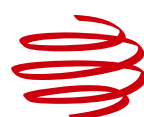


Track Measuring Systems



The track is the foundation and soul of all rail travel, not to mention one of the most capital intensive investments a railway can make. Proper care and cure of the permanent way can bring countless benefits to all using it. However, the permanent way is subject to innumerable elements and activities that have a detrimental effect on its condition and potentially on the safety of passengers and freight.

Today, as railways increase their capacity and speeds, it is more important than ever to be completely aware of the state of the infrastructure's condition to ensure the highest quality and safety to those using it, as well as being in the position to maintain costs as low as possible.



mermec group

Track Measuring Systems



At a glance

MERMEC Group offers a wide range of systems for the measurement and monitoring of every aspect of the permanent way, from the track geometry and rail profile to rail corrugation.

Using measuring technology which is at the forefront of the industry, the MERMEC Group has on-board and manual measuring systems able to monitor every type of infrastructure, covering tramways, light rail, metros, heavy haul, conventional and high speed railways.

Holistic product development

Every single product is designed with the complete measuring solution in mind. MERMEC Group products' interoperability and seamless integration enable you to make future proof investments allowing for modular installations of additional systems when your need of knowledge increases. What's more, our experience and know how in railway vehicle design and development allows us to provide and install all of our solutions, even "unattended", on any type of rail vehicle, revenue producing or maintenance specific.

Track Geometry

Rail Profile

Rail Corrugation

Onboard Measuring Systems



Versions: High-Speed Lines, Conventional Lines, Heavy Haul Lines, Metro/Light Railway/Tramway

Trolleys & Manual Operated Devices



Track geometry problems are the leading cause of all rail related maintenance and accident costs for many of the world's railways. There are so many diverse factors can adversely affect the correct geometry of the track, even daily use, that railways can't afford to not continuously monitor it. MERMEC Group offers numerous systems in order to provide you with a system that best fits your maintenance and measuring

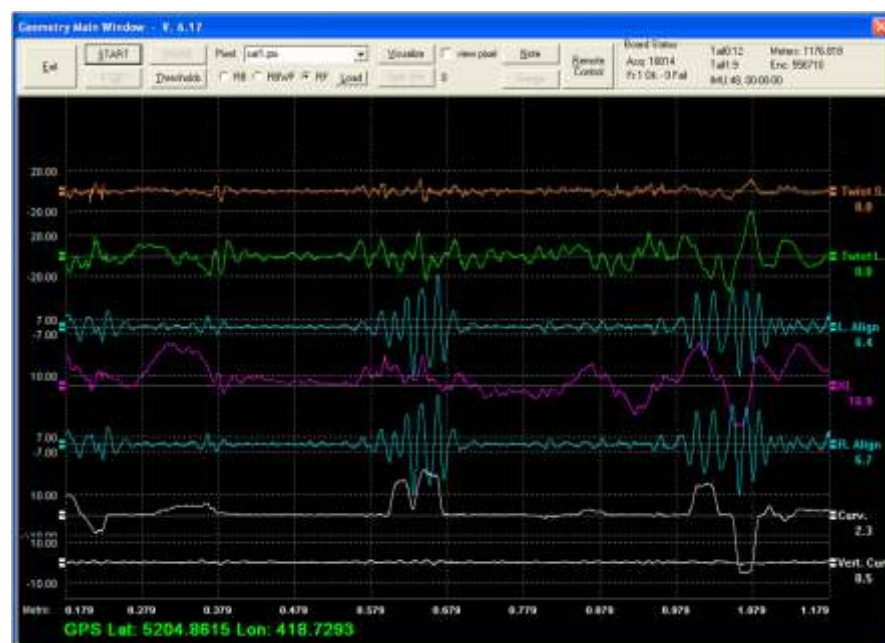
philosophy, helping you to keep your infrastructure safe and efficient. The Track Geometry Measuring Systems can be fully integrated with the systems for the complementary monitoring of rail profile and rail corrugation enabling you to detect simultaneously all the most important parameters of the line.

