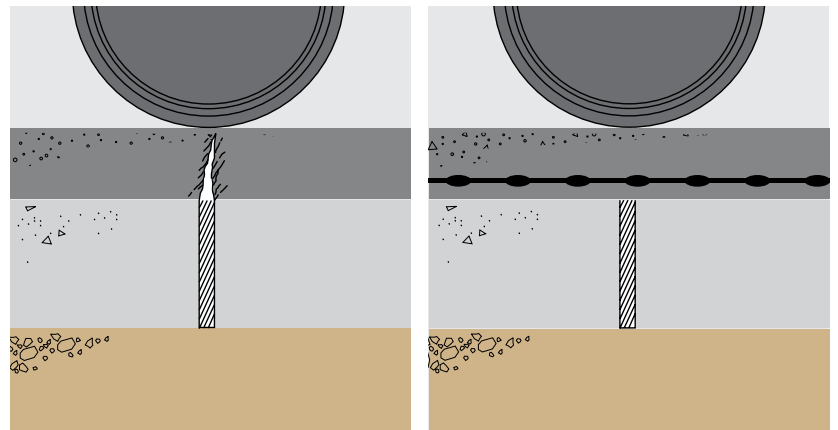
INDEPENDENT VALIDATION

Tensar AR-G and Tensar Glasstex have been tested and rated as “very effective” by the Autun LRPC (Laboratoire Régional des Ponts et Chaussées) laboratory, France.

TRAFFIC INDUCED REFLECTIVE CRACKING

Overlays over fractured surfaces will fail prematurely due to the traffic induced reflective cracking. Tests conducted at the University of Nottingham* showed that Tensar grids control traffic induced reflective cracking, greatly extending the life of the pavement.

A cyclic bending test was used to estimate resistance of an asphalt layer to repeated bending focused on a cracked substrate. The crack was simulated by mounting the asphalt slab onto two plywood boards, themselves resting on a rubber pad. A cyclic load is then applied on the top of the asphalt layer and crack development recorded versus the number of loading cycles.



Inclusion of Tensar AR inhibits the development of reflective cracking.

*Source: Brown et al, The Use of Polymer Grids for Improved Asphalt Performance and Brown et al, Polymer Grid Reinforcement of Asphalt

Selecting the Right Grid from Our Portfolio of Asphalt Reinforcement Products

Tensor provides six different product ranges for asphalt reinforcement:



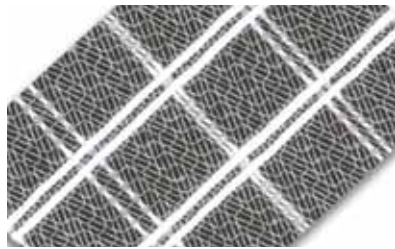
TENSAR® AR-G

AR-G is a composite product comprising a stretched polypropylene grid thermally bonded to a fabric backing. The fabric backing facilitates installation and provides a long-term sealing effect - once saturated with bitumen. Owing to the 3-dimensional geometry of the grid, the new asphalt layer is mechanically interlocked into the grid's wide apertures, thus providing reinforcement, stress relief and sealing functions.

- ▶ Installed directly on a sound substrate using a bitumen bond coat
- ▶ Bond coat must cure before placing the asphalt layer
- ▶ Any surface that is not finely milled may require a regulating course
- ▶ Potholes and open cracks must be treated separately
- ▶ Specialist installation is required
- ▶ Roll sizes from 1.0 m to 4.0 m (varies)

AR-G is used for base and binder course reinforcement. In flexible pavements, the grid can provide resistance to fatigue cracking and minimise fracturing due to long-term differential movements in the subgrade. On a cement-treated base, AR-G can reduce reflective and fatigue cracking in asphalt overlays. Horizontal strain in the asphalt can be minimised, achieved by the stiff high profile grid ribs.

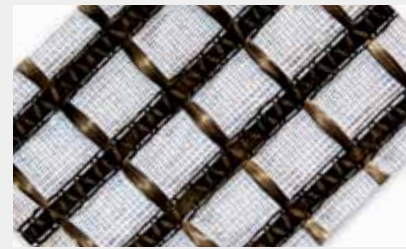
AR-G can be used in scenarios where maximum strains in the pavement structure exceed a level of 3%.



