

# TRENCHLESS WORKS

TRENCHLESS WORKS IS THE ON-LINE NEWS AND INFORMATION SERVICE FOR THE TRENCHLESS INDUSTRY ENDORSED BY BOTH THE UNITED KINGDOM SOCIETY FOR TRENCHLESS TECHNOLOGY (UKSTT) AND THE INTERNATIONAL SOCIETY FOR TRENCHLESS TECHNOLOGY (ISTT)



ISSUE 30

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## HDD PROJECT IN SAUDI ARABIA RESCUED USING IMPACT HAMMER TECHNOLOGY

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# INDUSTRY, COMPANY AND INSTITUTION NEWS AND RESEARCH



## PAUL NICHOLAS JOINS AKKERMAN INC.

Akkerman is pleased to announce that Paul Nicholas has joined the sales and marketing team. Paul will hold the position of international marketing manager, increasing Akkerman sales overseas for all lines of equipment with a focus on microtunnelling systems.

Paul brings an extensive 22 year career of trenchless technology and international sales and marketing experience. He was the president of Soltau Microtunneling Inc. and made Soltau the market leader in USA in the 90's. Prior to joining Akkerman, Paul held the position of general manager of The Robbins Company SBU division. In addition, Paul spent 11 years in international sales in the oil services industry and holds a BSc in Geology. Paul currently resides in New Delhi, India.



*Paul Nicholas.*

Paul stated: "My experience has enabled me to develop as a recognised industry expert in microtunnelling with the ability to operate across many cultural environments." His international experiences have been extensive and worldwide including Africa, Europe, South America, Asia Pacific, China, and the Middle East.

Rob Tumbleson, Vice President, Sales and Marketing said: "We are excited about the potential opportunities in store for Akkerman with Paul coming on board. Having an international presence has been a long-time goal for our team. Paul's recognition in the industry and his overseas location will positively further the Akkerman Inc. brand abroad."

Since 1973, Akkerman Inc. has manufactured distinctive microtunnelling, pipe jacking, tunnelling, guided boring and earth pressure balance equipment. Akkerman Inc.'s reputation for reliability and responsive service has been attributed to its team of experienced engineers, field technicians and its extensive parts department. Website: [www.akkerman.com](http://www.akkerman.com)

## CON EDISON GAS MAINS IN 2008

As part of the company's ongoing infrastructure investment program, Con Edison recently announced that it had installed over 105 km (65 miles) of new natural gas main piping in 2008. In most cases, it replaced smaller cast iron and uncoated steel pipe with larger diameter or higher pressure main to increase capacity and prepare for future growth.

The company is establishing state-of-the-art technologies to increase the system's reliability with stronger gas pipe materials and making the installation of the new pipe as unobtrusive as possible. Con Edison has also developed the use of protective polyethylene coatings and plastics which make the gas pipes stronger and less likely to damage than older cast iron main.

About half of the new pipe installed in 2008 was replaced using 'trenchless technology', minimising excavation and reducing traffic disruption. Website: [www.conEd.com](http://www.conEd.com)

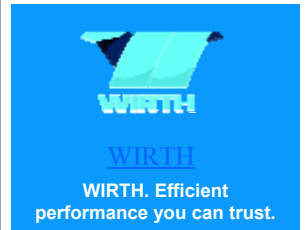
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# PIPE JACKING, MICROTUNNELLING, TUNNELLING & AUGER BORING

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## HOUSE CONNECTION USING PILOT AUGER TECHNOLOGY

In combination with the renewal of the B236 main road in the Lennestadt village of Saalhausen in Germany, the new installation of a pipeline was planned. In line with this there were also several house connections that required attention.

In one case the house connection in question had to be completely re-installed. This was because, due to a sharp bend in the existing PVC pipe, there were numerous instances of flow backups occurring in the sewage system, sometimes right up to the house itself.

The local company TRACTO-TECHNIK was asked to provide a solution to the problem and following extensive investigations proposed the complete replacement of the pipeline with a new one using its Grundobore, Type 200 S pilot auger boring system. The 200 S unit is a small and compact boring unit, specially developed for use on house connection installations. It has the capacity to install very accurate pipelines in terms of line and grade.

The boring unit is set up inside an installation frame in a semi-shell retainer within the start shaft. By simply turning the boring rig it is possible to bore in different directions. Furthermore, it is also possible to make alignment alterations in the pre-prepared and installed starting frame, as well as make any inclination alterations for the bore.



*The landscaped garden beneath which the new pipe was required to be installed (the bore route is shown in red).*



*Installing the pilot bore.*

The set-up times are minimal. Work can be started almost immediately, as soon as the rig has been connected to the hydraulic power unit. The space requirements are also only minimal, requiring start pits of just 1.6 x 1.2 m dimensions.

Short PP-HM ND 150 pipes, each with 450 mm length were to be installed to create the new pipeline with an installed gradient of 5.5% over a 10 m length from the main sewer pipe to a manhole on the property. A hedge, a high quality flower bed and a comprehensively paved area lay along the route of the pipeline, hence the choice of the trenchless option for the installation. The garden had only been created shortly before, so the house owner had no intention of allowing the use of open trenching. That

was not the only reason for the choice of the trenchless option. As the installation depth was 2 m this also meant that it was worth using the technique even over such a short distance.

The bore path crossed a ND 100 mm pressure water line, which was uncovered manually to be on the safe side.

The installation was carried out in three phases. After the precise alignment of the unit, a pilot bore was installed using pilot rods with a triple-winged chisel drill head being bored through heaped, compact soil right up to the manhole.

Then a bore head and the spiral auger conveyer was connected to the pilot rods. This assembly was then pulled back towards the start pit with the larger bore head excavating spoil as it progressed. Enlarging the bore The loosened soil at the bore head was removed from the bore using auger chain into the manhole through the retrievable pipes in which the auger was placed. These pipes are with the equipment.

*Installing the new pipe subsequent to the bore enlargement run.*



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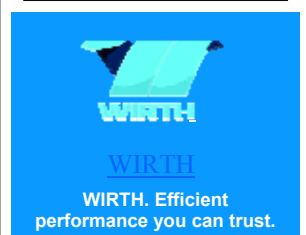
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In the final working process the auger casing pipes were pushed with the product pipes, which had the same diameter, from the bore rig into the target pit. The casing pipes were retrieved for use on future projects leaving the house connection pipes in place in the ground. The house connection was completed within 6 hours. Website: [www.tracto-technik.de](http://www.tracto-technik.de)

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## MEXICO CITY PREPARES TO BUILD THE WORLD'S LARGEST WASTEWATER SYSTEM

The CEO of the Mexican water authority CONAGUA recently visited Herrenknecht AG on the occasion of completion of the first tunnel boring machine for the Emisor Oriente project.

