

High output track renewals adopt high output data capture

Roy Hickman, Senior Rail Consultant, Fugro, details the Network Rail work the company is undertaking.

Building on the successful relationships established between its High Output Track Renewal (HOTR) team and Fugro (on Scotland Route HOTR projects in 2015 and further extensions in the South East and Great Western Routes in 2017/18), Network Rail awarded the national CP6 geometry data capture for high output to Fugro. HOTR undertake large volumes of asset replacement on a daily basis, requiring not just a huge logistical supply of materials, but equally large amounts of high-quality data to ensure track designs and other systems keep rolling.

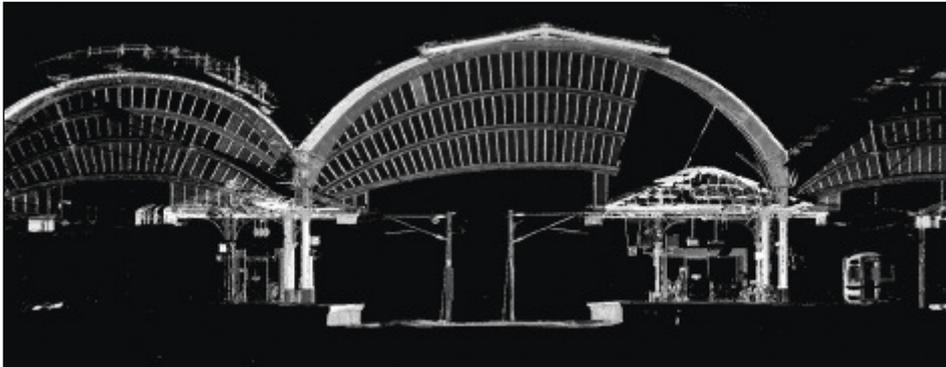
A high output benefits analysis undertaken by Network Rail reported that, in 2017/18 alone, the use of Fugro's RILA system on HOTR projects in LNW, Western & Wales and the South East Routes saved a total of 4,298 man-hours. Without this system, these hours would have required survey crews to access the track with the inherent health and safety risk of working on or near the track. Additionally, the analysis reported that RILA had saved in excess of 10,000 man-hours across all HOTR projects since 2015.

The RILA system

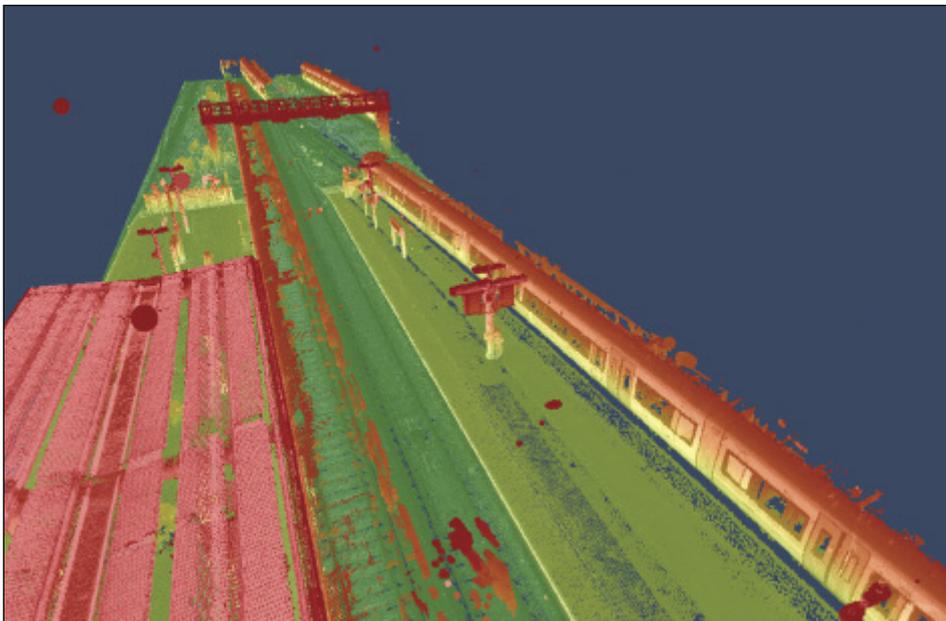
Fugro's RILA is a trainborne geospatial data



The RILA 3.0 system with integrated 360° scanner, high-resolution imaging and video cameras fitted to the rear of a timetabled passenger service. It projects a laser beam over the rail, as can be seen from the blue line on the track in front of the vehicle.



