

In this issue | Hong Kong | Poland | Taiwan | USA | France | India | Russia | UK | Germany | PNG

Trenchless in the Middle East

Global Financial Crisis

Horizontal Directional Drilling

CCTV Inspection

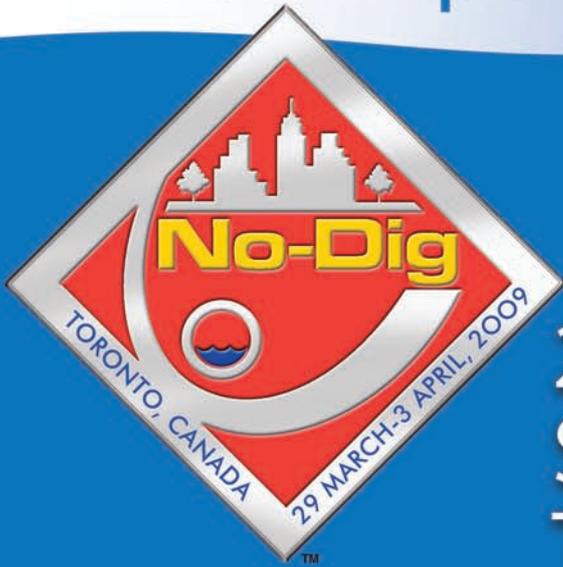
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Issue 2

January 2009

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Chris Bland
Editor

WELCOME TO THE second issue of *Trenchless International*.

The response to the first issue of this new magazine was very pleasing, while it may look a little indulgent to include too much of the feedback we received, I would just like to include this one comment;

"That is a very, very good magazine! It is picturing the big family we are now with all the different countries now being involved. With the picture we are now presenting it is easier for us to attract new members and get them involved as well as showing the government who we are and that we are to be taken seriously. I'm really proud of what we have achieved so far."

This was particularly pleasing for us to hear, as that is exactly what we are trying to achieve. *Trenchless International* is aiming to be the flagship of the industry worldwide, something that we can all point to when people ask "what is trenchless all about anyway?" or "what does the ISTT do?"

While we can't help but feel pleased to get this feedback, it is you, the readers, the trenchless industry who should be proud. This is your magazine, and it is you who do the work, developing and refining the equipment and techniques and carrying out the projects, we just write about it afterwards and try to make it look as good as we can.

But the end result is a journal that records and promotes the achievements of our industry, so I encourage all of you to continue to support the magazine, to keep feeding us the information we need, so we can keep giving you this effective tool for promoting the industry.

Right now, a day doesn't seem to go by without more bad economic news rolling in as many countries around the world edge closer to recession. While any long term view suggests that it is part of the ongoing boom and bust cycle, people are understandably concerned about the short term pain it may cause. In this issue, we look at the effects of the global financial crisis on the trenchless industry, with input from all over the world. While times are getting tougher, we find plenty of reason to be optimistic about the trenchless industry.

Stakeholder engagement is more than just a buzz word and is becoming an increasingly important part of any successful infrastructure project, and is often even more necessary with trenchless projects as by their very nature, and a large part of the solution is often hidden from the public's eye. To that end, Anna Grutzner of respected firm Fenton Communications provides a detailed look at public participation across a number of countries.

Professor Ian Moore also takes a look in this issue at the variety of relining options available and provides some useful advice. We also bring you projects from Texas, Russia, India, Paris, Germany, Yorkshire, Helsinki, Papua New Guinea as well as a detailed look at the Middle East.

It is a busy time for trenchless events, some of the notable ones coming up in the near future include UCT in San Antonio, Texas in January; Trenchless Middle East in Dubai in February; and of course the International No-Dig in Toronto in late March. All these events present an excellent opportunity to improve your technical knowledge, network with all levels of the industry, and learn more about the products and services available. We will have a presence at all of these shows, so please come by and say hello.

I look forward to catching up with all of you soon. 

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Cover image shows pipe ramming in Saudi Arabia with the Taurus Grundoram.

Photo courtesy TTUK Ltd.

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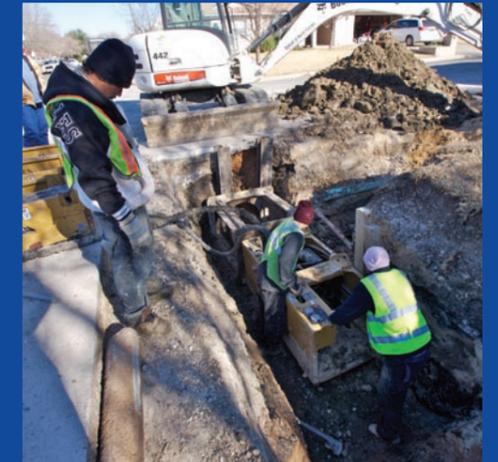
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Dec Downey
ISTT Chairman

IN THIS ISSUE I would like to celebrate the initiative of three of our leading affiliated society's activities in the field of education and training. Each year the UKSTT Chairman offers an award of £2,000 for a young engineer, under the age of thirty. This grant contributes to the travel and accommodation costs of a trip to undertake further research in a chosen trenchless topic.

In 2008 Chairman Russell Fairhurst selected Wessex Water engineer James Kitching for his contribution to knowledge in the area of renovation of pitch fibre pipe. James decided to use his award funding to visit Japan to get up to speed with the country's approach to pipeline renovation. He has just returned from an exceptional experience, which included visits to several of the major companies in the renovation business and a chance to make presentations on his work and the activities of Wessex Water to the JSTT Conference and to Japanese government officials. What greater challenge could a young engineer seek? James also had a chance to see the sights of Tokyo and Kyoto and thoroughly enjoyed the experience.

Much of the success of this visit and technical exchange can be attributed to JSTT Chairman Taigo Matsui and our Membership Secretary Kyoko Kondo who made all the arrangements and ensured that the logistics ran smoothly. My sincere thanks to Mr Matsui and Kondo-san for their efforts. This exceptional opportunity reminds me of the enormous kindness I received in 1981 when I first visited Japan, the first of more than 200 visits, to my best estimate. At that time, with Dr John Heavens, I was fortunate enough to meet Dr Tohyama and he introduced me to Nobutoshi Ishibashi, then Chief Engineer in Urawa City, Dr Kimura of Kidoh Construction and Mr Kurose, founder of Iseki Polytech. These gentlemen gave me a basic understanding of microtunnelling and set me on a very satisfying career path...and the fun continues!

This is not the first time that the JSTT has assisted with the UKSTT Chairman's award. In 2004, Mott MacDonald young engineer Alec Marshall visited Japan and Hong Kong to study microtunnelling developments. He is now working at Cambridge University under the guidance of ISTT Guarantor Professor Robert Mair. The collaborative initiative of the UKSTT and JSTT to support the development of young engineers is a good example of the fraternity of the trenchless industry. Hopefully others will follow the example and seek opportunities to share information and experience across boundaries.

On the subject of training I was, last month, privileged to spend three weeks with members of the Australasian Society delivering a Trenchless Technology Roadshow in eight cities of Australia and New Zealand. Starting in Perth and concluding in Christchurch, a potentially punishing schedule was alleviated by excellent arrangements made by Great Southern Press and warm hospitality at each venue from my hosts. Many thanks to Jeff Pace and the ASTT Council members for this opportunity to visit some of the outposts of the trenchless world, including a thriving group of trenchless enthusiasts in Launceston, Tasmania and the spectacular cities of Sydney, Melbourne and Auckland.

Special mention must be made of Queensland Council Member Andy Krumins for delivering the largest audience and Grant Binns in Christchurch who delivered the most enthusiastic group. It was a great opportunity to talk to over 400 trenchless users and I am sure that I learned more than I was able to transmit to my audiences. I was also glad to escape from both countries before the news of the defeat of the English Rugby team at the hands of the Wallabies and the All Blacks hit the headlines.

John Hemphill has outlined the ISTT commitment to training and given news of our initiative planned for Trenchless Middle East and future events. As I write I am in Los Angeles having delivered a training course on Drainage Culvert Renovation to the California Department of Transportation, Caltrans, and en route to Portland, Oregon to teach a course on pipeline renewal for the American Society of Civil Engineers. I continue to be amazed at the legion of engineers yet to encounter the skills and talents of our members, their enthusiasm on discovering what our members can offer and the opportunities which may be opened up by training activities.

We need to work very hard to bring the news to more people in the engineering community particularly as nations focus back on basic infrastructure needs to combat the credit crunch. The ISTT needs more trainers, people of experience and language skills to take the message further afield. We would welcome contact from interested parties to develop training initiatives, don't wait, just call.

Many of you will be familiar with Paul Hayward; Paul writes a regular and much loved piece for *Drain Trader*, the UK's Sewerage Magazine. He has a great knowledge of the rehabilitation industry and has made many friends throughout the world who celebrate his laconic humour and sharp focus on our business issues. I am sure that his readers would have been saddened to learn in the December Issue that Paul had been diagnosed with prostate cancer in an advanced state. It is typical of Paul that he has chosen to make a virtue of his predicament by writing in the magazine to urge all men to take this dire disease seriously, investigate the symptoms early and take action where necessary to have a PSA check. Under the circumstances it would be a fitting tribute to Paul if many of us promptly took his advice. 🍀



John Hemphill
ISTT Executive Director

THE FUTURE IS now. First, best wishes to all for a Happy New Year! I am excited about what 2009 will bring. We are off to a promising start. We have launched a first class magazine. We have excellent leadership from Chairman Dec Downey, UK and the Society's Executive Sub-Committee members, Vice Chairman Samuel Ariaratnam, USA; Derek Choi, Hong Kong; Karel Franczyk, Czech Republic; Gerda Hald, Denmark/Scandinavia; Norman Howell, UK; and Olga Martynynk, Ukraine. And I am fortunate to have the able support of Kyoko Kondo, Japan, Membership Secretary, whose work on behalf of the ISTT goes well beyond what her title suggests.

We have a full agenda. We will be giving the ISTT website a new look. Our goal is to make istt.com the go-to website to find out what is happening around the world in trenchless construction and training, and the state-of-the-art in trenchless methods and applications.

Our training efforts begin early in the year. In mid-February, Dec Downey, Sam Ariaratnam and I are off to Dubai to teach an ISTT-sponsored Masterclass on Trenchless Technology at the 2009 Trenchless Middle East conference. Sam Ariaratnam has developed an outstanding program that covers key trenchless subjects from new installation, renewal, and rehabilitation to pipe condition assessment. We look forward to bringing information on trenchless to this dynamic area of the world and to continuing to support this event in the future.

The big event of the year is the 2009 International No-Dig Show, which takes place from 29 March to 3 April in Toronto. The North American Society always puts on a first-rate conference and exhibition. The Toronto No-Dig will be no exception. They anticipate over 1,600 attendees and 100-plus exhibitors.

The 2009 International No-Dig conference and exhibition is a truly international event. Over 30 papers will be presented by trenchless experts outside North America. Members from ISTT – affiliated societies including Brazil, Denmark, China, France, Germany, Italy, Japan, the Netherlands, Poland, South Africa, and the United Kingdom, plus individuals from India, Peru, and Taiwan will share their expertise and experiences with host members from Canada and the United States.

Plan now to attend the No-Dig in Toronto. I hope to see you there.

Trenchless Middle East and the 2009 International No-Dig conference and exhibitions are only the beginning. The ISTT will work with affiliates to offer subject matter training courses that address specific interests and will take ISTT training to other parts of the world where the ISTT previously had no presence. We will actively seek participation from affiliated societies in support of this effort.

Let's make 2009 a banner year for trenchless! 🍀



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World Wrap

No-Dig Detroit

VINCI Construction Grands Projets and Frontier-Kemper Constructors recently signed a contract with the City of Detroit to build a 1.9 km tunnel with a pressurized-mud TBM, for carrying treated wastewater from the city for discharge into the Detroit River.

Going for gold

The 73 hectare Stratford City 2012 Olympic redevelopment, east London, will be one of the largest mixed use developments in the UK for many years. Trenchless Technology will play an integral part in the construction. The former industrial rail area requires 15 under rail crossings with microtunnelling.

Swagelining in Scotland

TT-UK has been awarded an order to build and supply a 40 tonne, track-mounted crawler version Grundowinch incorporating a technical specification to facilitate Petrology's unique subsea swagelining operations in Wick, Scotland.

Going round the bend

A project in Poland's capital Warsaw, to relieve the down-town sewer collector and to transport wastewater to the new treatment plant "Czajka," was constructed with 3.3 km of HOBAS CC-GRP jacking pipes installed by remote controlled microtunnelling at depths of 4.7 – 10.6 meters, including six curves.

MDC awards CIPP contract

Insituform Technologies has been awarded a \$US10.3 million sewer contract from the Metropolitan Development Commission (MDC) in Connecticut for the rehabilitation of 270,000 linear feet of sewer lines using CIPP.

TBM in Azerbaijan

A 6.3 metre EPBM will bore the first ever TBM-driven tunnel in Azerbaijan for the Samur-Apsheron Irrigation Project, part of a plan to rebuild the main canal, which provides the majority of water supplies to the capital city of Baku. Contractor Azerkorpu awarded Robbins the complete contract. The project consists of open canals and three TBM-driven tunnels totaling 5.7 km in length.

Powering up underground

Contractor Søren Knudsen A/S recently completed an HDD bore in an environmentally sensitive area involving the installation of 342 metres of 110 mm diameter PE pipe. The new electrical supply cable to the small island of Hindø in the Stadil inlet included 300 metres underwater crossing with the GRUNDODRILL 8S drill rig.

CIPP the star of the show

Michel's Pipe Service Work and the Department of Utilities will videotape all above ground structures onsite and adjacent to sewer rehabilitation before CIPP works begin. The filming will ensure that the works have not effected structures above. Michel's will rehabilitate concrete sanitary sewer interceptor and six manholes, 45 kilometres west of Chicago in Naperville, Illinois.

Road, rail and river crossings

The Enbridge oil pipeline being installed in La Salle County, one 42 inch pipeline and one 20 inch pipeline, involves many road, river and rail crossings including the Illinois River crossing. Contractors will use HDD to arc 9 – 12 metres beneath the river bed.

Trenchless works in Goa

The Sewage and Infrastructure Development Corporation of Goa will complete 3.5 km of sewage works around Pedda, Khareband and Sirvodem with Mumbai-based Krita Engineering Private Ltd, which has experience in using Trenchless Technology. Work on the project is likely to likely to be completed before May 2009.

Pipes & People

New President for Geospatial

David Vosbein is to lead Geospatial Holdings as President and Chief Operating Officer.

Mr Vosbein will be filling the position formerly held by the company's founder Mark A. Smith, who will retain his positions as CEO and Chairman.

Prior to joining Geospatial, Mr Vosbein was the founder and CEO of several successful energy and technology companies. In 1982, Mr Vosbein founded Wellstream Corporation, and served as the company's CEO and President prior to the company's sale in 1995.

Now Wellstream is the largest provider of dynamic flexible riser pipelines and static flowlines manufactured for applications in deep and ultra deep undersea environments. The company employs over 1,000 people internationally with facilities in the UK, USA, Canada, Brazil and Australia.

Geospatial provides infrastructure management technologies. Geospatial's technologies permit the company to economically collect and manage on its web-based portal, 3D geo-referenced maps of above and below ground infrastructure such as pipelines, underground structures, buildings and bridges.

Mr Smith said "David has proven to be a wonderful addition to the Geospatial team. His 30 years of legal, entrepreneurial and operations experience within the infrastructure industry are exactly what Geospatial needs at this critical point in the company's rapid growth."



Members of the Geospatial team exhibiting.

Henneveld elected fellow

The Commissioner of Main Roads Western Australia and the Chairman of the Australian Society of Trenchless Technology Menno Henneveld has been elected Fellow of the Australian Academy of Technological Sciences and Engineering.

Mr Henneveld is the Chairman of the ASTT and the former Chairman of the ISTT.

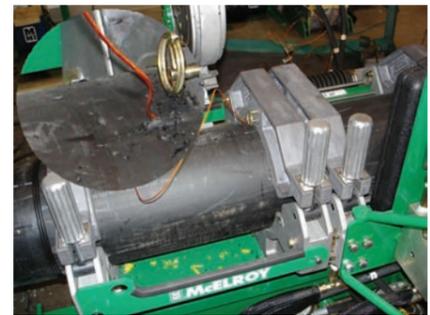
Mr Henneveld was honoured for his achievements over 43 years of public service in the water and road transport industries, particularly the national and international recognition for his initiatives in the areas of trenchless technologies and alliance contracting.



Menno Henneveld.



Trace Temcoff explaining the McElroy fusion process.



International fusion for McElroy

McElroy Manufacturing has authorised three key international distributors for McElroy's pipe fusion products.

The new distributors are Geomembranas Y Geosinteticos S.A. De C.V. of Mexico, Rho-Tech/SKW Industrial Supplies of South Africa and QSI Motor Group of Venezuela.

President and CEO of McElroy Chip McElroy said "Adding these three organisations as our newest international distributors is an indicator of the growing appeal that McElroy Fusion Equipment garners across the globe."

"There is a real need for premium fusion equipment and solutions that address the needs for increased productivity in wide varieties of rugged field conditions."

Pipe fusion is a process that joins two pieces of thermoplastic pipe together with heat and pressure.

Asia Pacific office for Robbins

Robbins has opened Robbins Asia Pacific, located in Hong Kong, the office will focus on sales, technical support, and procurement.

Robbins Asia Pacific Business Development David Salisbury said "This new office will allow us to meet the needs of our East Asian customers in real time, and in face-to-face conversations, which was previously difficult due to the locations of our other offices."

Goals of the new branch include expanding the regional EPB market, as well as providing support for hard rock TBMs and small-diameter tunnelling. The branch is in addition to three other Robbins offices in Asia.



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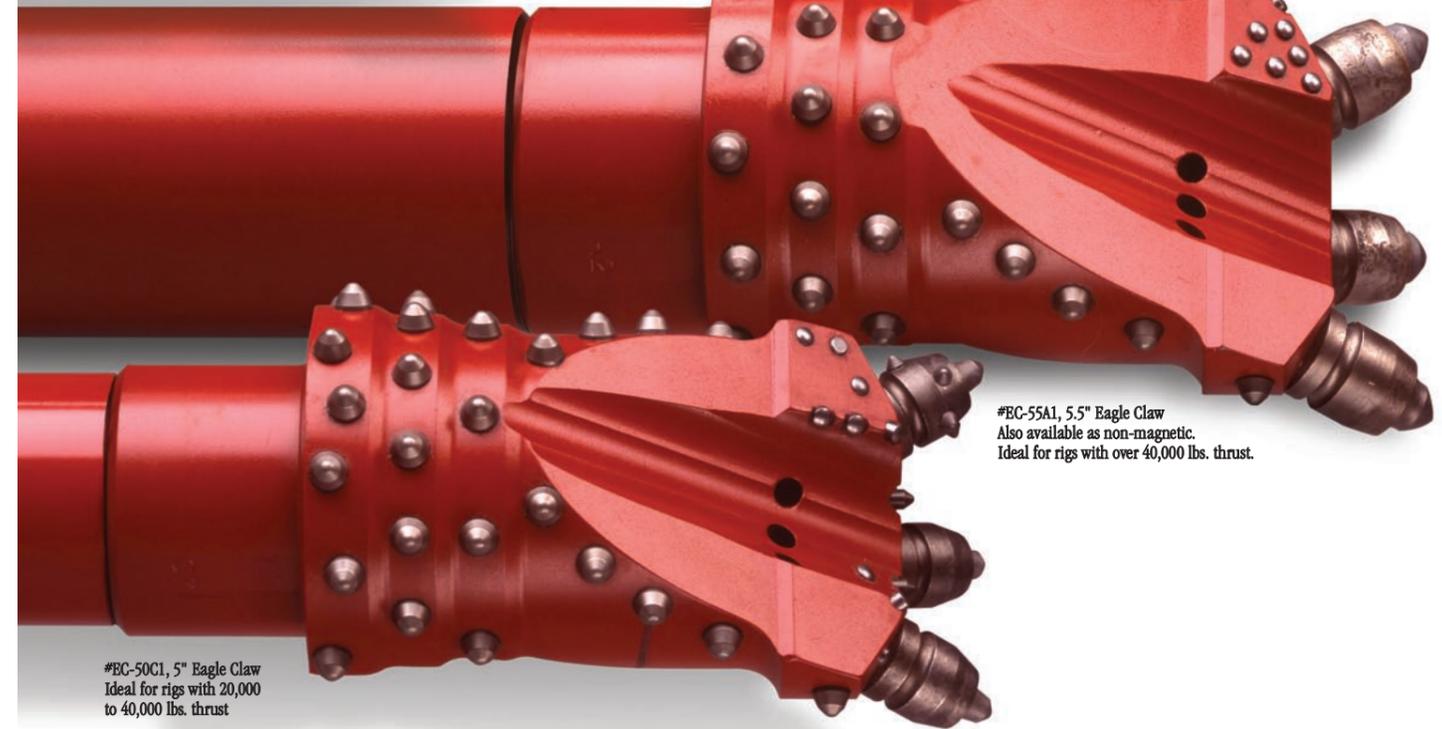
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News in Brief



Making TT compulsory

In an effort to preserve roadways in Tirunelveli, India, the Department of Highways is considering making the use of Trenchless Technology mandatory. Tirunelveli is a city in Tamil Nadu, and was formed into a municipal corporation in 1999, by merging three municipalities. State Minister for Highways Vellakoil M P Saminathan told reporters that the roads were frequently dug up by various government departments.