The 'East Tunnel' wastewater duct in Mexico City is the largest inner urban wastewater system being built in the world, with an investment of more than €650 million. With this project, the Mexican government plans to solve the massive wastewater problems being faced by the Mexico City conurbation with its more than 20 million inhabitants.

Herrenknecht AG is providing three Earth Pressure Balance tunnel boring machines for the project with diameters of 8.70 m and 8.89 m. They will be used in the construction of the new Eastern Wastewater Tunnel in Mexico City with a total length of more than 60 km at a depth of up to 200 m. The first tunnel boring machine, the Herrenknecht EPB Shield S-497 (8.70 m diameter), has just been accepted by ICA Ingenieros Civiles Asociados at the Schwanau plant.

On the occasion of his visit to the Herrenknecht plant in Schwanau, the CEO of the Mexican water authority CONAGUA, José Luis Luege Tamargo, witnessed the completion of the first tunnel boring machine. "The Eastern Wastewater Tunnel is one of the most important water projects in the world, if we consider the investment level, the length of the tunnel and the technology used", said José Luis Luege Tamargo. "The project will significantly reduce the risk of flooding in Mexico City and it will improve the safety and the well-being of the inhabitants and protect their properties."

The Chairman of Herrenknecht AG's Board of Management, Dr Martin Herrenknecht, expressed his gratitude for the trust that has been placed in Herrenknecht and its tunnelling technology. "We are very proud that our tunnelling technology is part of this gigantic and internationally trail-blazing wastewater project. As part of this project, we can show how high-tech tunnelling technology made in Germany is making it possible to build very efficient inner city tunnel constructions safely and precisely and without major inconveniences for those living in the city."



*Witnessing the completion of the first TBM for Mexico City.*



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# IMPACT HAMMER TECHNOLOGIES

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## HAMMER TECHNOLOGY AIDS HDD RECOVERY OPERATION IN SAUDI ARABIA

In 2007/8 a pioneering HDD project was started using trenchless technology on the Berri Causeway and Abu Ali Island on the Persian Gulf coast of Saudi Arabia. Two parallel 3,050 m long steel pipelines were to be installed under the bay. The smaller one is to be used as an oil trunk pipeline at 610 mm (24 in) diameter and the larger one at 760 mm (30 in) diameter, with a total steel pipe weight of more than 1,500 t, will serve as a water injection pipeline. Previously published press releases claimed these as the 'world's longest undersea HDD crossings ever undertaken'.



*The Berri Causeway crossing showing the location of the stuck hole opener.*

In November 2008 TT-UK was contacted by the Middle East specialist HDD Contractor Digital Connection Co Ltd of Al-Khobar, Kingdom of Saudi Arabia (KSA). The client sought technical advice and assistance in the recovery of a 1,070 mm (42 in) diameter hole-opener that had become stuck along with the 3 km drill string beneath the seabed during a pre-ream pass on the second of two under sea pipeline crossings.

The 'Berri Causeway' pipeline project in the Middle East was always seen as a big challenge, not only given the length of the crossings but also the dimensions of the pipeline which would weigh more than 1,525 t.

Whilst the first 610 mm (24 in) diameter oil pipeline had previously been successfully installed, unforeseen delays between the drilling process over a 12 week (non working) period had caused the drill string and the 1,070 mm (42 in) diameter hole-opener to become stuck on the second 760 mm (30 in) diameter pipeline crossing/installation.

TT-UK, renowned for its expertise in the supply and service of high quality manufactured trenchless technology equipment had little time to provide a solution to releasing the 3 km stuck drill string and 1,070 mm (42 in) hole-opener.

However, emergency discussions between TT-UK, the main contractor and the local drilling contractor quickly led TT-UK to respond to the challenge and recommend utilising its powerful Grundoram Taurus impacting hammer combined with steel pipe adaptation's which were designed and formulated to transfer dynamic impact performance energies through special steel fabrications adapted to the drill string via the Grundoram dynamic impacting hammer.

Sharing the project information with other TT Group offices in the USA and Germany, TT-UK quickly drew up a strategic plan together with a technical proposal on how it was believed the drill string could be freed using 'Dynamic Impact Vibration Energy'.

Whilst similar successful undertakings have previously been carried out worldwide, few have been attempted for releasing stuck drill rods over this exceptionally long distance with each drill rod weighing 480 kg.



Dynamic impact vibration energies have normally been placed on the end of product pipes for assistance in completing HDD (Ram Assist), or for product pipe retrieval where the product pipe has become stuck using HDD techniques, few had previously tried with stuck drill rods due to the enormous 'impact power' which has to be contained onto a relatively small size drill rod from a large impacting hammer in a usable and controllable process.

*The TT-UK supplied Grundoram Taurus impact hammer set up on the end of the stuck drill string.*

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# IMPACT HAMMER TECHNOLOGIES

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The project owner is Saudi Aramco. The main pipeline contractor is Al Robaya and the HDD subcontractors are DCL and TATCO.

The combined efforts from all companies and the personal attendance on site of Roger Atherton of TT-UK proved invaluable to the success and final retrieval of this problematic bore taking TT's Grundoram and 'Pipe Ramming' technologies to a 'new' level of HDD ram assist, pipe/drill stem rescue method. Following bore salvage operation the 760 mm (30 in) diameter, 3 km water injection pipeline was finally and successfully installed on 13 January, 2009.



*The recovered hole opener.*

This rescue saved significant financial implications such as the total cost of a lost bore; contractual penalties; ongoing cost delays in commissioning the final pipelines; all associated costs involved in planning a new bore and the actual costs of duplicating all the undertakings of a new bore/installation, etc. Website: [www.tt-uk.com](http://www.tt-uk.com)

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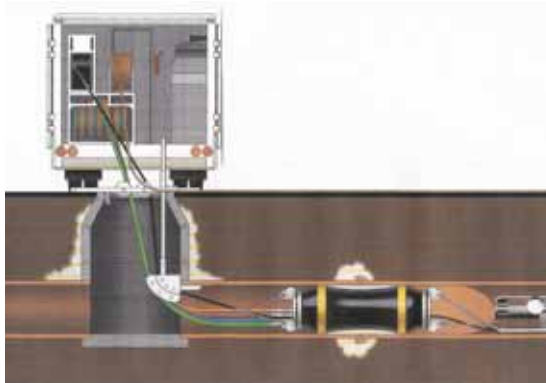
# PIPELINE REHABILITATION

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## GEL SEALING OPTIONS OFFER MAJOR COST SAVING SOLUTIONS

SDI-unistrade Ltd (SDI) specialises in drainage investigation and repair using both no dig technology and traditional excavation and repair techniques. The company's wide client base includes customers in the Waste Water Utilities, Commercial, Insurance and Industrial markets. SDI is committed to providing cost effective and practical solutions, combined with the latest technology to give clients comprehensive cover for all their needs in the CCTV Pipeline Survey, High Pressure/Volume Water Jetting, Drain Repair, Re-rounding, Pipe lining, pipebursting, Gel Sealing and Manhole Rehabilitation sectors.



