TENSAR® GEOSYNTHETICS IN CIVIL ENGINEERING

A GUIDE TO PRODUCTS, SYSTEMS AND SERVICES

Tensar®

Tensar®

Tensar® Technology – proven, practical products and systems and the know-how to get them built

Based on the characteristic properties of Tensar® geogrids, Tensar Technology is widely used in ground stabilisation, soil reinforcement and asphalt reinforcement applications often delivering major environmental benefits and real savings in cost and time. We can help you apply Tensar Technology to improve the bottom line on your project.

Solutions for Soil Reinforcement and Ground Stabilisation

LEADING INTERNATIONALLY

Tensar International Limited (Tensar) is a worldwide leader in the manufacture and provision of soil reinforcement and ground stabilisation products and systems. Our expertise and experience has been accumulated over several decades of successful collaboration in projects internationally. Our service team, comprising many qualified civil engineers, provides practical and best value advice and design to support the use of Tensar products and systems in your application.

INNOVATIVE, BEST VALUE SOLUTIONS IN THOUSANDS OF APPLICATIONS

Tensar's high-performance range of innovative geogrids has been continuously developed since being introduced in the 1970s as the first geosynthetic products of their type. The outstanding performance of Tensar® geogrids and geotextiles has benefited thousands of road, rail, runway, embankment and many other applications across the world. Tensar products are available wherever ground stabilisation and soil reinforcement is required through Tensar regional offices, or specialist distributor networks.

INDEPENDENTLY PROVEN PERFORMANCE

Our state-of-the-art geogrid and geotextile products have been rigorously and exhaustively tested by leading universities, independent laboratories and national authorities, under research and site conditions. Many Tensar products and systems hold internationally recognised certification, and can provide cost-effective, timesaving and lasting solutions to widely encountered civil engineering problems.

PARTNERSHIP FOR SUCCESS

Tensar's range of support services is an integral part of every project partnership. Our team of design and applications engineers can work with you from the outset to ensure that our products, systems and designs are tailored to your exact requirements, to help you achieve your project objectives on time and to budget.

Contents

Reducing construction costs and long-term maintenance needs

TriAx® gives improved aggregate confinement and interaction, leading to improved structural performance of the mechanically stabilised layer.

Ground Stabilisation

STRUCTURAL PERFORMANCE THAT CAN BE APPLIED TO DIVERSE AND DIFFICULT GROUND CONDITIONS

There are now unprecedented demands to design economic and environmentally sensitive roads, container ports, car parks, airfields and hardstandings sited over weak or variable ground. Tensar can provide high performance geogrid-based systems which meet these demands.

The structural contribution made by Tensar® TriAx® geogrids is to stabilise the unbound layers of roads and trafficked areas to create a mechanically stabilised layer. Aggregate particles interlock with the geogrid and are confined within the apertures, creating an enhanced composite material with improved performance characteristics.

TriAx geogrids have radial stiffness producing a truly multi-directional product with near isotropic properties.

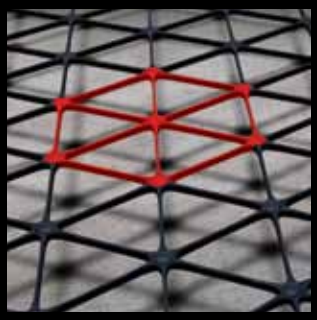
Independent trials have confirmed that it is the shape and form of the ribs and junctions of Tensar geogrids, which determine the structural performance of pavements.

Since 1980, several hundred million square metres of Tensar geogrids have been successfully incorporated into a wide range of sites under diverse working and climatic conditions.

COMBINING COST SAVINGS AND REDUCED EMISSIONS

Tensar TriAx geogrids combine major cost savings with considerable performance benefits in granular capping, sub-base and other aggregate layers. When compared with an unstabilised aggregate layer, TriAx can:

- Give savings in granular thickness of up to 50% with no performance loss
- Provide a reduction of excavated soil together with conservation of natural aggregates
- Control differential settlement
- Reduce disturbance and weakening of sensitive subgrade formations
- Improve fill compaction
- Increase design life
- Increase bearing capacity
- Give savings of up to 50% on construction CO_2 emissions



