


# High Performing Airport Pavements



**Tensar**<sup>®</sup>





Airport owners and operators often find themselves in a never-ending pavement maintenance process to ensure uninterrupted operations.

Compounding the issue, the most frequently used pavements, like taxiways and runways, often need the most work. The onset of reflective cracking generally signals the start of rapid pavement deterioration and an urgent need for rehabilitation. Failure to act on reflective surface cracking in a timely manner will result in permanent damage to the lower layers within the pavement. Fortunately, Tensar offers proven strategies that not only address immediate repairs but also ensure that our high-performance solutions reduce future maintenance and rehabilitation over the long-term.





## GLASGRID® PAVEMENT REINFORCEMENT SYSTEM

When reflective cracking is present, the traditional remedy has been to apply thicker asphalt overlays. However, this solution can be both disruptive and expensive in the long-term; it is generally accepted that for every one (1) inch of overlay applied, existing reflective cracks will be deterred from reaching the surface for a period of one year. The thicker overlay solution is therefore temporary at best.

## PAVEMENT MAINTENANCE

The GlasGrid® Pavement Reinforcement System is a type of HMA pavement reinforcement that has been used successfully in airport runways, taxiways and aprons for over the past 30 years. It has been particularly effective for addressing transverse thermal cracking or PCC joint cracking. When GlasGrid is installed at the bottom of an overlay, cracks propagating toward the surface are intercepted and prevented from

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migrating further and tensile strains are reduced to increase the life of the overlay. Cracks are intercepted, redirected, and dissipated horizontally, mitigating, and reducing tensile strain, delaying cracks that will extend the life of the pavement and reduce future required maintenance. The reinforced overlay will eventually show signs of fatigue, but at a much-reduced rate, thereby significantly extending the service life of the road.



In airport applications, the GlasGrid System is typically used for:

- Full width repairs of aged, random block cracked or alligator cracked pavements
- Detail repairs applied over local transverse-cracked areas



## BENEFITS OF THE GLASGRID SYSTEM:

### EXTENSION OF PAVEMENT DESIGN LIFE

Field and laboratory tests have demonstrated that the GlasGrid System can delay reflective cracking in overlays by three to five times.

### LESS DISTURBANCE

Extended pavement life equals decreased maintenance in the future.

### COST EFFICIENT PAVEMENTS

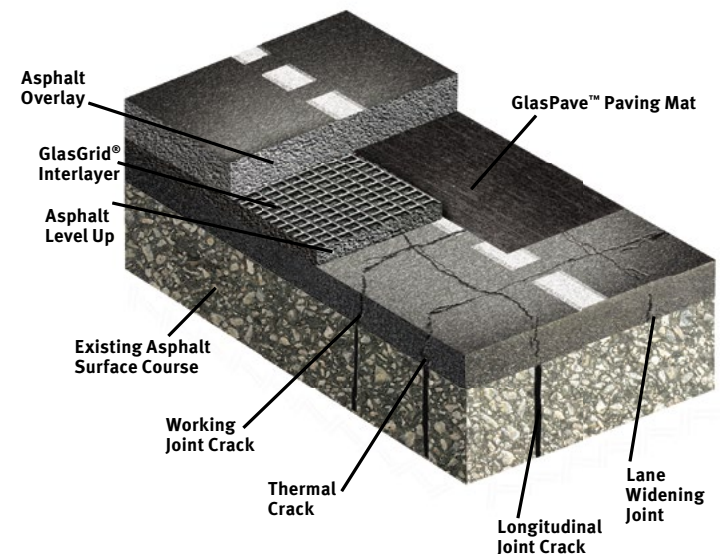
When overall life cycle costs are considered, the GlasGrid System can offer a 30% savings on future maintenance costs due to delayed cracking.

### RECYCLING POTENTIAL

Unlike most other interlayer systems, the GlasGrid System can be milled using conventional equipment. Asphalt millings containing GlasGrid millings are easily recycled back into new HMA.