TENSAR GLASSTEX®

Glasstex® is a composite product comprising a grid of glass filament bundles stitch bonded to a non-woven fabric. The high modulus glass filaments provide high absorption of stress at low strains. After being saturated with bitumen the fabric performs a sealing function. Glasstex provides reinforcement, stress relief and sealing functions.

- ▶ Installed directly on a sound substrate using a bitumen bond coat
- ▶ Bond coat must cure before placing asphalt layer
- ▶ May be installed on a standard milled surface
- ▶ Potholes and open cracks must be treated separately
- ▶ Compatible with uneven surfaces, e.g., concrete or open textured surfaces
- ▶ Specialist installation is required
- ▶ Roll sizes from 1.0 m to 4.0 m (varies)
- ▶ Glass based reinforcement materials should not be used in applications where the maximum strain in the pavement structure will exceed a level of 3%.



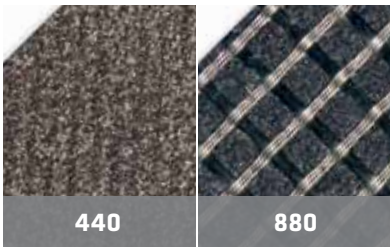
TENSAR GLASSTEX® GRID R

Glasstex®Grid R is a composite product comprising a glass yarn grid stitch bonded to a lightweight backing fabric. The high modulus glass filaments provide high absorption of stress at low strains. The lightweight backing fabric is only present to assist with adhesion during installation and subsequently permits intimate contact between overlying asphalt and the underlying surface.

- ▶ Installed directly on a sound substrate using a bitumen bond coat
- ▶ Bond coat must cure before placing the asphalt layer
- ▶ Any surface that is not finely milled may require a regulating course
- ▶ Potholes and open cracks must be treated separately
- ▶ Specialist installation is required
- ▶ Roll sizes from 1.0 m to 4.0 m (varies)
- ▶ Glass based reinforcement materials should not be used in applications where the maximum strain in the pavement structure will exceed a level of 3%.

Asphalt Reinforcement Product Selection Guide

	Open grid structures Asphalt bonds directly through the grid apertures with the pavement layer below (lightweight fabric for installation only)	Grid/fabric composites Grid is augmented by fabric/bitumen membrane interlayer as water barrier and/or stress relief	Paving fabrics Fabric/bitumen provides water barrier and/or stress relief
High profile products For absorption of stress at high strains. Stretched polypropylene grids have deep ribs and stiff integral junctions for optimal mechanical interlock		AR-G	
Thin profile products For absorption of stress at low strain and ease of installation under surfacing	Glasstex® Grid R60 & R120	Glasstex® P50, P100 & P200 Glasstex® Patch™ 440 & 880	TruPave® Tensor Paving Fabric



TENSAR GLASSTEX® PATCH™

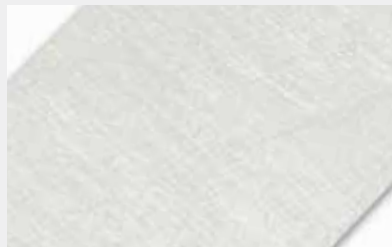
Glasstex® Patch™ consists of a glass yarn grid combined with a polymer modified bitumen membrane. The underside of the Glasstex Patch includes an adhesive coating, while the upper side is treated with a protective layer of quartz sand. The adhesive layer is protected during storage by a peel-off release film. Glasstex Patch provides a stress relief action by combining a dense bitumen membrane with an asphalt overlay reinforcement effect provided by the glass yarn grid.

Most significantly, Glasstex Patch does not require specialist installation and can be affixed to most sound substrates utilising the adhesive coating or alternatively can be heat activated via a flame torch.

- ▶ May be installed on a standard milled surface
- ▶ Potholes and open cracks must be treated separately
- ▶ Compatible with uneven surfaces, e.g., concrete or open textured surfaces
- ▶ Specialist installation is not required
- ▶ Installed directly onto a sound substrate using self-adhesive coating or heat activation
- ▶ Easily transportable
15.0m L x 1.0m W rolls
- ▶ Simply cut on site to suit the area, e.g., around manholes and gullies
- ▶ Compatible with bond coats when used on uneven substrates
- ▶ Compatible for use under double coat surface dressing systems

Tensar Glasstex® Patch 440 is used for general applications of stress relief.