TriAx®

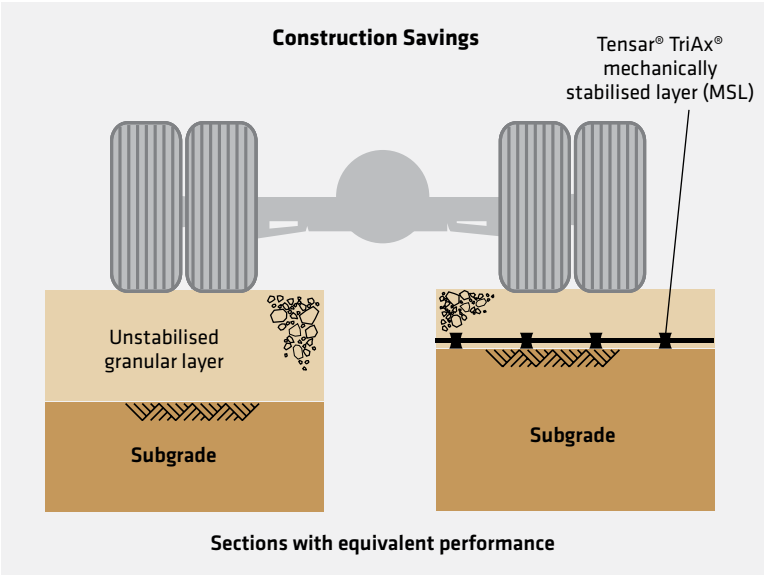
A REVOLUTION
IN GEOGRID TECHNOLOGY

Proven performance – in trafficking trials TriAx® outperforms Tensar biaxial geogrids

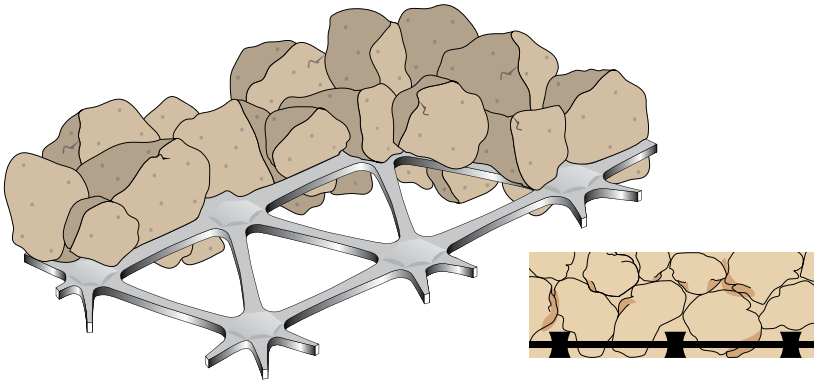
Reduces aggregate – providing cost savings, less excavation, less disruption

360° directional properties – a truly multi-directional geogrid

The reduction in aggregate materials and transportation helps engineers meet sustainability objectives.



TriAx enables significant savings in granular thickness and consequent reduction in construction CO_2 emissions.



Particle interlock and the effect of confinement enhances compaction over weak ground.

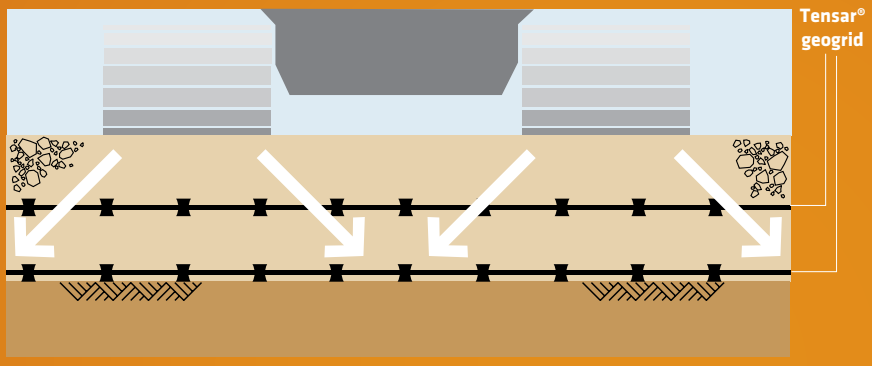
Ground Stabilisation Applications

CHOOSING THE GROUND STABILISATION SOLUTION FOR YOUR PROJECT

Since Tensar introduced stiff polymer geogrids, more than 30 years ago, they have become a major component of civil engineering projects.

A project may require only one geogrid application or it may be necessary to devise solutions that involve a combination of applications.

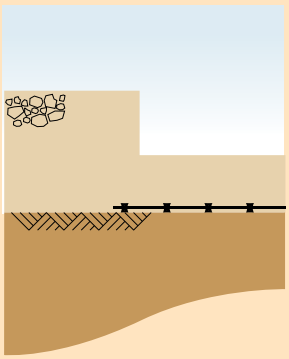
Our technical service levels range from a free Application Suggestion for your own project design to Design and Supply where Tensar can take over the responsibility for the design of mechanically stabilised layers based on agreed design parameters. Tensar can provide project specifications and certified calculations.



The Tensar mechanically stabilised layer spreads the track loads over a wider area.

The Major Ground

REDUCING LAYER THICKNESS



Numerous research programmes* over the years have consistently proven the high stabilisation factors attributed to Tensar geogrids. With the improved performance from Tensar® TriAx® geogrids, Tensar Technology now offers even greater reductions in aggregate.