Measured Parameters

- › Longitudinal Levels of left and right rails
- › Track Gauge
- › Cross Level
- › Alignment of left and right rails
- › Curvature
- › Twist
- › Internal Rail Profile

Three point measurement (3PM)

Using the latest no-contact optical technology the 3PM system measures geometric parameters from actual rail profile using the versine principle, providing enhanced accuracy and giving you the most precise information available. Able to measure up to 320 km/h (199 mph) while providing real time reports. The system is completely compliant with international standard EN-13848. This system is able to measure even with standstill vehicle. In this way it is possible to detect track parameters on every part of the line, events included.



Inertial Measurement

The MERMEC Group's Laserail™ inertial track geometry measuring system is leading the pack in inertial track geometry measuring systems. The system offers highly accurate measurements at speeds of up to 360 km/h (244 mph), real time reports and is fully compliant with the EN-13848 international standard. The system can even be run "unattended", mounted for use on revenue vehicles providing frequent measurements without operators. Compact configuration for installation on hirail vehicles for speeds of up to 80km/h (50mph) is also available.

Technical Specifications

	3PM	Inertial
Measurement Accuracy		
Track Gauge	± 0.7 mm	± 1.0 mm
Cross Level	± 2.5 mm	± 2.5 mm
Twist	± 0.8 mm	± 1.0 mm
Alignment D1	± 1.0 mm	± 1.1 mm
Alignment D2	± 3.0 mm	± 3.0 mm
Alignment D3	± 7.0 mm	± 7.0 mm
Longitudinal Level D1	± 0.8 mm	± 0.8 mm
Longitudinal Level D2	± 2.0 mm	± 2.0 mm
Longitudinal Level D3	± 5.0 mm	± 5.0 mm
Operating Parameters		
Measurement Speed	0 ~ 320 km/h (standard 0 ~ 220 km/h)	5 ~ 360 km/h
Operating Temperatures	-30 to +50°C (-22 to +122°F)	-25 to +50°C (-13 to +122°F)



Rail Profile

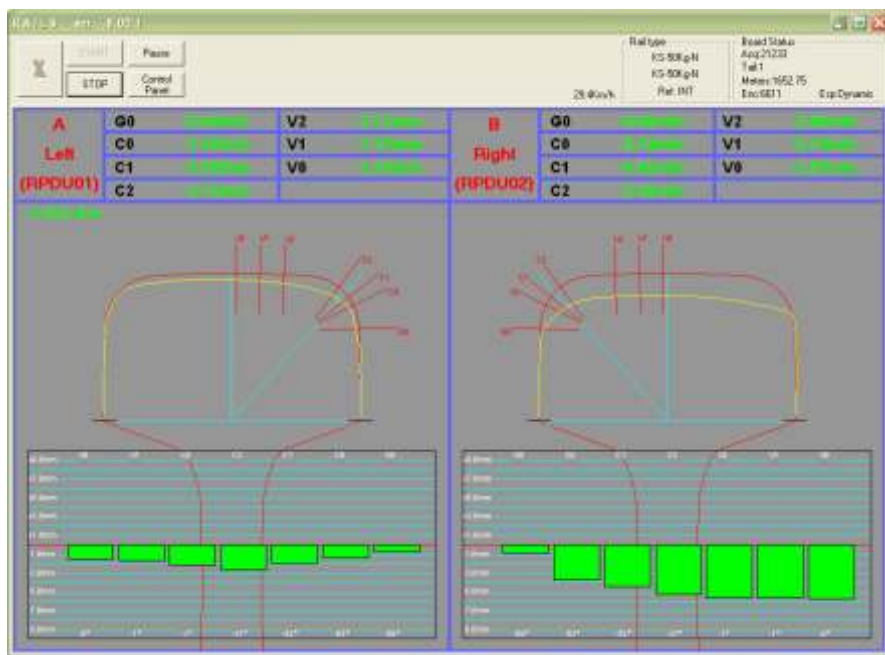
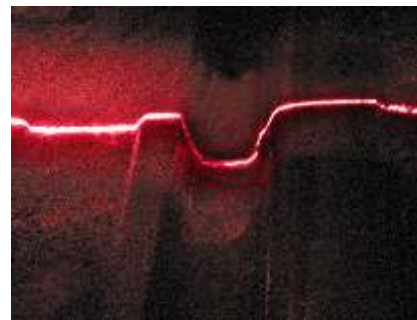