### GENERAL ACCEPTANCE

Asphalt Reinforcement is recognized as a standard technique to mitigate reflection cracking in hot mix asphalt overlays (FAA Advisory Circular 150/5230-6D).







## GLASPAVE® PAVING MAT

GlasPave® paving mats are a unique combination of fiberglass mesh embedded into high performance polyester mats. The non-woven matrix structure of GlasPave paving mats allows for an asphalt binder to penetrate and fill voids within the fabric to limit moisture infiltration into a pavement structure. The fiberglass matrix in a GlasPave paving mat coated with an elastomeric polymer provides significantly greater tensile strength at low strain when compared to conventional paving fabrics and other paving mats.

## BENEFITS OF THE GLASPAVE PAVING MATS:

### **DELAY REFLECTIVE CRACKING**

The higher strength at low strain helps extend pavement life by delaying reflective cracking.

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### **EFFECTIVE MOISTURE BARRIER**

Preventing water ingress into the lower layers of a pavement structure is critical to preserve the integrity and long-term performance of the pavement section.

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### **SIZED FOR EASY INSTALLATION**

Glaspave comes in various roll widths and lengths for fewer roll changes and easier placement around corners and curves.

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### **THERMAL STABILITY MEANS NO SHRINKAGE**

This feature eliminates the risk of premature slippage or loss of bond.

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### **MORE ROBUST**

The additional stiffness compared to paving fabrics and other paving mats, makes them more durable and less prone to on-site installation damage.

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### **EASY RECYCLING**

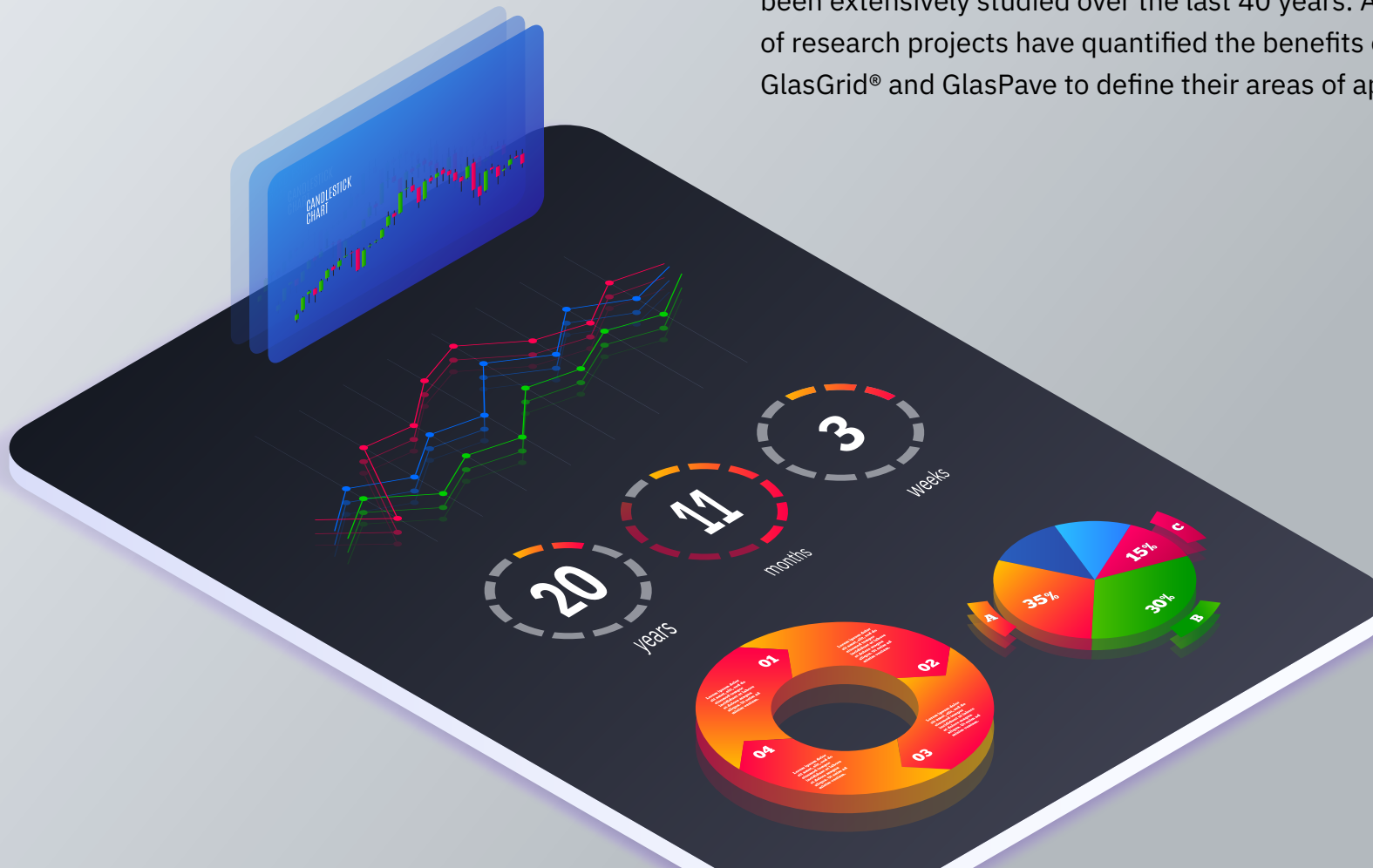
Milled GlasPave fibers are easily disbursed within the HMA millings and will not negatively impact the recycling of the HMA back into a new mix for future projects