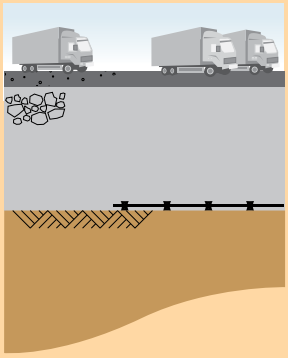
**See Tensar Ground Stabilisation brochure*

Reducing Layer Thickness

By reducing the granular capping layer thickness by up to 50% with no performance loss compared with a standard unstabilised design, the contractor can save significant money on the costs of the ground improvement work as well as achieving savings of up to 50% in construction CO_2 emissions. Cost savings of over 75% have been made over conventional solutions, such as working platforms, in providing a supporting substructure to a road pavement.

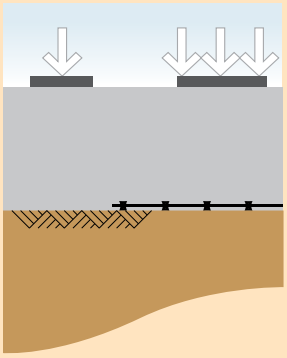
Stabilisation Applications for Tensar® Technology

INCREASING LIFE



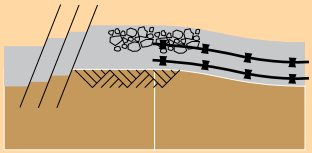
The use of Tensar® TriAx® geogrids in pavement layers can extend the service life of the road and therefore the use of Tensar Technology makes significant savings in maintenance budgets.

INCREASING BEARING CAPACITY



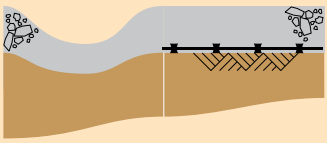
By applying Tensar Technology the load spreading capability of a Tensar TriAx stabilised layer can increase the bearing capacity of working platforms for heavy-duty plant, cranes and piling rigs.

CONTROLLING DIFFERENTIAL SETTLEMENT



Multiple layers of Tensar TriAx geogrids in an aggregate layer create a flexurally stiff platform. Through the use of Tensar Technology the effects of a variable quality of support from a foundation soil can be smoothed out.

CAPPING WEAK DEPOSITS



Where the ground is exceptionally weak, Tensar TriAx Technology is available to enable a capping operation. Tensar TriAx geogrids enable safe placement and compaction of the fill when capping sludge lagoons and industrial waste deposits.

INCREASING LIFE

A mechanically stabilised layer has proven benefits over traditional road layers and can increase a road pavement design life by a factor of three or more. A reduction in road rehabilitation cost is estimated to give savings, on annual maintenance budgets for flexible pavements, of over 50%.

CONTROLLING DIFFERENTIAL SETTLEMENT

The increasing need for development of brownfield sites means that these industrial areas could be prone to differential settlement problems due to the variable ground support. Tensar has a long established track record in mitigating differential settlement which can be demonstrated by the preserved surface profile of roads built over variable ground after many years of service.

CAPPING WEAK DEPOSITS

Tensar has continued to develop and refine techniques for capping weak deposits and is seen by engineers as the preferred method for capping sludge lagoons and industrial waste deposits.

INCREASING BEARING CAPACITY

On weak subgrades, it is often necessary to construct access roads or working platforms that have to bear very heavy loads. Heavy-duty plant such as cranes and piling rigs are prime examples where the bearing capacity has to be increased and designed for safe site operations.

WALLS AND SLOPES

TensarTech™ Earth Retaining Systems permit the construction of steeper slopes with the benefits of speed and versatility

TensarTech Systems for Earth Retaining Slopes can shorten construction times and minimise traffic disruption.

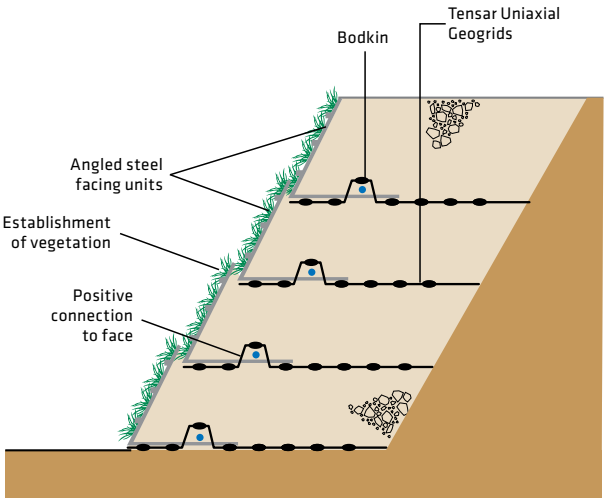
TensarTech™ Earth Retaining Systems for Slopes

VERSATILE AND PROVEN SYSTEMS TO SUIT YOUR SCHEMES

TensarTech™ Earth Retaining Systems permit the construction of steeper slopes with the benefits of speed and versatility and offer huge cost savings of up to 75% over alternative methods.

With ever increasing building constraints, including environmental and rising land costs, Tensar provides a variety of systems for slopes of up to 70° offering a number of finishes to fit in with your construction schemes.

