

Customer:

Costain

Project:

M6 - Heysham link road & M1-j 28-31 and 32-35a

Solution:

Trimble R10 GNSS

Case Study



land survey requirements from initial control and setting out to intensive materials management. Jon has used **KOREC** supplied Trimble GPS for over 15 years and in keeping with Costain's 'Engineering Tomorrow' strategy, was keen to supplement the project's existing fleet of Trimble R8 GNSS with the latest technology.

"Our surveying equipment is managed through the site and purchased at site level," explains Jon. "We are always thinking ahead...what next...where next... and because of this, we select instruments that are upgradeable and therefore won't become obsolete. As well as looking at the

GNSS technology an instrument can offer, we can't overlook the basics either. It must have a short learning curve for both new and existing staff eliminating the need for massive manuals or lengthy familiarisation with hidden functions and it must also be rugged and portable. During our appraisal of the R10s we additionally had the feedback of Stuart Fagg on the M1 smart motorway scheme. He not only vouched for the impressive performance of the technology but also its popularity amongst his team. The reports were all good and that assisted our purchasing decision."

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Costain's R10s are used in conjunction with Trimble TSC3 data loggers and



Trimble R10 delivers "confidence in results" and "reliability"

The M25 road widening project, the M1 j19 improvements, the M1 j 28-31 and 32-35a smart motorway schemes and the M6 - Heysham link; these are some of the most important Highways Contracts in the UK today and they all have one thing in common, adoption of the most advanced GNSS on the market, the Trimble R10.

Costain are the contractor for two of these projects - the M1 Smart motorway scheme where Stuart Fagg is the survey manager and the M6 Heysham link where Jon Hooker fills the same role. Costain has an 'Engineering Tomorrow' strategy aimed at identifying, developing and implementing innovative solutions to meet the UK's major national infrastructure needs. This strategy relies on sharing knowledge and applying best practice across the Costain Group with high priority on innovation - an ethos that has resulted in information sharing between Stuart and Jon and extensive use of Trimble's ground breaking R10 GNSS on both projects.

M6 - Heysham link road

The £124.5m project is the first highway scheme to pass successfully through the Government's new National Infrastructure Planning process. It will involve a full reconfiguration of Junction 34 of the M6, 4.8km of dual carriageway 4.5km of new slip-roads and 12 major structures including a 200m span crossing of the River Lune. When complete it will connect Heysham and the Morecambe peninsula directly to the M6 with completion expected in 2016.

Survey manager on the project for Costain is Jon Hooker whose team covers all of the

Trimble Access software (with Road Alignment module), as are their Trimble S6 and S3 robotic total stations. The Heysham site is large, high and open, ideal conditions for both GNSS based survey operations and machine control. Consequently a fixed SPS850 base was established early on to provide real time corrections for both areas of use.

Setting out with the R10 is done directly from the MX GENIO model issued by the designers which goes straight into the TSC3 data loggers eliminating unnecessary number crunching. The R10's have also been used to establish all control and Jon reports that the repeatability is excellent, repeating at sub 10mm constantly. Traditionally a high percentage of this survey work was undertaken by surveyors but Jon adds that the engineers have found the R10 so straightforward to use, they are now carrying out these tasks as well.

On the Heysham scheme all materials are retained on site making the movement and management of the 1.7 million m3 of earth key to the smooth running of the project. The R10 has enabled Jon's team to keep track of both the materials and the speed at which the subcontractors are working providing the commercial team and the client with regular, reliable updates on volumes and progress.

"The Trimble R10 brings speed, accuracy and precision to what we do and consequently all our surveyors want them for this superior repeatability and fix," continues Jon. "We've also been able to use them successfully in particularly challenging conditions, for example under tree canopy and in areas where normally only optics would be suitable - in fact areas where they have no business working! They save us time and their exceptional performance in these conditions gives us total confidence in the results."

The ability to carry on surveying under tree canopy is attributable to Trimble's unique xFill technology. In the event of the connection to the base station or Trimble VRS network being temporarily lost, xFill



▲ Trimble HD-GNSS processing engine



allows for continuous surveying, without interruption. Trimble xFill works seamlessly to 'fill in' for gaps in the RTK or VRS correction stream by leveraging a worldwide network of Trimble GNSS reference stations and satellite data links.

Also unique to the R10 is the eBubble which again Jon says, instills confidence in his team. The Trimble R10 system employs an electronic bubble that appears on the Trimble controller display, in this case the TSC3 logger. With this new eBubble, all measurement information is displayed in one place and users don't have to switch focus from the controller screen to the pole bubble to check that the pole is plumb.

"There are many stand-out features on the R10," concludes Jon. "However, whilst the eBubble saves us time, the good battery life means we can stay longer in the field and its construction makes it lighter and easier to carry around, what really makes it special is that it gives us total belief that the information we are collecting is spot on. You have to have that confidence to avoid large, time consuming errors and this is where the R10 really delivers."

Stand out R10 benefit - Complete confidence in the results

M1, j 28-31 and 32-35a smart motorway scheme

Over 100 miles away, two further Trimble R10's and five S3 and S6 Trimble robotic stations with TSC3 loggers are in use on

a second Costain project. The M1 J28-35 smart motorway scheme will run through Derbyshire, Nottinghamshire and South Yorkshire. This scheme aims to increase capacity and improve journey time reliability, supporting economic development in the region. The project also aims to relieve congestion through improved incident management and driver information.