# Research Quantifies the Benefits of the GlasGrid System and GlasPave Paving Mat

The use of interlayers for preventing reflective cracking has been extensively studied over the last 40 years. A number of research projects have quantified the benefits of the GlasGrid® and GlasPave to define their areas of application.





A photograph of a multi-lane highway with a line of heavy trucks, including several flatbeds and a tractor-trailer unit, traveling away from the viewer. The road is flanked by green grass and dense trees. A semi-transparent text box is overlaid on the right side of the image.

## NATIONAL CENTER FOR ASPHALT TECHNOLOGY

The National Center for Asphalt Technology (NCAT) at Auburn University features a 1.7-mile long test track (Image A). An unreinforced and a GlasGrid System-reinforced paved section were trafficked. After 70-80 million ESALs (Equivalent Single Axle Loads) over more than a decade, distresses were clearly evident in the unreinforced section, while the reinforced section showed no signs of distress cracks.



## IFFSTAR TESTING FACILITY, FRANCE

The fatigue benefits of a 100 kN/m GlasGrid System were evaluated at the IFFSTAR facility, a circular full-scale accelerated pavement test track located in France. Crack percentage was determined by the ratio between the length of pavement with cracks and the initial length. The test was run until the extent of cracking increased such that the control section was too damaged to continue, which occurred at 1.2 million cycles. At this point, the control section exhibited a cracked area of 70%, while the GlasGrid System-reinforced section exhibited less than 10% cracking.