Crucially the variety of systems we offer can help with early planning approval at the beginning of a scheme or can allow for greater aesthetic flexibility than those offered by traditional earth retaining schemes.



A typical section through the TensarTech GreenSlope System shown with a stepped face to aid irrigation of the vegetation.

TensarTech™ GreenSlope System

PRACTICAL, ECONOMICAL AND ATTRACTIVE CONSTRUCTION UP TO 70°

The TensarTech™ GreenSlope System is designed for building soil structures with a sloped face of up to 70°.

The facing consists of durable steel units connected to the geogrids using Tensar's highly efficient bodkin connection. During installation these are lined with selected anti-erosion mats, allowing the chosen vegetation cover to establish itself upon the slope, whether these are climbing plants, grasses or simply ground cover.

The cost effectiveness of the TensarTech GreenSlope offers many advantages over traditional concrete structures and has a more attractive appearance than gabions or crib walling.

TENSARTECH EARTH RETAINING SYSTEMS FOR SLOPES CAN:

- Allow rapid and economical construction
- Maximise the plateau area on a sloping site
- Tolerate differential settlement
- Optimise the use of available space
- May allow use of site-won materials (including cohesive or contaminated), or recycled fill materials
- Provide high resistance to earthquake loading
- Often avoid expensive foundation treatment

The TensarTech GreenSlope System can provide practical solutions to otherwise difficult building projects.

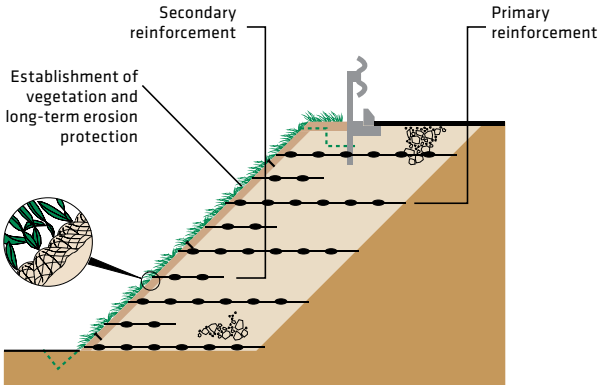
The TensarTech NaturalGreen System can provide a durable, cost-effective and attractive flood defence.

TensarTech™ NaturalGreen System

TENSARTECH™ NATURALGREEN IS AN ESTABLISHED AND PROVEN SYSTEM WHEN BUILDING SOIL SLOPES OF UP TO 45°

The system relies on Tensar's proven geogrids to reinforce the soil mass, providing the structure with long-term stability and a high quality composite erosion protection material at the slope face to help establish the chosen vegetation and stabilise the roots systems. This mesh composite provides all the root support and moisture retention necessary for productive and sustained growth for the slope covering.

In addition Tensar is able to offer advice on construction and vegetation selection ensuring optimum growth and cover.



Tensar's proven geogrids reinforce the soil mass providing long-term stability.

TensarTech™ SlipRepair System

QUICK AND EFFICIENT REPAIR OF SOIL EMBANKMENTS OR CUTTINGS

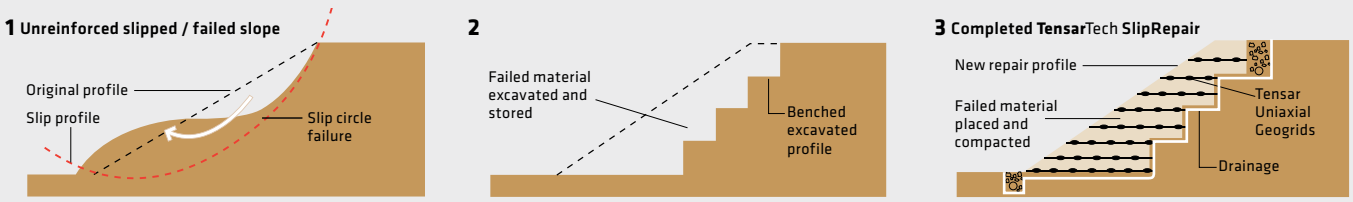
Tensar® geogrids can be used to provide a quicker, cost-effective and more environmentally friendly alternative to the customary techniques for slip repair.

Traditionally these would involve the excavation and off-site transportation of failed fill material. Replacing these materials often with imported granular fill is not only time consuming and expensive but can incur landfill and aggregate taxation as well as being environmentally damaging.

Tensar provides a solution whereby the excavated soil can be returned and reinforced with geogrids, reducing the need for additional on-site imports. Construction activity on-site is significantly improved as off-site movements are kept to a minimum.

- Reduction in off-site tipping
- Reduction in imported fill
- Less transportation costs and pollution
- Minimising traffic disruption and lane closures
- More economic than traditional methods by up to 75%
- Meeting sustainable construction objectives

A TYPICAL SECTION THROUGH A TENSARTECH SLIPREPAIR



TensarTech™ Wall Systems such as this TW1 modular block wall are suitable for the most demanding applications and are versatile enough to accommodate both technical and aesthetic requirements.