"Though efforts were being taken by the Highways Department to ensure quality in road laying, they were damaged through frequent digging," said Mr Saminathan, "hence the Department is considering making Trenchless Technology compulsory for laying pipes underneath the roads."



Watchdog wants TT

A report by the Northern Ireland Audit Office into the quality of reinstatement works of roads has recognised that although improvements have been made, Trenchless Technology could assist in reaching the government targets of a maximum ten per cent failure rate.

The report stated that the failure rate for the standard reinstatement was 14 per cent in September 2007. This was down from a 35 per cent level in 2002. The government-owned Northern Ireland Water's (NI Water) failure rate stood at 19 per cent in September 2007. The company is responsible for 60 per cent of all road openings.

A statement from NI Water said "We are very focused on our role as a responsible corporate citizen in Northern Ireland and we have introduced a range of initiatives aimed at reducing the impact of our works.

"This includes increased use of Trenchless Technology which reduces the need for reinstatement."

EPBMs to drain Mexico City

Mexico City is sinking at a rate of 10 cm per year. Over the last 30 years, the city's critical drainage lines have lost their slope, resulting in a 40 per cent reduction in overall capacity.

The city plans to construct the 62 km Emisor Oriente sewer tunnel. The tunnel will be constructed using a total of six TBMs, including three 8.93 metre diameter Robbins EPB TBMs.

Carso Infraestructura y Construccion, S.A.B de C.V signed a complete contract with Robbins. The three machines are scheduled for an early 2010 launch after design and assembly in the US and China.

The finished tunnel will provide drainage at 150 cubic metres of water per second, easing problems caused by surface subsidence and the city's increasing population.



Singapore supports scholarship

The National Research Foundation is offering scholarships to individuals with the passion and aptitude to pursue a PhD in environment- and water-related fields. The objective of the PhD program is to build up Singapore's research capability and groom research leaders in the promising Environment and Water technology (EWT) sectors.

Candidates can look forward to an exciting R&D career in any Singapore-based organisation of their choice after graduation.

The NRF PhD Scholarships offer support for up to four years of academic pursuit, leading to a PhD in the fields of Environmental Science & Engineering, Chemical Engineering, Civil Engineering, Mechanical Engineering, Chemistry, Physics, Biological Sciences and Materials Science or Engineering. The research projects and theses should be in areas of or related to EWT.

The scholarships are tenable at NUS, NTU or overseas universities renowned in EWT. For more information visit www.mewr.gov.sg/ewi.

Yorkshire Water relines in Selby

Contractors working on behalf of Yorkshire Water are revamping Selby's water mains, more than 30 miles of pipes have been included in the project. The current phase is the cleaning and relining of a trunk main.

In addition, Yorkshire has started on the next phase of an improvement package which takes investment in the area through the £8 million mark.

The company has already spent £7 million replacing, relining or cleaning the pipes in Middleton, Bramley, Meanwood, Headingley and Rothwell, but will start work next week on a £1 million improvement package in Swarcliffe, Whinmoor and Manston.

Contractor Laing O'Rourke will be carrying out the project on the company's behalf; the majority of pipes will only need cleaning, although shorter sections will be scraped and then coated with a polymeric lining or dug out and replaced.

Project Manager Carol Fairbrother said "As we only need access pits and not trenches to clean or reline pipes, we're hoping we can keep disruption to a minimum. However, some inconvenience is inevitable — particularly where we have to replace."

Tenders called for Karlovac

The Croatian town of Karlovac has opened a tender for the upgrading of the water supply network. The Karlovac Water and Waste program includes three main aspects of water management; water supply, wastewater collection and waste water treatment.

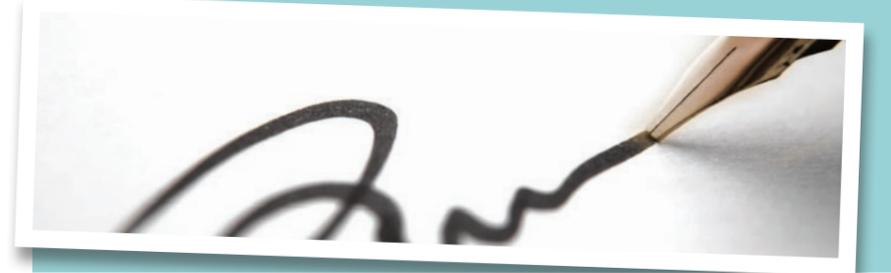
The water supply investments will help minimise the risk of drinking water quality and reliability of services being compromised, through the refurbishment of key elements of the system and through the introduction of network management systems that will help to ensure safe operation of the supply system. System management tools will help to improve leak detection and prompt remediation.

The program involves the investment in main collector sewers and pumps, which will be refurbished and complete the main elements of the wastewater collection network — required by the

Urban Waste Water Treatment (UWWT) directive.

The contract for works includes all necessary installation and civil works for the water supply system. Comprising the refurbishment and cleaning of the existing water wells at Mekuše and at Borlin, the refurbishment of the Bolin reservoir, the replacement of 9.5 km of pipes and all necessary installation and civil works for the wastewater system for the construction of the main collector sewers, holding-through rivers, drilling beneath railways and buildings, construction of pump stations and secondary and tertiary towers.

The deadline for submission of tenders is the 2 February. The tender dossier is available from the Central Finance and Contracting Agency, Ulica grada Vukovara 284 (Business centre Almeria, building C), Zagreb, 10000.



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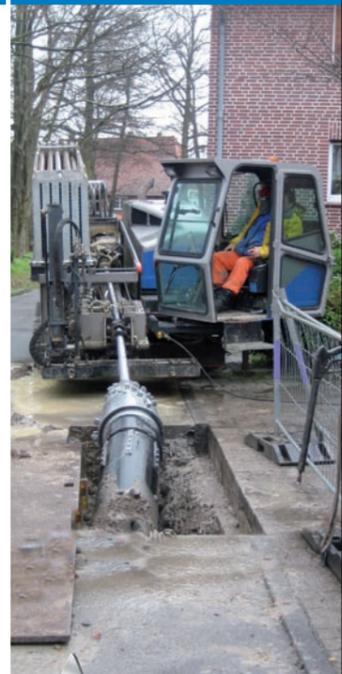
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45 years of experience

Trenchless expertise awarded in Poland

At the No-Dig Poland conference and exhibition 2008, held in Kielce, five impressive Trenchless Technology projects were recognised with the awarding of the "Expert" statuette for trenchless projects and products.

ISTT CHAIRMAN DEC Downey presented the inaugural lecture. The conference was officially opened by PFTT professor Andrzej Kuliczowski. Over 250 delegates attended including many international guests. No-Dig Poland 2008 was held by the Ministry of Infrastructure of the Republic of Poland while the conference itself was organised by the PFTT, the ISTT, the European Forum on Underground Construction and numerous Polish organisations, eight technical magazines and 13 sponsors. The Exhibition also attracted enormous interest with more than 30 stands.

"Expert" Statuettes were awarded in five categories;

The trenchless installation in Poland –was awarded to Keramo –Steinzeug N.V. for crossing under the landing strip at the airport in Gdansk – Rebiechowie using vitrified clay jacking pipe CraeDig of 800 mm in diameter.

The trenchless renovation in Poland was awarded to Amitech Poland Sp. z o.o. for

the renovation of a water main of between 800 mm and 1,000 mm in diameter and altogether 26 km in length in Łódź City using GRP FLOWTITE pipes and relining technology.

The trenchless renovation outside of Poland – was awarded to Per Aarsleff A/S for the renovation of a sewer trap of 1,400 mm in diameter and 300 metres in length under the Moskwa River using the Aarsleff CIPP liner in very hard winter conditions.

The innovative product – was awarded to Else Sp. z o.o./ Ibak Helmut Hunger GmbH for the sewer pipe CCTV inspection system BS5 using ARGUS5 camera manufactured by IBAK

The innovative product – was awarded to Insituform Sp. z o.o. for the iPlus Composite – the CIPP liner reinforced by carbon or glass fibre.

The No-Dig Poland 2010 Conference and Exhibition will be held in April. Nominations for the "Expert" statuette awards and information about the conference will be available on www.pftt.pl.



The "Expert" statuette is inspired by the components of a drill springing up from a book which symbolises the importance of Trenchless Technology knowledge.

Contracts awarded in Hong Kong

The Water Supplies Department (WSD) of the Hong Kong Special Administrative Region Government has awarded three major consultancy assignments for stage 4, the final stage of the territory wide watermains replacement and rehabilitation program.

THE CONTRACT FORMS part of the department's 15 year comprehensive program to replace and rehabilitate approximately 3,000 km of aged water mains throughout the territory.

Black and Veatch was awarded the largest contract for the new territories. The contract covers a total of 400 km of watermains; 125 km are 600 mm diameter or more and will therefore require condition assessment. Maunsell was

awarded the Kowloon and Hong Kong assignments.

Stage 3, covering about 800 km of watermains, will be completed by 2013 while the entire program is planned to be completed by 2015.

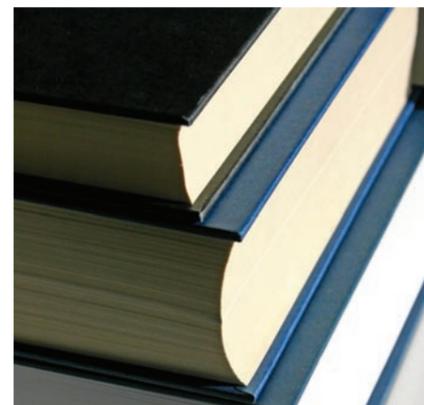
The first stage 3 contract was awarded to China State Construction Engineering. The contract involves the replacement and rehabilitation of approximately 107 km of aged watermains with diameters

ranging from 20 – 600 mm in West Kowloon. Construction began on 17 September 2008.

At the southeastern tip of China, Hong Kong covers Hong Kong Island, Lantau Island, the Kowloon Peninsula and the New Territories, including 262 outlying islands. Between Hong Kong Island and the Kowloon Peninsula lies Victoria Harbour, one of the world's most renowned deep-water harbours.



PFTT offers international course in Trenchless Technology



The PFTT, in conjunction with the Kielce University of Technology will offer a three week international course in Trenchless Technology.

THE WINNING ENTRY for the 2008 ISTT No-Dig Award in the category of Academic Research or Training Aid recognised the PFTT and the University for establishing a year long postgraduate program on Trenchless Technology in Environmental Engineering.

The international course will run from 2 - 22 September 2009. The course will

offer 135 hours of specialised knowledge in topics such as microtunnelling, pipe jacking, HDD, designing pipelines in Trenchless Technology, CCTV, geotechnics, and the renovation and renewal of waste water lines. The course will also include site visits to investigate underground infrastructure in Warsaw and Cracow.

Please contact the Kielce University of Technology – Faculty of Civil and Environmental Engineering +48 41 34 24 450, email nodig.study@wp.pl or visit www.nodig.tu.kielce.pl

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Toronto International No-Dig

Networking, special industry awards and entertaining events planned for No-Dig show attendees.

DEAR TRENCHLESS COLLEAGUES,

We are pleased to invite you to attend the 27th annual International No-Dig Show which will be held March 27 – April 3 2009 in Toronto, Ontario, Canada. No-Dig is the largest Trenchless Technology event in North America sponsored by non-profit organisations, the ISTT and its affiliate, the NASTT, and developed by a group of volunteers known as the No-Dig Program Committee.

Together we will explore the new methods and techniques available that will help you save money and improve infrastructure in your cities, towns and municipalities using trenchless methods. Five-track educational sessions filled with quality technical paper sessions have been designed to meet the needs facing today's Trenchless Technology professionals like you who are looking for solutions to underground infrastructure problems. Don't miss the enormous exhibition hall featuring the latest Trenchless Technology products and services.

In addition to the informative presentations and exhibition hall, the Program Committee has worked diligently to offer an educational, yet fun program with plenty of opportunities for networking, industry awards and recognition and entertaining events while you're in Toronto.

Arrive a day early and journey with us 'behind the Falls' to one of the world's greatest wonders, Niagara Falls. Kick off the conference with our Monday morning breakfast where you can expect fantastic food and the comedic entertainment of 'That Canadian Guy' – Glenn Foster – a popular headliner of the Canadian comedy scene for 25 years. Glenn's brand of humour is intelligent, slightly edgy and will be sure to please the No-Dig crowd and set the stage for a great conference. Special awards will be presented to the 2009 Trenchless Technology Person of the Year and to the NASTT Outstanding Papers in Rehabilitation and New Installation published and presented at No-Dig 2008 in Dallas.

On Monday evening, join us for NASTT's Annual Educational Fund Auction and Reception. Since 2001, this successful fundraiser has raised more than \$US230,000 for support of NASTT's student chapters, trenchless research and training courses. Bid on fabulous items; mingle with colleagues and help make the 8th

annual auction another successful event for the future educational endeavours of the NASTT. You can help by donating an item, such as a trip, construction equipment, electronics, or jewellery, and other big dollar donations.

Meet the best and brightest of the trenchless industry at Tuesday evening's Gala Awards Dinner, where the winners of the 2008 Trenchless Technology Projects of the Year in Rehabilitation and New Installation, along with the winners of the ISTT No-Dig awards, are recognised in a special awards ceremony. Afterwards, satisfy your appetite with great food and enjoy live entertainment and dancing.

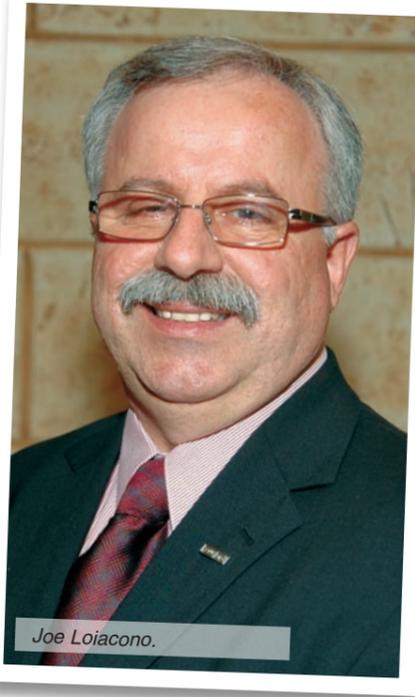
Say farewell to your new No-Dig friends during Wednesday's closing lunch and help us kick off No-Dig 2010 in Chicago, Schaumburg Illinois. Get motivated by special speaker, Ira Blumenthal, who has counselled world-class clients such as Coca-Cola, Nestle, McDonald's and Disney in areas related to branding, strategic alliances, reinvention and success. Recognised as a visionary business development expert, Mr Blumenthal has been quoted in major media such as The Wall Street Journal, USA Today and CNN. Another highlight of the closing lunch is the special awards made to the student winners of the poster and CCTV competitions.

All of these No-Dig events will take place at the Sheraton Centre in downtown Toronto; an international city which offers warmth, energy and cultural diversity for the International No-Dig crowd. Enjoy a walkable downtown, with seemingly endless shopping, restaurants, entertainment and sports.

We look forward to seeing you in Toronto!

Joe Loiacono
2009 Program Chair

P.S. Make your hotel reservations and register today for the ISTT and NASTT International No-Dig Show. Save \$US100 on your full conference fee if you register before 27 February.



Highlights:

Pre/post conference seminars

As with previous NASTT events, there is a strong training program attached, this time with the added input of the ISTT.

Five-track technical program

Over 140 papers will be presented by trenchless experts from North America, Brazil, Denmark, China, France, Germany, Italy, Japan, the Netherlands, Poland, South Africa, the United Kingdom, India, Peru, and Taiwan. The program is illustrated with a handy key so delegates can easily distinguish between the different utilities covered. The conference component will run from Monday 30 March – Wednesday 1 April.

Major exhibition

As always, the trade exhibition will be a major highlight, with over 100 exhibitors displaying their equipment and capabilities. The exhibition is open from Monday 30 March until midday Wednesday 1 April.

Social program

Both the ISTT and NASTT events are well known for their strong social programs, and Toronto 2009 is no different, presenting an exceptional opportunity for international networking.

"Toronto 2009 presents an exceptional opportunity for international networking"

Kick-off breakfast – Monday 30 March

All full conference attendees are invited to begin the 2009 International No-Dig Show with fantastic food and special entertainment during this crowd-pleasing event. The highlights of the breakfast are the presentation of the prestigious 2009 Trenchless Technology Person of the Year award and the 2008 outstanding papers in rehabilitation and new installation special awards.

Education fund auction – Monday 30 March

Since 2001, the NASTT Annual Educational Fund Auction has become one of the most popular events at the No-Dig Show – and a successful fundraiser. Bid on fabulous items, mingle with colleagues and make the seventh annual auction a successful fundraiser.

Gala Dinner – Tuesday 31 March

Meet the best and brightest of the trenchless industry at the Gala Awards Dinner. The winners, runners-up and honourable mentions of the 2008 Trenchless Technology Projects of the Year in Rehabilitation and New Installation are recognised in a special awards ceremony. Afterwards, satisfy your appetite with great food and enjoy live entertainment

City/hotel info

Every city has a story and Toronto's is written by the people; in several languages, in poetry, in song, in sidewalk art, in restaurant menus, in architectural blueprints, in scientific discoveries and even in legislation.

Toronto is a city built with and for the limitless imaginations of the people who come here to live and those who come here to visit. Toronto's cultures offer an unparalleled variety, but the city takes fusion to a level far beyond cuisine. Discover the beautiful architecture of the city's settlers alongside modern, sleek, gold-tinted skyscrapers. The city is

modest, but celebrates voraciously with over 1,000 festivals every year. If you are the kind who likes the unexpected, you will fall in love with Toronto. For more information visit www.torontotourism.com.

Sheraton Centre Toronto

123 Queen Street West, Toronto, Ontario, M5H 2M9, Canada

Main phone: 416-361-1000

Reservation line: 416-947-4955 x4440 or 888-627-7175

Group code: mention 'No-Dig Show-2009' to receive discounted rates.

Located in the financial and entertainment districts, the CAA/AAA Four Diamond Sheraton Centre Toronto is connected to PATH, a 16 mile underground network of shops and services. Shopping, theatre, world-class dining and Toronto's best attractions are literally steps away. Experience comfort and style in an urban setting. The 2.5 acre waterfall garden complements the new lobby, Arrival Court and Traders. The addition of a new ballroom and exhibit hall offers nearly 100,000 square feet meeting space. ☎



Registration info
Visit the website to register
www.nodigshow.com/registration_attendee.html

Please note; the procedure has recently changed. Delegates who are members of an ISTT affiliated society need to enter their ID number, and should contact their local membership secretary for a valid profile log in ID number.

