

Case Study

Customer:
S&C South Alliance

Project:
Willesden North Junction
Blockade

Solution:
Trimble GEDO IMS and Trimble
SX10



Innovation is key when it comes to “Putting the passenger first”

The successful 90mph handback of a 400m stretch of the West Coast Mainline during the replacement of Willesden North Junction over Easter has been assisted by the willingness of the S&C South Alliance* to adopt a range of innovative technology during the blockade.

Over the Easter weekend, the West Coast Mainline was closed over four days during the replacement of Willesden North Junction. This included two NR60D crossovers and 400m of new line. The aim of the project was to re-open the track on Tuesday morning at 90mph with no train delays and no evidence of an engineering presence beyond clean ballast and new track.

The West Coast Mainline is rarely closed which means that when it is, the demands for high productivity, high quality work and a timely job can make for a busy and challenging site. The S&C Alliance was therefore keen to use a number of innovative approaches. These included the use of the Trimble GEDO IMS Track Measuring Device (a self-contained trolley designed to capture track position, gauge and cant in a single operation) and the Trimble SX10 (high-accuracy total station and 3D laser scanner combined in a single instrument).

In particular, the Trimble GEDO IMS has a highly accurate inertial measurement unit removing the need for a total station on the track and the attendant challenges this can bring such as line of sight issues, and the possibility of impeding on a site with cherry pickers for OLE, signalling teams, welders etc. Instead, the GEDO IMS can be easily taken on and off track in the event of obstacles, is easily manageable and has a short initialisation time for rapid use.

Using the Trimble GEDO IMS

Pre blockade: Colas Rail familiarised themselves with both the GEDO IMS and the Trimble SX10 prior to the blockade. Using the GEDO IMS, a design validation survey was undertaken (DVS) and control was checked. In this case, control was already established every 60m on overhead gantries and through the use of chequer boards (70:30) although it could have been easily done using the IMS and GEDO Profiler (used to measure distance

and height offsets between the track and any object adjacent to the track).

During blockade: The GEDO IMS was used to survey the track providing the team with greater accuracy for as-builts behind the tamper, ultimately improving track quality. Downtime was reduced because the IMS was used whilst walking behind the

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**Nick Matthews,
Programme
Engineering Manager
Transformation S&C
South Alliance**

tamper with no line of sight issues leading to enhanced productivity. The GEDO IMS proved stable and reliable, performing well despite the vibration and shock from the tamper. Alignment was measured in relation to tamping on the large clear display of the Trimble T10 tablet running the GEDO IMS field software. This allowed for the detection of the inner and outer track geometry for the immediate spotting of errors or tamping mistakes. At the end of each cord, readings show the difference to design for immediate lift and slew. The team created a front offset file on the tablet and then transferred it to the tamper via a USB after every cord so that at no point was the



▲ The Trimble SX10 was used for Progressive Assurance

tamper waiting for calculations to be made. Previously, this was a time consuming process that involved a rail shoe and the manual entry of many numbers. Now the process requires just one system and one operator who controls the whole process.

The track was handed back on time at line speed of 90mph using Progressive Assurance** throughout the weekend.

Post blockade: Using the GEDO IMS and GEDO Office software, the track was monitored over a period of several weeks. A baseline survey was undertaken and then comparison surveys were used to calculate any movement. Further GEDO IMS follow-up tamps were carried out as part of the hand-back procedure.

Using the Trimble SX10 Scanning Total Station

The question that the South Alliance wanted to answer was whether the SX10 could perform in the harsh conditions of a blockade, delivering under the stresses of dust, vibration and restricted access in a decreased working area.

The SX10 would be used for Progressive Assurance and as an alternative to having

a surveyor in the dig capturing data for a 3D model, all whilst setup in a position of safety. With limited windows after the dig and stoning, the SX10 provided a fast alternative to traditional survey methods - a resection to the existing control allowed the scan to be coordinated and using the polygon framing on the sx10 the extents of the dig were scanned.

The data produced by the SX10 could be used immediately in Trimble Business Center office software (TBC) for checking against the 3D model to ensure that everything was correct. In TBC noise such as machines and people can be removed and the formation/design that goes into the cabs can be laid onto this for checking live in the field.

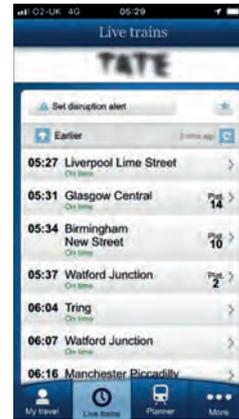
The SX10 could also be used during the pre-works as a tool to assist site planning and build up area organisation. There is potential for a complete survey of the renewals site from which the safety team can investigate the hazards that could potentially impact on the workforce.

Using the combination of point cloud data and 3D imagery, the engineers and surveyors can overlay the new track designs and organise the site prep works prior to installing new control.

On this project, the SX10 was part of a trial with Network Rail and in the future the data can be used to locate previous troublesome areas or soft spots.

Conclusion

Nick Matthews, Programme Engineering Manager Transformation S&C South Alliance, reports that as a result of being familiar with Trimble's GEDO VORSYS two trolley system, a move to the GEDO IMS was a natural evolution. He said, "The main advantage of GEDO IMS is it is based on a single trolley. This over comes the line of site issues often encountered on site using two trolleys. The track position is recorded continually using GEDO. This continuous measurement is far better than



"Day one of 90mph handback running over Willesden North Junction fast lines. As smooth as it gets. Very impressive. Well done to all concerned!" Peter Bowes, Managing Director, Virgin Trains West Coast (Based on driver's feedback)

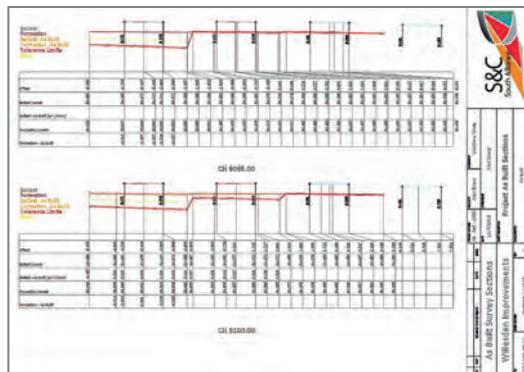
the discreet data gathered by using a detail pole and total station every 5m."

"The introduction of GEDO IMS to the S&C South Alliance will be a game changer. It will ensure that continuous data is always captured by the survey and delivery teams rather than discrete data using total stations and detail poles. The KOREC/Trimble teams were always there during the introduction of the IMS for the Alliance, including representation at meetings, training and being on site during the works. They provided a world class service to the Alliance."

Throughout the four-day blockade, the Southern Alliance was supported on site by Matt Moss (Trimble Rail Applications Engineer) and Tom Williamson (KOREC Rail Applications Engineer). The adoption of the Trimble technology on this site underlines the S&C South Alliance's commitment to continuous improvement and KOREC and Trimble were proud to be a part of this great effort that saw the successful hand back of Willesden Junction, on time, at a line speed of 90mph.

* The S&C South Alliance develops, designs and installs major track programmes across the South of the UK and is a partnership between Network Rail, Colas Rail and AECOM.

** A process which ensures that every stage of the process is measured and signed off by a named Responsible Person for each stage. This creates an evidence file critical for assessing the line as fit for reopening at a certain speed. In this case it was not possible to open the line at 120mph because the formation stiffeners weren't sufficient to support the high-speed handback.



▲ Sx10 data captured for Progressive Assurance



Contact us:

Please do get in touch for further information on any of the products or services mentioned in this case study, a demonstration, support or just a chat about your requirements.

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