

# SIMPLY A WALKOVER

**M**axi-rigs and walk over locating system are terms not often used in the same sentence, let alone on the same job-site. The following is an account of one such occurrence, which took place in June of 1998.

A month earlier, Charles Stockton, drilling manager for Stockton Pipelines contacted Bill Ettel, one of Digital Control's European Field Service managers, regarding a recently won project for which the company intended to use its in-house designed 100 t maxi drilling rig. Stockton had never before used a walk over locating system, each time relying on traditional a wire-line steering tool system for all of the 70 crossings previously completed with the machine.

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## PROJECT

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The question posed by Mr. Stockton in essence was, could the project be completed using a DigiTrak system? The contract required a 530 m bore at depths ranging from 6 to 10 m. The ground conditions consisted of hard-packed blue London Clay. There was an elevation difference of some 30 m between entry and exit points. In addition, the drill profile included a compound curve, 4 to 6 m off the centerline. Due to Stockton's wire-line background, some discussions ensued about the DigiTrak cable transmitter, but in Bill Ettel's opinion it would not be required. The red DigiTrak 4 C-cell battery transmitter, rated to about 17 m depth with 40 hours of running life, fulfilled the project requirements.

More specifically the project location was at Toddington Manor, about 70 km north of London. The customer was Rugby Cement which needed to install a 10 in diameter steel line for transporting lime

*View of the drilling route to the exit point 30 m below.*



slurry. Stockton Pipelines deployed its 100 t machine, using 9 m long 4.5 in diameter IF drill pipe. The bottom hole assembly consisted of a 4.75 in diameter IDS transmitter housing behind a 1.5° bent sub with a 9.75 in diameter mill tooth bit on a standard jetting assembly.

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## PREPARATION

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Once Bill Ettel had closely inspected the job site, the bore planning began in earnest. Strict control of the profile, especially in terms rate of slope change, was required, no more than 3 to 4% per joint. As the drill pipe being used was 9 m long, this was a very gentle curve, demanding careful attention. The planning therefore emphasised this aspect as well as taking the compound curve into account.

Since the crew had never previously used a walkover system, an impromptu training class was given at the site. The biggest difference, according to the crew was the radically different display and the differing information presented. One of the

properties measured by wire-line steering systems is the transmitter azimuth, typically given in degrees. This parameter is not measured nor displayed on walkover systems. The DigiTrak receiver however, due to its unique patterned antenna arrangement, allows the operator to find locate points, aft of and in front of the transmitter. Once found and marked on the ground, the yaw of the head is now clearly visible. Once the crew had understood this concept, they realised that by using the DigiTrak system's forward locate point method, the line and therefore the compound curve could be easily managed. All of the pilot bore data was recorded using the DCI Datalogger. This allowed Stockton to get hard drilling data and copies of the bore profile for project record keeping.

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## DRILLING

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After calibration checks indicated that the DigiTrak receiver was reading depths well within acceptable limits, the down hole assembly was put together and the crew was ready to put some pipe in the ground. Late Thursday night, June 4, 1998 according to the Datalog report, the first rod entered the ground. Since daylight was rapidly waning, drilling was halted for the night.

On Friday morning drilling recommenced. The first part of the bore was fairly straight forward, down the hill and under open farmland. By midday Friday 14 joints were in the ground, some 120 m of drilling. By the end of Friday, 24 joints had been drilled, slightly less than half the planned bore. Drilling during this section went well with good progress, averaging



*Stockton 100 t rig fitted with DigiTrak guidance system.*



*A precise exit completes the pilot bore.*

about 15 minutes per drill rod. The crew, still getting used to the new method of locating, managed to control line and grade quite accurately.

The next section was more sensitive, as it passed beneath the grounds of Toddington Manor, the estate of Lord and Lady Neville Bowman Hayes. The first 150 m traversed under the working farm of the estate where Bill became well acquainted with several of the lord's livestock as they located through pens and under various animal dwellings. As it was not practical to enter the small barns to locate so the off track guidance method of the DigiTrak system was employed. This allows the operator to track the progress, direction and of course pitch of the tool, parallel but off to the side of the transmitter.

At the end of Friday, the zoological portion of the drill was complete but ahead was another interesting day. The following and final section would pass under the estates' cricket pitch with a match scheduled to begin at 2 p.m. on Saturday. Lord Neville Bowman Hayes, not being familiar with directional drilling, was worried about the fate of his pristine pitch.

Locating over the flat and nicely groomed cricket pitch went quite well and drilling during the morning was uneventful. The pitch was crossed by early afternoon with time to spare. Needless to say, neither cricket team ever knew that the Stockton crew had been there, a fact not lost on Lord Neville having seen the benefits of trenchless technology first hand. At this point about 50 rods had been drilled in 1½ days. By all accounts, good progress.

The pilot bore was finished just before 3 p.m. in the afternoon and the tool exited right next to the waiting steel pipeline. After finishing their bore with a walk over system the crew was very impressed with the accuracy of the DigiTrak receiver. Stockton Pipelines has future projects planned where the product sizes being installed require the use of these large rigs. The company considers the DigiTrak system a good option for a steering on some of these future projects due to its accuracy and competitive cost. According to Charles Stockton, "The ability to exactly locate the tool head position on the surface is a useful benefit over the traditional steering tools when drilling

close to other utilities since all parties involved can actually see the progression of the bore."

## FUTURE

Wire-line steering tools are almost exclusively used for locating on projects drilled with machines of this size. Most of these projects are too long and deep for walk over system to be considered adequate. Hence the wire-line steering tools have traditionally been thought of as the only viable option in these cases. However, more utility companies are asking for larger distribution ducting and correspondingly contractors are increasingly looking at more competitive ways of installing these large projects. This particular project showed Stockton Pipelines that by combining the DigiTrak system with the latest downhole tooling, projects, which before were exclusively done by wire-line systems can be successfully completed with a walk over locating system. Different drilling techniques must be used when planning a project using a walk over system, but bend radius and build rates can be achieved and are very accurate.

One of the ways to verify the accuracy of the pilot bore and the quality of the backreaming is to monitor the pressure gauges during the project installation. According to Stewart Briar, the driller on the rig, these were some of the lowest readings he had seen on pull back during his tenure running this machine. In the opinion of all of the crew, the DigiTrak system passed the test with flying colors.

**by Jennifer Hiatt**

*Digital Control Inc*

*Datalog graph showing topography and bore path.*