Events

Underground Construction (UCT)
San Antonio, Texas, USA
20 – 22 January 2009
www.uctonline.com

Microtunnelling short course
Golden, Colorado, USA
9 – 12 February 2009
www.microtunneling.com

Trenchless Middle East
Dubai
16 – 17 February 2009
www.westrade.co.uk

ISTT International No Dig 2009
Toronto, Canada
29 – 3 April 2009
www.nodigshow.com

Wasser Berlin 2009
Berlin, Germany
30 March – 3 April 2009
www.wasser-berlin.de

UKSTT Awards Dinner
Birmingham, UK
24 April 2009
www.ukstt.org.uk

CityPipe 2009
Moscow, Russia
26 – 29 May 2009
www.citypipe.ru

Salon Ville Sans Tranchée
à Rosny-Sous-Bois, Paris
16-18 June, 2009
www.fstt.org

DT Exhibition 2009
Cheltenham, UK
16 – 17 September 2009
www.dtexhibition.com

Trenchless Australasia 2009
Melbourne Park, Melbourne, Australia
20 - 22 September 2009
www.trenchless2009.com

ICUEE 2009
Louisville, Kentucky, USA
6 – 8 October 2009
www.icuee.com

UCT set to dazzle Texas

Underground Construction Technology will conduct an unrivalled educational program at the San Antonio Conference.

REBUILDING THE NATION'S infrastructure has emerged as one of the top priorities of the incoming Obama administration. This will be a key topic for speakers at the Underground Construction Technology (UCT) International Conference & Exhibition from 20 – 22 January 2009 at the Henry B. Gonzalez Convention Center in San Antonio, Texas, USA. Thirty-three trade associations and universities co-sponsor the sessions, providing one of the best educational opportunities of 2009 for attendees.

UCT focuses on the complete underground infrastructure industry. The event features the latest equipment, products and services targeted to meet sewer, water, gas distribution, telecom, power and energy pipelines and engineering challenges. Scores of comprehensive presentations as well as pre- and post-show workshops, association/organisation meetings, specialty conferences and much more are regular features at UCT, including countless opportunities to network in an amiable setting.

UCT's educational program is led by prominent industry leaders who offer realistic approaches in handling workplace challenges. The 2009 program features new tutorials, engaging panel discussions, interactive presentations, detailed case histories and more. The UCT sessions qualify for Continuing Education Units (CEUs) or Professional Development Hours (PDHs) in conjunction with the University of Texas

at Arlington. Several of the specialty sessions offer industry certification as well.

Sessions include tutorials, a Trenchless Technical Symposium and a host of specialty programs sponsored by the NASTT, Gas Technology Institute (GTI), National Association of Sewer Service Companies (NASSCO), and the Center for Underground Infrastructure Research & Education (CUIRE).

Since the event marks the first major meeting of the year, industry leaders traditionally schedule special meetings and specialty conferences in conjunction with UCT such as the third annual WaterWorks conference.

In partnership with the Gulf Coast Trenchless Association and *Underground Construction* magazine, *WaterWorks* will be held 20 – 21 January. *WaterWorks* will include a slate of nationally respected speakers committed to sharing their expertise and insight into the critically important water infrastructure market.

They will emphasise the construction/rehabilitation of water transmission and distribution systems, examine issues and problems, case studies and explore both near and long term solutions.

The exhibit hall will contain more than 400 booths with many state-of-the-art innovations and equipment designed to improve efficiency and profitability in an increasingly competitive market. Organisers expect that nearly 3,000 people will attend UCT.



Look out for the *Trenchless International* magazine at UCT's exhibition, booth 641. Meet Tim Thompson and discuss the new official magazine of the ISTT.



For exhibitor or registration information, visit www.uctonline.com, or contact Karen Francis, Convention Manager, kfrancis@oildom.com

Taking charge at the CTSTT

The CTSTT has held its Annual General Meeting (AGM) and Technical Conference, resulting in a change of leadership. The evening also provided an opportunity for international fellowship and the exchange of Trenchless Technology ideas.

CHAIRMAN OF THE Taiwan Water Supply Company (TWSC) Dr Liao Tsong Shen has been elected Chairman of the CTSTT. Dr Liao has previously served as CTSTT Chairman from 1995 – 2001. The ISTT No-Dig event in Taipei was held during his first term. During his absence from the position, Mr Wang Shan Kuai was CTSTT Chairman.

Mr Wang attended ISTT events and created many short courses and seminars for local young engineers. Mr Wang also published quarterly journals and a handbook in Chinese about pipeline renovation and rehabilitation. Mr Wang is currently Deputy Director of the Taipei Water Administration Office.



Above: From left to right; LI Chien-Chung, Chairman of CECI Engineering Consultants, Inc., Taiwan; Liao Tsong-Shen, Chairman of CTSTT, Mr. Matsui, JSTT; Professor Daniel Jiang.



Left: The CTSTT Annual General Meeting and Technical Conference 2008.

International representative of the CTSTT Daniel Jiang said that, at short notice, Mr Taigo Matsui, Chairman of the JSTT, graciously attended the AGM as the VIP. Mr Matsui delivered the keynote address.

During his speech Mr Matsui discussed the organisation of the JSTT and its activities in the research and dissemination of Trenchless Technology throughout Japan. Professor Jiang said "I am deeply impressed by the forming of a social costs subcommittee, involving Mr Matsui and nine JSTT members.

"We hope that in the near future the

JSTT and the CTSTT will unite to spread Trenchless Technology throughout Asia." Professor Jiang said with over 200 participants "it is a really exciting time to encourage the promotion of Trenchless Technology in Taiwan."

Mr Matsui has also invited the Japan Anti-Bacteria Concrete Association to form a new association in Taipei. Mr Onda Minoru and Mr K.L. Fu will be the founding members of the organisation.

Mr Matsui also spoke of the sad passing of Dr Toyama in August. The members of the CTSTT were shocked and deeply sad-

dened by the news. Dr Toyama, together with his Taiwanese friends Mr T.P. Tsai, Mr S.F. Chang and Dr T.S. Liao founded the CTSTT and supported the society's entry to the ISTT. Born in Taiwan, Dr Toyama never forgot to support the growing industry in Taiwan. Japan and Taiwan continue to frequently exchange technological and industry knowledge. "We share deeply in this sadness," said Professor Jiang.

A group of special international guests of French, Japanese and Canadian engineers also presented a paper at the AGM about inspection, monitoring and managing pipelines.

A 'Kanbei' evening banquet was held after the meeting in the Howard Plaza Hotel. The presenters and business leaders, together with representatives from top engineering firms and public officials gathered to enjoy delicious food and wine.

"We expect next year to be even bigger," said Professor Jiang.

Crisis management

The global financial crisis and the trenchless industry

In a relatively short period of time, the economies of the world have gone from boom to bust, and again face an uncertain economic future. Kate Pemberton asks what this means for the trenchless industry and finds reason to be cautiously optimistic.

THE TRIGGERING OF the current global financial crisis is generally attributed to the sub-prime mortgage crisis in the United States of America. The loss of investor confidence in these securitised mortgages resulted in a credit crunch. Leaders at the G-20 Summit reached a common understanding of the causes of the crisis; "Major underlying factors to the current situation were, among others, inconsistent and insufficiently co-ordinated macroeconomic policies, inadequate structural reforms, which led to unsustainable global macroeconomic outcomes. These developments, together, contributed to excesses and ultimately resulted in severe market disruption." In September 2008, stock markets worldwide crashed. This was followed by more than 25 banks around the world failing or being bailed out. The World Bank has lowered its growth forecast for developing country economies to 4.5 per cent for 2009, compared to a previous projection of 6.4 per cent, due to a combination of financial turmoil, slower exports and weaker commodity prices. The

International Monetary Fund (IMF) has also readjusted global forecasts. (See Table 1).

President of the World Bank Robert B. Zoellick said "If September and October were about co-ordinated and co-operative monetary policies, then November and December will be increasingly about starting fiscal stimulus." Mr Zoellick said that such actions must take into account the interests of the poor and most vulnerable in developing countries.

The G-20 Summit brought together the heads of state and government of the G20, the Secretary General of the United Nations, the Director General of the IMF, the President of the World Bank, the President of the European Commission and the President of the Financial Stability Forum. The leaders discussed the causes and implications of the global financial crisis in order to formulate policies to deal with the situation and ensure it does not happen again and adopted a declaration.

The G-20 declaration stated that "We have taken strong and significant actions to date to stimulate our economies, provide liquidity, strengthen the capital of financial institutions, protect

savings and deposits, address regulatory deficiencies, unfreeze credit markets, and are working to ensure the international financial institutions can provide critical support for the global economy."

The declaration pledged to explore ways to restore emerging and developing countries' access to credit and resume private capital flows which are critical for sustainable growth and development, including ongoing infrastructure investment. Around the globe Trenchless Technology is providing an efficient, non-disruptive, greener and more economical option for governments when initiating infrastructure projects.

Global snapshot

Trenchless International spoke with representatives of the ISTT, affiliated societies and industry representatives to learn their perspective on the impact the global economic crisis is likely to have on the trenchless industry.

States are responding to the development of the crisis with differing means, internal structures and spending packages.

IMF Global Growth Forecasts	Actual		Forecasts	
	2006	2007	2008	2009
World	5.1	5.0	3.9	3.0
Advanced economies	3.0	2.6	1.5	0.5
United States	2.8	2.0	1.6	0.1
Japan	2.4	2.1	0.7	0.5
Euro area	2.8	2.6	1.3	0.2
Major advanced economies (G7)	2.7	2.2	1.2	0.1
Australia	2.7	4.2	2.5	2.2

Table 1. Source: October 2008 IMF World Economic Outlook

EXECUTIVE DIRECTOR OF the NASTT Mike Willmets reiterated the importance of Trenchless Technology, as the technology is less expensive and more environmentally friendly than traditional methods.

Mr Willmets said that, based upon the observations of industry contacts, North American trenchless contractors, suppliers and engineering firms are currently extremely busy with no large scale slow-down evident. "Nevertheless, it may be fair to say that much of this work was funded by various government levels prior to the so-called 'cratering' of the economy," he said.



THE UNITED STATES

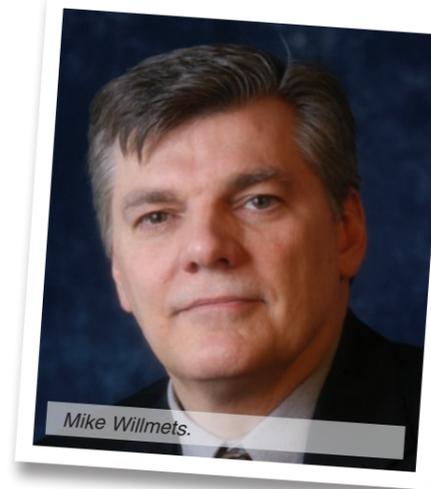
Government enacted the Emergency Economic Stabilisation Act of 2008, authorising the Treasury to spend up to \$US700 billion to purchase distressed assets in an attempt to support the financial and banking sectors. Mr Willmets said that if North America is uneasy; it is with the continent's main industrial engine, the United States. The financial uncertainty of the "Big Three" (Ford, GM and Chrysler) has raised fears to a new level.

"Excessive debt is a major obstacle and the controversial \$US700 billion bailout of major banks can be viewed as unthinkable that the U.S. government would be required to guarantee inter-institutional loans. This casts suspicions on the free market economic system and indeed, the global economy."

Nevertheless, the U.S. is still an industrial giant with a resilient business community said Mr Willmets. "The entrepreneurial spirit of America should never be underestimated and cynical fatalism has no place on Wall Street."

When asked if the global credit crisis has affected the outlook for trenchless projects Mr Willmets answered that the true state of Trenchless Technology and the related industries will be revealed in 2009.

"Tell tale signs are already appearing in the municipal Capital Budget planning process whereas, many upcoming infrastructure projects are being curtailed or outright cancelled," said Mr Willmets. "This being the case, the importance of an economic resurgence and recovery is critical prior to the next budgetary cycle."



"Thankfully, American decision makers truly understand that Trenchless Technology reaps the well known moniker of 'doing more with less' and generally, a trenchless or low-dig approach can be significantly less expensive than traditional methods. Moreover, the 'green' label of less impact on the environment will keep trenchless in the tool box of most municipalities regardless of slowdowns."



IN CANADA, STIMULATIVE

measures were taken to boost the economy in 2007, including \$US17 billion in incremental tax relief. Minister of Finance Jim Flaherty said "We will work together to continue to invest strategically in things like infrastructure that will help leverage this economic advantage through difficult times."

Mr Willmets said that in Canada, the housing industry is still experiencing growth and mortgage consumers remain relatively positive.

"This is not to say that belt tightening is not occurring or planned but, the highly regulated and conservative Canadian banking system should mean less instability."

"The newly re-elected Canadian government is committed to responsible fiscal management and has announced the creation of a common securities regulator. The Canadian dollar is almost entirely natural resources based and has devalued proportionately with the decline of the world price of oil. A lower Canadian dollar will assist with stabilising the national economy and is a godsend for export driven industries in Canada," he said.

The recent survey from the North American-based Association of Equipment Manufacturers (AEM) found that construction machinery manufacturers forecast a tough business outlook through to 2009. The survey was conducted in the third quarter 2008 with many of the

responses prior to the U.S. financial market collapse.

AEM President Dennis Slater said "We need to get dollars into the construction pipeline. An immediate increase in public works funding will help jumpstart the U.S. economy."

"Construction projects are being deferred and our customers are looking for work. It's estimated that there are currently 3,000 projects that could begin work within 30 to 90 days of a governmental funding commitment."



MR WILLMETS SAID

"I have just returned from a water and wastewater conference in Mexico. This event was opened by the President of Mexico and an enormous financial commitment to infrastructure projects was announced. The blossoming trenchless industry in Mexico will undoubtedly benefit from this initiative. Hopefully, the announcement is more than just political rhetoric."



TO COMBAT THE

effects of the global financial situation, the Federal Government of Australia announced a \$US6.7 billion Economic Security Strategy. The Government is also accelerating the implementation of projects to be funded through the three Nation Building Funds announced in the Budget to strengthen the economy, with \$US8.1 billion towards the Building Australia Fund for transport and communications infrastructure. Infrastructure Australia has also produced an interim report, which will identify investment priorities and policy and regulatory reforms that will be necessary to enable timely and coordinated delivery of national infrastructure investment.



IN INDIA INVESTMENT

flows into infrastructure have been hit as a result of the global financial crisis. The Planning Commission Deputy Chairman Montek Singh Ahluwalia said "We can see some slowing down of investments in the economy not only because of foreign investors but also because of domestic investors." He said the Government planned to expand investment in infrastructure and is examining ways of doing it.

**THE STATE COUNCIL**

of the People's Republic of China announced that a stimulus package estimated at \$US570 billion will be spent over the next two years to finance programs in ten major areas, such as low-income housing, rural infrastructure, water, electricity, transportation, the environment, technological innovation and rebuilding from several disasters, most notably the May 12 earthquake.

China has implemented a series of stimulus policies including interest rate cuts, lower bank reserve requirement ratios, tax changes, higher credit quotas and the injection of central government funds to infrastructure construction. The package aims to improve environmental protection by enhancing the construction of sewage and rubbish treatment facilities and preventing water pollution in key areas. The Chinese Government also plans to increase rural infrastructure construction. Roads and power grids in the countryside will be improved, and efforts will be stepped up to spread the use of methane and to ensure the safety of drinking water.

**JORDANIAN PRINCE**

EL Hassan bin Talal said that the global financial slowdown could be seen as a unique opportunity for Middle Eastern investment and reform, encouraging the states of the region to embark on a trans-border process for co-operation and security. Prince Hassan said that "Middle Eastern nations could expand their regional collaboration in the fields of water, energy and the environment through intra-regional agreements focused on building trust, cooperation and security."

**CHAIRMAN OF THE**

JSTT Taigo Matsui said that the trenchless market in Japan is shrinking by 3 – 5 per cent every year due to the decreasing of public and private works.

Mr Matsui said that in particular the number of new installations is radically decreasing. However, rehabilitation and renovation works are slightly increasing and are expected to continue growing in the future.

Trenchless International asked Mr

Matsui if the global credit crisis has affected the outlook for trenchless projects. Mr Matsui said "It does have an effect. We are hoping that more public works will be ordered as a countermeasure to boost the economy."

**BRAZILIAN PRESIDENT LUIZ**

Inácio Lula da Silva said that the country will not cut budgets allocated for infrastructure programs, despite the current financial crisis.

President Lula said that Brazil will stick to its plans to spend hundreds of billions of dollars on infrastructure in the coming years.

President of ABRATT Paulo Dequech said that anecdotally ABRATT believes it will experience a retraction of 30 per cent for contracts in the oil and gas industry. However, the association does not predict a change in the sanitation industry.

Mr Dequech added that although the government is helping local banks to reduce financial costs and increasing official funding for local companies in general with more credit restrictions and high costs for investments the credit crisis is likely to impact private infrastructure programs.

**IN OCTOBER, HEADS**

of state and government from 27 European Union countries met at an EU Summit to discuss the financial crisis.

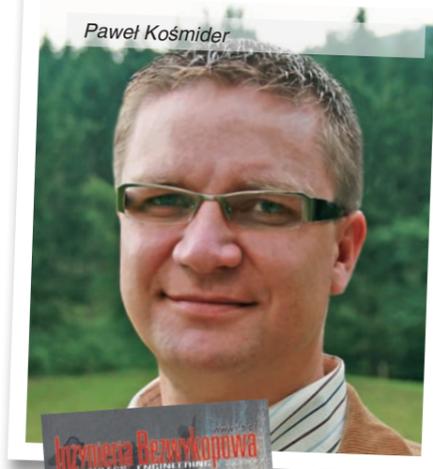
French President Nicolas Sarkozy said "We all agree in Europe that we are going to need to re-found the international financial system."

**PUBLISHER OF MAGAZINE**

Trenchless Engineering Paweł Kośmider said that the condition of the trenchless market in Poland is good.

"There are more and more projects where the traditional technologies are replaced by trenchless technologies. It's connected with all the advantages which are given by using no-dig techniques. We spend continuously growing amounts on industry projects. The growth in our country is connected with the Union funds that we receive from the European Union for development in the industry fields."

Trenchless International asked Mr Kośmider how the current credit crunch has affected Poland's



trenchless industry. He said "At the beginning of the global crisis the impact of it was barely perceptible. The direct reason of this situation was that there is such a good banking system in our country. Now there appear to be some problems in applying for credits."

However, Mr Kośmider said that this has not had a direct impact on trenchless projects in Poland. "A lot of those projects are incorporated in a very large industry project which is financed by the funds from the European Union. So the money for many of the projects is guaranteed." Trenchless projects will also benefit from these funds.

Mr Kośmider said that one of the most significant moments of the year was the sudden realisation of world financial crisis and the consequences that followed. "Not so long ago both Polish politicians and economy experts would claim that the crisis would avoid Poland and its effects would be minimal. Indeed, if compared to some of the countries where economy has been seriously damaged, in Poland there are no severe consequences.

"We cannot, however, assume that Poland is an economic island independent from the global situation. Only now, in the longer run, are we starting to suffer from the repercussions.

Some sec-

tors of our economy or industry do still need to wait a while before they are affected."

He said that the former optimism is slowly subsiding and the views on the subject are being carefully reviewed. Acting from the new prognosis, the government has decided to introduce an amendment into the budget project for 2009 along with revising its assumptions regarding the growth.

"The government's answer to the slowing down economy is the newly announced plan for stability and developments which is supposed to guarantee a slowdown of only one year. We can also expect some simplifications in regulations for getting bank loans and mortgages, which have become very steep recently. The government is also planning to speed up the realisation of projects financed by the EU."