*A schematic of the pipe joint sealing using gel injection process.*

As part of this commitment, SDI has spent the past two years working with UK regional water company Wessex Water, gel manufacturer De Neef and industry partners to develop and improve the gel sealing options it offers to clients. This was in response to a need at Wessex Water for a gel sealing system for pipe joints that would not be adversely affected in cyclic wet/dry situations as ground water and pipe flows varied with seasonal and weather conditions. Wessex Water's problem was that in certain circumstances sewers suffering infiltration could experience a 'Loss of Service' due to surcharging of the pipeline with the combined volumes of sewage and infiltration. In lesser situations this could lead to sewage back up in the pipe and excess flows to the treatment plant, or in more extreme circumstances and bad weather possible local flooding due to the incapacity of the pipeline to effectively handle the high volume flows.

The outcome of the research and development programme was SewerSeal JF, which through the addition of a rubberising agent to the base gel mix is better able to withstand the volumetric changes that occur with wet/dry cycle conditions without cracking and therefore potential failure of the pipe joint seal. SewerSeal JF won the ISTT Product Award for innovation of the year in 2007 at the International No-Dig Conference and Exhibition in Rome.

Since its launch onto the market, the new gel has been successfully used on several pipelines where infiltration/exfiltration have been a major problem but where more traditional joint sealing applications have failed due to the fluctuating flow and ground water conditions.

Manufacturers' ongoing testing of SewerSeal JF, for something in the order of now 700 days under fluctuating wet/dry conditions, has also shown that the new product is achieving considerably greater success in ensuring that it is maintaining the required seal volume without seal failure in the test situations as compared to more traditional sealing gels despite the wet/dry fluctuations.

## OTHER GEL SEALING APPLICATIONS

Whilst pipe joint sealing may be an ongoing workload requirement across the country for many water companies, this is not the only application for which gel sealing is a suitable solution. There are several other applications where infiltration problems in particular can be effectively dealt with using this technique, if using somewhat different application methods. One such application is that of manhole sealing.



Over the past 20 years or so one of the major concerns expressed with many of the trenchless technology systems that have been developed for rehabilitating pipelines has been that whilst the pipes themselves are, more often than not, effectively rehabilitated, the manholes and structures serving the pipelines are not. Also, studies of infiltration have also shown that much of the infiltration that occurs in deteriorated pipeline networks originates as much from manholes as from the pipelines

*SewerSeal JF application on a project in the southwest of England.*

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# PIPELINE REHABILITATION

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themselves. So, it has become increasingly important for the rehabilitation works to also include the manhole structures. With treatment plant costs ranging anywhere from £0.50 to £1.00 per cubic metre if both treatment and pumping costs are allowed for, minimising the flow volumes by eliminating major infiltration can bring major cost savings downstream of the problem area whilst improving treatment effectiveness. The costs of carrying out the sealing work can also be returned in very short order through these savings.

## MANHOLES ETC...

One example of such a project was an operation to seal a manhole in Holburne near Christchurch, Hampshire which had been suffering significant infiltration for some length of time.

The manhole in question was about 4 m deep but on arrival at site the SDI crew measured the infiltration at approximately 1 l/sec or 86,400 l/day (86.4 m<sup>3</sup>/day). Elimination of the flows to the treatment works from this manhole alone would therefore bring a significant cost saving to the water company.

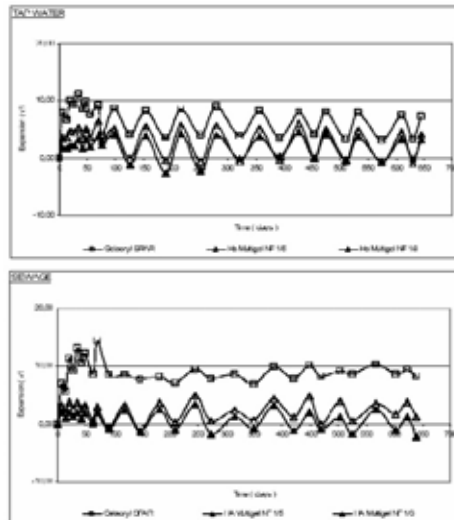
The work was completed by drilling small injection holes through the manhole wall around the point of infiltration and injecting just 15 l of HA Cut CFL/HA Sealfoam into the ground surrounding the manhole at that point. Once set off the infiltration was eliminated and the flows stopped. The manhole was later re-inspected to ensure, firstly, the injection seal was holding and that infiltration at the original point was still zero. Secondly, the inspection was carried out to ensure that the original flows had not found any further weak point in the manhole structure through which infiltration had restarted, something which would require further treatment. In the event the manhole was still sealed after a project costing in the order of just £1,500.

Another interesting application of gel sealing was seen recently on a project to eliminate infiltration of ground water into a wet well installation at Swallett Gate near Swindon. The wet well itself was not the easiest of site to work in particularly at 7 m deep. With the pumping system and infiltration (in the order of some 22,000 l/day or 22 m<sup>3</sup>/day) to contend with in a narrow shaft, access was in itself difficult.

Prior to work on the sealing operation commencing, 3 portable pumps had to be installed to over-pump flows into the wet well ensuring maintenance of the service during the sealing operation. Two 6 in pumps were installed to handle flows on main line into wet well and one 4 in pump was installed to take flows on a second lateral line feeding into the wet well. This over-pumping system was installed by Selwoods.

Once the over-pumping was installed, the wet well was decommissioned and the main pumping system was removed by pump supplier Flygt. The wet well was then cleaned and emptied and a scaffold was installed with regular staging

*Before (top) and after (bottom) views of the gel sealing of a manhole at Holburne near Christchurch, Hampshire which enabled major savings to be achieved by the water company in terms of minimising treatment of flows at the local treatment plant.*



*Graphic representations of the wet/dry testing cycle of the SewerSeal Jf product showing its volumetric variation performance against traditional sealing gel (top) in clean water and in sewage (bottom).*

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platforms down the full depth of the shaft to ensure safe working practices on this confined space operation. The sealing work could then commence. All of these operations were organised and coordinated by experienced SDI staff in association with Wessex Water control engineers and the pumping system control room.

