

Case Study

Customer:
Birse Civils

Project:
The Highways Agency A14
Improvement Scheme

Solution:
Trimble GCS900 for Dozers &
Graders & Trimble SPS930 UTS



◀ Birse Project Manager David Huckstep checks progress with a Lancaster operator using Trimble's GCS900 dozer system

contract that allows the contractor's expertise to be introduced at a much earlier stage in the preparation of the scheme. As part of this initiative, locally based Lancaster Earthmoving were involved from the earliest stages, immediately bringing their three years experience of machine control to the mix.

Lancaster's Managing Director and owner, Ian Blything and Birse's Project Manager David Huckstep were keen to explore how a relatively new way of working could deliver the road rideability that Birse was after. David Huckstep explains, "The construction industry can be staid and sometimes slow to utilise new technologies and methods. For us to be able to effectively introduce machine control on a

"the grader was typically producing +/- 5mm - much better results than we were achieving using traditional methods"

project like this, all parties involved needed to be committed and have the confidence that the adoption of machine control would deliver more benefits than traditional setting-out methods. In the past, Ian has used machine control independently

on sites, even when it was rejected by the client, so has some good practical examples of what it can deliver. As confidence grew, the decision was taken to go ahead and two years down the line, the fantastic results are there for all to see."

Cautious beginnings

Lancaster supplied two types of system to the site - Trimble's GCS900 Grade Control System for dozers using dual GPS on Komatsu D61 and CAT D6N Dozers and Trimble's GCS900 system for graders utilising a Trimble Universal Total Station (UTS) on a CAT140G Motorgrader - a system suggested by Peter Brooks of **KOREC** (Trimble's UK and Irish distributor

Continued overleaf ▶

Smooth Operator

How Birse Civils used Trimble Machine Control to create a perfect sub-base for blacktop

Just East of Bury St Edmunds lies 3.5km of newly built dual carriageway and not for the first time, members of the public have been quick to let those involved in its construction know exactly what they think. This new stretch of the A14 is offering local drivers such a smooth ride, they've felt compelled to email Birse Civils with their approval!

The A14 Haughley New Street to Stowmarket improvement scheme, a Highways Agency project involving 3.5km of dual carriageway and around 275000 cubic metres of earth moving, has already

opened ahead of schedule. Deemed by the Highways Agency to be a route of national strategic importance, connecting the east coast ports of Felixstowe and Harwich with the Midlands and the North, it will straighten out the notorious 'bends' section of the road and greatly improve safety.

Groundwork

The superior ride quality of the A14 has not come about by chance. The contract was awarded to Birse Civils under the Highways Agency's Early Contractor Involvement (ECI) initiative - a forward-thinking style of

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▲ Trimble's GCS900 system for graders typically delivered +/-5mm

of machine control systems) for trimming the road up.

The dozer systems use GPS technology to accurately position the blade in real-time with transmitted corrections coming from a Trimble SPS851 Base Station established by Lancaster on the works cabin roof. Positioning sensors are used to compute the exact position of the blade many times per second. The on-board computer uses this position information and compares it to the design elevation to compute cut or fill to grade. The information is displayed on an in-cab screen.

In the site office, information provided by Birse designers Mouchel is converted to the correct format and then loaded onto a memory card for transfer to the cab-based control box. Any changes to the design can be quickly and easily distributed the

same way.

Birse Section Engineer Dave Annan outlines working practice in the early days. "Initially we were very cautious and to ensure everyone had confidence in machine control we used traditional setting-out methods as well. For the bulk earthworks we used batter rails every 50m for reassurance and road box profiles every 25m. As confidence grew, the setting-out for the bulk earthworks was reduced and almost completely taken away for the final trim. A comparison of results showed that the blade was producing a consistent accuracy of +/-30mm and the grader was typically producing +/-5mm - much better results than we were achieving using traditional methods when each stage of the process can induce an error! Now it's definitely a

case of 'right first time' and rework has been minimal freeing up my time for checking and data handling. The GCS900 systems also mean that we needed only a very small engineering team for this job - no bad thing with the current skills shortage. Without the system I would have needed at least another 3 or 4 engineers to carry out the same work. Instead of an engineer spending 3 days setting out, now he just needs to spend half an hour checking. We've also managed to cut out a lot of downtime. If there is a problem in one area of the site, drivers can simply carry on working somewhere else without the need to wait for setting-out engineers and that means 100% utilisation of the plant. Additionally, from a health and safety point of view, we have less workers moving around the machine pulling strings or boning in."