THE SSTT SAID that the society does not think that the global credit crisis has had a direct affect on trenchless projects in Norway, Sweden and Denmark. The SSTT said that the crisis could perhaps even have a positive effect on investments as the maintenance of infrastructure will be increased in order to keep up with the rate of employment which again means increasing business for no-dig projects.

The governments of the Scandinavian countries are all very much focused on climate changes and environmental issues in general. The SSTT said that this increased focus can benefit no-dig methods, provided that they are able to inform and market the huge environmental advantages of Trenchless Technology.

**SHANTAYANAN DEVARAJAN, CHIEF**

Economist of the World Bank's Africa region, said that Africa's banking system is not threatened by the current global

financial crisis, but the region could see a decrease in private investment flows. Such a decrease would compromise the financing of many infrastructure projects on the continent.

Trenchless International asked Cedric Bessit, of Vela VKE Consulting Engineers in South Africa, his opinion on the state of the trenchless industry. Mr Bessit, considering the number of tender submissions returned on a recent trenchless construction project, said in his opinion that the number of contractors has increased since 2006. "There has definitely been a shift of traditionally conventional construction contractors to also now include trenchless construction."

When asked if the credit crisis has affected the outlook for trenchless projects Mr Bessit explained that considering that the majority (if not all) trenchless construction materials, machinery and equipment is imported from countries affected by the global financial situation, this is likely to affect the application of trenchless construction projects in South Africa.

The South African Government has made asset management mandatory for local municipalities. "This is very beneficial to the trenchless application of routine CCTV maintenance," said Mr Bessit.

A dynamic and expanding industry

In a period of tumultuous economic uncertainty, many industries are suffering, but at the same time many governments are choosing to invest in infrastructure to help prop up financial security and domestic prosperity. The trenchless industry stands to benefit from this spending. Even when economic times were good, governments and municipalities could not rehabilitate essential infrastructure fast enough; this need remains, despite the changed conditions. This type of work should also be a key element in fostering employment and helping facilitate the economic recovery.

The trenchless industry serves communities by decreasing the disruptions to traffic and ensuring business can continue; offering technologically innovative and environmentally friendlier solutions to ensure that essential services are maintained and improved.

Ultimately Trenchless Technology is about doing more with less and is therefore a very viable option when belts are being tightened. No industry is immune from global economic shocks, but trenchless looks poised to ride it out better than most.

TI would like to acknowledge the generous assistance of many ISTT affiliated societies in the preparation of this article.

Rocking around the rock



Round Rock, a growing community in Texas USA, is experiencing the many benefits of trenchless techniques with less disruption to people and traffic and rehabilitated infrastructure.



DURING THE 1980s Round Rock had expanded its water infrastructure, installing over 160 kilometres of asbestos cement water lines and hundreds of kilometres of blue polybutylene service lines. Over the past five years Round Rock has been replacing the blue polybutylene service lines due to excessive line breaks.

During the course of replacing the water lines Round Rock Utility Engineer David Freireich said that they began to look at other issues in the water distribution system and decided to address the asbestos cement pipe water mains in older residential areas.

In 2007 Mr Freireich attended the Underground Construction Technology (UCT) conference in Houston to research pipe replacement techniques. "We are always looking for new and better ways to do things. I think UCT is where we first found out about the pre-chlorination process and wanted to learn more," said Mr Freireich.

Replacing line in Round Rock

This was the first major water main replacement project in the town in over twenty years. The project involved upsizing over five kilometres of 6 inch and 8 inch asbestos cement pipe to 8 inch HDPE pipe in three older neighbourhoods affecting 415 homes.

The ground conditions consist of heavy clay and rocks that create a lot of heaving, shrinking and swelling of the soil. The contractors had a number of reservations about the rocky ground conditions. The whole line was under the footpath and the driveway.

Murphy Pipeline Contractors, of Jacksonville Florida, was the first contractor in the USA to begin using the pre-chlorinated pipe bursting process in 2000 and has replaced more than 46,500 metres to date. However this is the first time that the technique had been used in Texas.

Todd Grafenauer of Murphy Pipeline Contractor's said "The main point that we emphasise to communities and engineers is that pre-chlorinated pipe bursting may not be the only solution to address the challenges of their ageing water infrastructure, as there are so many technologies available today.

"However, as communities are now discovering across North America, this process will play a substantial part in replacing more pipe every year in a more efficient, aesthetically pleasing and customer friendly way."

The contractors estimated that the pre-chlorinated bursting method would be a 23 per cent cost saving over conventional methods such as open cut.

The HDPE pipe was prepared in a staging area near each neighbourhood. The process included butt-fusing the 12 metre sections with McElroy fusing equipment to form continuous 90 – 180 metre sections. The pipe was then pressure-tested, chlorinated, capped and sealed.

Murphy Pipeline Contractor's increased their service crew to ensure they were only in front of a home for one day. President of Murphy Pipelines Andy Mayer said "Those open-cut boys can be in front of a house for weeks at a time."

The interruption to water supply was limited to one day per home. Following written notification, the day prior to the burst Murphy Pipeline went door-to-door to inform residents of the temporary interruption.

The bursting crew excavated the launch and burst pits and decommissioned the old main. Once the pits were excavated, a HammerHead HB100 static bursting machine was set into place. Mr Mayer was the first contractor in the country to use the new 100 tonne HB 100 on a project and he helped design the machine. The Hammerhead HB100 is designed to replace potable water, sewer and gas lines as large as 16 inches and is compact enough to efficiently replace pipes as small as 3 inches.

Once the HB100 was set into place, the bursting crew began the rod payout procedure while the pre-chlorinated pipe was pulled into position near the launch pit. The bursting crew began by pulling back the pre-chlorinated pipe using a 10 inch bursting head and a ductile splitter to shatter the old cement line. By midday the new 8 inch HDPE main was in place. The service connection crew then began attaching the new service lines to the main using mechanical service saddle.

Mr Mayer said "Most communities believe that you have to fuse the service saddle to the main when using HDPE pipe. This is a misconception, we're using a standard mechanical service saddle that you would use on PVC pipes, as well as DI fittings to make connections to valves, tee's and crosses."

A particular challenge of the project was the discovery that none of the original AC pipe was restrained. When the contractor attempted to re-energise the lines, they blew out joints further up the line. To overcome this they worked from valve to valve, capped off as they went and tied the whole system back together at the end of the project.

Future projects

Mr Freireich said that Round Rock is a different kind of city to most. "The city relies on the technical staff to make the decisions and has always been willing to try new products and processes.

"We foresee doing this over a period of several years," said Mr Freireich, "the town has also dedicating up to a million dollars a year to replace the AC pipe in areas that feature clay and rocky ground conditions."

Mr Mayer concluded that pre-chlorinated pipe bursting is a great technology, "once communities fully understand they see how easy it is to install pipe and get customers back in service in a day."

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We'll always have trenchless

Certain locations in Paris are essential to the management of road traffic, such as La Place d'Italie in the 13th arrondissement. Several métro lines pass through its underground, as well as concessionary pipeline networks of potable water. Old and worn out, the pipelines are in need of renewal. Axéo is on the job.



THE CITY OF Paris has access to a distribution network of potable water, comprising about 1,800 km of pipelines. The pipes transport water for more than two million residents and nearly two million people who work in the city each day. To meet the demand, an average of 680,000 cubic metres of water flow through the pipes daily.

Before being distributed, the water is stored in five principal reservoirs with a combined capacity of 1.4 million cubic metres, which is about a two-day supply. The network needs a very particular kind of treatment in order to avoid leaking and breakage. Such is the case with the old 800 mm diameter grey cast iron pipelines that exhibited weaknesses. Consequently, a 1,260 metre length of pipeline, partly under La Place d'Italie and then running alongside métro line 6 to Denfer-Rochereaux, required replacing.

Non-invasive analysis

In November 2007, a longitudinal break alerted authorities to the deteriorated state of this section of pipe. The reaction was quick and the water company, Lyonnaise des Eaux, implemented its 'scanner' system in order to test the state of the iron without cutting out any sections. Though the pipe's interior had remained in serviceable condition, the exterior was corroded and the overall cast iron structure had weakened over the years.

Normally such a break would only warrant repair on a small section of the pipe. However, it was decided to err on the side of caution and commit to an overall repair. Axéo won the contract, allowing the company to be the sole contractor.

To complete the project, the company encouraged four of its employees to undergo specialised training to obtain an operating license for the lifting equipment. The crane was required to lower the pipes into the underground bore path. In the bore path an indispensable auxiliary machine manipulated the cast iron pipes through the underground tunnel via Pont-à-Mousson, transporting them at a rate of ten pipes every two days. These pipe segments are seven metres in length, but often have to be cut in half in order to pass through the bends of the tunnel. Before deciding upon cast iron steel was considered, but dismissed due to time constraints with welding, as well as the surge in price of raw materials.

Discretion and efficiency

As part of the contract, Axéo agreed to minimise as much as possible the inconvenience to residents living along the banks of the river. So, along the entire route, only five shafts were dug, with only

three remaining open at any one time. This also limited accidental damage to the concessionary pipeline networks that cram the Parisian underground.

In order to quickly and efficiently complete the project, the company anticipated three project stages: the extraction of the old pipe; the installation of the new pipe; and then the last stage of remediation. The removal is relatively quick and easy work. The grey cast iron segments of pipe are no more than four metres long, so it is enough to cut through the sealing ring and take out the pipe sections.

The installation phase is a little more complex and demanding. Once the completely new pieces of pipe are lowered down one of the shafts into the tunnel, they are transported by a vehicle with two guides that direct its motion – so as to avoid shocks to the sidewalls of the tunnel – and then pulled by a winch. Once in place, each segment is raised to its permanent position by jacks, fitted into the previous piece and put on support blocks.

The final phase has to put into place all the elements that will determine the durability of the new network. Each pipe is supported by two small custom-built columns, and each pipe has a ring around it to prevent it from raising or moving away from the tunnel wall. A knob is then fixed at every second segment to stop the pipe moving closer to the sidewall. This device should prevent movement in any direction. Finally, concrete anchorage is put into place at the level of the pipe's bends to ensure their stability.

Thorough testing

The pipes of this new network will have to withstand a service pressure of six to seven bars. To ensure the structure is water tight, tests are carried out at twelve bars over an hour. The disinfection phase of water analysis follows and then water is permitted to flow through the pipes for distribution.

Even though there are only five shafts along the entire 1,260 metre route, these still remain sites that must be reconstructed once all operations have been completed. In order to facilitate operations, the company has the authorisation to rebuild the roof of the tunnel with concrete. This process, which could be seen at La Place d'Italie, utilises wood shoring that will hold up the new tunnel roof.

The last remarkable aspect of this network is erecting a floodgate, weighing almost seven tonnes, at the third shaft. The pipeline replacement project includes very specific challenges, a great way for Axéo to demonstrate its *savoir-faire*.



The crane lowers the pipe lengths into the shaft.



The supporting columns are visible under the pipeline.



Crossing the tracks



Situated on the banks of the River Chambal, Kota is primarily an industrial city and one of the largest municipalities in the state of Rajasthan. Much of the city's water supply is contaminated or inadequate, necessitating a new system and up to 15 pumping stations.

The Rajasthan Government plans to address these problems and others with the Rajasthan Urban Infrastructure Development Project (RUIDP), a large scale water supply, waste management, and urban improvement scheme.

Part of the RUIDP will involve a new water line travelling 13 km from the Kota Barrage on the River Chambal to the Govindapura area of Kota, servicing about 70,000 people. Once complete, the pipeline will add 24 million litres per day to the current water supply. Though much of the pipeline has been excavated by cut and cover, the government mandated that all rail crossings had to be excavated by Trenchless Technology with casings.

Work on Kota Water Supply Project 16 started in 2000, utilising cut and cover methods to install 700 mm diameter steel pipe from the river into the city. Numerous

attempts to complete several crossings across high-traffic rail lines were unsuccessful. In 2007, Vichitra Constructions was contracted to complete the crossings, which could not be open cut.

Choosing technology: the Small Boring Unit

When Vichitra agreed to construct the massive water line snaking through hard quartzite rock, they knew it would be tough. After eight years and multiple attempts with various excavation methods the company needed a new kind of technology.

"We were looking for a completely different method, and found that disc cutter technology would likely work best in the very hard, abrasive rock we had," said Vichitra Executive Director Sudhir Agrawal. The company has now success-

fully utilised a Robbins Small Boring Unit and Auger Boring Machine to excavate three rail crossings in India's first ever use of disc cutter boring attachments.

Crews first hand-mined an 11 metre long by 4.5 metre wide launch pit, which took four months at rates of 200 to 300 mm per day in extremely hard quartzite up to 200 MPa UCS. The first attempt at the crossings in 2000 used a small pipe jacking system and hand mining, which was abandoned after several months of low production rates. Subsequent attempts utilised HDDs with rock heads, but both times the drills failed in the hard rock.

In 2007 after researching various methodologies, Vichitra purchased a 1.5 metre diameter Robbins Small Boring Unit (SBU-A) with 11.5 inch disc cutters and a Robbins 60-1270 Auger Boring Machine (ABM). The technology was supplied



Left: The 1.5 metres Robbins SBU-A excavated two 50 metre crossings after three unsuccessful attempts with other methods.

Below: The Robbins SBU utilised in Kota City is India's first-ever use of disc cutting heads.



The three crossings using a Robbins SBU-A and ABM completed a water line which will service 70,000 people in Kota City.



The Robbins SBU-A completed two rail crossings and one road crossing.

by Robbins Tunnelling and Trenchless Technology (India), a local subsidiary based in New Delhi who also provided the contractor with technical support, crew members, and cutter rebuild services.

How it works: SBU technology

Small Boring Units, available in diameters from 600 mm to 1.8 metre, are typically used on crossings up to 150 metre in length utilising a standard Auger Boring Machine (ABM) and steel casing. During excavation, the SBU-A is welded to the lead casing while the ABM provides both torque and forward thrust to the cutting head. The circular cutterhead is fitted with single disc cutters to excavate hard rock, or a combination of single disc cutters, two-row tungsten carbide insert cutters, and carbide bits in mixed ground. Disc cutters penetrate the rock face, creating a 'crush zone' through which fractures propagate. Material between adjacent crush zones then falls from the face. Muck scrapers scoop the muck into openings on the cutterhead. Muck is then transferred through a full-face auger for removal.

Crossing excavation

Both rail bores were completed in abrasive, hard rock. The 100 metre crossings, were excavated in two 50 metre long passes from either side of the tracks. During the first bore, the machine holed through into a center pit between the two tracks. Typical advance rates were up to 1.5 metre per hour. "We have shown the railway authorities that crossings can be effectively excavated with Robbins SBUs. Owners are now becoming more familiar with the technology and confident with its capabilities," said Mr Agrawal. A third 14 metre long bore was added underneath a roadway after difficulties with open cut operations in the rock.

Future potential in India

Robbins India hopes, through this project, to familiarise contractors not only with the efficacy of SBUs, but with mechanised underground construction in general. Most Indian contractors still consider hand-mining the standard, with typical advance rates of 300 mm per day. Drilling and blasting of crossings is also

prohibited in India. "Our aim is to provide turn-key solutions, consisting of ABM and pipe jacking systems, for hard rock areas including Hyderabad and Bangalore," said Paul Nicholas of the Robbins SBU Division. Typical SBU-A advance rates are some 20 to 30 times those of hand mining – around six metres per day on average.

Vichitra plans to re-use the Robbins SBU-A and ABM on several projects in the future. "Given the success of the SBUs after an eight year wait, combined with the size of India and the number of infrastructure projects, we believe there will be many opportunities for this technology," said Mr. Sudhir. The contractor's next project will utilise a 1.8 metre diameter Robbins Double Shield Rockhead (SBU-RHDS) – a type of self-propelled, manned entry boring machine utilising disc cutters. The machine will excavate several crossings up to 400 metre in length in hard granite up to 250 MPa UCS at the Mount Abu resort in Rajasthan. Construction is scheduled to begin in January 2009. ♣

Bursting gets bigger and better

High in the Ural Mountains of Russia, technology from the Scandinavian No-Dig-Centre is bursting expectations.



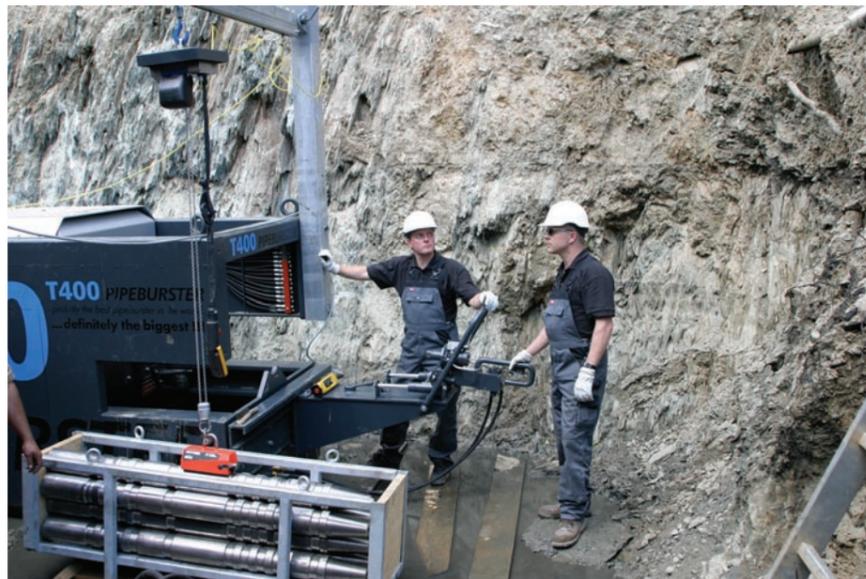
A 30 YEAR old steel reinforced concrete pipe had, through the years, been severely damaged by tree roots and cracks caused by erosion. The existing steel reinforced concrete pipeline had an ID 1,200 mm and OD 1,700 mm.

A 500 metre section of sewer pipeline was replaced with HDPE OD 1200 mm SDR26 at a depth of five metres. The ground conditions onsite consisted of sand and clay. The T400 Hydrostatic Pipeburster was selected as ideal to meet the project specifications and conditions.

A bypass system was set up to re-route the sewage water during the project. The by-pass system was made from three parallel 315 mm diameter HDPE pipes. Specialised butt-fusion equipment was brought onsite in order to weld the 12 metre lengths of 1,200 mm diameter HDPE sections together into two 250 metre sections.

Two pits were dug and the existing concrete pipe was removed. The pits were drained and levelled. One pit was for the T400 pulling unit and one for the installation of the new HDPE pipe, both measured approximately seven metres in length and three metres in width.

The T400 pipeburster operates with round threaded solid steel rods; weighing in at 127 kilograms with a 1.5 metre rod. An electrical hoist system is built



onto the pulling rig to lift the steel rods in and out of the machine. A hydraulic driven rod spinner is attached to the back of the machine, to screw the steel rods on and off, for easier rod handling.

The flexible steel rods were pushed through the existing concrete pipe with a special guide cone in front, to avoid getting stuck on displaced flanges or other obstacles inside the old pipe. On arrival at the installation pit, the bursting head and HDPE pulling head were attached to the steel rod system.

The bursting head used, is a unique and simple cutting head design from the Scandinavian No-Dig Centre, which enabled the pulling power to be concentrated at one specific point. This made it easier to actually split the steel inside the concrete pipe, which resulted in the need for less pullback power. The cutting head was designed with a larger rear end dimension than the nominal size of the new HDPE pipe. This was to avoid potential damage to the new pipe caused by fragments of the old pipe during the pull-in phase.



The first section of the project was 260 metres and the elapsed time pulling back was just short of six hours. The pull back power needed for this project ranged from 250 up to 350 tonnes.

The new HDPE pipe was installed according to plan with the exact gravity line and depth. The completion of the 500 metres was carried out within five working days, all-inclusive.

