

Radar detectable geotextile Enka®-D-Tect

This special geocomposite is manufactured to include a metallic element at regular intervals (5m) in the cross machine direction to facilitate nondestructive monitoring of trackbed deformation through the use of electromagnetic detection.



Function
Trackbed motion sensing

References
Záhony railway, HU
 163 000 m² (2011)
Szajol-Püspökladány, HU
 370 000 m² (2011-2013)
Piliscsaba-Pilisvörösvár, HU
 200 000 m² (2012-2014)
Budapest-Tárnok, HU
 13 500 m² (2013)
Mezőberény-Murony, HU
 40 000 m² (2013)
Szajol-Szolnok, HU
 75 000 m² (2014)
South Balaton railway, HU
 150 000 m² (2014-2015)
Nagyút-Mezőkeresztes, HU
 180 000 m² (2015)

Challenge

Ballast fouling is one of the main reasons for track deteriorations. Due to the poor drainage in the ballast the moisture content of the subballast and subgrade increases which enhances the risk of the undrained failures risk. Ballast fouling also reduces strength and stiffness of the trackbed with the result of excess deformation in the track and also shock, vibration and noise level problems.

To decrease the maintenance costs of the railway line regular inspection is necessary.

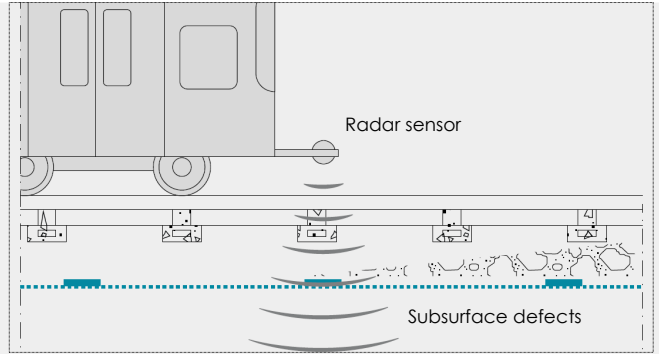
Solution

Besides the visual inspection, trial pits or other destructive inspection methods, the non-destructive techniques can give a better picture about the condition of the railway substructure. Ground Penetration Radar (GPR) is one of the most commonly used non-destructive methods. It detects the signal reflection from the layers of the substructure to identify the variations of the ballast fouling.

Enka-D-Tect is a type of nonwoven geotextile with a special thin aluminium sheet attached to it which strengthens the signal of the GPR with the result of a clear interface between the ballast or subballast and the subgrade.



Szajol - Püspökladány railway line, Hungary, 2012



Theoretical drawing of the Enka-D-Tect non-destructive monitoring technology



Mezőberény - Murony railway line, Hungary, 2013



Szajol - Püspökladány railway line, Hungary, 2012



Typical Ground Penetration Radar device for railway lines

Benefits of the solution

The Ground Penetration Radar signal is strongly reflected by metal foil and will highlight the substructure interfaces, even in dry or wet soil conditions or when the ballast is highly fouled or polluted. It is also a very useful tool for locating pockets of trapped ballast and deformed capping of subgrade in a non-destructive way.

The use of Enka-D-Tect and electromagnetic detection allows for systematic maintenance and will increase the track safety through early detection of subbase movement.

Strengthening the reflection of the GPR reflection, Enka-D-Tect provides a more detailed picture compared to regular methods.

Product and application details

The aluminium strips are perpendicular to the rail direction and occur every 5 m. A reflection hyperbola will be formed when the antennae pass across the reflective strip.

The equipment, acquisition and processing of GPR data is usually provided by external companies.

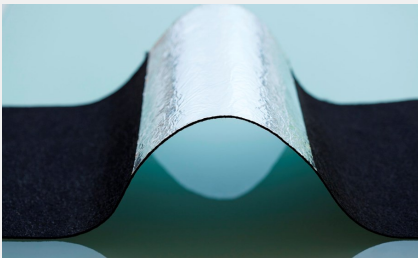
The maximum depth is about 0.8 - 0.9 m.

Results

With this application the thickness and the fouling of each layer can be calculated.

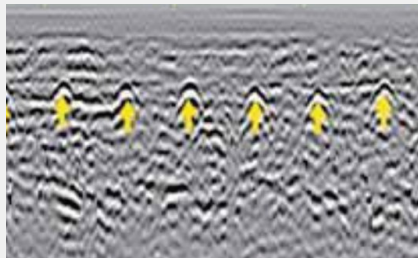
The application allows for rapid control and early detection of failures therefore a smaller repair is applicable instead of the complete reconstruction, saving money and time for the investor.

Product and equipment



Enka®-D-Tect

Type of nonwoven geotextile with a special thin aluminium sheet attached



Reflection hyperbola

The view of the aluminium strips when the antennae pass across the reflective strip of the Enka-D-Tect



Ground Penetrating Radar device

The GPR can detect the signal reflections from the layers of the trackbed