TensarTech™ Earth Retaining Systems for Wall and Bridge Abutments

A Comprehensive Range of Solutions and Advice for Your Projects

TensarTech™ Wall Systems have a proven worldwide reputation for quality in the construction of retaining walls and bridge abutments, with savings of up to 50% on traditional concrete structures.

TensarTech Wall Systems utilise uniaxial geogrids for soil reinforcement leading to rapid and cost-effective construction.

We offer free application suggestions to support your own designs or you can select a Design and Supply contract, based on a design brief, including specifications, drawings and certified designs.

The wide ranging options in facing materials will give the designer and builder the opportunity to meet the aesthetic demands as well as providing economic options on cost and finish.

- Long-term design stability using proven, independently certified products and systems
- Simply constructed systems to reduce build times and resulting costs
- An aesthetically appealing end result
- Modular block systems are dry laid without using mortar
- Easily form complex or curved geometry
- Durability – 120 year design life
- Possibility of using site-won fill materials
- High resistance to dynamic and seismic shock loadings
- May avoid the need for piling or ground treatment

Tensar Offers a Range of **Tensar**Tech™ Modular Block Wall Systems

TENSARTECH MODULAR BLOCK WALL SYSTEMS SAVE TIME AND PROVE MORE ECONOMIC

The TensarTech Wall System offers a combination of concrete modular facing blocks and reinforcing soil geogrids to create strong and durable retaining wall structures. A highly efficient connection is made between the facing block and geogrid creating a durable, strong retention system.

The distinctive and aesthetic quality of the facing blocks permit internal and external curves, corners and stairs to be easily detailed allowing for easier and quicker installation. With a wide range of finishes and colours combined with special attention to the detail such as corners and copings, it is possible to create strong architectural results easily and cost effectively.

A feature common to all TensarTech Wall Systems is the high efficiency of the connection between geogrid and the chosen facing, in this case the TW1 Wall System.

Significant Savings on Time, Budget and Design

Costs can be kept to a minimum with the TensarTech™ TW Wall System which can be built without the need for cranes or propping. Facing units are simple to install and connection to the face is easy yet secure. Proven benefits include significant time savings and up to 50% on traditional build costs, combined with durability and a wide choice of finishes.

TensarTech Wall System – a combination of coloured facing blocks is used for dramatic effect on this bridge wingwall.

Tensar – Making the Right Choice for Your Building Projects

Tensar offers a broad variety of cost-effective and attractive solutions for retaining walls. Whether they are to provide long term permanent solutions or for temporary works, we have a variety of systems available.

TENSARTECH PANEL SYSTEM

Pre-cast full height or incremental facing panels are connected to the geogrid reinforcement creating a wall clear of horizontal joints. The installation is quick and a variety of finishes can be added to the fascias.

TENSARTECH ROCKWALL SYSTEM

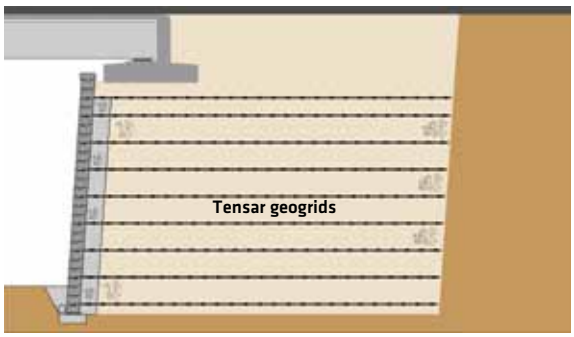
This method replaces the traditional mass gabion gravity structure with a single rock filled steel facing unit, securely connected to the geogrid reinforcement. Reductions can be made in both the cost and time of placing rockfill.

TENSARTECH MARINE SYSTEM

Suited to aggressive marine conditions, these large sized stable blocks are designed so that no propping is required through construction.

TENSARTECH TR2 SYSTEM

This system is aimed mainly at temporary structures where practicality and economy are more important than aesthetics. Designed principally for contractors' temporary works situations, these simple to build, low cost structures have also been successfully adapted as thrust-relief structures.



A typical section through a Tensar load bearing bridge abutment detailed here with a modular block facing.

The modular block systems can be built without cranes or propping.

A variety of panels and finishes can be applied with either pre-cast or cast on-site panels.

A TensarTech Marine System is well suited to aggressive coastal or tidal conditions such as harbour and river locations.

FOUNDATIONS

Whatever the particular circumstances and problems, we can offer advanced, cost-effective and proven solutions.

Tensar® Basetex™ installation at Oran airport in Algeria providing cost-effective installation and offering permanent stability to a critical load bearing surface.