The equipment

The existing range of hydrostatic pipebursters has until now been limited to mid-range machines able to replace most pipes up to approximately 800 mm diam-



eter. However the introduction of the T400 Hydrostatic Pipeburster has opened a new market. The T400 has a pull back capacity of 400 metric tonnes, equivalent to 440 short tonnes (US) or 880,000 pounds.

Scandinavian No-Dig Centres says that this makes it by far the most powerful pull back unit ever built for pipe replacement purposes. Having a footprint as small as 3.50 x 1.40 metres yet able to replace existing pipes of diameters up to 1.5 metres, the T400 creates a new standard in professional pipe rehabilitation.

The T400 unit is fitted with many of the same features as the rest of the T-series pipeburster program. The machine is built

on electric hoist system for easy rod handling, has automatic high pressure water cleaning of the steel rods during pull back and positive hydraulic jaw-gripping systems to prevent fly-back of the steel rods in case of breakage during. The T-series is the only machine-brand with the positive grip system.

As an addition to producing and selling the machines, the company has set up a new rental branch for the new T400 pipebursting machines. It is now possible to rent the T400 units, including a supervisor and consultant, for short and long term projects. All T-series pipebursters are also covered by a full 24 month warranty, terms apply.



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Getting out of the trenches

Embracing public participation in infrastructure planning and delivery

Anna Grutzner

The less invasive nature of trenchless excavation works has much to commend it in helping to win community support for infrastructure projects. Yet it is not as simple as providing factual, technical information to the general public to allay concerns about proposed works in its backyard.



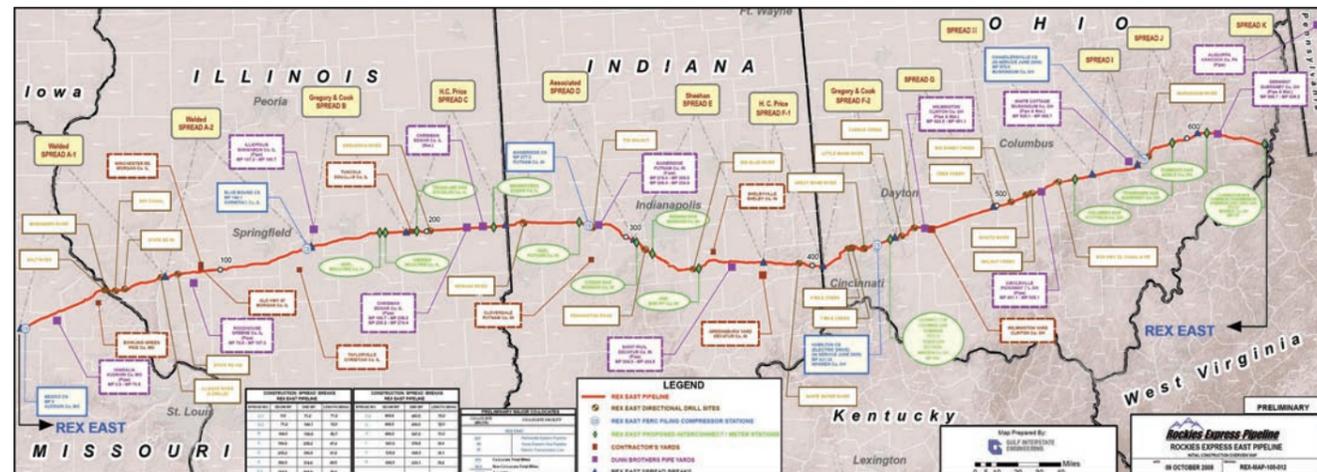
THE PUBLIC EXPECTS to be actively engaged in the decisions that affect where communities live, work, travel, send their children to school and pursue their leisure activities. This is where the concept of *public participation* comes in as a framework for and to complement both actual project delivery and supporting communications.

The what and the why

Public participation is a process that variously involves the public in information sharing, problem solving and/or decision-making, using public input to make better decisions. The tools can include public relations, market research, consultation, negotiation and conflict resolution, media relations and organisational development.

It may seem an enormous ask when a project is being co-ordinated on a major scale, driven to tight timelines or budgets, or faces significant technical challenges. Yet in precisely such circumstances its a far riskier strategy to question "Can we afford to involve the community?" than to conclude "We cannot afford *not* to involve the community."

REX-East pipeline route.



The following case studies illustrate some of the public participation initiatives that are being pursued by leading organisations involved in infrastructure development around the world.

Multiple community forums: A US experience

Public participation has been a key project element throughout delivery of the Rockies Express-East (REX-East) natural gas pipeline, a joint development of Kinder Morgan Energy Partners, Sempra Pipelines & Storage and ConocoPhillips. The pipeline runs for 638 miles (1,027 km) across three states and fourteen counties, and features 24 HDD river crossings from Audrain County, Missouri to Clarington, Ohio.

At the outset, the developers hosted community open houses to present the project to affected landowners and stakeholders, and continues to solicit input from landowners, community leaders, and

citizens through face-to-face meetings, a toll-free number, and a project website.

REX was also presented to dozens of service clubs along the proposed pipeline route including farm bureaus, Kiwanis clubs, Rotary clubs, and professional industry organisations to give the wider community information and a voice.

The sheer number of elected government officials and legislators at the local, state, and national level who need to be kept in the loop might seem like a consultation nightmare. Yet informing government officials and politicians of project developments is critical to ensuring their constituents feel up-to-date on REX and its local impacts.

Talking the community's language: An Australian experience

Running 24-hour operations in a big city, urban environment is no mean feat when a key project objective is to minimise the potential impacts on the community.

This is the challenge that has faced the Northern Sewerage Project (NSP) in building much-needed sewerage capacity across Melbourne's rapidly growing northern suburbs. NSP is a joint Melbourne Water-Yarra Valley Water project with John Holland Group undertaking the 13 km construction works, Connell Wagner as project managers and SKM-Jacobs as design partners.

NSP Community Relations Manager Trent Woodberry said "Many of our project sites are located in densely populated areas, meaning that community engagement is of the utmost importance."

Talking with the community began at the planning and design phases and has continued throughout construction. Community forums, house-to-house door-knocking and invitations for residents and business owners to tour sites have been employed to inform and keep the community onside. In a part of Melbourne with a large Italian and Greek demographic,



Northern Sewerage Project noise exclusion shed: Australia.

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the use of translators and materials in key community languages has been important. The project has also worked with local councils to identify specific CALD (cultural and linguistic diversity) communities along the pipeline route.

It has taken a best practice approach to consulting at the micro level with impacted residents street by street. Where a strong case has existed for special support, the company has acted to address the issue. For example, it had a new front fence built for a mother fearing for her young children's safety with heavy trucks regularly using her street. The home of a nightshift worker exposed to sustained daytime noise received double-glazing.

One of the nicest community engagements was in the form of an invitation to local primary school children to name the three Tunnel Boring Machines, which is how Victoria (TBM1), Gemma (TBM2) and Julia (TBM3) came into being!

Working with local business: A UK experience

The impact on trade can be a very real threat to local businesses in close proximity to major infrastructure works. Severn Trent Water has recognised this significant issue in its £2.8 million investment in replacing a centuries-old sewer system under Ashbourne, Derbyshire.

The water company's local contractors, Whitehouse Construction, are about to begin the final phase, which is imperative

and unavoidably coincides with the busy period for local business leading up to Christmas. Making life as easy as possible for business, transport, residents and visitors is a high priority.

The project partners have worked closely with local traders to accommodate Christmas late night shopping and Royal Shrovetide Football, a popular local event and tourist attraction to maintain trade. Temporary access routes have been planned to a leisure centre during works, and plans are underway to ensure access to the busy Sainsbury's supermarket.

Face-to-face meetings, letterbox drops, local newspaper ads, and Council and road authority meetings have been used to update the community on project developments. A project contact is available to address concerns 24 hours a day.

Severn Trent is also aware that trading losses might result from necessary road closures and diversions. They have spoken about their duty to compensate any such loss of profits, and booklets explaining the claim and compensation procedure are readily available.

Speaking at a local meeting Brell Ewart of Whitehouse Construction explained "One of the benefits of being employed by Severn Trent is that our people come from the town and we have a vested interest — local people doing local work and putting money back into the town through the employment of local people."

The role of consultation

The community is rightly sceptical of the government-speak and corporate jargon that sometimes substitutes for 'consultation' as a form of public participation. This tick-the-box 'They just want to be able to say they have consulted the community' approach has given consultation a bad name.

It is *not* consultation if the feedback gained from stakeholders occurs at a time and in a way that it *cannot or will not* be factored into decision-making processes or have the potential to change the outcomes.

However, consultation can be genuine, effective and non-tokenistic whilst conducted on a limited scale. For example, when the PPP (Royal Women's Health Partnership consortium and the Department of Human Services) redeveloped Melbourne's Royal Women's Hospital, it recognised the hospital's iconic status for generations of local women, their families and the wider Australian community.

It used focus groups with a range of women including patients, ex-patients and those from particular ethnic and religious backgrounds, to get input and feedback on the design, decor and furnishings for patient rooms.

Effective communication

What we say and what we mean don't always coalesce with public audiences inclined to be suspicious of what's being planned when infrastructure projects are announced. Being precise in our language can avoid a potential disconnect, as can even an admission that we can't be more precise but will keep them updated regularly.

For example, when we say: "We don't expect there will be much disruption" the resident hears: "So there will be disruption, will there?" When we tell the local businesses: "The works will only take a few days" they think: "I'm raising hell if this mess isn't cleared up by the end of the week."

Being prepared to listen and be flexible in accommodating simple requests or the special circumstances of individuals impacted by infrastructure projects can make an enormous difference to community goodwill and trust that often goes way beyond the life of the project. 📍

Exploring the Middle East

The Middle Eastern region spans southwestern Asia and northeastern Africa. The Arabian Peninsula, which includes Kuwait, Bahrain, Oman, Qatar, Saudi Arabia, the United Arab Emirates and Yemen, is home to a dynamic construction industry.

These countries are investing huge oil revenues in large scale building and infrastructure projects to ensure long term prosperity in the region. Trenchless Technology, causing less disruption, and with economic and environmental benefits, is becoming increasingly sought after in the densely populated cities and growing regional areas. Far from being new, trenchless techniques have been employed across the region for a number of years. *Trenchless International* looks at some of the successful trenchless projects from the region.



Anna Grutzner is an Account Director with Fenton Communications, a PR consultancy. Its environment and sustainability group assists clients in managing communications around major infrastructure projects. For more information: anna@fenton.com.au or +61 2 9290 3777

A trenchless oasis



The incredible Palm Islands development off the coast of Dubai has three islands Palm Deira, Palm Jebel Ali and Palm Jumeirah. Dubai will have a coastline of 120 km when the development is complete.

CREATED OUT OF rock and sea sand, the islands are an extraordinary man-made creation. The islands consist of a five kilometre long 'trunk' and 17 'palm fronds,' protected by a half-moon shaped wave break. Work on the project began in 2001. The creation of the palm islands has resulted in ground conditions of sand coral and limestone. Contractor Al Naboodah Engineering Services chose HDD and microtunnelling to install pipes and services between the 'fronds'.

A Herrenknecht AVN D2500AH was a part of the team on the island of Jumeirah, drilling two safety tunnels of

around 600 metres in length for various supply lines such as electricity, telephone and water, which run in a slight curve from one of the palm branches to the protective ring. The AVND bored 600 metres at a diameter of 3,025 mm. The cutterhead power is 316 kW with 1,200 kNm torque.

The Palm Jumeirah project also included twelve HDD bores with a total length of 9,600 metres, 500 mm diameter PE pipe. The rig was a Vermeer D300 x 500 with 136 tonne pullback, 68,000 Nm torque. Also in use were three Vermeer R300 fluid recycling units.



Underground in Abu Dhabi



The government of Abu Dhabi is increasingly investing in the sewerage networks of the city. To avoid the danger, disruption and mess associated with deep open cut works, microtunnelling is used for projects exceeding depths of 10 metres.

One project from the municipality of Abu Dhabi divided the sewerage into several contracts. The Gulf Tunnelling Co. Consultants were awarded the longest length of pipe jacking, 24 km.

In combination with other materials, GRP pipes were specified for all sewers. HOBAS supplied half of the project with CC-GRP pipe. The installed sewerline has a diameter ranging from 400 – 1,800 mm with a stiffness class of SN 10000. The pipe systems were installed with a special concrete surrounding. The reinforced pipe was required because of the diameter of the TBM. The size of the TBM did not have to be changed as the diameter of the pipe could vary.



Photo courtesy of Herrenknecht.



Photo courtesy of Herrenknecht.

Tunnelling in Saudi Arabia
Machine: DN3500 VSM
Ground conditions: fossilised coral, hard sandstone, ground water, sea water.
Tunnel length: 50 metres
Cutterhead power: 315 kW
Torque: 30 kNm

Master plan for Jeddah



Saudi Arabia is investing in the future, constructing essential infrastructure above and below the earth. An important component of these projects is planning work in inner-city locations with a corresponding scarcity of space. Trenchless Technology is essential in the booming Gulf states.

IN SAUDI ARABIA new residential districts and suburbs of the rapidly expanding port city of Jeddah are being connected to the sewage system. Shaft sinking plants and tunnel boring machines from Herrenknecht are working in tandem to achieve building records. Local construction company Abul Jadayel Est chose Herrenknecht as they offered an all-in-one solution. Since 2006, a Herrenknecht vertical shaft sinking machine (VSM) has been sinking 17 start and/or target shafts along the Al Amir Sultan Road and Al Nuzhah Street, in a residential area close to the centre of

Jeddah, in preparation for the deployment of two microtunnelling machines.

The VSM is cutting its way through fossilised coral, hard sandstone, ground water and sea water. The crew and machine sank a shaft of 12,000 mm for the first time – corresponding to the maximum possible outer diameter of the VSM. Because of local regulations, the shafts were lined with single shell, local concrete; prefabricated lining segments were not permitted. Step for step, two metre high shaft rings were being lined, covered with concrete, separated and finally – carefully sunk through the immersion unit.

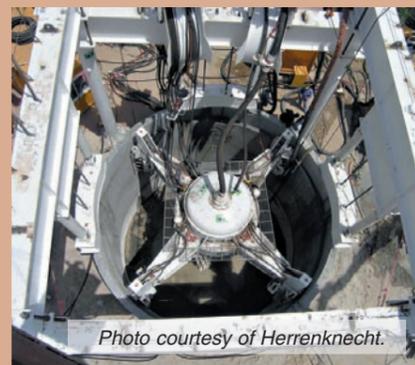


Photo courtesy of Herrenknecht.

Changing the oil pipe



Pipe ramming is becoming a popular technique in this region of the world. Aramco Oil Company contracted Faysal M. Qahtani Sons Co. for Trading and Contracting to lay an oil pipeline. The trenchless subcontractor was Directional Drilling.

IAN LOGAN OF Directional Drilling, working in the Middle East region, investigated the advantages of pipe ramming. The project involved a 30 inch, 450 mm diameter pipe replacement using ramming, 110 metres under the main highway between Dammam and Riyadh. Directional Drilling chose the TT-UK Taurus Grundoram machine to complete the works.

The equipment was prepared and shipped to Damman followed by an engineer to assist in the commissioning of the Taurus onsite.

A sacrificial, 30 inch steel casing pipe, previously installed by augur boring, was to be rammed out. This was achieved by welding new 12 metre individual pipe lengths attached to the existing sacrificial pipe through a specially fabricated steel pipe-pup to allow attachment of the Taurus.

After each pipe length was installed the next length was lowered for welding, followed by x-ray and epoxy coating. Average pipe ramming speeds were in excess of 23 metres per hour, excluding stoppages between welding and preparation. Mr Logan said he was delighted with the powerful performance of the Taurus and it will be used on many under-road crossings to be carried out in the Middle East in the future.

Project: To pipe-exchange an installed 30 inch sacrificial steel casing, replacing it with a new 30 inch oil pipeline 110 metres under a main highway in Saudi Arabia.

Machine: Taurus Grundoram
Diameter: 450 mm



Shuwaikh sewer project

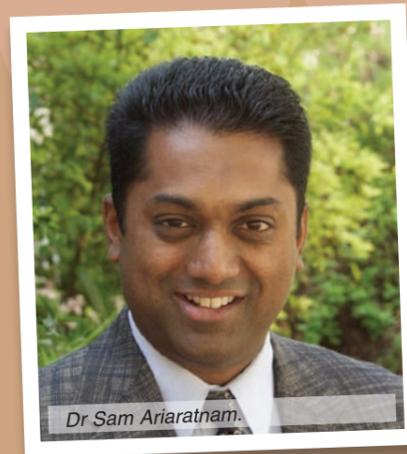


One of the world's biggest sewerage projects in Kuwait required a shaft sinking machine in order to create four start and target shafts for microtunnelling projects.

In this region, where due to the proximity to the Persian Gulf, the ground water level is only three metres below the earth's surface, the shaft construction posed a particular challenge.

A Herrenknecht shaft sinking machine VSM 8000 was successfully deployed. The machine was developed in co-operation with the client KBC Greenline and sank four shafts to a depth of 15 – 27 metres.

Machine: VSM 8000
Ground conditions: sand, cement sand, loam and limestone
Diameter: 8,800 mm
Cutterhead power: 315 kW
Torque: 55 kNm.



Dr Sam Ariaratnam

Keeping traffic on the move in the Middle East

In February 2009 Dubai will host the Middle East's premier Trenchless Technology event.

TRENCHLESS MIDDLE EAST 2009 will include a three day conference and two day exhibition, incorporating a Trenchless Technology Masterclass. The objective of the conference is to provide local utility engineers and related professionals with detailed information on the latest techniques for the non disruptive installation and rehabilitation of pipelines and pipe networks.

The conference program and ISTT

Masterclass begins on 16 February with an introduction to Trenchless Technology by ISTT Chairman Dec Downey. Masterclass sessions will also be hosted by Executive Director of the ISTT John Hemphill examining typical defects found in sewer pipelines.

ISTT Vice Chairman Sam Ariaratnam will present a session on pipe bursting applications and provide an overview of the various techniques and applications of the technology. Dr Ariaratnam

will also discuss a HDD case study.

The Exhibition will be open on 16 and 17 February, showcasing equipment and services from the leading suppliers from around the world. Exhibits will include HDD, pipes and pipeline products, pipeline renovation and rehabilitation, high pressure cleaning, leak detection, CCTV and much more.

On day three, delegates will be invited to join the site visit program to see utility contracts in progress.

Register online at www.trenchlessmiddleeast.com

Water is life



The Haya Muscat Wastewater Master Plan, a portion of the Muscat Wastewater Scheme Project, is a huge investment in time and money. The project will rely on trenchless techniques to install pipes and services in densely populated areas.

The Muscat Wastewater Scheme Project consists of planning, design and construction of needed wastewater infrastructure for the Muscat Governorate in Oman. This project started in April 2003 with the design work for the sewerage network and treatment plant. The overall development plan is divided into 3 phases and it is intended to serve 80 per cent of the Muscat population by the end of 2014 and 90 per cent by 2017.

The Oman Wastewater Services Company recently renamed itself Haya. The company's Chairman Omar bin Khalfan Al Wahaibi said "Our new brand name resembles the life we bring back to the community through recycling wastewater to help in the birth of a new botanical environment."

The role of CCTV in pipeline rehabilitation programs

Billions of dollars are spent worldwide every year on the rehabilitation of wastewater systems. This work for the most part is determined by a condition assessment, which in turn is based on the data collected during an investigation. Steven Apeldoorn explains the role that Closed Circuit Television (CCTV) pipeline inspections play and what information can be obtained as part of a rehabilitation investigation program.

A CCTV INSPECTION provides information about the condition of a pipe through the eyes of the camera lens; a 2D view of the inside pipe surface above the water level. This technology is perhaps the best inspection system available because of the breadth of information that it can provide, wide availability, cost-effective use and easy-to-understand output.

