# Tensar Information Bulletin
# Summary and background to Tensar Value

## Introduction

A design completed in the Tensar+ software for a for a Tensar Mechanically Stabilised Layer (MSL) incorporating Tensar geogrid provides a performance-based solution for the specified project conditions adopted.

As well as providing the required performance, whether that's achieving a traffic target for a roadway under dynamic traffic loading or a safe bearing capacity in a working platform, the Tensar MSL can provide additional value to benefit the project financially and environmentally. The Tensar+ module will calculate available value for a series of aspects to show what a Tensar solution could be worth to your project.

(Figure 1)

*Figure 1 – Reduction in thickness with a Tensar MSL*

## Construction cost savings

A Tensar MSL can be designed to minimise the thickness of the road or platform whilst maintaining its project specific performance. Savings in aggregate can be quantified when compared with the thickness of a non-stabilised granular layer without a Tensar geogrid. With project material costs applied, available cost savings with a Tensar MSL can be calculated.

Reducing the aggregate thickness can also reduce the amount of any excavation that may be required to suit project levels which will add to the overall construction cost savings.

The Tensar+ design module allows the input of project specific costs for the delivery and installation of aggregate, excavation operations as well as the installed cost of the geogrid component of the MSL. A comparison will be provided showing the estimated costs of the Tensar MSL and the non-stabilised section with savings calculated as both a cash figure and percentage saving.

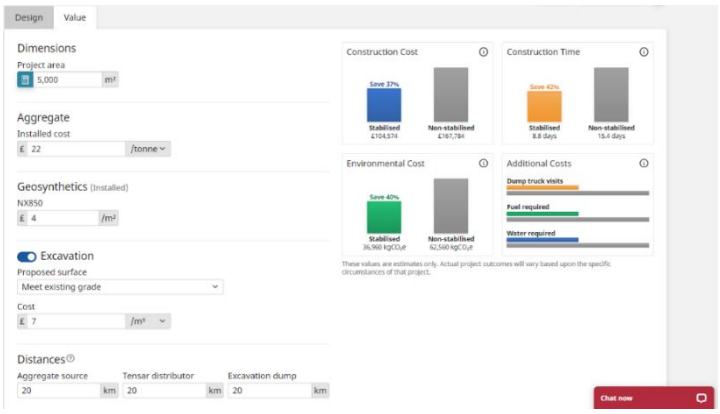
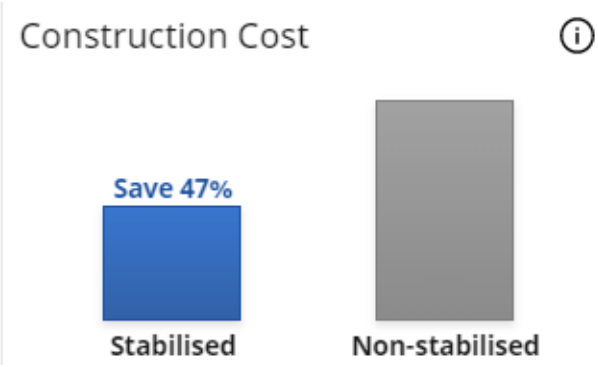



*Figure 2 – Tensar+ Value screen*

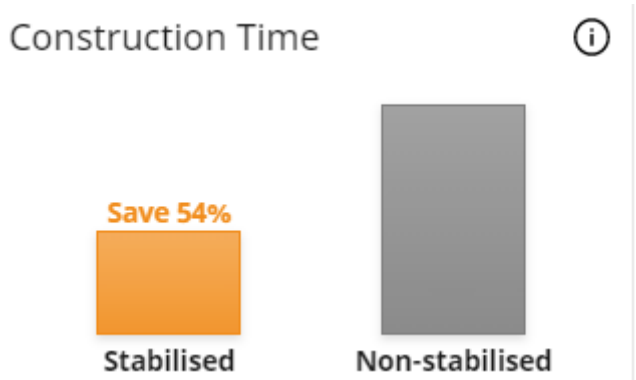



A more detailed breakdown of component costs can be found under the ⓘ icon in the corner of the "Construction Cost" results graph on the Tensar+ "Value" screen.

