


# TRENCHLESSWORKS

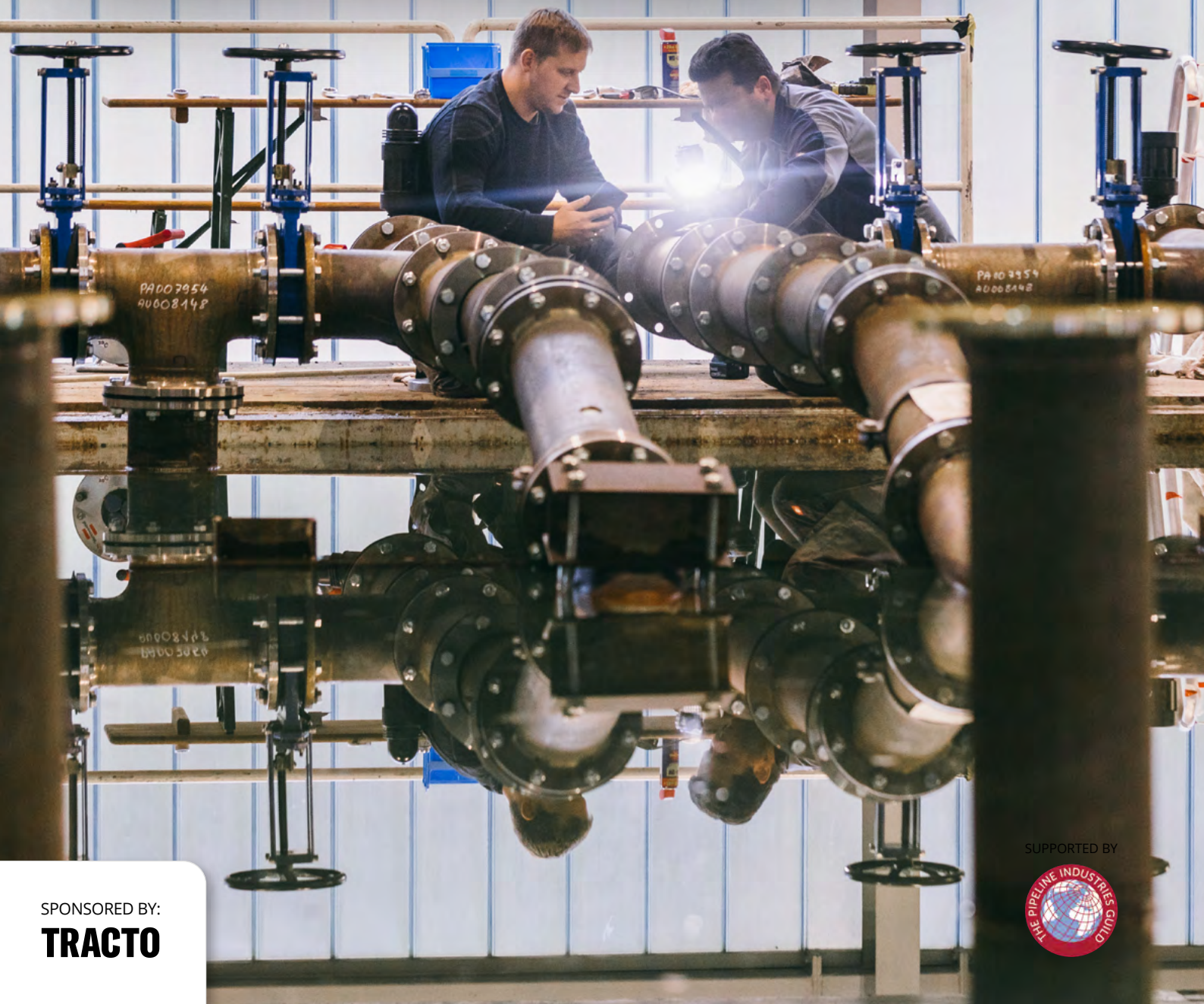
THE VOICE OF THE TRENCHLESS COMMUNITY **ISSUE 205** SEPTEMBER 2023

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Official Publication of the International Society for Trenchless Technology