Ever-rising running speeds in railway lines requires an intensification of rail profile control. Knowing the rail wear condition is important because it is strictly related to the key safety aspects of the railway infrastructure, with the stability of the train run and it is essential to guide and focus the maintenance activities.

The Rail Profile Measuring System, using non-contact optical technology, measures all the key wear parameters with excellent accuracy. The incorporated analysis software compares the worn profile to the original, allowing your maintenance team to detect problem areas. The system, which can be mounted on revenue producing vehicles, becomes an important tool in wear trending, which can maximize the effectiveness of your grinding program.

Along with the Ride Quality package, the Rail Profile Measuring System enables you to examine the real behavior of the vehicles on the track.

By collecting all the parameters related to the track and wheel geometry and analyzing the equivalent conicity parameter, the system allows to characterize the wheel-rail interactions and therefore to quantify the vehicle safety against derailments.



Measured Parameters

- › Full Rail Profile
- › Lateral Wear
- › Vertical Wear
- › 45° Wear
- › Head Loss
- › Rail Inclination
- › Lamination
- › Sidecut
- › Optional: Equivalent Conicity

Technical Specifications

Rail Profile	
Technology	Optical Triangulation
Mounting	Bogie or Coach Mounted
Accuracy Measurements	Typical ± 0.2 mm (0.008 in) (enhanced accuracy on demand)
Operating Parameters	
Measurement Speed	0 ~ 350 km/h
Sampling Step	Standard 25cm (9.84 in) - Customizable to Client's Needs
Operating Temperatures	-30 to +50°C (-22 to +122°F)



Rail Profile Measuring System for Grinding Application

Rail Corrugation



Rail Corrugation defects can create a vicious circle, causing problems on wheels, which lead to further rail problems, which lead to further wheel problems and on and on. The increased dynamic interaction forces between wheel and rail caused by corrugation give rise to fastening, sleeper and ballast deterioration reducing the life of track and vehicle components.

And it's not just rails and wheels that are affected by corrugation, your entire infrastructure feels its affects, and so do your clients. Moreover, the level of roughness is in most cases proportional to the generated noise pollution. Vibrations emissions from the track induce the so called ground borne noise inside the adjacent residences often causing significant community reaction.

The MERMEC Group has diverse rail corrugation measuring systems, which allows your maintenance staff to work with proven methods with which they feel most comfortable.