Embankments Over Weak Ground

PROVEN RELIABLE GROUND REINFORCEMENT SOLUTIONS THAT ARE BOTH RAPID AND INEXPENSIVE

When faced with building embankments over soft ground, it may not be economical or environmentally viable to excavate and dispose of the poor soil and replace it with granular fill. In such cases, Tensar can help with the best option from a range of possible techniques. Whatever the particular circumstances and problems, we can offer advanced, cost-effective and proven solutions.

When stability rather than settlement is the problem, the use of Tensar® geogrids will allow initial access over a soft formation and permit embankment construction to take place in a controlled and safe manner.

Tensar geogrids and Tensar® Basetex™ geotextiles can be placed as a single layer, or as multi-layer reinforcement, at the base of the embankment to intersect potential failure surfaces extending into the foundation.

The use of Tensar Basetex geotextiles can avoid staged construction delays and, if vertical drains are used, will allow greater surcharges to be applied safely to the weak foundation to accelerate settlement. Tensar Basetex can also be used as a tensioned membrane between piles.

TensarTech™ Foundation Mattress System is used to control differential settlement over variable ground.

When there is a danger of collapse into underlying voids such as in areas of shallow mine workings or dissolution features, a reinforced layer may be constructed by using either Tensar geogrids with granular fill to form a stiffened raft, or Tensar Basetex, as a tensioned membrane, to provide short term support should a void appear prior to a permanent repair.

TensarTech™ Foundation Mattress System

When the need is to reduce differential settlement or maximise the bearing capacity from a relatively thin soft formation, a TensarTech™ Foundation Mattress System can provide the base strengthening.

The TensarTech Foundation Mattress System is a 1 m deep, open top, continuous cellular structure formed from geogrids and strong connectors. It is placed on the subsoil and filled with granular material. This creates a stiff foundation for the embankment as well as safely allowing initial construction access over the soft site.

Use of the TensarTech Foundation Mattress System results in rapid construction with no need for excavation and removal of subsoil.

TENSAR CAN OFFER DESIGN IN EMBANKMENT FOUNDATIONS

Tensar has a range of proven and economical solutions for construction over soft or variable ground that can:

- Allow rapid construction
- Allow safe access for operatives and machinery
- Avoid excavation and replacement
- Reduce loss of fill into weak foundations
- Enable safe spanning of voids

Foundations over Piles

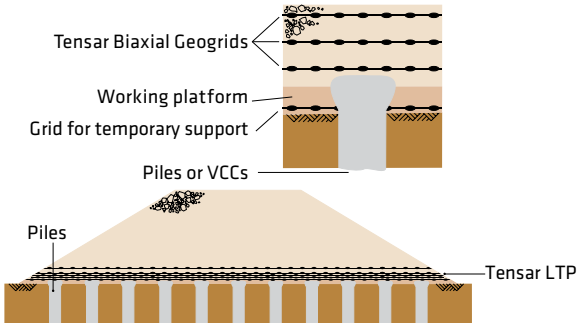
Project programme constraints can mean that there is insufficient time to allow for consolidation settlement to occur after placing embankment fill over soft compressible soils. In this situation, a deep foundation solution may be the only way to resolve such a problem.

The Load Transfer Platform (LTP) can distribute embankment load efficiently onto a series of piles or vibro concrete columns (VCCs) which bear on firmer strata below. This avoids the cost of using a concrete raft. Depending on ground conditions, the most economic solution could be to form the LTP from good quality granular fill reinforced with multiple layers of Tensar® Biaxial grids. Alternatively a design using Tensar® Basetex™ can be employed to accommodate poorer quality fill. Tensar LTPs have also been successfully used below concrete ground floor slabs in order to avoid designing the slabs to span between piles.

Controlling Differential Settlement

When settlement restrictions dictate that a deep foundation solution is required to support an embankment or ground-bearing slab, an LTP can:

- Avoid the need for concrete rafts
- Mean simple and rapid construction
- Be used under ground-bearing slabs to provide a uniform quality of support



Second Severn Crossing Bridge Toll Plaza supported on Tensar geogrid LTP (UK).

LTP to support a concrete ground floor slab beneath a steel portal frame building (UK).

Road construction using an LTP over peat (Indonesia).

PAVEMENT SURFACING

Tensar asphalt reinforcement products have been proven by up to 30 years of success in many countries and in a range of climates.

Asphalt Pavements

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 significant maintenance costs and traffic disruption.

Tensar asphalt reinforcement products have been proven by up to 30 years of success in many countries and in a range of climates.

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; fatigue cracking, reflective cracking and to provide resistance to asphalt rutting and mitigation of cracking due to differential settlement during road widening projects.

BENEFITS THROUGH EXPERIENCE

By selecting the appropriate Tensar solutions, 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

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

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

AR-G bonds well into the underlying surface.

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

A simple overlap joint for Tensar Glasstex.

Paving takes place directly over the Tensar AR-G.

