

Composite solutions for infrastructure

Wednesday, 05 July 2017



Andrew Leech, head of technology development at GEOFabrics

LEEDS – European manufacturers of geosynthetics are increasingly turning to customised solutions to meet specific infrastructural problems, in order to differentiate themselves from “me too” manufacturers.

Speaking at the 22nd Nonwovens Network Seminar held in Bradford, West Yorkshire on 29 June, Andrew Leech, head of technology development at Leeds-based GEOFabrics, explained how his company, as a manufacturer of needlepunched nonwovens and geocomposites, has responded to meeting some specific needs of its customers via customised solutions.

Landfill

He cited two key examples, the first relating to landfill containment.

“The design of an engineered waste containment system is considered a continuous project, including all operational activity, closure and aftercare,” he said. “The selection of an appropriate geosynthetic has to be considered during the planning and design stage and account for changes that are likely to occur over the whole life of the landfill.”

There are a number of challenges that need to be considered by a landfill design engineer when proposing a geosynthetic solution within a landfill development, he added, including establishing the required design life of the materials and the geotechnical design parameters, such as vertical and lateral forces, the nature of point loads, shear stresses due to waste settlement and the likely temperatures, chemical and biological stresses.

“Modern landfill design requires a leachate drainage layer that is up to 500mm thick at the base of the cell,” Leech explained. “This fills hard-won void space with equally hard-won primary drainage aggregate.”

GEOfabrics LFX is a 2,000 gsm composite drainage layer designed to be used in conjunction with only half the depth of aggregate while maintaining the same leachate extraction performance, providing a range of benefits.

It has a four-layer construction consisting of a woven top layer as a filter-separator above a tri-planer geonet, a second woven geotextile filter layer and a sturdy, protective nonwoven base layer.

“GEOfabrics LFX reduces the use of expensive primary aggregate and allows a void saving for more efficient and productive use of space,” Leech said. “This considerably reduces the haulage of construction materials to a site – a single truck of LFX can replace up to 90 trucks of aggregate. Using the composite lowers material, transport and installation costs and also allows the necessary quality audit be carried out in a factory environment. As a drainage core, GEOfabrics LFX has a proven flow rate and has been tested up to 1000kPA allowing for its use in the deepest landfills. One landfill site has calculated savings of £120,000 by switching to the material.”

Railways

The second application example concerned railway track reinforcement.

“The use of geosynthetics to reduce or replace traditional layers is now an accepted part of track-bed construction and renewals around the world,” Leech said. “When correctly specified and installed, geotextiles and geogrids are proven to enhance track performance, significantly extend design life, reduce the time required to renew a specific length of track – or allow more track to be renewed in a fixed time – and cut overall material costs.”

Subgrade pumping has always been a problem in ballasted track, he added, particularly on weakly cemented mudstones or over consolidated clays.

“These soils have a high shear strength and as such do not need a deep trackbed to support track loading, yet if unprotected, the upper surface degrades easily to a slurry when exposed directly to water. A small

amount of slurry can considerably reduce ballast life. Under extreme conditions, the ballast will become unmaintainable within a very short time post-installation.”

Western Rail in the UK has calculated the cost of repairing a kilometre of track as £300,000.

To effectively solve this problem, GEOfabrics developed Tracktex – a 2,000gsm composite consisting of a patented microporous filter system protected by two spunbond layers and outer protective layers of thick needlepunched fabrics.

“The performance of Tracktex was proved in full scale testing and in live track improves track quality and geometry,” Leech said. “It allows for faster installation rates compared to alternative systems, reducing the likelihood of overruns and increasing the coverage for a given possession time. It is durable in the extreme conditions found in ballasted track and no specialist equipment is required to install it. It can also be used with geogrids where required.”

Tracktex has been shown to increase the maintenance intervals made necessary by pumping failure by more than 25 times compared to regular geosynthetics, resulting in significant savings.

“Tracktex has been actively used in live rail since 2010, providing significant maintenance savings to rail authorities and contractors alike,” Leech concluded. “So far, over half a million square metres of Tracktex has been installed in Europe, Australia and the United States, with no reported failures. Site monitoring has been performed on a number of key sites and the benefits of Tracktex over traditional maintenance systems are clearly evident.”

GEOfabrics was established in 1992 specifically to serve the landfill and coastal protection industries and today manufactures around seven million square metres of product annually.

Web: www.geofabrics.com