TENSAR® TECHNOLOGY

FOR USE IN THE WIND ENERGY 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 bottom line on your project.

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.

Working with the Wind Energy Industry- Developing Construction Solutions

Gaining access to a wind farm site, often in a remote location, can be a challenging part of any wind energy project and Tensar International Limited has been supplying solutions for access roads and lifting platforms to the wind energy industry for over 15 years. Roads and crane lifting platforms are often constructed over poor soils and are frequently subjected to extreme weather conditions. Add to that the enormously heavy loads that they are expected to carry, then traditional solutions can be costly, time consuming and not environmentally friendly.

Reducing Costs and Construction CO_2 Emissions

By using a Tensar mechanically stabilised layer in a road or working area, construction savings of up to 50% can be made in the amount of aggregate required. Consequently these savings mean that the project can run more efficiently, as less excavated material needs to be taken away from site and less aggregate needs to be imported, placed and compacted.

On a wind energy project, material often needs to be transported considerable distances to and from the site. By reducing vehicle movements and the volume of material to be removed from the site, considerable savings of up to 50% can be made in construction CO_2 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 CO_2 emissions when compared with the unstabilised design.

The TriAx Carbon Calculator is available at www.tensarsustain.co.uk

Stable Access Roads and Working Platforms

There are now unprecedented demands to design economic and environmentally sensitive roads and working areas sited over weak or variable ground. These roads are usually required for the construction, maintenance and ultimately the dismantling phases of a wind farm project.

Excavating organic material such as peat is often difficult, time consuming, expensive and releases significant quantities of CO_2. Tensar geogrids offer an alternative high performance solution.

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 stiff geogrid 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 reductions in excavated soil along with the 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

Installing a turbine using a heavy mobile crane supported on a Tensar stabilised platform at Hadyard Hill, Scotland.

HEAVILY LOADED AREAS

The greatest challenge when the wind farm is being constructed can be when the large turbine components are unloaded and lifted into position using a crane. The load spreading capability of a Tensar mechanically stabilised layer increases the bearing capacity of working platforms for heavy-duty plants, cranes and piling rigs. For the contractor this means that less natural aggregate is required to construct the platform which can result in quicker construction and less cost when compared with a traditional unreinforced construction.

Design and Construction Solutions for Your Projects

TriAx geogrids are used to create a mechanically stabilised layer in the construction of an access road at Dongying Wind Farm, in China.

Faced with very soft soils on both the Lijin and Zhanhua wind farms in China, Guohua Ruifeng (Zhanhua) Wind Power Ltd decided to use a Tensar® TriAx® Mechanically Stabilised Layer to enable the heavy vehicles to gain access to both sites.

The foundation soils on the Zhanhua project were excavated from the nearby shrimp ponds and so the project proved particularly challenging. Tensar Technology proved to be the ideal solution to overcome these construction issues.

Access road under construction in Arecleoch, Scotland.

Tensar TriAx geogrids were the answer for a new Scottish wind farm built in a rural area. Existing tracks had to be widened and new access roads built over the site which had low ground strength with CBR values between 0.5% and 1%. Using thick stone layers to accommodate site traffic would have involved large numbers of vehicle movements and excessive road settlement. Instead, multiple Tensar TriAx geogrid layers were installed and combined with site-won stone. Although the stone quality was less than ideal, this solution delivered excellent trafficking performance and achieved a significant carbon emissions saving over an unstabilised solution.

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 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.

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

Stable staging areas are required for offshore wind farm construction. (Photography courtesy of Luc Van Braekel).

Staging Areas for Offshore Wind Developments

The construction of offshore wind farms often requires a staging area onshore for the delivery or assembly of large pieces of equipment. These staging areas are often constructed on weak ground, so the bearing capacity has to be increased and designed for safe site operations, Tensar Technology is a proven, practical solution in overcoming such problems.

TensarTech® Earth Retaining Systems allow rapid construction of bridge abutments and retaining walls. (Photography courtesy of Forestry Commission, Scotland).

Temporary Structures are Economical and Practical to Construct

Earth retaining structures required on wind energy sites need to be practical, economical to build and use fill materials which are available locally to the site where possible. The TensarTech® TR2 System is often used as it requires no formwork since the steel mesh face is secured as the geogrid and reinforced fill materials are placed. Structures up to 18 m have been constructed with this system at a lower cost than that of traditional methods. The face is normally vertical, but inclined face angles can also be accommodated by the system. Additional benefits can include:

- A low cost retaining wall at a fraction of the cost of a reinforced concrete solution
- Rapid and economical construction
- Often no specialist construction skills necessary
- Simple to build using established earth embankment construction techniques
- Possibility of using site-won including cohesive or contaminated materials
- High tolerance of differential settlement
- For temporary works it can either be easily dismantled or covered with backfill
- Ready for immediate use upon completion
- High tolerance to seismic loading

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

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Tensar International Limited
Units 2-4 Cunningham Court
Shadsworth Business Park
Blackburn BB1 2QX
United Kingdom

Tel: +44 (0)1254 262431
Fax: +44 (0)1254 266867
e-mail: info@tensar.co.uk
tensar-international.com

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