Emptying and cleaning the wet well highlighted all infiltration entry points. Working in a similar manner to that used to seal flows into the manhole mentioned previously, some 70 l of HA Cut CFL and HA SealFoam NF gel was injected into the infiltration sites exposed. This successfully sealed the wet well against infiltration as expected.

What was unexpected was that, when an adjacent valve chamber was inspected, some of the injected sealing gel had found its way into the chamber from the wet well, indicating a water channel between the two. With the exit to the wet well sealed the valve chamber became the focus of attention as it then filled with infiltration water in its own right, indicating further that this had been one source of the wet well infiltration. Discussions with Wessex Water led to an agreement that the valve chamber also should be treated with sealing gel. This was also successfully completed.

In total the project took about 5 days to complete at a value of about £17,000, including wet well main pump reinstallation and re-commissioning. According to Wessex Water this would mean a project pay-back of, at most, 3 years given the cost of infiltration water it no longer had to handle. Once the infiltration into the wet well and valve chamber had been sealed off the effects of the ground water were clearly observed at surface as fields lower down an adjacent slope were seen to become waterlogged as the ground water had nowhere to escape to other than natural water channels in the soils.

## BROAD OPTIONS

So, from the examples of gel sealing works shown here it can be seen that there are a variety of circumstances and practical options where the technology can be applied.

For SDI-unistride Ltd, managing director Andrew Hendrie said: "We have put considerable time, effort and money into researching and development of our range of gel sealing options. We now believe that we can offer clients a broad range of very cost-effective, quick, yet relatively simple solutions to the majority of their infiltration problems in both pipelines and in other buried structures. Our operatives are well trained and increasingly experienced in the application of these techniques enabling them to 'think on their feet' and generally overcome most situations on site."

Website: [www.sdi-unistride.co.uk](http://www.sdi-unistride.co.uk)

## NEW TEST METHOD MAKES THE INVISIBLE VISIBLE

Trenchless rehabilitation methods are environmentally friendly whilst reducing the construction time and offering a high-quality low-cost repair solution. But invisible contamination and microscopic surface damage can impair the efficiency and service life of coatings in rehabilitation projects. To avoid this, careful inspection and preparation are indispensable to ensure the success of the coating process. Trelleborg epros GmbH has come up with a newly developed test method for easy and uncomplicated application under on-site conditions. It is specifically designed for pre-job testing in rehabilitation projects using the epros® SprayCoating system, but is also ideal for pre-job inspections and preparations for installers using different techniques.

Trelleborg epros GmbH, one of the world's leading specialists in innovative technologies for the upkeep of water and sewage systems, has been developing and selling efficient systems for trenchless repair and rehabilitation of infrastructures for more than 15 years. The Surface Analysis Box put



*The shaft head set up for the wet well sealing project at Swallett Gate (top) with (bottom) gel used to seal the wet well at Swallett Gate shown having tracked back along the water channel into an adjacent valve chamber showing the route through which the wet well infiltration ran.*

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# PIPELINE REHABILITATION

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together by Trelleborg epros allows for the easy detection of invisible damage and contamination such as oil, grease, moisture from condensation, or soluble salts. The high-quality test method helps the user to ensure the coating ability of the surface to be repaired.

The Surface Analysis Box includes all devices required for testing structural moisture and air humidity and also comprises a digital adhesive pull strength tester for concrete substrates or steel, a specific epros SprayCoating drill bit for 50 mm adhesive pull strength bores, a hardness tester, as well as quick test strips and accessories for performing the quick tests.

The Surface Analysis Box and the test method developed by Trelleborg epros are the basic equipment for the successful and non destructive inspection of coating substrates. The practical and user-friendly design allows testing and sampling operations to be performed in any situation and on any structure. Since the Surface Analysis Box delivers measurable and reproducible results, they can be used as final quality records both for internal purposes and for submission of proof to the project owner. The pre-job inspection method provides high quality standards, because it detects and determines even smallest damage and contaminations in the structure.

The epros test method means best benefit at minimal time, material and financial expenditures. The Surface Analysis Box as a tool for final inspection of contracted work and quality assurance should be of particular interest especially for municipalities or engineering teams. Website: [www.trelleborg.com/epros](http://www.trelleborg.com/epros)



*The Surface Analysis Box from Trelleborg epros.*

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# HORIZONTAL DIRECTIONAL DRILLING

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## DUBAI LOGO ISLAND - TURNING A LEAF INTO A HOME

Dubai's Palm Trilogy is one of the most ambitious engineering ventures ever undertaken. Three completely manmade islands, in the shape of palm trees, have been reclaimed from the sea to form a unique retail and tourist resort.

At one of the three complexes, the Palm Jumeirah, developer Nakheel has included two smaller islands shaped like date palm leaves – the development's logo. Jutting out from the main island's trunk, the Logo Islands give the Palm Jumeirah an iconic look from the skies above or from one of Dubai's many skyscrapers.

Nakheel began the land reclamation project for the Logo Islands in June 2003 and finished in February 2005. In total, 4.4 million m<sup>3</sup> (155 million ft<sup>3</sup>) of sand and 1,000,000 t of rock were used to create the two islands, which together cover 140,000 m<sup>2</sup> (1.5 million ft<sup>2</sup>). Both islands are intended as highly exclusive residential area. The one on the Abu Dhabi side of the development has been sold to a property developer, while the one on the Dubai side will become home to one of the emirate's rulers.

For this second island, Nakheel had to supply services like drinking and irrigation water, telecoms and sewerage from the Palm. That meant creating three 550 m (1804 ft) crossings to the island and, for this, the company decided to use horizontal directional drilling (HDD). This method had already been used to bring services to the main Palm Island. HDD proved to be faster and cheaper than micro tunnelling, while having less impact on the island, its residents and local wildlife than dredging.

### CHALLENGING CONDITIONS

The HDD contract was awarded to Al Naboodah Specialist Services LLC, a part of the local Al Naboodah group of companies. Having carried out the HDD project from the Palm, Al Naboodah was already well acquainted with the ground conditions at the site. The first 8 m (26 ft) of sand sits on a 1.5 m (5 ft) layer of cap rock. Beneath that, at a depth of 9.5 to 27 m (31 to 89 ft), drilling would be through sandstone for the first half of the horizontal section and gypsum and clay for the second.

As both the Palm and Logo Island are manmade, the top layer of backfilled material was a major concern for the contractor. Its soft nature meant bentonite drilling fluid blowouts at either end were a distinct possibility. This could have potentially caused problems in achieving an appropriate exit angle when drilling on the Logo Island. Moreover, much of the drilling would be under the sea, so keeping bentonite returns going was not going to be easy either.