Tensar Glasstex® Patch 880 is required for high strain applications where an additional reinforcement component is required.



TRUPAVE® ENGINEERED PAVING FABRIC

TruPave® engineered paving fabric is a non-woven pavement interlayer composed of a mixture of high strength fibreglass and polyester fibres. It is designed with low elongation and higher modulus to reinforce the pavement section and retard reflective cracking in overlay applications. TruPave installed with a bitumen bond coat creates a moisture barrier and stress relief layer between the existing pavement and new overlay thus increasing the life of the pavement. TruPave can be milled and recycled.

- ▶ Installed directly on a sound substrate using a bitumen bond coat
- ▶ Bond coat must cure before placing the asphalt layer
- ▶ Any surface that is not finely milled may require a regulating course
- ▶ Potholes and open cracks must be treated separately
- ▶ Specialist installation is required
- ▶ Roll sizes from 1.0 m to 4.0 m (varies)
- ▶ Shares the same benefits as standard paving fabrics but augmented with higher modulus



TENSAR PAVING FABRIC

Tensor Paving Fabric is a high-quality 140 gsm needle-punched non-woven polypropylene geo-textile that, when installed on a bituminous bond coat, performs as a stress absorbing membrane interlayer (SAMI) and inhibits the upward propagation of cracks from the underlying pavement into the overlay caused by fatigue.

Tensor Paving Fabric can offer optimum tensile strength with high corresponding elongation. This ensures that the saturated non-woven fabric will absorb stress but still follow the contours of the underlying surface. This enables the fabric to be installed on milled surfaces and for roads with difficult alignments.

- ▶ Installed directly on a sound substrate using a bitumen bond coat
- ▶ Bond coat must cure before placing the asphalt layer
- ▶ May be installed on a standard milled surface
- ▶ Potholes and open cracks must be treated separately
- ▶ Compatible with uneven surfaces, e.g., concrete or open textured surfaces
- ▶ Specialist installation is required
- ▶ Roll sizes from 1.0 m to 4.0 m (varies)
- ▶ Compatible for use in conjunction with surface dressing systems



Manual installation of Glasstex®Grid R can be straightforward.

Tensor® asphalt reinforcement applications have been demonstrated to increase the service life of roads and thereby save money over the full life-cycle.



Tensor® AR-G bonds well on to the underlying surface to allow paving directly over the grid.



Glasstex®Patch™ 880 can be applied to most sound substrates utilising the adhesive coating.



A simple overlap joint for Tensor Glasstex.



Mechanical installation of Tensar Glasstex® is fast and efficient – an experienced crew can install up to 12,000m² per day, per tanker.

Contact Tensar for guidance on grid selection and for installation advice using local specialist installers.



Mechanical installation of TruPave® on a sound substrate using a bitumen bond coat.



Glasstex®Patch™ 880 can be applied to the construction of stable and durable asphalt sealing around iron works, where the combination of asphalt, concrete, mortar and iron causes reflective and fatigue cracking.



Tensar AR-G can provide resistance to fatigue cracking and minimise fracturing due to long-term differential movements in the subgrade.

Your local distributor is:

Contact Tensar or your local distributor to receive further literature covering Tensar products and applications.

Also available on request are product specifications, installation guides and specification notes.

The complete range of Tensar literature consists of:

- ▶ **Tensar Geosynthetics in Civil Engineering**
A guide to products, systems and services
- ▶ **Ground Stabilisation**
Stabilising unbound layers in roads and trafficked areas
- ▶ **TriAx®: A Revolution in Geogrid Technology**
The properties and performance advantages of Tensar® TriAx® geogrids
- ▶ **Asphalt Pavements**
Reinforcing asphalt layers in roads and trafficked areas
- ▶ **TensarTech™ Earth Retaining Systems**
Bridge abutments, retaining walls and steep slopes
- ▶ **Railways**
Mechanical stabilisation of track ballast and sub-ballast
- ▶ **Foundations Over Piles**
Constructing over weak ground without settlement
- ▶ **Basal Reinforcement**
Using Basetex high-strength geotextiles
- ▶ **TensarTech Geocell Mattress System**
- ▶ **Erosion**
Controlling erosion on soil and rock slopes

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INNOVATIONS FOR LIVING®

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