Responsible for all survey work, for looking after design and for engineer training is survey manager Stuart Fagg. The M1 site is heavily vegetated, extremely long at 50km and unlike Heysham, also has inconsistent mobile connectivity, all factors that influenced Stuart's decision to contact KOREC to find out more about the Trimble R10.

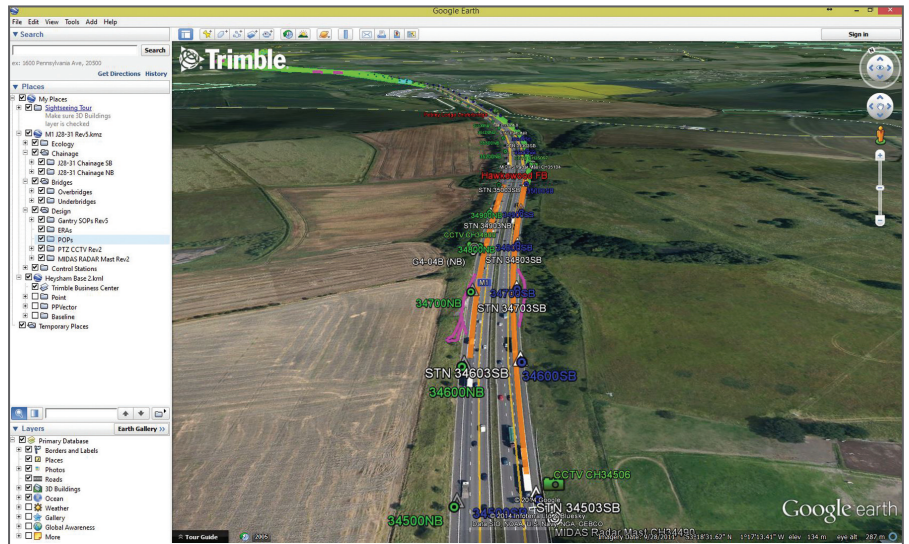
"I knew immediately that only a robust GNSS with a multi-network data SIM would be up to the challenges of this job," explains Stuart. "Initially there were sparse control stations on site so we put in an OS Grid based control network which meant that first up we needed reliable repeatable results from our R10s. They have delivered from the outset providing us with approximately 50% better repeatability than any GPS we have used before and that is a very, very, good result. Where there have been discrepancies, then the R10 eBubble record has shown that sometimes the pole wasn't level - we wouldn't have this information with our old GPS. Previously we would have had to revisit many of the points 3 or 4 times because of inconsistencies and with 50km of road and control every 100m, that could be hundreds of additional observations. With the R10, we have reduced this to just 10-20 saving many hours in both travelling

and in the publishing of results.”

The design for the scheme was based on unreliable LiDAR so Costain needed to resurvey the carriageway and carry out a topographical survey of the existing terrain before adapting the design. Again it is Trimble’s unique technology that has helped the team to work without interruption in the vegetated areas. The R10’s xFill technology has ‘filled in’ for gaps in the RTK or VRS correction stream whilst its advanced HD-GNSS processing engine which transcends traditional fixed/float techniques has provided a more accurate assessment of error estimates than traditional GNSS technology, especially in challenging environments.

Stuart has also been investigating how the R10s with their TSC3 loggers and Trimble Access software can help him better manage both his survey team and their instruments over the 50km site. “All our TSC3 controllers have SIMs for data connection and we are obtaining our RTK corrections with Trimble’s VRS Now service. Currently we are just using the built in email and that’s a reliable method of getting data in and out if something is urgent. Otherwise we use Trimble Office sync for routine daily updates. Nothing is more time consuming than having to drive all the way back to the office to share the data you have just collected or upload the latest info, especially when you’re on a deadline. Being able to wirelessly send control updates, design changes etc saves us time, money and field costs.”

Always looking for ways to improve site efficiency and team productivity, Stuart has also been using Trimble’s VRS iScope service which provides an interactive map



▲ In TBC data can be converted for viewing in Google Earth

view of the location of rovers currently receiving corrections or of recent rover sessions. If a GNSS is required elsewhere on the site and the surveyor using it cannot be contacted, it is easy for Stuart to identify his position and arrange for the rover to be collected without delay.

Greater efficiency has also been achieved through a simple feature in the Trimble Business Center (TBC) office based processing software. In TBC data can be converted for viewing in Google Earth providing context for surveyors working in remote locations. This includes chainages on the job and Stuart reports that 20-30 people on the site regularly use this time saving function.

Stuart concludes, “At Costain we want to innovate and we want to push boundaries, so if there is value to be had from

assessing and using new technology then that’s exactly what we’ll do. Our R10s with TSC3 loggers and Trimble Access software are way ahead of anything we have used previously and fit our ‘Engineering Tomorrow’ ethos perfectly. Our next step will be furthering connectivity on site which will further increase our productivity through efficient and smooth data sharing between site and office. We have also purchased a Trimble Tablet in preparation for use with the new Trimble V10 imaging rover enabling us to run it straight away when the time is right. However what has really contributed on this site is the R10 and its reliability. It always gets the numbers out and that is the bread and butter of good survey work. Simply, if it’s a road job, it’s got to be Trimble.”

Stand out R10 benefit – reliability



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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