*The Vermeer NAVIGATOR D100x120 drilling rig used for the smaller diameter boring work.*

### STARTING OUT RIGHT

The service installation included 250, 355 and 500 mm (10, 14 and 20 in) HDPE pipes with sub-ducts ranging from 39 to 200 mm (1.5 to 8 in). Al Naboodah designed the drilling project with 17° entry and exit angles, and 400 m (1,310 ft) radius entry and exit curves. This design meant the deepest point of each bore would be 27 m (89 ft) below the surface.

For the drilling, Al Naboodah decided to use its Vermeer® NAVIGATOR® D300x500 HDD drill rig together with three Vermeer R300 reclaimer systems and a Vermeer SA300

### STARTING OUT RIGHT

*Ready to start the pipe pull-in with reamer head, swivel and pipe attached to the drill string.*

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remote high-pressure bentonite pump. This combination had successfully pulled 10,000 m (32,800 ft) of 500 mm (20 in) diameter HDPE piping during the HDD project for the Palm.

The first task was to sink a 150 mm (6 in) steel pipe on the seabed, and determine its exact position using a Reduct DuctRunner. This pipe would house the wire for the Paratrack loop used to guide the drilling of the pilot bores, with return wire laid on the seabed with a 75 m (246 ft) clearance from the pipe. During the backreaming phase, the pipe would also be used to transfer the bentonite drilling fluid from exit to entry side.



*Pipe handling during the pullback operation.*

## DRILLING STARTS

Drilling began with the bore for the 355 mm (14 in) diameter pipe. For this, Al Naboodah used a 171 mm (7 in) diameter mud motor with a 248 mm (10 in) diameter tri-cone milled-tooth bit. Behind this, two 9.2 m (30 ft) long non-magnetic drill collars carried the Paratrack tool and pressure sub. The drilling took five days. Then the bore was backreamed using a 500 mm (20 in) diameter milled tooth-hole opener, which took an additional four days. Finally, the pipe was pulled with a 450 mm (18 in) diameter barrel reamer in front of the swivel.

Next on the plan was the 250 mm (10 in) diameter pipe. However the D300x500 was needed for an urgent job elsewhere. So to stay on schedule, Al Naboodah called in its NAVIGATOR D100x120 for this smaller bore.

Again, a mud motor was used for the pilot bore, this time a 94 mm (4 in) diameter motor with a 120 mm (5 in) diameter tri-cone milled tooth bit. Two 6 m (20 ft) long non-magnetic drill collars created a similar bottom hole assembly as for the bigger rig. After five days of drilling, backreaming was carried out using a 304 mm (12 in) diameter milled-tooth hole opener and took three days. The pipe was pulled the next day.

## A STICKY PROBLEM

A couple of days later, the Vermeer D300x500, R300s reclaimers and SA300 high pressure pump returned to the site so work could begin on the bore for the 500 mm (20 in) diameter pipe. Initially, a mud motor was used again. However, although mud motors had performed well on the previous bores, this time the drilling ran into difficulties when it reached the gypsum and clay in the second half of the horizontal section.

The layer was much stickier here than for the previous bores, and this was slowing down progress. By monitoring the bentonite returns, Al Naboodah realised that a jetting bit would be much more suited to the new soil condition. After making that change, drilling was finished in a total of six days and backreaming could begin.

When the first bore was backreamed, the hole opener had some difficulties getting through the gypsum and clay segment. So with the stickier condition in the segment for this final bore, Al Naboodah employed a new backreaming strategy.

First, a 760 mm (30 in) diameter milled tooth hole opener was pulled to the end of the exit curve and then pulled back out on the exit side. Next it was removed from the drill string and replaced with a 660 mm (26 in) diameter flycutter. This was pulled quickly through the 760 mm (30 in) diameter hole to start cutting the clay at the beginning of the horizontal section. Once the flycutter was through the clay, it was pulled slowly through the sandstone portion of the bore to reduce tooth wear and allowed to complete the backreaming without having to stop and replace the teeth.

This new strategy paid off and backreaming was completed within four days. A 610 mm (24 in) diameter barrel reamer was pulled through the bore to check it and no problems were found. The 500 mm (20 in) diameter sleeve was pulled the following day.

Finally, the sub-ducts were installed. These comprised a bundle of utility pipes for the 500 mm (20 in) diameter bore, and a 110 mm (4 in) diameter drinking water pipeline in the 355 mm (14 in)

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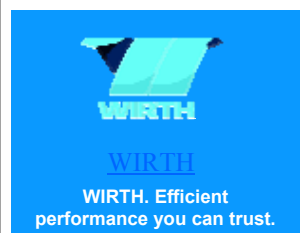
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diameter pipe. To do this, the D300x500 was used to push a drill rod through the sleeve, the bundled pipe and swivel was attached, and the rod pulled back.

## SATISFIED CUSTOMER

“The Vermeer equipment helped Al Naboodah once again finish a job on time and to the customer’s satisfaction. The D300x500’s huge torque and 135 t (300,000 lb) pulling capacity allowed us to install the two biggest bores without hassle,” said Joeri de Koning, HDD Supervisor, Al Naboodah Specialist Services LLC. “Even the compact D100x120 proved it was powerful enough to handle bores exceeding 550 m (1,804 ft) without problems, with the rig-mounted pump delivering enough flow and pressure to let us drill with a mud motor. And the trio of R300s easily handled all the cuttings, allowing us to keep up a fast working pace.”

The project certainly had its challenges: from blowout risk and changing soil conditions to coordinating the HDD around all the ongoing backfilling and construction activities on Logo Island. But Al Naboodah executed according to plan. It was a vital step in the creation of the Palm Trilogy – which has since become an iconic symbol of Dubai’s rapidly growing tourist industry.

Website: [www.vermeer.com](http://www.vermeer.com)



*Pipe bundles are pulled into the casing pipes previous installed using HDD techniques.*

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## 3D LOCATOR FROM DCI

The DigiTrak® F2™ delivers the most popular features of the Eclipse® locator with enhanced sensitivity and greater ease of operation.

The DigiTrak F2 incorporates DCI's patented 3-D antenna and 'target-in-the-box' locating with a new depth screen display for high accuracy and clarity.

The 2 dimensional bird's eye perspective is viewed on the same screen as the depth view. This means for the first time with an HDD locating device it is possible to actually view the drill head location in 3 dimensions in real-time.

The data display screen is streamlined to provide transmitter roll, pitch, signal strength and temperature in a single column view. The locating display is free from clutter.

It's picture-driven menu structure removes language as a barrier to using the system anywhere in the world. The menu and screen views are easily navigated with a single switch/trigger interface. The real-time, bird's-eye view provides operators with critical on-the-fly steering ability and directly contributes to on-the-job productivity and moneysaving opportunities.

