

# NO DIG INTERNATIONAL

*Reaping the benefits of  
trenchless technology*  
Page 13

*Gravity sewer installed  
using rock drilling*  
Page 15

*Rock drilling equipment  
roundup*  
Page 18

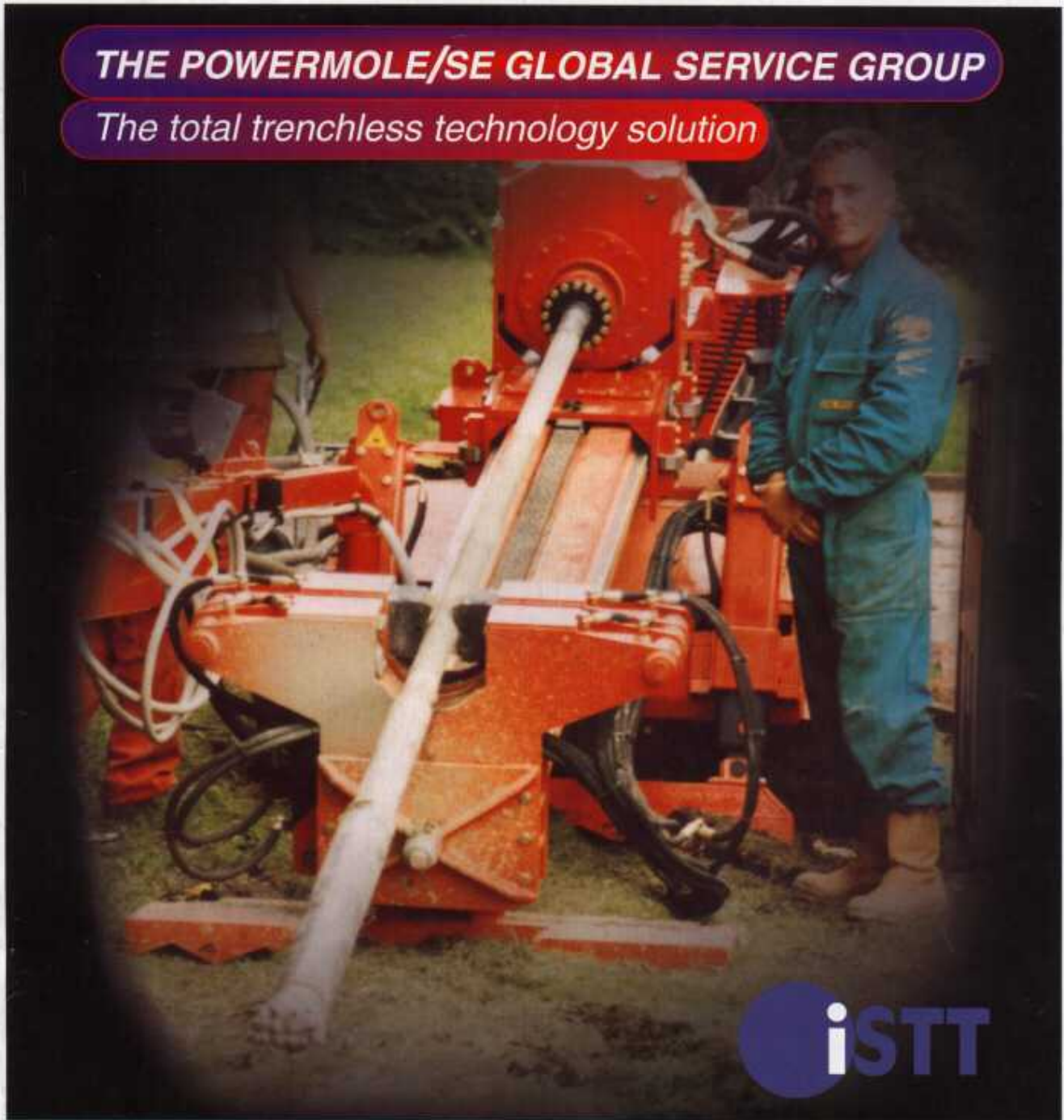
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**THE POWERMOLE/SE GLOBAL SERVICE GROUP**

*The total trenchless technology solution*



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# WORLD NEWS



## MICROTUNNELLING BATTLEFIELD

In 1690, Drogheda saw 'The Battle of the Boyne' between the mainly protestant army of William III (Of Orange), and the mainly catholic army of the exiled James II who was defeated and fled to France. Since that time, the battle has become part of Irish religious history and is remembered in annual 'Orange' marches throughout Ireland. In 1997, however, a second battle took place, this time between micro-tunnellers and the prevailing ground conditions in Drogheda, again on the banks of the Boyne.