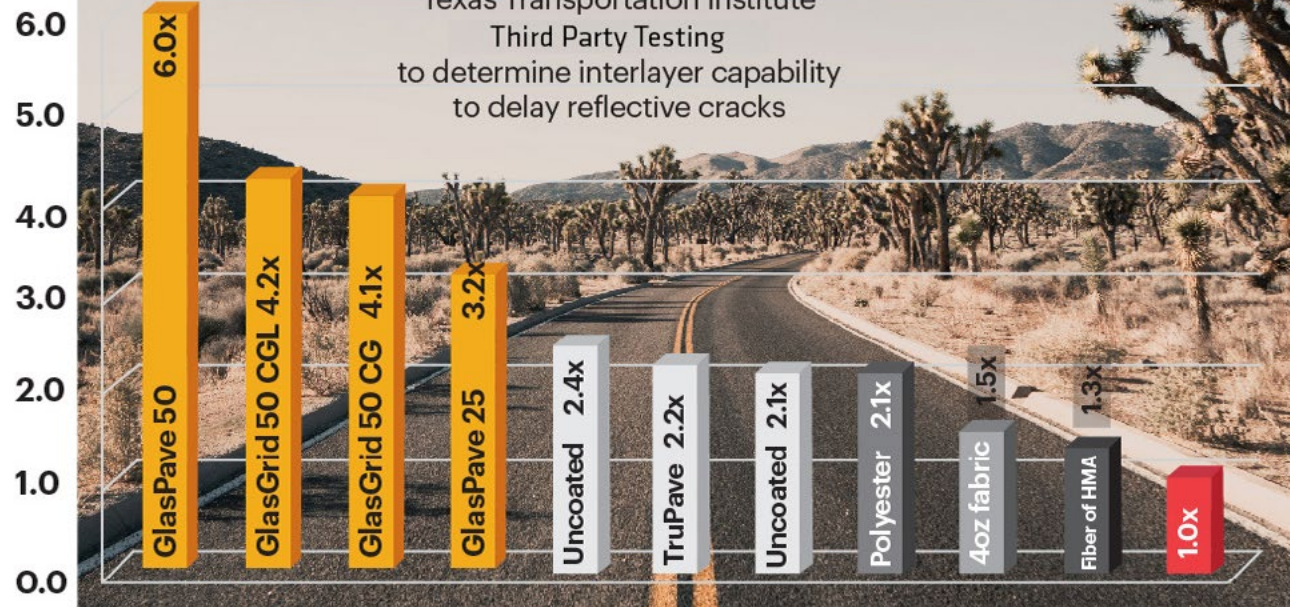


## GLASPAVE TTI STUDY

## PAVEMENTS ABILITY TO RESIST CRACKS

Texas Transportation Institute  
Third Party Testing  
to determine interlayer capability  
to delay reflective cracks

CRACK MITIGATING FACTOR



Tensile (kN/m)	50	50	50	25	50	3.9	30	50	1	Min	No Interlayer
%Elongation	<5	<5	<5	<5	<5	<5	<5	>12	>50	∞	
Type	PM	CG	CG	PM	CG	PM	CG	CG	Fabric	Fibers	
Elastomeric Polymer Coating	Coated Glass				Uncoated Glass			Polyest	PolyPro	Mix Add	

PM=Paving Mat, CG=Composite Grid

To demonstrate and quantify these benefits, various products, including GlasPave 25 paving mat, have been included in the Texas Transportation Institute's (TTI) overlay fracture performance study. The TTI testing captures the stress and strain improvement provided by interlayers and allows for the calculation of an interlayer product's ability to resist reflective cracking. The CMF (Crack Mitigating) Factor quantifies the combined improvement of the reinforced asphalt vs. unreinforced asphalt in terms of dealing with both stresses and strains. The results of the testing, which are summarized in the table below, indicate that GlasPave25 delays reflective cracking up to 3.2 times longer than asphalt with no interlayer materials. It also outperformed HMA using other interlayer products.

## PROVEN IN THE REAL WORLD



### PROJECT

Hutchinson County Airport Runway and Taxiway Rehabilitation

### LOCATION

Borger, Texas

### APPLICATION

Main Runway/Taxiway/Apron areas Mill and Overlay

### BENEFIT

Pavement Rehabilitation Fast tracked with GlasGrid  
Pavement just in time for holiday travel rush

## CLIENT CHALLENGE

The Hutchinson County Airport was experiencing severe, large reflective cracks on its main runway and taxiway. Since the runway would need to shut down for the pavement rehabilitation, timing was a factor.



## TENSAR SOLUTION

The GlasGrid System and GlasPave pavement interlayers were chosen because they could be rapidly installed and for their proven ability to extend maintenance cycles. GlasPave50 mats were installed on the taxiways while GlasGrid 8511 was installed on the main runway taking on the heavier duty loads. Trackless tack was applied to the grid prior to paving. The airport was pleased with the results and plans to install GlasGrid on its other runway during the summer of 2022.