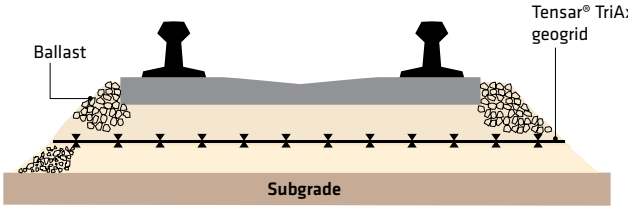
RAIL

Tensar® geogrids have been used to stabilise track ballast since the early 1980s to decrease maintenance costs and maintain ride quality.

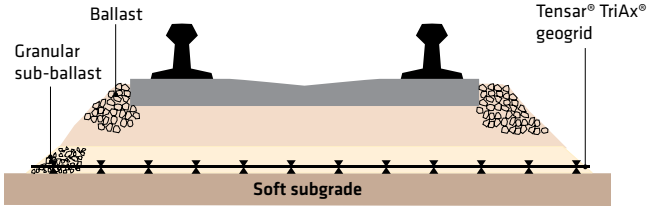
Tensar® TriAx® geogrids installed under the granular sub-ballast layer to increase bearing capacity (Belgium).

Railway Trackbed Stabilisation

Major Application Areas for Tensar® Geogrids within the Track Substructure



Mechanical stabilisation of the ballast layer to reduce the rate of track settlement and hence increase the period between maintenance operations with huge whole life benefits.



Mechanical stabilisation of the granular sub-ballast layer to increase the bearing capacity over soft subgrade, with significant thickness reductions and savings in both the capital and environmental costs.

REDUCING BALLAST DEFORMATION THROUGH THE MECHANICAL STABILISATION OF THE BALLAST LAYER

Poor track geometry and a loss of vertical and horizontal alignment of the rails is a major reason for line speed restrictions and track maintenance work. These can significantly affect schedules and are expensive and disruptive to the public and the train operators.

Track maintenance, involving ballast tamping or full ballast replacement, is required not only on weak subgrades but also on firmer supporting soils. Mechanical stabilisation of ballast, using Tensar® TriAx® geogrids, gives the railway engineer a rapid, inexpensive and proven solution.

Tensar geogrids have been used to stabilise track ballast since the early 1980s to decrease maintenance costs and maintain ride quality.

One method of installing Tensar geogrids below ballast prior to track lifting and tamping (Australia).

IMPROVING TRACK FOUNDATION THROUGH THE MECHANICAL STABILISATION OF SUB-BALLAST LAYER

When constructing track over soft subgrade having a low bearing capacity, it is necessary to improve the foundation to support the ballast effectively. This can involve a time consuming chemical stabilisation of the subgrade or deep excavation followed by importation and placement of a thick and expensive granular sub-ballast layer.

Introducing Tensar geogrid stabilisation allows for a significant reduction of sub-ballast layer thickness for the same bearing capacity.

This allows the reduction in subgrade excavation and spoil disposal and much less imported sub-ballast fill, while still achieving the target stiffness value required for the support of the ballast.

Tensar has extensive experience in mechanically stabilising sub-ballast layers, especially in the upgrading of European railway corridors, that has resulted in many successful cost-effective installations.

RESEARCH SHOWS THAT GEOGRIDS CAN:

- Reduce the rate of ballast settlement
- Maintain track geometry for longer
- Extend the maintenance cycle by a factor of about 3
- Function in ballast for more than 20 years
- Reduce maintenance-tamping induced ballast degradation

EROSION CONTROL

Tensar® erosion products provide a high-performance and economical solution for the control of erosion.

Controlling Erosion on Soil and Rock Slopes

SOIL SLOPES – LONG-TERM SOLUTIONS TO PROTECT AGAINST EROSION

Natural vegetation provides excellent erosion protection, however, extra erosion control measures are needed on steep slopes such as reinforced embankments or soil-nailed cuttings.

Areas prone to intermittent water inundation, wave run-up or occasional high velocity flows, such as river banks, shorelines, ditches, flood bunds and dam spillways, can also suffer from soil erosion. In these cases, an additional permanent erosion protection material is needed to enhance the resistance of the vegetation, but one which ultimately becomes visually unobtrusive.

Tensar erosion control products work by stabilising the surface until vegetation becomes established and then goes on to provide long-term reinforcement of the root system.

THE BENEFITS

Tensar erosion control products can provide an economical, long-term solution for permanent erosion protection on soil slopes.

- Less expensive than most hard and inert slope treatments
- Environmentally appealing
- Long-term solution
- Easy to install

ROCK SLOPES – SECURING GEOGRIDS CAN REDUCE THE DANGERS OF ROCK FALL

Weathering and freeze-thaw action can often lead to spalling on rock slopes, creating the hazard of falling rock fragments. This is particularly dangerous when close to public areas.

Tensar geogrids can be secured to the face to control loose rock fragments and reduce further rock slope erosion.

THE BENEFITS

Tensar geogrids provide a high-performance and economical solution for the control of erosion on rock faces.