## Construction time savings

By reducing the amount of aggregate and potentially excavation required in the roadway or platform construction, time to construct these elements can be reduced. By using some typical, industry encountered rates for the installation and compaction of aggregate, excavation and disposal of unsuitable fill and the laying of the Tensar geogrid, the Tensar+ value calculator will estimate the amount of time required for each operation and quantify the potential time savings expressed in days and a percentage reduction.

A more detailed breakdown of component costs can be found under the ⓘ icon in the corner of the "Construction Time" results graph on the Tensar+ "Value" screen.




## Environmental cost savings

A benefit of incorporating a Tensar MSL in a project is its ability to reduce the carbon footprint of construction operations. This is becoming more important for clients as the ability to design and construct sustainably moves closer to the top of project objectives.

Road and platform construction activities are energy rich and so any opportunity to reduce greenhouse gases produced can only add to project carbon credentials.

Carbon emissions come from activities such as:

- Quarrying/extraction of aggregate materials
- Transportation of these materials from source to construction site
- Installation and any excavation operations

The carbon footprint of the geogrid component can also be calculated considering:

- Geogrid manufacture
- Transportation of the geogrid to project site
- Installation of the geogrid

Tensar geogrids used in roads and platforms are manufactured from polypropylene which as a polymer, is an oil derivative. Although polymers or plastics can get a "bad press", using them in a Tensar MSL can be shown to reduce overall project carbon footprint.

The main component of a Tensar MSL is the aggregate which would form around 99% of the resulting MSL. The embodied energy in the manufacture, delivery installation of the aggregate component of the MSL is significantly greater than that of the geogrid component.

A Tensar MSL provides the opportunity to reduce the use of carbon rich resources such as quarried aggregate as well as the ability to reduce associated activities to transport and install them resulting in a positive effect on the carbon footprint of a construction project.

## Assessment of carbon

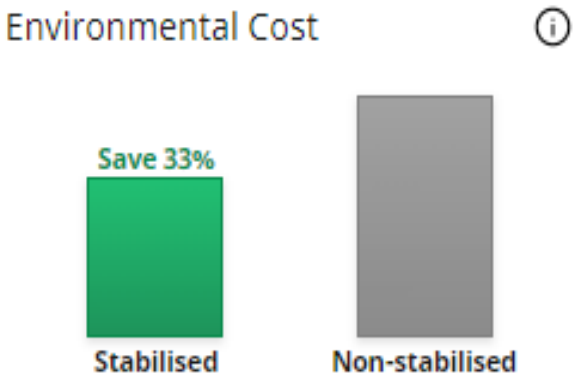
The embodied energy associated with the quarrying, transportation and delivery of aggregate can be calculated using standard and available information sources.

Factory operations for the manufacture of Tensar geogrids have been audited on several occasions across the three main Tensar manufacturing sites across the world. Carbon footprint values are available expressed in kgCO2e from third party review of the energy consumption to make the geogrids with Environmental Product Declaration's (EPD's) available across an increasing number of Tensar's geogrid products.

Combining the calculated aggregate and geogrid contributions allows a carbon footprint for a Tensar MSL to be determined and compared with that of a non-stabilised road or platform section to quantify the reduction in environmental impact by using a Tensar MSL.

## What does the user need to input?

The Tensar+ software requires the user to input the distance from the source of aggregate, the source of geogrid and the disposal site for any excavated material. An estimated carbon saving is then calculated comparing the Tensar MSL and the corresponding non-stabilised section with results expressed as a carbon footprint in kgCO2e or a percentage reduction.




A more detailed breakdown of component costs can be found under the icon in the corner of the "Environmental Cost" results graph on the Tensar+ "Value" screen.

Examination of this breakdown would typically confirm that the vast majority of the environmental impact comes from the aggregate component and so, by adopting a Tensar MSL incorporating a Tensar stabilisation geogrid can have a significant impact on a project carbon footprint.

## Dump truck visits

Reducing the number of vehicles required to deliver the aggregate to site has several benefits:

- Reduced traffic on site which improves health and safety
- Reduced traffic congestion of roads surrounding the site
- Reducing vehicle exhaust emissions
- Reducing the potential for additional damage to surrounding roads from these heavy vehicles.
- Reducing the generation of microplastics from abrasion of tyre contact with road surfaces

The Tensar+ value assessment will compare expected vehicle visits to deliver the aggregate required to build both a Tensar MSL and a non-stabilised road or platform section. Results are expressed in both estimated truck visits and a percentage difference.



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