

Case Study

Customer:
Jones Bros

Project:
A55 Ruthin by-pass

Solution:
Trimble GCS900 Grade Control System



Trimble Machine Control System speeds progress on 1km bypass

Projects in Wales often have special features of engineering interest due to the difficult terrain and geology – anything from slate to hard rock.

Engineers therefore need to have expertise in maritime works, tunnelling, river diversions, landscaping and environmental protection, mineral deposits and geology as well as the skills of a highways engineer.

In North Wales a 1km long by-pass around part of the historic town of Ruthin is a perfect example of the challenging conditions that the terrain can throw up. The road, 15km outside of Denbigh, links up with the important A55 trunk road connecting Denbigh and Rhyl. Here the earthworks contractor, Jones Bros, of Ruthin, has been faced with a demanding mix of soil conditions with the soft clay and peat and sand and gravel beneath requiring extensive excavation. The site, although generally flat, sits on a river flood plain with a 2m high embankment made up of granular fill. The road, which includes a new bridge over the River Clywd, is of

flexible construction with 150mm of sub-base, a 300mm top surfacing and an SMA (stone mastic asphalt) wearing course.

Work started in October 2005 with the first phase needing completion by the end of March 2006 to release some land for housing and all work having to be finished by July 2006. Time was therefore at a premium and Jones Bros, keen to investigate ways to increase their productivity whilst delivering a high standard of work, looked into the possibility of adopting machine control technology. The company was already familiar with Trimble's systems over a number of years and following a trial on a nearby landfill site opted for a GPS-based Trimble GCS900 Machine Control system for use on its Komatsu D61 dozer.

▲ The SPS780 GPS with SCS900 software uses the same data as in the cab to check the accuracy of the work done.

How the System Works

The GCS900 Machine Control system is Trimble's flagship system and can be installed on Dozers, Motor Graders, or Excavators with standard or tilt buckets.

"The operator knows exactly where he is and knows exactly how much he needs to put in and what sort of shape it has to be." The system uses two GPS receivers on either end of the blade in the case of a dozer or Motor Grader, or in the case of an excavator the receivers are mounted on the tailswing and with strategically mounted solid state angle sensors, the system can measure the precise 3D position of the tip of the bucket in real time. The GCS900 system enables complex site designs to be easily graded, significantly reducing material overages and dramatically improving the contractor's productivity and profitability.

Continued overleaf ►►

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The dual GPS antenna configuration computes the exact position and orientation of the machine blade or bucket for faster excavation without stakes. With accurate, 3D positioning of the blade, the system guides the Jones Bros' operator to quickly perform complex tasks and simplifies finishing slopes.

Following installation and a day's operator training by Trimble's UK distributor **KOREC**, the system was functioning real time. This was the first time that Jones Bros's had used GPS guidance on a road project and Site Engineer Chris Roberts was keen to assess the benefits.

Simplicity and flexibility Impress!

"It took the operator about a week to fully get the 'hang if it'" explained Chris, "and he now knows more about the system than I do which is the way it should be! The purchase of a Trimble GCS900 Grade Control System has saved us time and money. There is no engineer setting out or putting stakes in the ground because everything required to grade is on board the dozer. The operator knows exactly where he is and knows exactly how much he needs to put in and what sort of shape it has to be. On top of that, there is no need for a banksman to guide the driver of the dozer around the site and the machine doesn't have to stop every 5-10 minutes to check positioning."

The project features a lot of fill as opposed to cut, with imported shale material being quarried and trucked in from a nearby site. The material is then consolidated in layers of approx 300mm, rolled and compacted to formation level. This provides the road base with a secure foundation, thus avoiding settlement. The positioning

sensors of the grade control system provide an exact position of the dozer's blade and the on-board computer then computes the information and compares it to the design elevation.

Chris continues, "The Trimble GCS900 is operating in indicate mode. Light bars and an in-cab computer use the project design information and 3D GPS position as well as cross slope to show the operator the precise elevation and cross-slope movement required to get to grade."

Used in this way, the dual GPS antenna system indicates the exact position, slope and cutting edge orientation for faster grading of complex designs and maintaining accurate blade cuts. The machine control system is backed up by an

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accompanying Trimble Site Positioning System (SPS780) - a GPS receiver with the SCS900 Site Controller Software running on a data logger - which enables contractors to complete site measurement. It supplies real-time coverage maps, which simplify workflow and provide in-the-field feedback to speed up decision-making and validate 3D machine control operations. On this project, the contractor was using the SPS780 to check the daily progress of the GCS900, to make sure it achieves the stakeless environment and to monitor the cut and fill operation to see how close the operator was to final grade.

The Site Positioning System can be used either as a surveying pole or mounted on a



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site manager's vehicle. On this project, the contractor opted for both.

Easy System Transfer

Another reason for Jones Bros. to select Trimble GPS technology was the flexibility to quickly transfer the core components of the technology from one project or site to another, instead of moving machines from site to site. The system is currently being used for the redevelopment of the Anglesey Racing Circuit. Previously the home for car testing by Channel 5's TV show, 5th Gear, the circuit is being completely redeveloped to encourage more competitive motor sport and will feature four circuit choices. Jones Bros report that the SPS780 with SCS900 software combination has been particularly useful for the additional jobs of setting out the site's buildings and drainage along with other ancillary works.

KOREC's Peter Brooks concludes, "Jones Bros has been a customer for some time and was an ideal candidate for GPS technology. Initially they used some of the surveying technologies side by side to validate the work. The Site Positioning System was also used to validate material output. Consequently the degree of accuracy has gone up. Exact cut and fill measurements are taken along the entire length of the job and not as traditionally done at peg out positions, which are normally 20m apart."

Jones Bros is a medium sized company with an estimated turnover of 37 million euros and operates across the UK and provides a total road construction service, including paving as well as earthworks. They believe GPS will help win contracts in the future.



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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.

T: **0845 603 1214**
 E: **info@korecgroup.com**
www.korecgroup.com