## WITHSTANDING THE PRESSURE - TESTING LINERS FOR PRESSURE SEWERS



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# CONTENTS

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ARTICLE	PAGE		
SPOTLIGHT	5		
<b>INDUSTRY COMMENT</b>			
PAVING THE WAY FOR WOMEN IN BUSINESS AND THE PIPELINE INDUSTRY	6		
<b>NEWS</b>			
RSM OPEN DAY	9		
SAERTEX-LINER H2O COMPLETES SUCCESSFUL APPRAISAL WITH WSA	14		
BARHALE TO UPGRADE NORTH LONDON WATER ARTERY	16		
AUTOMATION IN THE PIPELINE: ATKINS REHABILITATION AUTOMATION TOOL FOR SEWERS AND STORMWATER	18		
TRACTO PASSES ACHILLES WITH FLYING COLOURS	21		
<b>PIPELINE REHABILITATION</b>			
WITHSTANDING THE PRESSURE - TESTING LINERS FOR PRESSURE SEWERSPACE	23		
AUSSIE REHABILITATION USING SEGMENTAL LINERS	30		
IBAK SYSTEM FOR THE QUICKLOCK COMPETENCE CENTRE	34		
TRENCHLESS PIPE REPAIR INSIDE BUILDINGS: THE FUTURE OF INFRASTRUCTURE MAINTENANCE	37		
THE 'QUICK-PIG' ESTABLISHES	41		
MECHANICAL POINT REPAIR YOUR PATCHING ALTERNATIVE	44		
		<b>GUIDED AUGER BORING</b>	
		RISE TO NEW HEIGHTS WITH GUIDED BORING	48
		GUIDED AUGER BORING SAVES TIME AND MONEY IN LEEDS	55
		<b>PIPE RAMMING</b>	
		ROADWAY PIPE RAM HANDLES HEAVY TRAFFIC	58
		<b>TUNNELLING</b>	
		FINAL BREAKTHROUGH FOR THE SILVERTOWN TUNNEL	63
		CANADIAN TUNNEL OF THE YEAR	66
		FINAL BREAKTHROUGH AT BAĞÇENURDAĞI RAILWAY TUNNEL	68
		<b>SUPPORT EQUIPMENT</b>	
		KWIK-ZIP PUTS ITS MARK ON WORM	70
		SUNBELT RENTALS INVESTS £2.6 MILLION IN NEXT-GENERATION MCELROY EQUIPMENT	72
		<b>UKSTT SOCIETY NEWS</b>	
		A MESSAGE FROM THE CHAIR	75
		<b>ISTT SOCIETY NEWS</b>	
		A MESSAGE FROM THE CHAIR	79
		NO-DIG MEXICO - THE COUNTDOWN IS ON!	80
		<b>NASTT SOCIETY NEWS</b>	88
		<b>EVENTS AND MEETINGS</b>	94

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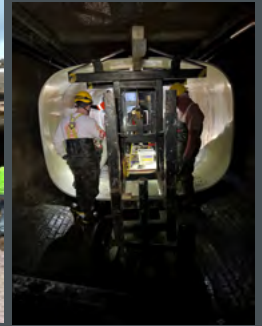
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## Beyond the Ordinary



# SPOTLIGHT



Ian Clarke, Editor-In-Chief,  
Trenchless Works

Hello All

By the time you read this the wonder of the main 2023 holiday season will be over and we should all be back at the grindstone, at least until the Christmas season comes upon us! Yes, blink twice and it will that time of year again. However, in between blinks it may be wise to look at what is occurring between now and then.

The end of the holiday season (at least for us in the northern hemisphere) usually means one thing, the start of the second half of the year event season.

This year there seems to be a plethora of events on the trenchless calendar including: International No-Dig Mexico 2023 (October 17 to 18) in Mexico City; No-Dig Turkey 2023 (November 1 to 2) in Istanbul; Trenchless Egypt 2023 (November 8 to 9) in Cairo and the UK's No-Dig RoadShow Bristol on November 29 along with the UKSTT Annual Awards in Wotton Under Edge.

From the number of events and their broad global locations it is very clear that there is a very distinct appetite for trenchless technologies of all sorts around the world. If there were not then the event organisers would simply not put these shows on!

So, now that we are at that time of year again, please consider attending the events, at least those closest to you and encourage your colleagues and contacts to visit also. You, and they, may never know otherwise what there is out there that could enhance your project, reduce your costs or impact on the environment and local residents and businesses or even offer you the solution to a long-standing difficult project that has been looking for just the right technology.

Why stress these events? We still hear of utilities looking at projects using open cut as a first option, which then, due to various circumstances, end up as trenchless projects. This usually happens only through the experience, suggestion and efforts of the contractors involved. We should be well past this stage by now. But it still appears that many who should know and understand the advantages of trenchless either do not know of them or do not know enough about what is available to them. So, they resort to the old 'tried and tested methods' that fail to provide a useful solution, usually adding cost, inconvenience and time to projects that would have been better planned as trenchless to start with.

These shows are there to educate and inform, over to you!