The complete system includes a handheld receiver, F Series display, battery charger, rechargeable lithium-ion batteries to power the receiver and remote display, DC power cable as an option to power the remote display from the drill rig, and carry case. Website: [www.digital-control.com](http://www.digital-control.com)



*The new 3D F2 locator from DCI.*

## DITCH WITCH BEACON HOUSING IMPROVES HDD EFFICIENCY

The Ditch Witch® organisation has developed a beacon housing that is designed to be more durable, versatile, and productive than the tapered-head beacon housings previously offered by the company.

The new Ditch Witch Thread Head beacon housing was created with the punishing downhole conditions of HDD in mind.

Beacons, used to monitor the progress of the bore (via signals transmitted to an electronic guidance tool), are positioned at the front of the drill string in a steel housing behind the drilling head. The Thread Head beacon housing is compatible with the Ditch Witch Talon Bit, a four-bit drilling head that can cut a smoother, rounder hole than a standard three-bit head can.

"Customers want the smallest size hole possible to do the job, and the Talon was designed with this in mind," said Richard Levings, product manager of the Ditch Witch organisation. "With a smaller, more precise hole, less drilling fluid is required because there are fewer cuttings to remove, reducing cleanup. Also, because the Talon can cut a smaller hole, bore-outs can be finished faster, reducing stress on the machine and electronics. The Thread Head beacon housing is just a lot more efficient." He added that the Thread Head beacon housing also accepts common slant-faced drill heads.

Levings said that because the drill heads on the Thread Head beacon housing can be threaded in, as opposed to bolted on, they are interchangeable. This capability, just one of this product's many exclusive features, makes it easier to adapt the beacon housing to different soil conditions. "We believe the Thread Head has the easiest assembly and disassembly on the market," said Levings.

The threading of the Thread Head beacon housing is perhaps its most important feature. It is a straight-thread pattern, meaning that all threads have full contact at all times, providing an exceptionally solid connection. Further reinforcing the integrity of the Thread Head beacon housing is a recessed lid that is designed to minimise the possibility of breaking off during drilling. Preventing damage to the electronics is the ultimate purpose of creating such a sturdy housing,



*The new Ditch Witch Thread Head beacon housing.*

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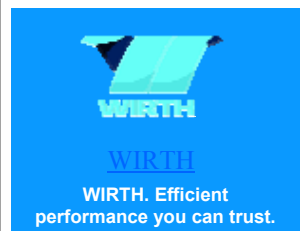
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because drilling operations cannot continue without knowing where the drilling head is. To protect the electronics, the Thread Head beacon housing has a check valve between the drilling bit and the housing that prevents backflow of mud and sand into the housing. The Thread Head beacon housing also has a patented feature called a 'Beacon Buddy'. If the housing overheats, the Beacon Buddy melts and flows around the beacon to protect it from overheating.

"Thread Head beacon housings are designed with meticulous attention to the unique rigours of directional drilling," said Levings. "They represent the newest component of the Ditch Witch systems approach to directional drilling. All of our HDD products, the drill, the drill pipe, electronics, downhole tools, fluid mixing systems, are designed to work together as a system, which results in better overall performance."

The Thread Head beacon housing is designed for use with the Ditch Witch JT922, JT1220 Mach 1, JT2020 Mach 1, JT3020 (Mach 1 and All Terrain), and JT4020 (Mach 1 and All Terrain) directional drills. Website: [www.ditchwitch.com](http://www.ditchwitch.com)

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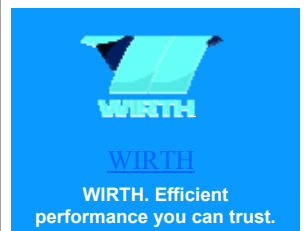
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## SOLVING AN AGE-OLD INFRASTRUCTURE DILEMMA

Roughly 2.4 million km (1.5 million miles) of buried water pipeline exists in the United States. About one-third of these pipes are in need of replacement or repair right now. Many experts believe that by 2020 nearly half of these pipelines will need some type of renovation or extension.

In some parts of the country, replacing outdated water and sewer pipelines using traditional open-cut excavation methods is simply not an option. The village of Glen Ellyn, Illinois, is one such place.

Glen Ellyn is a beautiful community, with stately homes and revered, 100-year-old trees. But below the streets of this affluent town, located about 37 km (23 miles) west of Chicago, it is not as beautiful. Like most communities across the country, Glen Ellyn has aging water and sewer pipelines that are straining, and often failing, to meet the water and sewer needs of today's larger populations. Also, like most communities, Glen Ellyn does not want the replacement of this infrastructure to disrupt normal life for any longer than it absolutely has to.

Fortunately, advancements in trenchless technology have made it possible to replace water and sewer pipelines faster and with far less impact on the landscape than ever before, as citizens in Glen Ellyn recently discovered.

A 244 m (800 ft) storm drain deep beneath a residential street in Glen Ellyn was in need of replacement. After taking bids from several contractors, city officials awarded the job to Trench Rite, Inc., a construction company from nearby Elgin, Illinois, based in part on the company's intention to use trenchless technology, both horizontal directional drilling (HDD) equipment and for them a relatively new technology, pipe bursting.

For this job, a pipe bursting system was the preferred option because the storm drain ran below the sewer pipeline. Trench Rite rented a Ditch Witch PR95 pipe bursting system for the work. The first step was to build a launch pit for the pipe bursting unit and an exit pit on the other end of the installation. The launch pit was 5.5 m (18 ft) below the ground, well below the sewer pipeline and other infrastructure in the vicinity. To reinforce the pit walls, the contractors used steel shoring.

The pipe bursting process began by pushing a series of threaded, 1 m long steel rods through the existing pipe. When the rod string reaches the exit pit, a bursting head was attached to the rod string and then pulled back to the launch pit. (There are bursting, cracking, cutting, and splitting heads, for breaking the pipes depending on the type of pipe being replaced.) Behind the bursting head is the replacement pipe, which takes the place of the old pipe as the bursting head breaks through it.

The pipe being replaced was 255 mm (10 in) VCP (vitrified clay pipe). To expand the capacity of the drain, the VCP was replaced with 400 mm (16 in) IPS polyethylene pipe. With 95 t of available pullback force, the PR95 is capable of replacing clay, steel, or iron pipe with polyethylene pipe of greater diameter.

This was Trench Rite's first time to use Ditch Witch pipe bursting equipment, and the company was impressed by the unit's ability to do the job without affecting adjacent utilities and surface obstacles like trees and sidewalks. The Trench Rite crew was also surprised by the speed at which the PR95 replaced pipe. One 63.7 m (209 ft) long section required only 2¼ hours from the time contractors hooked up the bursting head and finished pulling the new pipe to the pit wall.