A CCTV investigation provides multiple levels of inspection including identifying the general information and conditions of the pipelines investigated as well as prioritising pipes for further rehab investigation. On a second level, the product can focus on the defects and features of specific lines for an appropriate rehabilitation design for each pipe.

Identifying pipe information

CCTV inspection is a very good means of identifying information about the pipe system. This information can be used for planning a rehabilitation project by helping utilities better understand their system and to determine the general condition of the pipes inspected, and enabling the works to be prioritised.

Figure 2 provides an example of the information captured on a CCTV log sheet. This information identifies the pipe and its attributes, and can be used to update utilities' GIS and asset management databases. This data includes:

- Connectivity; identification of the upstream and downstream manholes
- Location; identification of the position of the nodes
- Laterals; identification and confirmation that the status – live or dead – of the laterals and their connectivity
- Length; confirmation of the length of the pipe
- Material; confirmation of the pipe material
- Diameter; confirmation of the pipe diameter

Most CCTV data management software systems will automatically calculate the grading of the pipe from the observations

recorded. This is designed to provide an assessment of the overall condition of the assets in the system, as well as a trigger to indicate possible problem areas for further intensive study. In addition, it allows an indication of any changes in condition from previous inspections.

Identifying defects

CCTV can also be utilised as a more focused rehabilitation planning tool by identifying and qualifying the defects and service problems in each pipeline to produce specific rehabilitation designs. To obtain quality information, certain issues need to be considered.

The first pertains to the level of skill required for the camera operator, as CCTV relies on the skill of the camera operator for both recoding observations and capturing an image of the pipe that allows suitable diagnosis of any defects. The second refers to different materials presenting different types of defects. It is important to consider the type of problems that could be expected and whether additional inspection methods are needed to complete the investigation.

CCTV versatility

CCTV inspections cannot prove that a pipe does not leak if there is no evidence of leakage available, however at the North Shore City Council in Auckland New Zealand, CCTV is being used to identify leaky private laterals.

The council was hydrostatically testing private wastewater service connections to identify pipes that allowed leakage into the system, but the testing posed a few problems. The testing was expensive to undertake and could only test the service connection up to the lowest gully trap. Furthermore, property owners found the test results hard to understand and were not sure which sections of pipe required repair.

The council therefore decided to rely solely on CCTV inspections for determining whether pipes were acceptable or

not. A grading system was developed by adjusting the standard condition rating scores – from the New Zealand Pipe Inspection Manual – for each defect code to reflect the impact it had on the leakiness of the pipe. Applying scoring analysis, property owners were required to repair drains with peak scores above 15 or a mean scores above 0.5. Trialling this system found that it gave similar results to hydrostatic testing.

Limitations of CCTV

A CCTV image provides qualitative information on the pipe condition, but not quantitative information. Therefore, the technology has some limitations as to what information it can provide that is necessary before conducting an investigation.

For example, CCTV technology cannot provide information beyond the inside surface of the pipe being inspected – it cannot provide information on the condition or thickness of the pipe wall material, nor can it determine whether there are cavities behind the pipe wall – unless it is visible through an opening in the pipe wall. In addition, the product cannot measure the dimensions of a defect or pipe attribute or accurately determine any loss or deformation of the pipe surface.

In short, CCTV inspections rely on being able to clearly see the pipe and the presence of 'evidence' – such as displacements, roots or infiltration – to determine the severity of most observations.

Developments to overcome limitations and improve diagnosis

Since the introduction of pan and tilt cameras, there has been some significant developments of camera and software technology that extend the capabilities of CCTV inspections.

The development of the digital CCTV camera has made significant improvements to the quality and amount of information available through digitising the images and allowing the measurement of



defects and intelligent analysis capabilities. Certainly, digital camera technology is the way of the future and eventually will leave analogue video to disappear the way of VHS tapes.

Pipe wall loss or the deformation of a pipe can be identified by CCTV, but the visual evidence generally needs to be pronounced for it to be seen. Deformations in non-flexible pipe are usually easy to see due to characteristic longitudinal cracking, however quantifying the severity of wall loss or pipe deformation in flexible pipes is very difficult. Increasingly, laser profiling equipment is being utilised in conjunction with CCTV inspections, giving a third dimension to CCTV images.

Similar to the laser profiling equipment, sonar technology is also becoming a more common tool in applications where

flow within a pipeline is significant and an image below the water surface is needed.

Measurement of pipe defects

The IPEK Supervision camera provides an advancement more commonly available and at a similar cost to a standard CCTV inspection. Whereas picture distortion and magnification on a standard CCTV image makes measurement of pipe defects entirely inaccurate, the supervision camera operates with the addition of two inbuilt lasers that project straight beams of light onto the pipe surface. The beams are positioned 45 mm apart, providing reference distance within the video picture that can be used to calibrate measurement equipment.

CCTV inspections have the ability to identify the majority of pipe defects that could be expected to be encountered, including:

- Cracks
- Internal corrosion
- Joint displacements
- Open joints
- Excessive pipe deflection or dips
- Pipe intrusions
- Joint leakage
- Grease & debris build-up
- Root intrusions
- Lateral connection/leakage

When analysed with the Cleanflow Laser profiling software – the same software used for profiling – it is possible to reliably measure to accuracy of up to 0.1 mm sensitivity; enough to easily measure crack widths. Open joints are possible to be measured off the screen with a scale rule. See page 44 for further information.

CCTV is the most versatile inspection method available for rehabilitation investigations. New technology is becoming more readily available that either will enhance the information that we can get from CCTV, or in the near future improve its capabilities to overcome a number of current limitations.

Consideration needs to be given to ensure operators and engineers are suitably skilled to capture and interpret the information gathered. The limitations of CCTV inspections must also be understood so that additional investigations may be undertaken in order to provide quality information for the rehabilitation program. ☺

Steve Apeldoorn is a director of ProjectMax New Zealand, providing consulting and project management services to local authorities and utility services.

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Pipeline inspection goes digital

The digital sewer pipeline inspection survey system has been successfully demonstrated on a project completed for Helsinki Water.

HELSINKI WATER HAS been a client of DigiSewer® for some time, with over 300 km of its sewer pipe network having already been surveyed using the technique. The recent project comprised the inspection of five kilometres of sewer pipe of between 300 mm and 500 mm in diameter, which included PVC, concrete and clay pipe materials.

Only five working days were required from the beginning of the survey work to the completion of the data collection. In conjunction with this efficient data collection period, a full analysis of the data was completed in only four hours. The entire survey, from the inspection run to the presentation of the completed and analysed survey on DVD, was achieved in five and a half working days. Such an accomplishment could not have been expected using any of the traditional CCTV survey systems available today.

Digital technology

The DigiSewer system comprises a 360 degree scanning camera mounted on a robotic, remote-controlled, wheeled tractor. The tractor travels through the pipe at a constant speed. The camera continuously scans the pipe's inner surface creating a series of adjacent section views covering the pipe's circumference. Specially developed computer software processes these scanned sections and stores them for further analysis as a single complete record of the survey run.

The software is capable of automatically recognising pipe joints and lateral connection positions within the survey data, which are highlighted in the stored data. Pipe defects can be subsequently viewed by an analyst quickly and efficiently, immediately after the survey is completed.

The continuous scanning technique of the DigiSewer at advance speeds of around 13 metres per minute has automated data gathering and storage. This technology eliminates the potential for human error that can occur with more traditional surveys that requiring the survey to be stopped by the operator in order to inspect suspect defects during the course of a run. It also eliminates the potential for defects to be overlooked should an operator be distracted during the observation process. There is also no requirement to pan, tilt or zoom the camera towards individual suspected defects as all relevant information is recorded on the single continuous pass.

This enables DigiSewer survey runs to be completed far more quickly than is possible with conventional CCTV surveys. The automated data capture, at higher resolution than standard video recording, also ensures that the survey data is acquired with consistently higher detail than is achievable with standard CCTV survey techniques. This in turn ensures that, once the survey run is complete, the data analysis is easier, faster and of a higher quality than that of traditional inspection systems.

Data Presentation

The digital format of the inspection data collected allows the survey results to be manipulated and presented in a variety of ways, simultaneously. This reduces significantly the number of man-hours required for the manual analysis of the data by eliminating many hours of unnecessary video footage observation by the analyst. As well as the standard forward view of the pipe being surveyed, the built-in DigiSewer software generates a full pipeline view from the start of the survey section to its end in a single picture.

The software also allows the analyst to zoom in on any point along this survey for a closer inspection of any suspected defect. This zoom view can be displayed alongside the whole pipe view. Joint and lateral positions are automatically displayed on these views, so that other potential defects can be easily recognised at other positions along the pipe length. The software also allows the data to be marked, commented on and restored immediately on screen. Up to five kilometres of survey data can be recorded manipulated, marked and commented on using a single DVD. The DVD can be presented to the end user with free viewer software for easy access.

High value results from high value data

As the survey run progresses, the scan data is automatically stored in a format that can be 'unwrapped' by the image processing software. Therefore, individual and adjacent scan sections can be strung together to form a continuous, single, full survey length, two dimensional image of the pipe's inner wall.

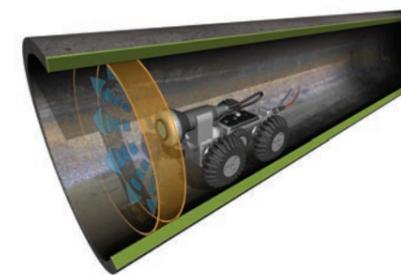
The presentation screen offers full pipe survey length; forward and side scan views of the pipe wall scan sections. This enables an analyst to process the survey data quickly and easily and to pinpoint defects that have not been automatically highlighted as either pipe joints or lateral connections. Analysis is quicker and easier and the software allows comments and measurements to be made at each defect which are then stored as part of the base data. The software also allows the analyst to pan, tilt or zoom on the images to take a closer look at potential defects,

subsequent to the survey data being collected rather than during the survey itself. This is a major time saving solution for the survey operation.

The system also carries a built-in inclinometer which records the slope of the pipeline at all points during the survey. The data recorded by this unit is displayed alongside the scan data to show the analyst the inclination of the pipe at any given point and over any length of the pipe. This highlights any troughs or humps in the pipeline that may cause flow problems. The data produced by DigiSewer has been designed to integrate with and provide instant data access via most, if not all, commonly utilised sewer survey reporting software, particularly those based on WinCan V8. The data field requirement itself is designed to be as compact as possible in order to minimise storage requirements and to enable electronic transmission of the data within an acceptable time frame. For example, inspection data from a survey of up to five kilometres in length can be stored on a single standard DVD disc, as compared to around 700 metres for traditional video recording.

DigiSewer efficiency vs traditional CCTV survey

The primary Rovver tractor system together with DigiSewer, using a single camera, can complete conventional



CCTV surveys as well as DigiSewer operations. As compared with traditional CCTV surveys the volume of data produced by DigiSewer, which utilises DSP video technology, is low, making it possible to store large surveys on a single DVD. The software for DigiSewer utilises an industry standard reporting system, such as WinCan V8. This means that little, if any, retraining is required for operators or analysts to interpret results and produce the required reports. This, alongside with the automatic recognition of joints and lateral positions, ensures that the DigiSewer operation is efficient and cost effective, with significant time savings as compared with traditional CCTV interpretation.

The continuous data collection achieved by traversing the camera unit through the survey pipe at constant speed also means that stoppage time for individual defect analysis is eliminated making further time savings. Pan, tilt and zoom functions for closer defect inspection is

achieved electronically at the analysis stage. Surveys are completed onsite more quickly, thereby reducing, if not eliminating, local disruption to traffic, businesses and everyday life.

Where a defect is suspected, the software also allows an instant zoom on the point in question without having to run through lengthy video footage. At this point the software also produces a side view and front view of the suspected defect position, enabling a fuller analysis. The analyst can then add highlights, comments and remarks on screen, all of which are added to the base data scans and stored for future reference by client engineers. Once the data is presented to the client, further comments, pan and tilt viewing and zoom can be carried out by the client's engineers as required for their own maintenance and rehabilitation programs, without the need to refer back to the survey company.

Measurements can also be made on screen to determine the size and shape of a defect. All such measurements can be linked directly to the reporting software output. The inclination of the pipe at any point is also displayed using data from the built-in inclinometer within the DigiSewer system. The DigiSewer saves time and provides better information to make more accurate decisions, making it a smart investment into future technology of automatic video analysis. 



Helsinki Cathedral in the centre of Helsinki, Finland.

FROM THE SURVEY CONTRACTOR VIEWPOINT THE ADVANTAGES OF DIGISEWER INCLUDE:

- Faster than standard video inspection — more meters per day so cost-effective
- Analysis is faster than reviewing video or printed reports, so more efficient use of time. Complete — all data on a single view, not just pictures of the observation
- Accurate (all measurements are accurate to within one mm).
- Can measure and remark on screen
- Collects several types of data at once
- Less data — five kilometres on single DVD or even more on removable memory
- Automatic joint and lateral observation recording
- The same equipment can be used to perform standard CCTV surveys.

Lasering in on CCTV

Companies around the world are discovering the benefits of laser profiling to test the ovality of pipes.

R&D - the thinking behind the product

CleanFlow Systems Product Engineer Tim Renton said the Profiler was designed to remove the subjectivity from current standard CCTV inspections, especially in the areas of plastic pre-adoption ovality, and concrete corrosion assessment.

The Profiler provides real data that can be measured, providing authorities with absolute information about the condition of their underground assets. Once the data has been collected and analysed the engineers can decide on whether to adopt the line or the best course of action for the rehabilitation of the line.

The range adapts to most existing conventional CCTV inspection covering the widest pipe sizes using both laser and underwater sonar systems. The system uses smart software with the operator processors the measurement data. The large pipe laser profiling units are capable of scanning pipes from about 30 centimetres to three metres in diameter.

Corrosion in wastewater lines can now be caught before the reinforcing bar is exposed, once the reinforcing bar has been exposed the cost of rehabilitation increases dramatically. With regard to pre-adoption of plastic lines, lines that do not meet the authorities guidelines need to be replaced at the contractors' expense – preventing costly delays once the lines have been put in service; this is especially evident when it comes to

storm water lines running beneath highways in the United States.

Lanes for Drains

The team at CleanFlow trained Lanes for Drains, an inspection and rehabilitation Company in the UK, purchased the Profiler systems.

Lanes for Drains Operations Director Alan Wallis said that the profiling systems will considerably expand the opportunities and applications for the company's CCTV crews.

"For our clients, it means that they will have precise figures to calculate the capacity and flow in a given pipe whether they need it for health and safety, environmental, industrial or commercial reasons.

"The Profiler will be especially valuable to the reline teams when they are assessing liner thickness requirements. For the first time we will know to the millimetre the diameter of a pipe and whether there are any variations to that along its full run."

Profiling North America

The Florida Department of Transportation has specified since 2006 that all pipe projects with diameters from 20 to 120 cm must be verified for ovality by a laser profiler before the contract can be handed over. The Arizona Department of Transportation requires ten per cent of jobs to be similarly scanned.

PipeFlo Contracting Corp. of Hamilton, Ontario Canada, owns one of the province's first large pipe laser profiling units, purchased from CleanFlow Systems.

President of PipeFlo Bruce Noble said "We've had the unit for maybe four or five months, but we've already used it for contracts in Hamilton and Ottawa. We're probably the only contractor in the province that can profile big pipes."

Noble says that the technology is becoming more relevant as more and more flexible pipe is used in infrastructure projects.

"Polyethylene and PVC pipe can distort after backfill and we can go over that pipe before it's put into service. That's what's driving the demand for us. People are saying, 'prove to me that the pipe hasn't squashed on us.'"

Future development

Mr Renton said there are currently about 300 Profiler systems in 32 countries around the world. "The largest current markets are in Germany and the United States. However there is a growing demand for corrosion assessment especially in large diameter pipes."

CleanFlow Systems, based in New Zealand, plan to release Version 7 of the Profiler software in early 2009 expanding on the Profiler analysis tools. It will also give users the ability to produce high definition report videos that combine inspections and graphs. 



HDD successfully crosses Ok Tedi River

Ok Tedi Mining contracted Coe Drilling to undertake the Ok Tedi River crossing project, entailing the construction of a 500 metre long DN 200 steel mine waste tailings pipeline beneath the Ok Tedi River to transport the mine waste to a newly constructed tailings dam on the west side of the river near Bige in Papua New Guinea.

THE OK TEDI Mining Operations consist of the mining of copper orebody at Mount Fubilan in the northwest corner of the Western Province of Papua New Guinea, and the treatment of the ore to the form of copper concentrate.

The Ok Tedi porphyry copper deposits form the core of Mount Fubilan, in a remote area of dense rainforest approximately 18 km east of the international border

with the Indonesian territory of Irian Jaya.

The Ok Tedi Mining Operations area lies on the south side of the central mountain ranges, and is an area of high relief and dense vegetation. The highest peak in the vicinity has an elevation of 3,138 metres and there are many peaks in excess of 2,000 metres. The catchment area in this region is drained by

the Ok Tedi River, which is one of the principal tributaries of the Fly River flowing south into the Gulf of Papua.

Accessing the site

Mobilisation of the HDD equipment including the Coe Drill 180 HDD rig, from Brisbane to the site was completed using the Kiunga Chief, an Ok Tedi Mining vessel, via the Fly River, which is a major

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waterway and is navigable from the Gulf of Papua 865 km to Kiunga.

Kiunga also has an unsealed airstrip that the crew flew in and out of, permitting direct access to Port Moresby and other centres by air. From Kiunga to Bige, road transport was used to transport the HDD spread comprising 14 trailer loads. Camp facilities were provided at the HDD site by the client.

Soggy conditions

The dominant characteristic of the mining operations area is its high rainfall. Annual values in excess of 14,000 mm have been recorded and the mean annual rainfall varies from 4,700 mm at Kiunga, increasing to 7,000 mm at Ningerum, to 8,200 mm at Mount Fubilan and 11,900 mm at Lake Wangbin, 5 km northeast of Tabubil.

The distribution of rainfall throughout the year is relatively uniform with the driest month being September and March as the wettest month with a mean of 819 mm. Records show that the site can expect rain in the range of 312 days to 349 days per year.

Rocky river

The geology in the vicinity of the river crossing was dominated by the presence of river gravels over cobbles and boulders to a depth of 25 metres, below which siltstones and sandstones dominate.

The presence of the river gravels over cobbles and boulders presented difficulties for standard HDD construction methods and required an innovative approach in order to successfully complete the crossing.

The HDD process

Coe Drilling planned and successfully installed steel conductor casings on both the east and west banks of the Ok Tedi River, using a Terra pipe ramming hammer to install the steel casing and flight augers to remove the spoil from within the casings. Seventy-five metres of 508 mm diameter 20 mm width steel casing was installed at each side of the crossing.

The entry side casing was installed down to bedrock and after being cleaned out by the augers, the pilot hole operation commenced using a 9 inch TCI Rock Bit driven by a 6 3/4 inch Mud Motor. Downhole survey control was provided using a Tensor Magnetic Guidance System. The pilot hole was completed through the gravel/cobble and boulder overburden material and once the pilot hole was completed the downhole drilling assembly was removed and sections of

the 508 mm 20 mm wt steel casing was driven into the borehole, guided by a stinger attached to the drill pipe. Once the casing was installed, an auger was attached to the drill pipe and the HDD rig was used to rotate the augers and flight augers to remove the soil ready for the hole opening. The borehole was completed by backreaming using a standard 18 inch split bit hole opener.

In order to ensure the integrity of the pipeline coating system during the pipeline installation HDPE casing liners were inserted into both entry and exit conductor casings to protect the coating, which was subject to a cathodic integrity test after installation of the pipeline.

The project was installed successfully to the satisfaction of the Ok Tedi Mining engineering staff and is evident of good planning, procedures and execution of a difficult HDD in a remote location. ☺

PNG FACTS

The island of New Guinea is the second largest island in the world and comprises, in the western portion, Irian Jaya, which is a province of the Republic of Indonesia, and in the eastern portion, the Independent State of Papua New Guinea.