Charles Haswell and Partners were asked by P. Rogers and Sons, the Contractor for the Drogheda Main Drainage Scheme, for advice in tunnelling a section of the main scheme, which was billed as 1,000 mm diameter concrete pipejack along Bessexwell Lane. The lane is only 4 m wide with three storey premises on either side, which are 200 years old and in poor condition. The depth to invert was approximately 3.5 m. Ground conditions were stated as soft silty sands, with sandy silts, and gravelly sandy clay. Ground water levels were above the pipe, but because of the close proximity of the River Boyne the levels were recorded as varying by up to 1 m due to tidal fluctuation.

Haswell recommended microtunnelling with a closed face slurry machine, and, at the request of the consulting engineers P.J. Tobin & Co Ltd, acting on behalf of the Corporation of Drogheda, were appointed to carry out a technical review and subsequent design and supervision of the microtunnelling alternative.

Apart from the risk of settlement to the buildings, the town of Drogheda is the third most important area of archaeological interest in Ireland. The streets and lanes are criss-crossed by the stonewall foundations of many medieval buildings. Some of these walls are up to 2 m thick, particularly where they are close to the River Boyne, where river flood defence walls were necessary. These walls could lie anywhere on the tunnel line and at any angle, and certainly down to the proposed depth of the microtunnel.

The normal site investigation boreholes were unable to completely identify the position of the walls, and additional cone penetration tests were used to give additional ground coverage. However, a residual risk was identified with these significant archaeological features, despite

using a machine fitted with a rock head with disc cutters. If the exact position of the walls could be identified, then the risk of machine failure could be reduced even further.

Ground Probing Radar had been used previously in order to try and identify the walls, but without success, and it was decided that the latest seismic techniques should be used. The technique, called 'Cross - hole Tomographic Imaging' by specialist U.S. firm NSA Engineering, had been used extensively in Los Angeles, and involved the use of sensitive piezo-film hydrophones set in boreholes drilled either side of the tunnel line. These hydrophones then collect data generated by a high-energy wave source. A three dimensional 'picture' could then be drawn along the tunnel line, following computer analysis of the collected data. From this picture, identified hard spots along the route helped the machine driver and supervisor plan the drives with more certainty.

The machine used to complete the drive was a Herenknecht AVN 800 machine with rock head, hired by P. Rogers from Byzak Ltd and operated by Carney Brothers.

Settlements were monitored by inclined electrolevels drilled in the road surface at an angle of 45°, with tilt meters and beam sensors on the buildings. Installation and monitoring of building movements was carried out by Boart Longyear who developed a software programme to display the

results at 15 second intervals onto a lap top computer located in the driver's control cabin.

Some obstructions were encountered, and the resulting ground movements were quickly identified so that the driver was able to modify his method of operation and minimise any adverse external effects. Instantaneous settlement readings also gave the driver confidence to drive the machine to its optimum performance.

The pipejack up Bessexwell Lane was completed successfully, together with a further three drives by the microtunnelling machine, all without any major incident and to line and level.

## POWERMOLE NO-DIG LIVE

As part of its display at the UK No-Dig Live 96 show, Powermole/SE Technology Global Services Group decided demonstrate the power of its equipment by installing 4 x 450 mm thick reinforced concrete motorway lane barriers back to back in pairs, in a trench. Contractor Autobore, one of Powermole/SE's customers, successfully demonstrated its PM903 Dry-Rock directional drilling system at the show. It took only 1.55 minutes to drill through the 900 mm barrier wall, which was reinforced with 4 layers of twin 12 mm diameter horizontal and 8 mm diameter vertical steel mesh.



**Powermole/SE's PM903 Dry-Rock Drilling Rig as demonstrated at the UK No-Dig Live 98, drilling through 2 x 450 mm steelmesh reinforced concrete motorway lane barriers.**



## WORLD NEWS



Autobore's chief rig operator Rob Tyler enthused to visitors the outstanding performance of the Powermole/SE rig, saying the company had successfully deployed this new technology over the last 5 months, by undertaking many projects in difficult ground conditions, including the installation of an 85 m length of 125 mm diameter PE pipe in Camarthen. This involved directional drilling through layers of soil, boulders, and bedrock under a river bed and railway, which had to rise 5 m through a length of 22 m at the receive end. Autobore was also called in to utilise the PM903 when a rockwheel system failed to cut through igneous rock with a strength of around 130 MPa at Thornbury. Powermole/SE's rig completed the 60 m length of 180 mm diameter project in 2 days.