With the Ditch Witch PR95, Trench Rite was able to complete the job much faster than traditional open-cut excavation would require, helping the village of Glen Ellyn avoid weeks of traffic problems and noise pollution. Website: [www.ditchwitch.com](http://www.ditchwitch.com)

*The bursting head entering the original pipeline at the start of a bursting run.*



*The Ditch Witch PR95 pipe bursting rig set up in a launch shaft.*

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## TAKING UK-MANUFACTURED CCTV SYSTEMS GLOBAL

AM Industrial (UK) Ltd (AMI) was founded in 2006 by Arthur Jones, formerly Northern Service manager for UK CCTV systems manufacturer Telespec Ltd.

Arthur has gathered a vast knowledge over more than 20 years in the pipe inspection industry having undertaken activities from operating a CCTV rig for Avec in the 80s to performing a prestigious role as operations Director for well-known Warrington-based contractor General Underground Services. These roles meant that Arthur was well placed to launch his own technical support company.

AMI started out initially as a much needed technical support facility based in the UK's Northwest. This was followed by the opening of a new division, AMI Southern in Surrey which heralded the opening a new much needed manufacturing facility. This facility enabled AMI to launch its own range of in-house designed and built, cost effective pipe inspection solutions.

The initial response to AMI's products and services was overwhelming and in order to manage the workload AMI's management structure was expanded with the appointment of Martin Woods formerly Sales director of Telespec Ltd joining the team.

According to Arthur Jones: "Pooling our joint experience of many years has enabled Martin and I to position the company so that we are now well placed to become a prominent player in the industry, both domestically and globally."

The company recently relocated the Northern offices to a purpose-built site on the Woodrow industrial estate in Irlam, Manchester. This move will allow further expansion of the company's technical support operations which will be coupled with the planned move in 2009 of the Southern Offices to a new manufacturing site. The manufacturing facility will enable a more streamlined approach to production to meet the ever-increasing demand for the AMI's products.

Arthur went on to say: "We are proud to have formed a business that is a 'true British thoroughbred' that successfully develops and manufactures its products here in the UK. The UK has seen some truly high quality, innovative inspection products from central Europe being marketed successfully by appointed distributors. Whilst our products may not be deemed by some as innovative they do perform in both reliability and picture quality with proven comparatively, low ongoing cost of ownership and operation, which in the current climate is as important as innovation."

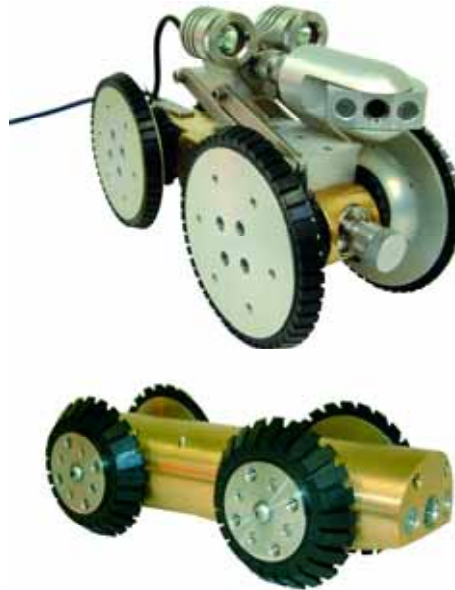
Also, whilst being proud to be a British manufacturer, the company is also putting considerable input into the British economy with around 60% of its current production going to export into some 14 different countries worldwide.

## EXPANDING GLOBAL INFLUENCE

Recent appointments of several new overseas business partners including: T&I Avenue (M) SDN.BHD for the Asia Pacific region, Pamtec Enviro for India and GSN Technologies Inc for distribution in North and South America only enhances the commitment of the company to the global distribution of its products. The current level of response to AMI's products indicates an even better export growth year for 2009.

Commenting on the company's growth Martin Woods said: "The main priority over the past two

*An AMI mini cable drum with an integral 150 m of cable (right) and the SP50 Push Rod camera system. (left)*



*The AMI mid-range/mainline crawler unit fitted with an SP100 Pan & Rotate camera (top) and the Minicam crawler unit for smaller diameter pipes (bottom).*

## SPONSORS LINKS

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[U Mole](#)  
Part of Vp plc

Suppliers for hire or sale of:  
Vac Ex, Moles & Rammers, Bursting, Coil Trailers, SBUs and Accessories.



[Insituform Technologies Ltd](#)

Manufacturer and contractor for Gravity & Pressure & Lateral Pipe Renovation & repair (inc CIPP, Close Fit PE & Localised Lining), GRP Lining, Surveying & Cleaning, Manhole Construction & Renovation, Pipe bursting and Guided Auger Boring.



[VMT GmbH](#)  
Supplier of TBM, Microtunnel, Pipe Jacking and Tunnel excavation Navigation & Guidance systems & Services.



[ONSITE/PERCO](#)

No-Dig contractors for: Sewer installation, renovation and maintenance including CIPP, Structural, Infiltration & Connection linings; Patch repairs; CCTV pipe inspection and assessment; pipe cleaning, flow monitoring; Auger boring; HDD; Microtunnelling; Shaft Sinking; Headings; Lateral Cutting; Pipe Bursting; Sliplining & Consultancy



# ASSET MANAGEMENT, MAPPING & SURVEY

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years has been the development and refining of the product lines to provide the highest standard possible in quality, reliability and cost effectiveness in the target markets. So, over this time the company has been fairly low profile in marketing its products and services. Now fully prepared, the time is right to properly launch our tried and tested product range. We have already supplied more than 60 of our SP100 Pan&Rotate cameras across the globe and customer feed back has been so positive we now have every confidence to proceed at full steam and increase our manufacturing quantities to meet the increasing demand for our products.”

AMI knows only too well how supply companies can often be so successful in growing their customer base to such an extent that the technical support falls short of customer expectations. Martin Woods explained: “We have already started to strengthen our service coverage by recruiting two additional service engineers to maintain the already rapid response time at both our Northwest and Southern service centres. As part of the next stage of corporate development the company is seeking to recruit a production manager to coincide with the impending move of the southern manufacturing facility later this year.

Having previously exhibited the AMI product range at the No Dig Live event in 2008, the response was well beyond expectation and new business has accrued as a direct result of the show. No-Dig Live was AMI’s first ever exhibition and because the products were so well received by so many potential customers the company has no hesitation in taking part in future industry related exhibitions throughout 2009. To further enhance its marketing campaign for 2009, AMI has started work on a totally new and much more informative website which is due to go live in April. This will also allow valued customers to purchase spares and accessories on line.