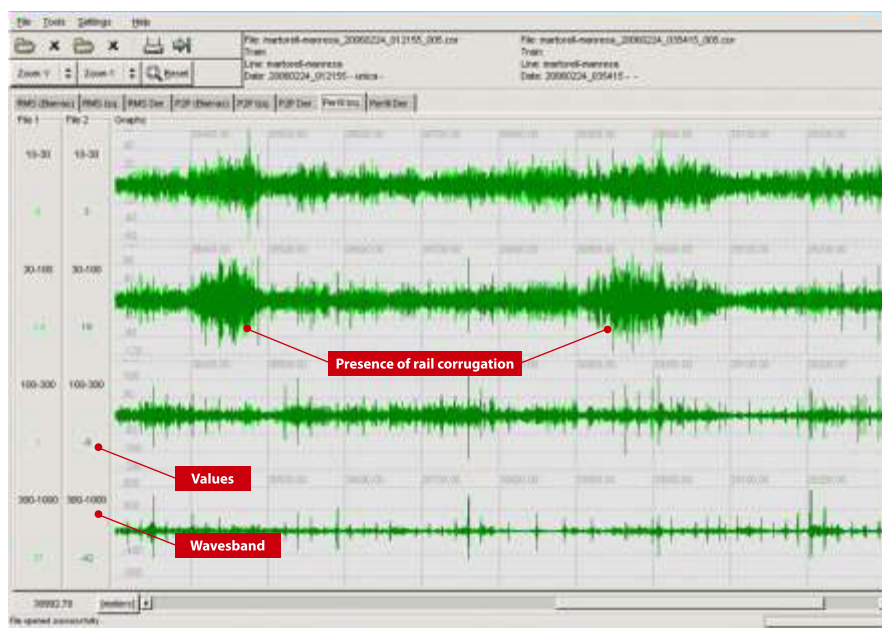
Fully compliant with the EN-13231-3 international standard the Rail Corrugation Measuring Systems take precise measurements for the complete wavelength range from the very-short (10-30 mm) to the long bands (300-1000 mm) enabling you to check even the rail grinding works.

The measurement can be done with the train travelling in both directions and with all weather conditions.

Each system offers real time data analysis and post processing analysis.

Real time functions include data acquisition, storage and diagram visualization in all the wavelengths.

Post processing allows for recorded data visualization and standard deviation calculations for each wavelength.



Measured Parameters - Low Speed

Longitudinal Profile in wavebands:

- › Very Short waves [10 - 30] mm
- › Short waves [30 - 100] mm
- › Medium waves [100 - 300] mm
- › Long waves [300 - 1000] mm

Measured Parameters - High Speed

Longitudinal Profile in wavebands:

- › Short waves [30 - 100] mm
- › Medium waves [100 - 300] mm
- › Long waves [300 - 1000] mm

Technical Specifications

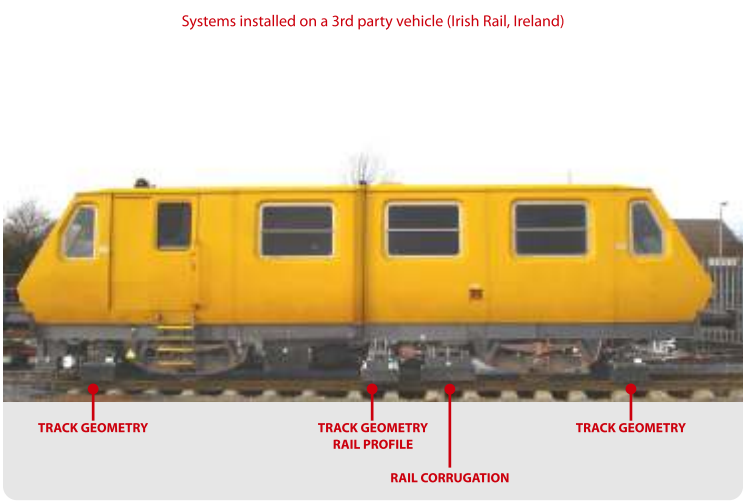
	Low Speed	High Speed
Technology	Laser Optical (versine method)	Optical - Inertial
Operating Parameters		
Measuring Speed	up to 200 km/h	up to 320 km/h
Sampling Interval	Depending on measurement speed Typical 5 to 10 mm	Depending on measurement speed Typical 5 to 10 mm
Reproducibility	Short and very short waves: $\pm 10\mu\text{m}$ Medium waves: $\pm 30\mu\text{m}$ Long waves: $\pm 100\mu\text{m}$	Short waves: $\pm 20\mu\text{m}$ Medium waves: $\pm 50\mu\text{m}$ Long waves: $\pm 200\mu\text{m}$
Operating Temperature	-30 to +45°C (-22 to +113°F)	-30 to +45°C (-22 to +113°F)



Rail Corrugation Detection Unit

Track Measuring Systems installation and integration examples

Track measuring systems have been specifically designed and engineered to be easily installed and integrated both on MERMEC Group diagnostic vehicles and any other recording or “revenue-generating” vehicle (locomotives, passenger coaches, freight wagons) provided by the final customer.