Papua New Guinea lies wholly within the southern tropics and has a total land area of 461,693 square km including numerous offshore islands, the most important of which are New Britain, New Ireland and Bougainville. The central core of the main island of New Guinea comprises a massive cordillera some 2,500 km from west to east and is one of the world's great mountain systems.

The population in Papua New Guinea is approximately 5.19 million people, predominantly Melanesians. Some 85 per cent of the population live in rural areas, mainly in small communities.

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Overcoming obstacles under roads

The overcrowded A1 motorway between Hamburg and Cologne, in Germany, is currently the focus of construction work, underground works are conducted in conjunction with the road works to minimise disruption to traffic.



THE UPGRADE TO a three lane motorway is almost complete with general renewal work underway, numerous motorway exits and merging points are also required. The road works are in various stages of construction.

Sound barriers are being built over a distance of two kilometres from the merging section of Cologne-West towards Dortmund. Pipe installations were planned in conjunction with the road works as they would be difficult to achieve at a later date.

HDD ingenuity

Utility company Rhein Energie AG in Cologne opened tenders to establish two parallel bores running over a 138 metre length below the A1 at the motorway exit Cologne, Lövenich. The first bore was for a protection pipe OD 450 mm to accommodate a 255 mm potable water pipe. Two bundled 160 mm cable protection pipes were to be pulled into the second bore.

The company Steinbrecher from Rheine, Germany was awarded with the contract. Steinbrecher assigned the company HDD bore specialists ME Meischen from Nerstedt, Germany to complete the project.

The motorway section, where the bore was planned, cuts almost nine metre deep into the landscape. Foundation remains from an old pedestrian bridge are buried about five metre below the road surface. The exact depth of the foundations was not known before the boring commenced.



Pulling in the 450 mm protection pipe after the 1st pilot bore.

Furthermore, about 40 metre away from the starting point for the bores, 6 metre long I-beams were already rammed in place approximately every two metres for planking.

In the difficult pebbled soil, ME Meischen set out to use an MDH-bore head and a drilling fluid adapted to the soil conditions. A machine type Grundodrill 15 N, manufactured by Tracto-Technik in Lennestadt, with an almost 20 tonne pulling force, was utilised for the bore.

ME Meischen had owned the Grundodrill 15 N for only four weeks. Bore team leader Mr Hildebrandt said "There is

loads of performance potential inside this machine, which can clearly be seen on this jobsite."

The very busy motorway was not accessible and so a Digitrac detection system with a remote transmission monitor was used to plan the bore path. Direction measurements and control of the bore path could only be carried out to the edge of the roadway. The receiver was set up on the opposite side of the road and used practically as an electronic target disc. Controlling the data was carried out directly via the operator on the bore rig, who was able to keep to



Jobsite overview.



Pulling in the 160 mm HDPE protection pipe after the 2nd pilot bore.



The HDD system Grundodrill 15 N during the pilot bore.

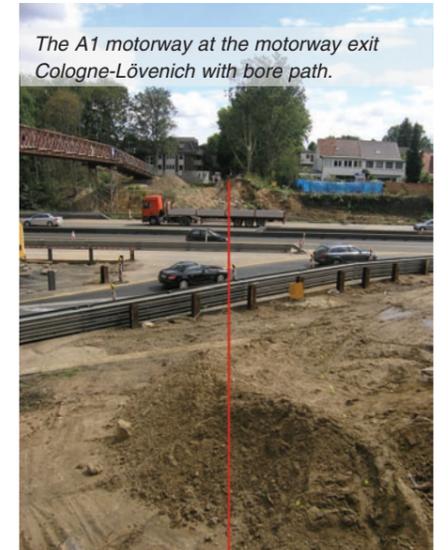
the bore path despite the limited range of the receiver.

The first bore reached the expected target point, despite all the obstacles. However, later the contractors discovered that the distance to the I-beams was insufficient with an expander diameter of 640 mm. After a discussion onsite it was decided to drive further below the I-beams and the foundations of the old pedestrian footpath.

ME Meischen was relieved that it was not necessary to pull back the complete

set of drill rods. Mr Hildebrandt was able to leave the existing bore path at the halfway point and make the required alteration. At approximately eight metres depth, the bore path between the foundation and the target pit on the other side of the motorway was inevitably a steeper exit angle over the last 30 metres than previously expected. Due to the confined conditions it was not possible to move the target pit to another area.

The pilot bore was expanded to 350, 480, 560 and 640 mm in succession.



The A1 motorway at the motorway exit Cologne-Lövenich with bore path.

The pipe installation was carried out with a 570 mm backreamer. The weight of the welded 12 metre pipe length was approximately 12 tonnes. The pipe was installed in four hours, including another welding process, which was required as the tight space prevented the pipe from being laid out.

The 300 cubic metres of drilling fluid was later extracted by a local farmer and spread over his fields.

With the experiences gained from the first bore, the second pilot bore could be started after an almost six week break. The bore unit Grundodrill 15 N was now placed in the exact opposite position than initially planned. The reason for this was the proximity of a 700 mm oil pipeline, which required a safety distance of at least five metres.

The obstacles in the bore path were now well known, so the pilot bore was almost a routine job. Due to the tight conditions on the target side it was not possible to pull in the 160 mm pipes bundled together, they had to be pulled in individually, one pipe directly with the expander and the other one immediately following.

After successful completion of the bore and the pipe installation Mr Hildebrandt commented "They were really not easy bores to accomplish and we learnt a lot from these!"

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Specialised design considerations for liners in gravity flow pipes

Many successful lining processes are in use around the world. Ian D. Moore, PhD, PEng Professor and Canada Research Chair, GeoEngineering Centre at Queen's – RMC, Kingston, Ontario Canada, discusses the latest research findings on the design considerations for liners.

A NUMBER OF repair processes are available that have been proven in the field, including cast in place liners, grouted slip liners, deform-reform systems, and helically wound liner systems (with or without grout). Each of these has advantages and disadvantages, and the choice of the best liner system for a particular rehabilitation project will depend on a variety of factors. For example, slip liners are often the lowest cost option for larger diameter sewer and culvert repairs, but require access from at least one end so that the preformed pipe structure can be inserted. Wound into place liners are possible in small and large diameters, and while these often need to be grouted, this may allow full bonding of the liner to the grout. Deform-reform systems provide many of the advantages of slip liners (a preformed liner of controlled thickness and material properties), but these may be unsuitable for heavily damaged installations or for use around bends. Cast-in-place systems can provide a close-fit liner of low cost in many instances, even when access is very restricted.

Liner design methods are established for these processes, and can generally be used with confidence. A number of circumstances arise, however, when a rehabilitation design specialist should be consulted, because the codified design methods may not provide safe or effective liner designs. These cases are the principal subject of the remainder of this discussion.

International studies – advancing understanding of liner performance and design

Over the past decade, significant advances have been made in our understanding of liner stability and the issues influencing design. Experimental work in the USA,^{5,8} the United Kingdom^{1,13} and in Canada^{6,7} has provided physical evidence for liner resistance to external water and earth loads. Theoretical work in Europe^{1,4,15} and in North America^{2,3,6,16} has explained the role of initial liner geometry (including imperfections in the circular shape) and other factors on liner buckling strength and the minimum liner thickness,



Professor Ian Moore.

and the manner in which earth loads can control the maximum permissible liner thickness.

Liner shape influences resistance to external fluid pressure

Liners can buckle under the external pressures that can develop on the liner due to groundwater or during grouting. Work by Khaled El Sawy^{2,3,10} in the 90s provided a key breakthrough in our understanding of the factors controlling this phenomenon. His studies revealed that liner buckling was sensitive to imperfections in the circular shape, and this work explains the test data that had been mystifying experimentalists working on this problem. We considered three different kinds of geometrical characteristics. Globally noncircular shape, initial gaps between the outside of the liner and the inside of the sewer or culvert being lined, and any initial wrinkle or waviness around the liner circumference can all degrade stability.

Noncircular shape has been discussed in design standards for some time, through consideration of elliptical (or 'oval') shapes. Often, the oval or other noncircular shape results because the sewer or culvert was not initially circular. For example, egg-shaped structures are common in various parts of the world.¹⁵ Alternatively, flexible sewers and culverts deform under the external earth loads and can become noncircular. Even nominally circular rigid pipes have initial out-of-roundness. Noncircular geometry can initiate or be exacerbated by deformations

that occur due to deterioration.¹² Erosion voids can form in the backfill surrounding a rigid or flexible pipe due to ingress of water through joints, or through perforations in the wall caused by corrosion.^{13,14} These erosion voids can then lead to significant deformations and increasingly noncircular shape in flexible structures. Rigid sewers experience increased bending moments and may fracture and deform as erosion removes ground support at the sides.¹⁴ Current ASTM design, for example, covers only elliptical shapes, and care should be exercised when using these provisions for sewers of other geometry (egg-shaped structures are particularly vulnerable to buckling along their almost flat sides). Design procedures are available to account for these more challenging shapes.¹⁵

An initial gap between the outside of the liner and the inside of the old sewer or culvert decreases the amount of external support and stability provided to the liner by the old pipe.² The gap may result from shrinkage of the resins used in cast-in-place liners, or as a result of initially loose fit (before grouting) of slip-liners and helically wound liners. Even if the gap is eliminated by grouting, the size of the gap can limit the grouting pressures that can be used. The design of the rehabilitation process should then consider how loose fit influences the potential to buckle under external grouting pressures.¹¹

Wrinkles or 'waviness' in the liner reduce buckling strength, because, in essence, the liner then starts with a shape that is like a potential buckle.^{3,10} This then decreases the amount of external fluid loads needed to induce buckling collapse. Wrinkles can result from the shape of the structure being repaired. For example, if the rigid pipe being repaired is damaged, and it has longitudinal fractures at the crown or invert, a cast-in-place or deform-reform liner with close fit will likely develop a wave or wrinkle where they cross these features.¹² Wrinkles or wavy imperfections can also result from the lining process itself. For example, deform-reform systems using folded thermoplastic (high density polyethylene or polyvinyl chloride) liners often feature a permanent

crease or wrinkle after inflation, a vestige of the fold-line. Wrinkles or waves can also develop when the liner has excess length (the external perimeter of the liner exceeds the internal perimeter of the pipe being repaired), and they sometimes occur when the liner is installed around horizontal curves. Installation of liners over obstructions, such as fibre optic cables installed along the sewer-liner, will also induce a wavy imperfection.

Liners experience local bending if they deform after insertion

The role of liners in supporting external soil loads has been the focus of considerable debate for over a decade. Some designers have concluded that the liner could be designed as if it were placed directly in the surrounding soil, and thickness chosen to resist the resulting stress, strain, or tendency to buckle. Others designers have recognised that the old sewer or culvert continues to provide support to the surrounding soil, and they concluded that no soil loads reach the liner. Experiments and analysis by Michael Law earlier this decade demonstrated that a liner placed within a rigid pipe before it fractures will experience local bending at the crown and invert if soil erosion or some other deterioration process causes the old sewer to fracture and deform.^{6,7} However, a cast-in-place liner placed inside a previously fractured and deformed sewer may not experience local bending if the use of the liner stops any further sewer deformation resulting from soil deterioration. A simple but effective design methodology for ungrouted liners has been developed,⁷ where local bending strains are calculated as a function of possible sewer deformations, and these lead to limits on the maximum allowable liner thickness (since local bending strains actually increase as liner thickness is increased). Bending strains have also been considered in grouted liner systems, considering the possibilities of composite or independent action of the liner and the grout (depending on whether slip occurs along the liner-grout interface).⁹ Other work is considering the effect of soil voids on the liner response to earth loading, and strategies are being developed to incorporate these issues in considerations of sewer damage obtained from closed circuit television or other pre-rehabilitation inspections.¹²

Summary

Sewer and culvert repairs are undertaken on a regular basis in many international jurisdictions, and conventional liner design methods generally provide safe and effective liner design choices. Specific cases

where more care is needed and an expert in liner design needs to be consulted include applications where there is non-elliptical shape, where the existing sewer is severely damaged, or where the soil has deteriorated significantly outside the structure. Care is also needed when the liner construction process results in significant gaps between the liner and the old sewer, or wrinkles or waviness is expected or observed to occur around the liner circumference. The liner research community has developed a wealth of new understanding and computational tools for use by these liner design experts, which can enable experts to resolve most geometrical or other difficulties. 



Grouting the gap left outside an HDPE slip-liner used to repair a corrugated steel culvert in Eastern Ontario.



A damaged clay sewer in Toronto, Ontario, showing noncircular shape due to deformations after fracturing; wrinkles (wavy imperfections) can develop in the liner where it extends over cracks at the crown and invert (obscured by wastewater).



Strip winding a culvert liner prior to grouting the gap outside the liner; whether or not the repair produces composite action between the liner, the grout and the old culvert has a major influence on the strain expected in the grout and the liner (used with permission of George McAlpine).

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Repairing leaks with Platelets

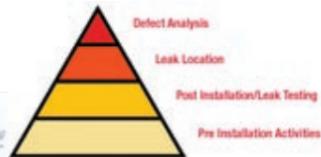


Yorkshire Water in the UK has utilised innovative technology inspired by the human body to seal leaks without digging up pipes.

THE COMPANY PERFORMED a world first by repairing a leaking pipe from the inside using the new technique. The concept works by inserting Platelets® into a water pipe through points along the network to seal the leak from the inside without the need to interrupt customers' water supplies or dig up the road.

Originating from the medical concept of platelets in the human bloodstream, the technology has the potential to revolutionise the way leaks are repaired and reduce the impact on customers.

Head of Innovation at Yorkshire Water Simon Barnes said "We had already set ourselves the target of achieving zero interruptions and zero excavations in the highway by 2010 which meant we were on the look out for technology which would help us to achieve this."



Technological thinking

Brinker Technology conceived the idea for use in the oil and gas industry. The application to water supply networks has been developed in partnership with Yorkshire Water.

The development of a Platelet solution

utilises advanced engineering processes which include analytical and numerical modelling, flow loop and pressure vessel testing and material compatibility analysis, said Brinker Technology.



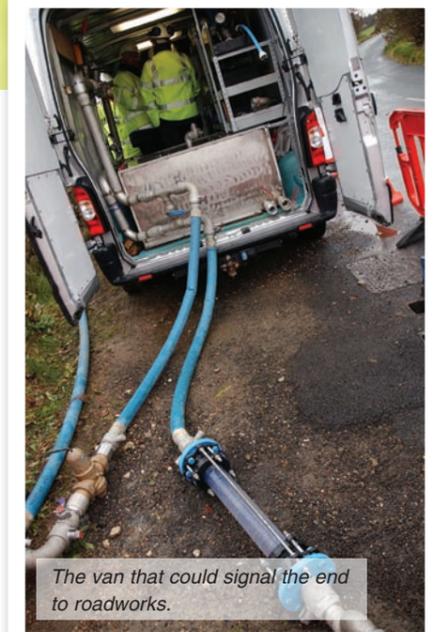
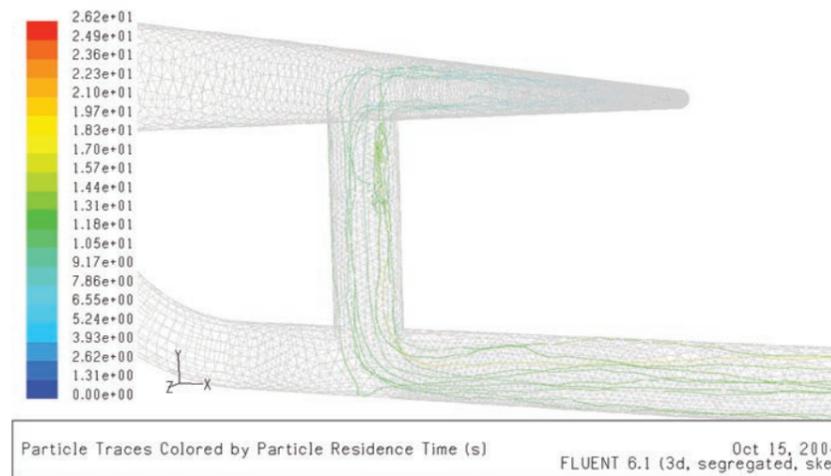
Leaking pipe.



Platelets being inserted.



Platelets before placed into water pipe.



The van that could signal the end to roadworks.

RELINING OPTIONS

January 2009 - Trenchless International



Current roadworks.

The technology has been used successfully in a number of oil and gas field applications in the North Sea. From the initial operation on a water injection line in BP's Foinaven field in 2004, successful operations have subsequently been carried out for other operators such as Shell and Norsk Hydro.

Repairing water lines

"We are trialling the technology now to understand its potential to repair different types of bursts. Because its use does not require us to dig holes in the road to get

to the leak, there are lots of benefits to be had in repairing difficult-to-access problems like those under busy railway lines or roads," said Mr Barnes

"The future benefits of the technology are huge; from the day-to-day repair of bursts to the reduction of leakage levels and holes in the road. It will bring the repair and maintenance of the water network into the 21st century.

The Platelets have undergone and passed stringent British Standard tests for materials that come into contact with drinking water and Yorkshire Water car-

ried out extensive consultation with Ofwat, the Drinking Water Inspectorate and the Consumer Council for Water before carrying out the trials.

Chair of the Consumer Council for Water Northern Andrea Cook said "We welcome this initiative which will make people's lives easier. There will no longer be a need to switch off a consumer's supply while work is completed and there will also be reduced disruption on the roads. We believe customers of Yorkshire Water will see this as a great benefit."



RELINING OPTIONS

January 2009 - Trenchless International

Rehabilitating Victorian-era shaft in London



Water authorities are responsible for maintaining and improving essential services to homes and businesses. The Thames Water operational area, covering London and the Thames Valley, has the greatest number of properties at risk of internal flooding in England and Wales.

IN A SCHEME to relieve such flooding in one of their catchments in Greater London, Thames Water joined forces with one of its principal contractors, Morrison Ltd, to find a way to radically alter the operational role of a 25 metre deep Victorian sewer maintenance shaft. This old, but well-maintained Victorian maintenance and materials shaft was built in the late 19th century. In the future, the shaft will be used as a combined sewer overflow backdrop shaft from a new DN750 overflow relief pipe from the local upsized sewer discharging into the Victorian Metropolitan Southern High Level Sewer No.2 some 20 metres below.

The projected lifespan of the rehabilitated shaft is at least a century; therefore Thames Water looked for a technique that was both technically mature and efficient. An unusual technical requirement was that only the middle 15 metres of the shaft were to be rehabilitated; the top and bottom five metres could be left as they were, once their stability had been checked.

Thames Water opted for the M-COATING process for the project, in conjunction with ERGELIT-KS1. The following prerequisites were crucial:

- High corrosion resistance
- High abrasion resistance
- Excellent bond with the sewer's wet clinker brickwork
- Optimum mechanical cleaning without operatives entering shaft
- Optimum mechanical coating of walls without operatives entering shaft
- Fast, efficient operation
- Highly experienced firm
- Internationally recognised qualifications
- Compliance with all relevant safety regulations
- Compliance with all applicable norms and directives
- Excellent references



Left and above: Shafts in London successfully rehabilitated.

After the contract had been awarded, a technical team from Habilitas – a company specialising in ERGELIT coatings – swiftly prepared for this unique assignment. In order to ensure rapid delivery of the 2,000 or so kilograms of coating grout calculated for the job, the engineers from HERMES Technologie prescribed a somewhat larger diameter hose-pipe than usual. They also increased the mixer's output by raising the dosing screw capacity to over 16 litres per minute. The grout pump would deliver 16 litres per minute. The winch line was upgraded to a 30 metre long 4 mm thick cable. All the technical prerequisites were now in place for a successful operation.

