

TENSAR® TECHNOLOGY

FOR USE IN THE OIL AND GAS INDUSTRY



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 profitability of your project.

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 major international projects. 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.



Tensar® geogrid being installed on a project in Eastern Siberia at a temperature of -40°C.

Working with the Oil and Gas Industry

Gaining access to a drilling site, often in a remote location can be a challenging part of any oil or gas project. Roads and drilling pads are often constructed over poor soils and are frequently subjected to severe weather. Add to that the extremely heavy loads that they are expected to carry, then traditional solutions can be costly, time consuming and not environmentally friendly.



Large pipe sections stored on a platform stabilised with Tensar geogrids.



Tensar geogrids are installed in the building of this access road in the North Baikal region in temperatures of below -50°C.

Ground Stabilisation of Roads and Drill Pads

There are now unprecedented demands to design economical and environmentally sensitive roads, drill pads and working areas sited over weak or variable ground. Tensar® geogrids give a high performance solution which also meets 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.

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

aggregate layer, a mechanically stabilised layer incorporating TriAx geogrids 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 subgrade formations
- ▶ Improve fill compaction
- ▶ Increase design life
- ▶ Increase bearing capacity
- ▶ Give savings of up to 50% on construction CO₂ emissions



Tensar geogrid being installed at a drill pad in Western Siberia, Russia.



Reducing CO₂ Emissions

By using a Tensar mechanically stabilised layer in a road or a working area, savings can be made in the amount of aggregate required by up to 50%. This means that the project can run more quickly, as less excavated material needs to be taken away from site, less compaction is required and less aggregate needs to be imported to the site. On an oil and gas project, material can be transported considerable distances to and from the site.

By reducing vehicle movements and by reducing the volume of material to be removed from the site, considerable savings of up to 50% can be made in construction CO₂ emissions when compared with an unstabilised design. Tensar published the TriAx[®] Carbon Calculator in 2009, this was developed and checked by Coffey Geotechnics. Armed with an application suggestion from Tensar, the user can enter the details and print out a statement which shows the percentage saving in CO₂ emissions when compared with the unstabilised design. **The TriAx Carbon Calculator is available at www.tensarsustain.co.uk.**

Performing in extremely low temperatures in North Baikal.

Experience in Cold Region and Winter Testing

In certain areas of Russia and Canada, extremely low temperatures can be experienced during the winter period which is when a lot of construction takes place. As a result of laboratory testing and full scale tests, Tensar[®] geogrids have been proven to work in extreme cold conditions. This is of particular benefit to oil and gas projects where Tensar mechanically stabilised layers have been used successfully in cold regions.

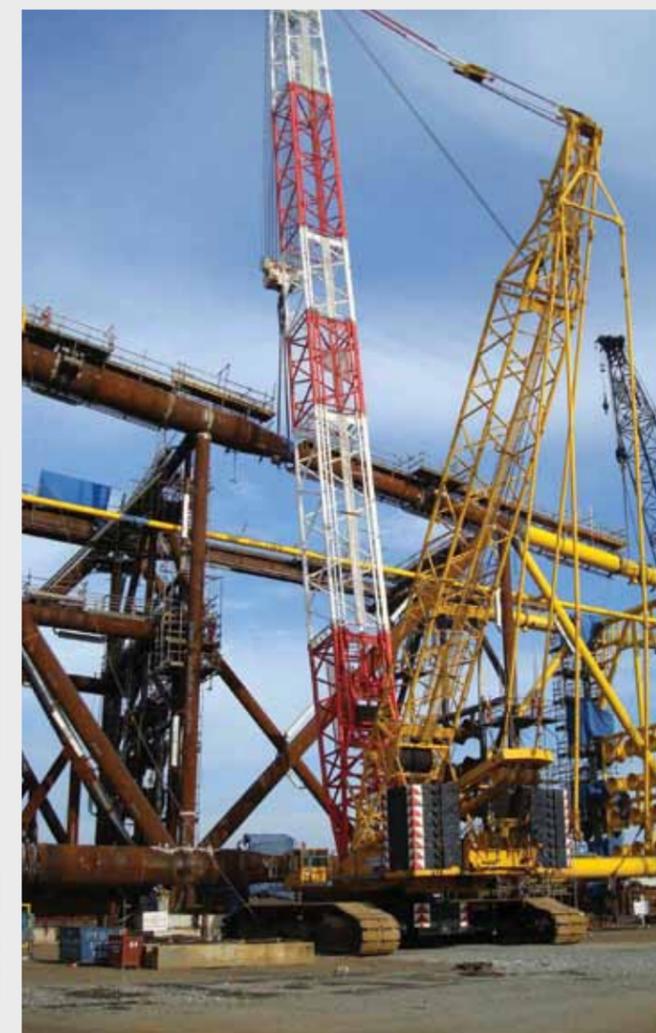
The Siberian Roads Academy in Omsk performed tests on Tensar geogrid to check its performance in cold temperatures. Conclusions from the series of tests showed that when used in ice roads, the load carrying capacity of the ice was increased by up to 60%. When frozen in to ice beams, Tensar geogrid increased the force required for destruction by a factor of 2 or 3. Further research in Russia has been carried out with LIŽD St Petersburg, VITU, MIIT and Soyuzdornii.



Tensar geogrids enable significant savings in granular thickness and consequent reduction in construction CO₂ emissions.

Safe Working Platforms over Weak Subgrades

Cranes, piling rigs and other heavy equipment require a working platform to operate safely and with controlled accuracy. Frequently, these operations have to take place over weak subgrades. Tensar mechanically stabilised layers help to increase the bearing capacity by spreading the load.



Cranes, piling rigs and other heavy equipment are examples where the bearing capacity has to be increased and designed for safe site operations.



Tensar® geogrid used to stabilise track ballast since the early 1980s.

Railway Trackbed Stabilisation

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 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® 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.

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.



Cost effective solutions to suit your project requirements.



Mechanical stabilisation of sub-ballast can reduce construction costs.

Tensar Support Services

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 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 Tensar 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 partnership with you to ensure the success of your project.

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.



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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