- Durable geogrid with high impact resistance
- Easy to install, wide, lightweight rolls
- Non-corrodible
- High resistance to weathering

Tensar products are used to protect stream banks against erosion during periods of high velocity water flow.

Tensar geogrids and mats are often used as a facing to soil-nailed slopes.

Geogrid used as face stabilisation.

Tensar Support Services

We Offer Experience and Reliability for Unsurpassed Product Support

PROFESSIONAL SOLUTIONS

We offer the services of a team of professionals who can assist in developing concepts to support your design or undertake full construction design. We also provide advice and initial training on site to assist you to effectively install our products and systems in your project.

Our range of innovative products is combined with our global experience of thousands of projects in a wide variety of climatic conditions and soil types. This means that we provide you with a unique specialist civil engineering viewpoint on how to use our products and systems and proven, best value solutions in your application.

We are committed to providing the highest levels of technical assistance in the field to support the use of our products and systems. Our own dedicated and trained teams of civil engineers or those of Tensar local distributors work in partnerships with you to ensure the success of your project.

TENSARPAVE™ AND TENSARSOIL™ DESIGN SOFTWARE

TensarPave™ and TensarSoil™ are design software packages that have been developed by Tensar to provide customers with economically efficient, accurate and timely Application Suggestions, assisting in scheme design from feasibility through to construction.

TensarPave, incorporating Tensar® TriAx® geogrids, can provide economical ground stabilisation and pavement design solutions. TensarSoil is a sophisticated piece of design software for Tensar reinforced soil walls and slopes.

Versions of TensarPave and TensarSoil are available free of charge with specific user training from Tensar.

TENSAR OFFERS A RANGE OF DESIGN SERVICE OPTIONS IN 3 CORE STREAMS

1 **SUPPLY ONLY**

2 **APPLICATION SUGGESTION & SUPPLY**
Conceptual drawing and advice

3 **DESIGN & SUPPLY**
Certified detailed design and construction drawings covered by Tensar's Professional Indemnity (PI) insurance

Our service range includes project specific advice on concepts, design, construction and installation, as well as general training on Tensar applications and your use of Tensar's proprietary software.

By engaging our team at the earliest stages of your project, we can help you save time and money during the initial design phases by developing concepts and assessing the design feasibility of using Tensar products or systems, and by providing indicative budget costs.

TECHNICAL SUPPORT

We can also support your projects with construction and installation guidelines, with independent certification documentation and with specification notes to assist in the production of contract documents and installation procedures. These are backed by an extensive range of case studies, product specifications and in-depth technical papers.

TensarTech™ Systems are versatile and meet the environmental and economic demands of any project, as demonstrated on this earth retaining wall supporting a ten lane road that will navigate through the mountainous landscape of Fujairah to Dubai (UAE).

DESIGN SUPPORT

- Application advice to assist you with your design concept
- Design advice to assist you in incorporating Tensar product and systems in your project
- Application suggestion providing our design concept for further consideration and design by you
- Detailed costing to enable you to competitively price Tensar in your project or bid
- Design review of your design which incorporates our products or systems
- Certified detailed design and construction drawings for using Tensar products and systems on your project with this design work being covered by Tensar's Professional Indemnity (PI) insurance.

CONSTRUCTION SUPPORT

- Initial installation advice on how to install Tensar on your project
- Initial installation training to demonstrate installation of our product
- Construction advice to answer practical questions on Tensar installation while construction progresses

TRAINING

- Comprehensive hands-on technical workshops
- Personal training or seminars tailored to your requirements

Independent Certification

Tensar® geogrids have been given accreditation by a number of independent government and other certifying agencies around the world. No other soil reinforcement material has such a wide range of certification.

- The British Board of Agrément has awarded certificates both for retaining walls and abutments, and for steep slopes.

PRODUCT SHEET 1
TENSAR RE AND RE500 GEOGRIDS FOR REINFORCED SOIL RETAINING WALL AND BRIDGE ABUTMENT SYSTEMS

PRODUCT SHEET 2
TENSAR TW1 WALL SYSTEM FOR REINFORCED SOIL RETAINING WALLS AND BRIDGE ABUTMENTS

PRODUCT SHEET 1
TENSAR RE AND RE500 GEOGRIDS FOR REINFORCED SOIL EMBANKMENTS

- Tensar geogrids have been granted Network Rail Product Acceptance Certification (Number PA05/02516) for the Structural Reinforcement of Ballasted Trackbed.

- In Hong Kong, the Geotechnical Engineering Office has awarded Certificate RF 2/11 for the use of Tensar RE500 geogrids in reinforced fill structures.

Reinforced Fill Product Certificate
No RF2/11 for Tensar RE500 Geogrids

- The Roads & Traffic Authority in Sydney, Australia, has certified both Tensar SR and RE geogrids under Specification R57 for use in Reinforced Soil Walls.

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 Foundation Mattress System**
- **Erosion**
  Controlling erosion on soil and rock slopes

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