The crew consisted of four operators to handle the 2,000 kg of ERGELIT-KS1 required for coating, and to successfully guide the 20 metre of grout delivery hose weighing in excess of 150 kg when full of mortar. As the cleaning cycle began there was a little nervousness in the air, however, this quickly disappeared. The TSSR HP nozzle was adjusted precisely to the cross-section of the shaft, and the middle section of 15 metres was then jetted clean in two passes. By midday the cleaning cycle was completed and the condition of the walls was checked by CCTV.

Everything had been properly and thoroughly cleaned, the coating equipment as well as the hoses and cables were put in position and everything was connected. It was certainly unusual to be coating only the middle 15 metres of a 25 metre shaft, but it was a challenge that the highly motivated operators were happy to take on. Each man took up his position and the grout began to flow to the centrifuge motor.

After 45 minutes the centrifuge motor suddenly cut out. The experienced team thought things through and were able to solve a problem with the electrical connections. Slowly and smoothly lowering and raising the centrifugal sprayhead meant that the 25 metre deep shaft could receive a new, solid inner lining coat of ERGELIT-KS1, some 30 mm thick, between points at 5 metre and 20 metre down. At this consistency, the grout was workable for about 30 minutes.

At the edge of London, while the public remained completely unaware, another page in the history of the M-COATING and ERGELIT Dry Mortar partnership was written. All observers on the client's side were impressed and satisfied with the nine-hour long operation.



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Mr Kitching goes to Tokyo



In April 2008, James Kitching won the UKSTT young engineer category award. The prize was a cheque for £2,000 to be spent travelling anywhere in the world to further his knowledge and understanding of Trenchless Technology. Mr Kitching reports on his adventure in Japan.

WESSEX WATER IN the UK had received several guests from Japan and the JSTT earlier in 2008, when Julian Britton of the Critical Sewers Team (CST) helped to lay a new foundation between the JSTT and the UKSTT. Following on from these meetings, Japan seemed like a natural choice, especially considering the gracious invitation offered by the JSTT in thanks for their visit to Wessex Water. Although I had considered many other locations, I was really moved by the willingness of the JSTT and in particular the enthusiasm of JSTT Membership Secretary Kyoko Kondo, who had been in contact with us months before my potential trip.

I was also offered a rare opportunity to take part in the JSTT technical conference being held on 20 November 2008, where participants give a 15 minute presentation on new trenchless techniques. I was offered 30 minutes for mine, so I jumped at the most generous offer! Furthermore, I see Japan as being at the forefront of modern Trenchless Technology and, considering the logistical and socio-economic problems faced by huge cities like Tokyo, I knew that there would be a great chance to see and exchange new ideas in a country that is not so well known to the UK market. On a personal level I have always wanted to visit Japan for its culture and diversity. I consider it to be a truly unique place.

My two week schedule began by meeting the three core members of the JSTT: Taigo Matsui, Chairman of the JSTT; Kyoko Kondo, my translator and guide; and Yoshihiko Nojiri, the current Executive Secretary of the JSTT. I learned that Mr Matsui had previously been at the top of the Japan Institute of Wastewater Engineering Technology (JIWET) and was a highly revered man in the industry.

The JSTT Technical Conference

The first part of my week was largely taken up with preparing for the JSTT conference. Ms Kondo was busy making preparations for all the entrants, and the big day. We managed to get some valuable practice in beforehand though, as she would be translating my whole presentation for me!

The big day arrived, and we travelled to the Hatsumeikaikan Hall in central Tokyo. Wessex Water and partners De Neef and SDI-Unistrade won the best new product/innovation category

at the ISTT awards ceremony in Rome in September 2007. My talk, based on this presentation, was entitled 'Sewer Seal JF: a Modified Polyacrylate Gel for Sealing Groundwater Infiltration'. This is a method for preventing groundwater infiltration in pipelines. My talk went really well, and I even introduced myself in Japanese! Ms Kondo did an excellent job of translating too. Throughout the day I met many people from many companies, and I also learned that the last time a European had presented at the conference was in 1990, and that since then relations between the JSTT and the UKSTT had fallen somewhat quiet.

Friday 21 November

I spent the day going around to the various arms of the Japanese Ministry that govern all the water and wastewater operations in Japan. Mr Matsui accompanied us on all our visits throughout the day, which ensured we had no problems gaining entry. We were very fortunate because it is normally very difficult to gain access to such places in Japan. My visit focused on the sewage networks. It was briefly explained that the National and prefectural governments (a prefecture describes an area or region of controlling government), municipalities and supporting organisations all co-operate with each other to meet the needs of the residents. Each organisation has a role, such as financial, regulatory, planning and construction, supply of building materials, conducting research and development, and the operation and maintenance of systems. The whole method is conducted organically. The key partners are JIWET, the Japan Sewage Works Agency (JS), the Japan Sewage Works Association (JSWA), the Ministry of Land, Infrastructure, Transport and Tourism together with private companies.

On the weekend we travelled to Kyoto, Japan's ancient capital, on the Shinkansen bullet train. In Kyoto I was able to do some sightseeing. My trip coincided with the national holiday 'Labour Thanksgiving Day' (kinro kansha no hi), a national holiday for honouring labour. I saw many sights including Sanjusangen-do, a temple with 1,001 individual statues of a Buddhist deity

Wednesday 26 November

I was introduced to a Mr Nishioka (a different one!). The construction project we visited involved lining 17 metres of 200 mm diameter sewer. There were around six lateral connections. It was very interesting, because in my team in Wessex Water we carry out a lot of water cure lining work, but I have never observed steam cure. The process is named PALTEM (Pipeline Automatic Lining System), and much of the equipment seemed to be largely similar, however I was informed that Ashimori utilises a very unique process that distributes the steam evenly, and a kind of plug is also used to pull through and drain out excess water in the process. I also observed the use of activated carbon to reduce the styrene problems.

In the afternoon I went with Ms Kondo and Mr Nojiri to see a Toa Grout UV lining project in central Tokyo. We arrived on site, and I was introduced to Mr Takashi Kawafuji, and a Mr Hirayama, among others. We were just in time to observe some lateral cutting of the 530 mm diameter liner. It would appear that in Tokyo, most of the manholes have adjacent access hatches at 1.5 metres from the main sewer, and this enables a light to be shone down to the main sewer. With the light, it is easy to position the lateral cutter with precision. The 1.5 metre length of lateral is also renovated as part of the prefecture or local government requirements. I observed that Toa Grout operates its construction using the TMS (Total Medical System) division of the company, which it owns, and the logo is also displayed on all the vehicles at the construction site, which adds clarity for anyone watching. I learned that the prefectures in Japan, in this case Tokyo Metro City government, check on the quality of the work carried out, and use a points system to evaluate it. The construction foreman then receives a commendation if the job is well done. Later Mr Ooka of Toa Grout took us out to dinner for some more culinary delights.



Thursday 27 November

I met Ms Kondo at the JSTT office and we travelled to Warabi City, in the Saitama prefecture, north of Tokyo. We observed a 2,600 mm diameter concrete pipe jacking project of some 100 metre long. We were picked up by Mr Takashi Senda of the Obayashi Road Company, and taken to the site. The new pipe was being installed as part of a flood alleviation scheme. I was introduced to Mr Yoneda, the foreman of construction of Obayashi Road, carrying out the construction works, who explained the site to me. I also met Mr Hosoi from Warabi City, who had made a special trip to meet me. I felt honoured by this. Ms Kondo and I then suited up and climbed down into the pipe where we were able to walk along and see the control systems and stand behind the tunnel boring head. Afterwards we went to lunch with Mr Senda, who had knowledge about a great many things.

In the afternoon we returned to the JSTT offices where I gave a presentation to around ten people from various companies on an overview of our work within the Critical Sewers Team in Wessex Water. I also gave the Aqualiner pipe lining presentation, requested by Mr Ooka, who has recently bought the patents for the Aqualiner process. Again the object of this exercise was to exchange information and ideas. The presentation went well, if not a little long.

Friday 28 November

Meeting Ms Kondo and Mr Nojiri once again, we travelled to Kashiwa city to the northeast of Tokyo to see a small 450 mm diameter pipe jacking project, carried out by the company Airec, from which I met many representatives. Airec was using an Acemole system for the pipejacking, and this phase of the project spanned some 164 metres. I met Mr Kiyoshi Kawasaki of Acemole, who was very helpful in explaining the equipment and process, which had some cutting edge features, among them a system to go round bends successfully. Again I was very humbled by the fact that although the construction phase was complete, the equipment had been retained for my arrival, and I also had the pleasure of meeting Mr Shinji Ishibiki, the representative official from Kashiwa city, who had made a special trip to meet me. Later I was taken to the Airec offices where I was introduced to some new techniques, one of which may prove to be highly beneficial for us in the UK and Wessex Water.

Tuesday 25 November

I saw a pipe splitting project in Chiba, a prefecture in the greater Tokyo area — east of the city, carried out by Tokyo Sangyo. I was escorted by Mr Iso of Tokyo Sangyo. It was interesting to observe. One length was pulled through by a winch, and a coil of new Polyethylene pipe pulled through, with the splitting head breaking out the old steel pipe as it was pulled through. The other length used a hydraulic puller for extra power. It occurred to me that we may be able to apply this technology for replacement of water mains in the UK. Later I met Hiroaki Nishioka of Tokyo Sangyo, who I recalled having met at the conference the previous week. Mr Nishioka is a good friend of Steve Kent, the Chairman of the UKSTT. We discussed the mutual benefits that our companies could offer each other, and later he took me out to dinner.



Renewing international relationships

I would like to end by saying that throughout my entire visit to Japan, the people I met showed me incredible kindness and generosity. There are many people who I do not mention here, but to whom I owe my thanks. I am also writing a much more comprehensive review of my trip. It is my profound hope that my visit on behalf of the UKSTT will help further our relationship, inspire more visits and exchanging of ideas, and perhaps a regular collaboration between our two societies. ☺



Conference demonstrates a dynamic Japanese industry

The JSTT's 19th annual trenchless technology conference was held on 20 November 2008 at the Hatsumeikaikan Hall in central Tokyo. This conference is well known as the only technical conference on Trenchless Technology in Japan and this year attracted about 150 people from various industries.

THE CONFERENCE WAS unique as it hosted a special guest from the UK, Mr. James Kitching. Mr Kitching of Wessex Water won the UKSTT's 'Young Engineer's Award' 2008 and chose Japan for his training course on Trenchless Technology. During his stay, the JSTT invited him to give a speech on 'Sewer Seal JF', which was the award winning technology at No-Dig Rome 2007. The title of Mr Kitching's paper was Sewer Seal JF: a modified polyacrylate gel grout to prevent ground water infiltration. The presentation was well received as the new polyacrylate gel has longer life compared to the current gel being used in Japan for sealing infiltration. For a comprehensive report on Mr Kitching's Japanese visit please turn to page 56

The Conference showcased 25 papers on Trenchless Technology, divided into six sessions:

1. Overseas experience on a Trenchless project
 2. Social cost
 3. Underground detection
 4. Rehabilitation techniques
 5. Pipe re-construction techniques (pipe eating)
 6. Technologies related to pipe jacking.
- The distinctive trend for this year were



the many papers on pipe re-construction (also called pipe eating). In Japan many of the old sewer pipes are made of concrete and there has been a demand to re-construct them by pipe jacking. It is sometimes inappropriate to rehabilitate these damaged pipes by lining methods since there are often large gaps or sagging between the pipes, caused

by frequent earthquakes. The techniques presented at the conference are able to burst the existing pipe and then emit the pieces to the starting shaft, which means the method does not leave existing pipe segments in the ground.

The 2009 conference will be the 20th anniversary and the JSTT is planning something special for the occasion.

For more information please contact the membership secretary of JSTT, Ms Kyoko Kondo, email: kondo@jstt.jp.

Reducing emissions with Trenchless Technology

The reduction of carbon emissions has become a global concern. David O'Sullivan shares his views on the environmental advantages of Trenchless Technology over open cut techniques.

WE HAVE ALWAYS known that the various trenchless methods of construction resulted in reduced excavation and other added advantages but nobody ever developed this thought further. For years we sold trenchless as a preferred method to reduce things like traffic concession, pavement patching and cutting dangerous open excavations. However, we never concerned ourselves with the concept that while installing utilities, from a domestic water connection to a traffic tunnel, the main difference between trenchless and open cut is the large differential in energy used to remove and replace the material above the utility.

In the case of trenchless techniques the only area we work in is the area immediately surrounding the utility. Thus, at most we excavate an area 150 per cent of the surface area of the utility.

However, in open cut we have to start from the ground surface and remove all the material above the utility zone, waste it and replace it, rebuild that material to solid ground over the pipe and reinstate the ground surface.

Open cut techniques use a lot of energy. When you start to look at most utilities, the proportional cross section of the utility to the cross section of the required trench can be smaller by orders of magnitude of 60 times.

The difference in material, to be removed between trenchless and open cut, to allow the installation of the pipe, is 53 times or 5,300 per cent.

As the trenchless systems develop and mature, we will become more efficient and get closer to achieving these enormous savings.

So, even if you do not buy into the reduced carbon concept, and think it is a government conspiracy, I think we all agree that we need to reduce our energy use. If we can use a number of methods of construction that can achieve these kinds of energy reductions and yet maintain our standard of living then we need to change.

The environment, economic downturn and No-Dig

The impending change of government in the US has been welcomed, it seems, by most of the world. It now looks much more likely that a carbon trading system will be in place for the western world very soon.

As the US did not sign on to the Kyoto Protocol, the agreement lacked credibility. However, the new US government direction will change that and it will become universally accepted very soon. It should be noted that 39 US states, as well as all of the Canadian provinces and six Mexican states are already in some form of carbon trading agreement. There is already a lot of support within the US to reduce carbon output.

Though most other western governments did sign on to Kyoto, many did not follow through when it came to reducing their carbon outputs. In fact, most countries have increased their carbon output since the signing of Kyoto. I believe they were afraid to put their own economies at risk for the sake of an idea and so they



David O'Sullivan.

paid lip service to the concept of carbon reduction but continued to expand their economies using the old methods of energy production.

If all western governments agreed to lower the use of energy output then a Kyoto type agreement can and will work. Carbon output may be reducing at the moment, however I believe this is because of the economic downturn. When the economy turns around, if we do not change how we use energy, the pollution of the world's atmosphere will continue.

A recession should be a time to reinvent ourselves and thus we should utilise this opportunity and move away from our dependence on fossil fuels. We are starting to see more of the hydro electric, wind and solar power plants, but we also see a lot of coal and natural gas power plants being built.

Trenchless Technology allows us to install utilities in a much more efficient manner.

David O'Sullivan is a director of the British Columbia chapter of the NASTT and has been working on the link between a low carbon footprint and Trenchless Technology.

A 200 MM PIPE INSTALLED IN A 2.5 M DEEP TRENCH

Trenchless option

If we use a HDD to install the pipe we require a hole, 300 mm in diameter, or a surface area of 0.07 metres square, 7 cubic metres of material removed per 100 metres of pipe installed.

Open cut option

To excavate to that depth we would require a trench 1.5 metres wide to allow a trench shield to be installed and with a depth of 2.5 metres the resulting trench area would be 3.75 metres square, 375 cubic metres per 100 metres of trench installed.

The NASTT carbon calculator has been designed in order to estimate the reduction in carbon dioxide emissions when Trenchless Technology methods are used over open cut methods. By entering job specific parameters, contractors and municipal engineers can estimate the amount of CO₂ that would otherwise be released into the atmosphere.

The calculator has been designed to be used for typical utility replacement projects wherein the pipe diameter is to be no less than 50 mm. Please visit www.nastt-bc.org for more information.

From cotton to CIPP

Applied Felts is a pioneer in the CIPP process and has played a pivotal role in perfecting felt liners from the very beginning of trenchless pipeline rehabilitation.

APPLIED FELTS PARENT company, W.E. Rawson Group, was formed in the United Kingdom in 1865, manufacturing quality textiles for a number of applications. After more than a century of experience, this knowledge was expanded to help create the CIPP process, as well as its first liners. Now, more than 30 years later, Applied Felts has become the international leader in supplying top quality liners for successful CIPP installations around the world.

In 1997 Applied Felts expanded its business to the United States by adding a manufacturing plant in Martinsville, Virginia. This move opened up a whole new world of opportunity in what has become the world's largest market for CIPP rehabilitation. To date, Applied Felts has more than 50 million metres of successful underground installations around the world.

Applied Felts is a 100 per cent vertically integrated liner manufacturer, which guarantees that every phase of manufacturing — from the purchase of raw fibre to the coating and manufacture of liners — is done in one location, providing impeccable precision and control over the quality of the products.

These innovative liners are subjected to a rigorous 28-stage testing system during every phase of the manufacturing process:

- First, raw materials such as polyester fibres, polyurethane granules are inspected and tested to ensure a superior quality basis for each felt liner manufactured.
- Next, a number of criteria are tested including density, thickness, fibre distribution evenness, strength and weld-ability of the finished felt.
- The third step is the coating of the felt. Applied Felts utilises a 'single pass' extruded process to ensure that no pinholes are present. During this phase, four separate tests are conducted to monitor coating uniformity, mass and weight distribution.
- Once the felt has been coated, each roll is sampled and destructively tested across a total of nine quality characteristics, including density at various pressures, tensile strength, coating distribution and more. During produc-



tion, the testing doesn't end. The liners are continually checked to ensure they satisfy the specifications of each customer's unique order.

- Finally, when the project is complete, a sample is cut from each finished liner and is tested across yet another seven criteria to make sure the circumference, density, length, coating integrity, weld strengths and other properties meet and exceed requirements.

The finest quality CIPP liners are just the beginning of the story. Applied Felts is also a complete solution provider, standing behind and supporting their customers every step of the way. Each relining job is different, and almost always provides

challenges and unique situations that require experience to get the job done right. Applied Felts is available 24 hours a day, seven days a week to answer questions and make sure that installations are successful each and every time.

Applied Felts' clientele includes small contractors, large contractors, municipalities, and everyone in between. The company's extensive history and experience give its customers peace of mind knowing that they have the support they need, allowing them to enter the market confidently, gain exceptional training and technical support, and receive the best custom felt liners available to fit their unique needs. 

For more information visit www.appliedfelts.com



About ISTT/Membership

The ISTT is the umbrella organisation for trenchless technologists in over 40 countries of the world. In 22 countries groups of trenchless technologists have their own national groups which are affiliated while the remainder are registered directly with the ISTT.

Trenchless technology covers the repair, maintenance, upgrade and new installation of underground utility services using equipment and techniques which avoid or considerably reduce the need for excavation. The ISTT promotes research, training and the more extensive use of trenchless technology through publications, co-operation with other NGOs, an annual international conference and an interactive website.

Trenchless technology is recognised as an Environmentally Sustainable Technology and is particularly suited to use in densely populated urban areas by reducing disruption to peoples daily lives, social costs (traffic congestion, damage to road surfaces and buildings, air quality), noise and dust. Trenchless technologies also have a considerably reduced carbon footprint compared to trenching in most situations.

ISTT Membership/Directory

Please complete the following form.

Please note: Entry in the ISTT Directory is free to Corporate Members but only if the Industry Sector is completed.

Alternatively, you can fill in this form online at www.istt.com.

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Corporate Membership Ordinary Membership

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Please write ISTT if there is not an ISTT Affiliate in your country.

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Industry Focus	Asset Management	Inspection & Condition Assessment	Risk Management	
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Technology	Pipe Cleaning Robotics	Manholes Resins	Utility Location	
Products and Equipment	Drill bits	Drilling Fluids / Pumps & Mud Systems	Drilling Equipment	
Extra Circulation	International No Dig, Toronto, Canada	SWE, Japan Modern Trenchless Technologies, Ukraine	Trenchless Australasia 2009, Melbourne, Australia Drain Trader Exhibition, Cheltenham, UK	
DEADLINE	13 February 2009	15 May 2009	10 July 2009	

There is a better way..



*The path of the pipeline
is unclear*

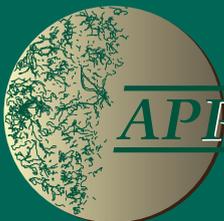
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