Lancaster owner Ian Blything agrees with Dave Annan. "On this job hardly any costs have been incurred for putting work right - it's been right first time. We've been using **KOREC** supplied Trimble machine

"Our drivers love the freedom that using machine control brings and find Trimble's cab control box particularly intuitive."

control since 2005 because the systems are ultra rugged and **KOREC's** technical support is fast and reliable and product advice second to none. Our drivers love the freedom that using machine control brings and find Trimble's cab control box

particularly intuitive. It's their experience which means that any glitches can be spotted early and design data tweaked accordingly before the need for expensive rework. Of course working like this brings extra responsibility for the drivers but they have the reassurance of an engineer behind them checking with GPS. The skill of the driver is as important as ever - they are still doing 90% of the work with only the last 10% done on auto - now they are just equipped to leave a better looking job behind them."

Grand Finale

Whilst the Highways Agency normally require a sub-base tolerance of +10/-30mm, Birse managed to cut this to just +5/-5mm by carrying out the final grade with Trimble's GCS900 system for graders utilising a Trimble Universal Total Station (UTS) on a CAT140G Motorgrader. The UTS uses active target technology to



► Birse Section Engineer Dave Annan carries out some checking with **KOREC's** Pete Brooks



reliably lock onto and track the target on the grader's blade. Its high up-date rate, low latency and synchronized angles and distance measurements capabilities make it ideal for blade guidance to 2-5mm.

"If the foundations are right, it will follow you through to the top, and that certainly

"The Highways Agency has acknowledged the superb finish that we have achieved"

proved to be the case when it came to the blacktop. The end result was also aided by the fact that the construction of the base course and wearing course layers

was conducted using a sonic averaging beam on the paver to sustain and improve rideability." states Dave Annan. "The Trimble machine provided us with continuous grade control so when it came to the blacktop, we agreed a thickness and Lafarge, our blacktop contractors, just let the paving machine run instead of the operatives constantly making manual adjustments. However the paver did not have continuous grade control which

meant we still needed to have pins every 10m for line but only put levels on pins every 50m to check on the grader and the blacktop. Initially unsure, Lafarge were soon won over when we came to measure the final surface regularity with the Rolling Straight Edge. If the closely mounted wheels of the roller ride up or drop down more than 3mm, a bell rings. We checked our 7 kilometres of surface course and there were just 3 bell rings at 4mm (max permitted number of surface irregularities is 20 per 300m). I also looked at a 1km section of type 1 sub-base in detail – the average surface deviation on this tested carriageway was zero and you can't get more perfect than that! In the future we will be putting full machine control on the blacktop paver which will enable us to dispense with pins altogether"

Conclusion

David Huckstep is quick to state that although using Trimble machine control undoubtedly brought material, personnel and other savings to the project, cutting costs wasn't the reason behind the decision. "We are not accountants, we just want to deliver a first class defect free job. Here on the A14 we have superb paving

▲ Lafarge let the blacktop machine run without the need for constant manual adjustments

because we had the courage of our convictions. The Highways Agency has around 15 Major Road Projects (over £10million) under construction as we speak and less than a third of those have utilised machine control so there is still a fairly low take up in the industry. The Highways Agency has acknowledged the superb finish that we have achieved and here at Birse we are totally committed to taking full machine control forward from first stage earthworks to final surface course on our next major scheme We know that with additional software, we can get even more out of these systems in the future. Acknowledging in quality plans how GPS can be used for checking will also help the technology become more accepted and be a big step towards winning over those who still remain uncertain. For us, this really is value engineering at its best." ■ ■ ■



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