Other equipment on display by the Powermole/SE Group included the recently launched PM250 tracked drill rig and optional special purpose (non-HGV) transportation vehicle with on-board hydraulic power supply, their range of impact Powermoles, Colli Drill Rods and the I.D.S. Radar Mapping Systems, which attracted a lot of enquiries and will shortly be demonstrated at various projects around the U.K.

### BETHELL GROWTH

A leading construction group in the north west of England is set to create a further 100 jobs, having increased its turnover from £500,000 to £20 million over the last seven years.

Bethell Group plc has achieved the expansion mainly through organic growth, and plans to exceed £40 million by the end of 2001. Now employing more than 250 people, the group's core business centres on highways, railways, water and the utility industries. It has also been recently announced that the company is to take delivery of the latest Perforator PBA38 guided boring system at the No-Dig Live event at Castle Donington, U.K. Supplied by Doncaster-based Perforator Trenchless Technology and equipped with the Perforator Optical Electronic Navigation system, the PBA38 can be used to install most types of pipe systems including clay-ware to accurate line and level without the need to mobilise a more traditional micro-tunnelling setup.

The purchase of the system by Bethell, which reinforces the company's commitment to trenchless technology, was made after a visit to France by the company's directors Tim Kilroe and Steve Wilkinson. Bethell also carries out pipe bursting, CCTV inspection and water jetting operations throughout the U.K. from its Manchester base.



Telespec camera on display at Kew Bridge Steam Museum.

### JOURNEY THROUGH TIME

Equipment manufacturer Telespec Ltd has teamed up with the Kew Bridge Steam Museum in west London by donating for their new 'Water for Life' gallery a pan-and-rotate camera and midi crawler system to demonstrate modern techniques for the inspection and maintenance of sewers and drains.

The equipment is part of the 'Down Hole' exhibit, one of the largest sections of the gallery depicting the development of sewers and sanitation in England from medieval times to the present day. Set in half a mock sewer tunnel, visitors walk along the exhibit starting at the present day and finishing in the medieval era. They also have the opportunity to try the Telespec equipment, controlling the video camera and water jets fitted to the crawler unit.

The new Water for Life gallery at the Kew Bridge Steam Museum has opened only recently, and is well worth a visit. The museum, housed in what was originally a Victorian pumping station, is home to one of the largest collections of steam-powered water pumping beam engines in the world, and is the ideal location for the first ever permanent exhibition dedicated to the life-giving properties of water.

### RADIODETECTION AWARD

The Pipeline Current Mapper (PCM) from Radiotection Ltd of Bristol, U.K., has won a prestigious R&D 100 Award recognising the PCM as one of the 100 most significant new technologies throughout the world in 1998. The PCM allows the identification of defects in pipeline coatings before serious corrosion develops.

The R&D 100 Awards Banquet was held at Chicago's Museum of Science and Industry on September 24, 1998. The event

was attended by U.S. politicians, foreign ambassadors and academics, and was broadcast on several U.S. TV news channels.

### RIBBLE CROSSING

Construction work on Transco's 31 km Treales to Burscough High Pressure 42 in diameter gas pipeline involved a major crossing of the River Ribble at Preston.

Main contractor for the pipeline, McAlpine-Preussag, awarded a sub-contract to Smit Land & Marine to directionally drill the 640 m crossing under the Ribble. After 14 weeks of preparatory works, including the grouting of gravel layers on both the north and south banks, and drilling through 400 m of sandstone to form a 60 in diameter hole, the final seven hour operation to pull the pipe into position was successfully completed on August 18, 1998.

The crossing involved special features for environmental protection including: recovery of hole cuttings from entry and exit pits, and the drilling fluid was cleaned for re-circulation via a temporary 6 in diameter line across the river. A special lagoon was constructed to hold and recover contaminated mud returns from an old refuse tip that had to be traversed on the north bank.

Transco had commissioned a comprehensive geotechnical and geophysical survey report, enabling the bore to follow the most appropriate route in what were considered to be difficult ground conditions. The profile was also deep enough to prevent disturbance to the flood banks on either side of the river.

### INTERNET SITE FOR HDD

Canadian company DCD Design and manufacturing Ltd has launched a Web site at: <http://www.dcdesign.com>