RILA high density lidar point cloud data used by Network Rail's high output teams to deliver ballast cleaning track renewal work.



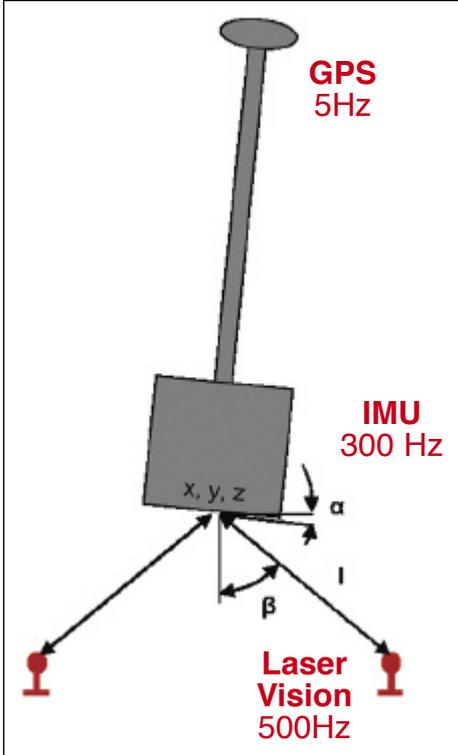
capture system. It can be deployed on passenger, freight or network management services to capture track asset information such as X, Y, Z coordinate geometry, 360° point cloud data and high-resolution video from existing rolling stock. All the data is captured at line speed, which in many cases is 125mph.

The unique versatility of the equipment allows it to be fitted quickly (under two minutes for passenger trains) to any railborne equipment that provides the traction power. The self-contained RILA unit houses the highly accurate geospatial referencing equipment, power source, rotating laser, IMU, video cameras and track scanner, all of which are referenced to each other for a holistic asset management view of the infrastructure. The system has recently been trialled on a road/rail Land Rover, further demonstrating versatility of deployment, particularly on short track lengths.

Once collected, the data can be utilised to provide track line, level and super elevation, six-foot information, structure clearances, OLE height and stagger data or third rail location. In fact, anything that can be seen on the network by the system is recorded and can be analysed in detail. Once captured and processed, the data can be exported to design packages such as Bentley Rail and then utilised for the design and installation of assets requiring renewal.

Other uses

The processed data is not limited to providing design files for track renewal work. Increasingly, it supports other asset management areas such as structure gauging, boundary security, lineside equipment management, maintenance tamping design files and, currently under development, ballast shoulder integrity. The



How the RILA system takes its measurements.

data has also been successfully integrated to Building Information Modelling (BIM) projects, providing detailed planning and design models that de-risk delivery.

This utilisation demonstrates the Fugro ethos of 'capture once and use many times' so whilst the data may be captured initially for large sections of the network, once processed, it can be used for many applications, large and small. Not only is the system highly cost-effective when large amounts of asset data are required, but it has a strong positive impact on reducing worker exposure to risk on the infrastructure by removing 'boots from ballast' to undertake surveys.

Network Rail's Major Projects Team has estimated that the deployment of RILA on the Trans-Pennine Route Upgrade between Manchester and York has saved a total of 71,680 surveying track man-hours. Furthermore, based on this data and using standard HSE-weighted injury formulae, it suggested it had potentially prevented seven major and 144 minor injuries.

The review also estimated that deploying RILA had resulted in a reduction of approximately 50% in CO₂ emissions when compared to the number of van journeys needed to support a conventional survey (even though RILA had been deployed on a heavy haul diesel locomotive).

Covering the network

Identification of potential uses for RILA data continues to grow. As more of the network is recorded (currently in excess of 10,000 route-miles of the UK network have been surveyed with RILA), asset engineers and designers are better

placed to access accurate data for the effective management and renewal of the infrastructure. All objects are location referenced, which greatly improves the outcome of machine learning algorithms, artificial intelligence routines and learning, meaning that Fugro's Geo-data can provide the geodetical backbone of the railway network.



Current UK network RILA survey coverage.