Trolleys & Manual Operated Devices



Trolleys and MOD Technical Specifications

	LineCheck	TecnoRail	TecnoLine
Physical Characteristics			
Weight	30 kg (66 lbs)	7.5 kg (16.5 lbs)	26 kg (57 lbs)
Size	1875 x 2192 x 80 mm	260 x 240 x 220 mm (10.2 x 9.45 x 8.66 in)	900 x 120 x 80 mm (35.4 x 4.72 x 3.15 in)
Operating Parameters			
Measuring Speed	5 km/h	Manual Operated	5 km/h
Battery Life	8 working hours; 10 standby hours	6 working hours; 8 standby hours	4 working hours; 6 standby hours

LineCheck Track Geometry Measurement



A light weight, carbon fiber manual track geometry measurement device, LineCheck allows for easy transfer between different measurement points. Using the three point measurement (3PM) method, the system has the following accuracies:

- › Profile and wear measurement ± 0.2 mm
- › Top and Lateral alignment ± 0.3 mm
- › Gauge ± 0.5 mm
- › Cross Level ± 0.5 mm
- › Twist ± 0.2 mm/m

Measurement unit mm and inches

A portable computer or PDA takes care of the final elaboration, the reports and measurement storage.



TecnoRail

Rail Profile Measurement System



TecnoRail is a portable, light weight tool for measuring rail profile in specific areas of your track. A large LCD touch screen allows the operator to view graphically and numerically the wear and area difference as well as compare the measured and nominal rail profiles. Optionally the system can measure both rail gauge and superelevation depending on the needs of the operator. Measurement is based on no-contact optical technology and covers the internal and top rail profiles.

Accuracy

- › Profile measurement $\pm 0,08 \text{ mm}$
- › Gauge measurement (optional) $\pm 0,5 \text{ mm}$
- › Cant measurement (optional) $\pm 0,7 \text{ m}$

Features

- › Measurement unit mm and in
- › Memory capacity profiles 10.000
- › Measurement time $\text{about } 7 \text{ s}$



TecnoLine

Rail Corrugation Measurement



TecnoLine is a small, easy to manage rail corrugation measuring system. Its measurement principle is based on the measurement of displacements on the rail head trough Eddy Current transducers, which are very high accuracy sensors.

The system measures rail corrugation in the very-short (10-30 mm), short (30-100 mm), medium-long (100-300 mm) and long (300-1000 mm) wavelength bands according to international standards.

A PDA interface system makes storing, transferring and analyzing of data a simple exercise.

The system has a measurement resolution of $0,003 \text{ mm}$ and has an accuracy of $\pm 0,005 \text{ mm}$.



System configuration with two detection units in order to measure both the rails simultaneously



mermec

via Oberdan, 70
70043 Monopoli (BA) Italy
ph. +39 080 8876570
fax +39 080 8874028
www.mermec.com



imagemap

Technical Center
220 Outlet Pointe Blvd.
Columbia, SC 29210, USA
ph. +1 803 213 1200
fax +1 803 798 1909
www.imagemap.com



mermec france

Technopôle de Château-Gombert
Les Baronnies - Bat. A
rue Paul Langevin
13013 Marseille (France)
ph. +33 (0)4 91100190
fax +33 (0)4 91086040
www.inno-tech.fr



tecnogamma

vicolo Ongarie, 13
31050 Morgano (TV), Italy
ph. +39 0422 8391
fax +39 0422 839200
www.tecnogamma.eu

© MERMEC Group 2008-09

Printed in Italy

The information in this document contains general descriptions of the technical options available, which do not always have to be present in individual cases. The required features should therefore be specified in each individual case at the time of closing the contract.