## PROVEN IN THE REAL WORLD

### CLIENT CHALLENGE



At Shreveport Downtown Airport, Taxiway Foxtrot, which runs parallel with Runway 14-32, was one of the airport's most used taxiways. It needed a rehabilitation to address the significant deficiencies such as large, localized block cracking, alligator cracking directly in the landing gear paths, and it was riddled with both longitudinal and transverse

cracks. Since Taxiway Foxtrot was so heavily used, providing maintenance without inconveniencing its users would be difficult. The rehabilitation would need to be carried out efficiently and needed to perform effectively.

Due to financial costs, as well as the user's inconvenience, complete reconstruction was not the preferred option. Alternatively, the airport considered the commonly used strategy of removing and the replacing the oxidized surface asphalt with a double lift of new hot mix asphalt. Mr. Dennis Dean, the Project Engineer, stated this was not the ideal solution either, "One of the main concerns was the potential for the existing cracks to prematurely reflect through the new asphalt wearing course."



#### PROJECT

Shreveport Downtown Airport  
Taxiway Foxtrot

#### LOCATION

Shreveport, Louisiana

#### APPLICATION

Taxiway pavement rehabilitation

#### BENEFIT

Taxiway remained crack-free after seven years of performance

### TENSAR SOLUTION

The Shreveport Airport Authority approved the removal of 3.5" of old oxidized asphalt from the taxiway surface and replaced it with new asphalt pavement of the same thickness and included GlasGrid® 8511. The GlasGrid® Pavement reinforcement System was installed over a 1.5" leveling course and then covered with a 2" wearing course. By reinforcing the asphalt pavement with GlasGrid 8511, the wearing course was given a greater ability to resist tensile stresses and remain free of cracks for a longer duration. In total, 21,000 SY of GlasGrid® 8511 was used to cover Taxiway Foxtrot and it was paved the same day it was installed. This impressed all of those involved with the project as it supported a very efficient paving operation.

The reinforced overlay has remained crack free and has met the expectations of our design. It is our opinion that GlasGrid® 8511 provides excellent protection against reflective cracking in structurally sound pavements.

- Mr. Dean

## PROVEN IN THE REAL WORLD




**PROJECT**  
Centralia Airport

**LOCATION**  
Exeter, Ontario, Canada

**APPLICATION**  
Airport Apron Pavement Rehabilitation

**BENEFIT**  
Taxiway remained crack-free after seven years of performance

### CLIENT CHALLENGE



The airport apron was becoming extremely oxidized and brittle due to irregular maintenance and the harsh climate. Centralia's highest recorded monthly average temperature was 80°F in July while the lowest was 15°F in January. The surface layer included thermal, alligator, transverse and longitudinal cracks. Further surface degradation was likely to affect aircraft movement and safety.

Adding a thicker overlay to the apron was considered, however, this approach would have proved very expensive. Experience also suggested that an overlay without reinforcement would provide only a temporary solution.

### TENSAR SOLUTION

The GlasGrid® Pavement Reinforcement System was recommended as a lower cost, longer lasting alternative to installing a thicker overlay. Reinforcing the apron with GlasGrid 8501 would produce a strong interlayer solution capable of resisting the migration of reflective cracking.

After return site visit in February 2007, Brad Pryde who was the design engineer of record, stated, "We incorporated GlasGrid 8501 into Centralia Airport's concrete apron rehabilitation to mitigate the reflective cracking that was anticipated to reoccur in the proposed 3 in. thick asphalt pavement overlay. After 13 years of Canadian weather, the cracking is minimal. We are satisfied with the performance of the GlasGrid product in this application." The airport was visited again in 2018. Although more cracking was observed, the pavement was still performing as planned.



# A Partnership You Can Depend On

**Tensar®**

By partnering with Tensar you benefit from an experienced team of distributors and installers along with a technical team that can help you build the highest performing pavement for your budget.

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