## PRODUCT RANGE

AMI now manufactures a wide range of pipeline inspection solutions including:

- SP50 Pushrod system for use in 100/150 mm diameter pipes
- SP75 MiniCam crawler system for use in 100/300 mm diameter pipes
- SP100 Pan&Rotate camera
- SP150 Midi Crawler system for use in 150/1,000 mm diameter pipes
- SP300Z Mainline crawler system with Zoom for use in 300/2,000 mm diameter pipes

To compliment the range AMI is also the sole UK distributor for the Pipe Profiling Sonar (Model 1512USB) manufactured by Marine Electronics Ltd. The Model 1512 Pipe Profiling Sonar provides an acoustic method for profiling the interiors of liquid filled pipes or boreholes. This method does not require draining of the pipes as with camera surveys and provides accurate quantified data. The equipment comprises an underwater Scanning Unit (which may be skid, float, tractor or ROV mounted) and a compact USB interface unit. To complete the system a ‘Windows’ P.C. with a USB port is required to run the 1512 system software.

As a complete turnkey solutions provider AMI is also an Authorised reseller of the industry standard Wincan pipe defect reporting software with the pending launch of its integrated control system via a ‘ruggedised’ laptop with preloaded Wincan mobile software. Customised in house van fit-out is also scheduled to begin later in the year.

So to summarise, AM industrial can now offer a complete range of products to meet almost any inspection requirement. Not confined to just the water and waste pipeline sectors, AMI’s products lend themselves to other applications including boreholes chimneys, flues and non-destructive testing situations. Website: [www.amindustrial.co.uk](http://www.amindustrial.co.uk)



*An SP150 Crawler unit fitted with a forward view LED Camera (top) and the SP252 Control unit.*

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Click Name for website access



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# UKSTT NEWSLETTER



Brought to UKSTT  
Members by:



## Come & Join us for the 15TH ANNUAL DINNER & AWARDS CEREMONY

Friday 24th April 2009  
Holiday Inn, Birmingham City Centre

The United Kingdom Society for Trenchless Technology will be holding it's Annual Dinner and Awards Ceremony at the Holiday Inn, Birmingham on **Friday 24th April 2009**.



This event has been growing in popularity over recent years and last year attracted over 250 members and guests from across the UK and over 45 entries across all award categories. The evening, which includes a first class meal at a quality venue, is a time to recognise the outstanding contributions made by organisations and individuals in the development of Trenchless Technology in 2008.

Following the success of last year's awards we have again secured the services of the naturalist, author and broadcaster Chris Packham.

Chris will present the seven prestigious awards covering renovation, new installation, small project, product innovation and young engineer. Once the awards ceremony and the dinner are completed, entertainment will be provided with the bar being available until 2am.

**Sponsorship Opportunities:** Current sponsors include **South West Water, CJ Kelly Associates Ltd and U-Mole**.  
Details on how to sponsor the event are below.

### Tickets

Tickets for the dinner are £69 each, and can be reserved by completing the booking form and sending this with the full remittance, cheques payable to UKSTT to:

**Val Chamberlain**, UKSTT, 38 Holly Walk, Leamington Spa, Warwickshire, CV32 4LY or on the telephone on 01926-330935 by Credit Card or Switch.  
Email enquiries to [admin@ukstt.org.uk](mailto:admin@ukstt.org.uk)

Tables of 10 or 12 will be reserved on a first come, first served basis. Tickets will be forwarded as soon as possible after payment has been received.

### Sponsorship Opportunities

Various sponsorship packages are still open to UKSTT members which will secure the Sponsors publicity at the event, two complimentary tickets and press coverage of the awards presentations.

Current sponsors include **South West Water, CJ Kelly Associates Ltd and U-Mole**. For details contact **Claire Gowdy** at [claire.gowdy@nwl.co.uk](mailto:claire.gowdy@nwl.co.uk) or on 0191-301 6014.

### Awards Categories

The deadline for submission to the Awards is **27th February 2009**. Entrants should complete the entry form with up to 2 pages or 1500 words to support their application.

- **Renovation - Large >£250k or Small <£250k**
- **New Installation - Large >£250k or Small <£250k**
- **Small Project - <£50k**
- **Product Innovation**
- **Young Engineer - <30yrs**

Judges will give particular credit to projects that readily illustrate the benefits of Trenchless Technology and further the aims of the UKSTT.



For further information and an entry form contact **Val Chamberlain** at [admin@ukstt.org.uk](mailto:admin@ukstt.org.uk) or on **01926 330935**

# EVENTS AND MEETINGS



## 2009

March 1-4

**International Conference on Utility Management & Safety** - Hong Kong

Details from: [www.hkius.org.hk/conference](http://www.hkius.org.hk/conference)

March 3-5

**CGA Excavation Safety Conference and Exhibition** - Orlando, USA

Details from: [www.CGAConference.com](http://www.CGAConference.com)

March 29 - April 3

**International No-Dig 2009** - Toronto, Canada

Details from: [www.nodigshow.com](http://www.nodigshow.com)

30 March – 3 April

**Wasser Berlin 2009** - Berlin, Germany

Details from: [www.wasser-berlin.de](http://www.wasser-berlin.de)

April 20-25

**Intermat 2009** - Paris, France

Details from: [www.intermat.fr](http://www.intermat.fr)

April 24

**UKSTT Awards Dinner** - Birmingham, UK

Details from: [www.ukstt.org.uk](http://www.ukstt.org.uk)

May 19-21

**IWEX/Sustainability Live** - Birmingham, UK

Details from: [www.iwex.co.uk](http://www.iwex.co.uk)

May 26-29

**4<sup>th</sup> International CityPipe Exhibition** - Moscow, Russia

Details from: [www.citypipe.ru](http://www.citypipe.ru)

June 14-17

**RETC** - Las Vegas, USA

Details from: [www.retc.org](http://www.retc.org)

September 16-17

**DT Exhibition 2009** - Cheltenham, UK

Details from: [www.dtexhibition.com](http://www.dtexhibition.com)

September 20-22

**Trenchless Australasia 2009** - Melbourne, Australia

Details from: [www.trenchless2009.com](http://www.trenchless2009.com)

September 23-25

**Tunneling Short Course** - Golden, USA

Details from: [www.tunneling.com](http://www.tunneling.com)

October 6-8

**ICUEE 2009** - Louisville, USA.

Details from: [www.icuee.com](http://www.icuee.com)

## 2010

April 19-25

**BAUMA 2010** - Munich, Germany

Details from: [www.bauma.de](http://www.bauma.de)

May 2-7

**NASTT No-Dig Show** - Chicago, USA

Details from: [www.nodigshow.com](http://www.nodigshow.com)

If you have an event, course or meeting scheduled for 2009 or 2010 and would like to add it to this listing please forward details to: [ian@nodigmedia.co.uk](mailto:ian@nodigmedia.co.uk)