Fugro provides essential infrastructure information for rail professionals. We help build a better understanding of existing assets, to optimise the design, construction and maintenance of infrastructure, bringing the railway to your desktop.

HELPING YOU MANAGE RISK
We help clients worldwide to design, build, upgrade and maintain rail infrastructure. Whatever the scale of the project or the level of detail – from 30,000 kilometres to 0.3 millimetres – we provide the information and insight that helps reduce uncertainty, manage risk and improve cost-effectiveness and safety.

Our aerial LiDAR and imaging capability, together with train-based laser scanning, track measurement and video surveys, provides an affordable, comprehensive overview of routes and networks. Based on technologies that are rapid, safe and non-intrusive, we provide highly accurate asset inventory data, bringing together track, overhead catenary, signalling systems, cable runs, structures and more. Geodetic and geometric data can be acquired at line speed, often from scheduled passenger trains, without the challenge of arranging track possessions or the risks associated with surveyors walking on or near the track.

For insight into conditions below the surface, our expertise in geotechnics, engineering geophysics and non-destructive investigation provides the detailed information required to optimise design, construction and rehabilitation.

Using Aerial LiDAR (FLI-MAP) and imagery to generate terrain models and asset inventories.
Our mission is to deliver the information you need to manage assets and deliver projects. With an international team focused on rail surveys, Fugro is the natural choice for a better understanding of rail infrastructure.

CORRIDOR MAPPING AND 3D VISUALISATION
Our aerial LiDAR and imaging capability is a fast, accurate and cost-effective solution to map complete railway networks for prefeasibility track design.

The LiDAR data can be combined with RILA and RILA 360 to provide an exact XYZ location for all objects in the corridor model. This enables feature extraction to identify assets within the railway boundary, including track assets, structures, earthworks and vegetation. Other data typically collected includes orthophotography, oblique imagery and video.

RAIL ALIGNMENT AND TRACK GEOMETRY
Fugro’s rail infrastructure alignment acquisition system (RILA) provides superior levels of accuracy to measure absolute track position and geometry and to act as a control base, improving the accuracy of airborne and train-mounted LiDAR.

The highly portable RILA unit is easily connected to the rear of a regular passenger train in less than two minutes and collects accurate georeferenced rail position data. By working from scheduled trains, the RILA solution brings three key operational advantages:

- Eliminates many of the risks associated with survey crews working on the track and disruption caused by track possessions
- No need for special measurement trains and additional train paths
- Limited disruption to train services, therefore more efficient.

The RILA system is particularly well-suited to rail measurement before and after maintenance works. Track position is calculated to a very high level of absolute accuracy, referenced to a customer-defined grid, using advanced processing software. Track engineers use the data to optimise design and check alignment following maintenance.

RILA data can also be used to calculate track geometry, and track safety parameters (such as track gauge, or cant); to identify rail wear, and the condition of switches and crossings; and to determine comfort and ride parameters.

INFRASTRUCTURE AND ASSET DATA COLLECTION
Where clients require survey information relating to surrounding infrastructure and assets, terrestrial and mobile survey systems are used. The train-mounted Fugro RILA 360 system incorporates two 360° laser scanners and a panoramic camera system, which enables clients to analyse trackside assets, critical clearance issues and areas obscured from airborne systems.

The RILA 360 system can be combined with RILA track data to achieve higher levels of accuracy than possible with conventional mobile laser scanning platforms. This provides data at engineering-level accuracy, informing design and construction at strategic locations.

TRACKBED ASSESSMENT
Ground Penetrating Radar (GPR) is the quickest, most cost-effective and least disruptive way of building a clear picture of ballast thickness and condition.

Using our sophisticated train-mounted radar, we can survey entire routes and networks at speed, without affecting scheduled train movements. This provides a comprehensive overview of track ballast thickness and condition (fouling /
intermixing). Alternatively, more detailed investigation of specific sites can map buried utilities and potential obstructions to high output ballast cleaning operations.

GEOTECHNICS AND ENGINEERING GEOPHYSICS
A thorough knowledge of ground conditions is essential to predict and understand the performance of underground and surface rail assets. With a broad engineering geotechnical capability, we can provide high resolution insight within a few centimetres of the surface, revealing geological stratigraphy and structure to depths of more than a kilometre.

Ground investigations are often conducted in stages. Electromagnetic and magnetic techniques provide a rapid overview of conditions and highlight features for further investigation. More definitive methods, such as microgravity or seismics, can then be followed by precisely targeted drilling or cone penetration testing.

Common applications include:
- Mapping cavities and voids, mineworkings, karstic features, geohazards
- Engineering parameters e.g. stiffness mapping in earthworks
- Groundwater studies
- Ground structure and stratigraphy – from depths of 1 metre to 1 kilometre.

STRUCTURAL INVESTIGATION
Our structural investigation experts provide detailed understanding of the structure and condition of rail tunnels, bridges and buildings. Non-destructive surveys sample large areas quickly, revealing subsurface changes that help explain deterioration or failure mechanisms. They contribute to structural assessments, for example by determining thickness and internal structure of concrete and masonry, using techniques such as ground penetrating radar, ultrasonics and infrared thermography.

Common applications include:
- Determining thickness and hidden structure
- Investigation of cracking, voids, and delamination
- Construction materials testing
- Corrosion and moisture surveys.

Cone penetration testing provides geotechnical, environmental and hydrogeological information.

The RILA system gathers absolute and relative position, rail wear and video information.

360° dual scan technology determines objects in and near the tracks.
Installation of RILA system with a connection time of less than 2 minutes.

OUR EXPERTISE
Fugro provides essential infrastructure information for rail professionals. We offer a safer, faster and more affordable way of delivering accurate up-to-date rail infrastructure data and analysis, with limited disruption to service.

We are approved and accredited by international rail bodies to deliver a broad spectrum of survey and investigation services, providing a thorough understanding of the location, attributes and condition of rail assets. We can assess and evaluate entire rail networks, including earthworks, track, structures and the ground below, ranging from submillimetre rail wear measurement to characterisation of the underlying geology.

PROJECT EXPERIENCE
Over 100,000 kilometres of railway track and infrastructure components have been surveyed by Fugro, which has provided imagery, LiDAR, geophysics and geotechnical services to clients around the world.

Some of our recent projects include:
- 10,000 km RILA absolute track position measurement and 1,000 km airborne survey for Network Rail, UK.
- Non-destructive investigation of various structures for Crossrail, UK.
- 6,400 km RILA absolute track position measurement for ProRail, Netherlands.
- Airborne LiDAR survey of 40,000 km for CSX, USA.
- 1,000 km of railway trackbed surveyed in seven days, Irish Rail, Ireland.
- Geophysical surveys of 20 high speed railway construction sites to map geohazards for SNCF, France.
- Buried utility mapping, various sites and clients, UK and Netherlands.