Ian Clarke

Editor-in-Chief Trenchless Works

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## PAVING THE WAY FOR WOMEN IN BUSINESS AND THE PIPELINE INDUSTRY

The range of tooling offered by Innovex Technologies Ltd

Rosalind MacGregor, the Sales Director of Innovex Technologies and Chair of the Pipeline Industry Guild Northern Branch in 2023, has shared her thoughts on why the pipeline industry is evolving positively. She emphasises the importance of solid relationships with customers and suppliers for long-term success, challenges antiquated attitudes toward women in business and highlights the broader benefits of Guild membership.

For Rosalind MacGregor, change has been a driving force behind her success. With a career spanning several decades, Rosalind shares her insights into why the pipeline industry is changing for the better, what it takes to succeed in a male-dominated sector and how working with family can bring unexpected benefits. "The key to success in business is having good relationships with customers and suppliers," said Rosalind. "Good relationships help build a platform of trust that allows the long-term flourishing of business."

Throughout her journey in the utility industry, Rosalind has learned that trust is essential. It takes years to build but can be shattered within seconds if not nurtured carefully. This principle applies not only to individual interactions but also to building trust within organisations and across industries. "When I first started in this industry," reflected Rosalind thoughtfully. "The women I met were often confined to answering phones or taking notes at meetings." >



Rosalind and daughter Victoria



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However, she acknowledges that times have changed since then. The presence of women in boardrooms across society has grown significantly over time, although some antiquated attitudes persist. As Chair of the Pipeline Industry Guild Northern Branch this year, one goal close to Rosalind's heart has been breaking down barriers for younger women entering the field. She believes showcasing strong female leaders who have succeeded against all odds will inspire future generations while dismantling preconceived notions about gender roles. But breaking barriers is not all she hopes to achieve during her tenure as Chair, educating others about more comprehensive benefits provided by Guild membership also tops her agenda. "Whether it is sharing knowledge or networking opportunities," explained Rosalind, "being part of the Guild truly makes a difference in how you can succeed in this industry." Networking plays a pivotal role in any business's growth and for Rosalind it has been instrumental in her journey. She credits her ability to connect with others as a significant factor behind her achievements. "I want businesses to learn from each other," she stated passionately. "Sharing experiences and best practices ensures our sector continues to thrive going forward."

Moreover, networking within the Guild allows professionals from various backgrounds and expertise to come together on common ground, their dedication to the pipeline industry. This collective knowledge-sharing fosters innovation, strengthens partnerships, and ultimately benefits everyone involved. For Rosalind MacGregor, success does not stop at professional accomplishments alone; it also extends into personal life. "Innovex Technologies Ltd is not just another business venture; it is also an opportunity for me to work alongside my daughter," Rosalind proudly said. "While there are unique challenges that come with being family members in business together, there are unexpected benefits too."

Working closely with family members provides trust and understanding that may be difficult to replicate otherwise. It allows for open communication channels where ideas can flow freely without fear of judgment or rejection. "Being able to share professional triumphs and challenges with someone who understands you on a deeper level is incredibly valuable," explained Rosalind. "We support each other every step of the way." >





Rosalind MacGregor

Rosalind MacGregor's journey serves as an inspiration not only for women aspiring to excel in male-dominated industries but also for individuals seeking success through solid relationships within their professional spheres. As Chair of the Pipeline Industry Guild Northern Branch this year, she hopes that by breaking down barriers faced by women entering the field while promoting collaboration through networking opportunities within organisations like the Guild, she will contribute significantly towards creating positive change within the pipeline industry. With her unwavering determination and commitment to fostering growth, Rosalind embodies the spirit of a true leader, paving the way for future generations of women in business.

The Pipeline Industries Guild is essential to the pipeline industry's community. As the Northern Branch Chair, Rosalind stresses the importance of making businesses aware of the broader benefits of Guild membership. By fostering knowledge sharing and facilitating networking opportunities, being part of this guild significantly contributes to professional growth and overall success in the sector.

### Achieving Success through Networking

MacGregor acknowledges that networking is crucial to success within any industry, particularly within pipelines. By sharing knowledge and experiences among members, businesses can learn from one another's triumphs and setbacks. Encouraging open collaboration through networking ensures that our sector thrives going forward.

Rosalind MacGregor has exhibited exceptional leadership within both her organisation, Innovex Technologies Ltd, and her role as Chair of the Pipeline Industry Guild Northern Branch. Through her determination and dedication, she strives not only for personal success but also to create opportunities for younger women entering this field. By emphasising solid relationships built on trust, promoting knowledge-sharing within the industry, and supporting charitable causes that uplift communities, Rosalind is contributing to the positive changes in the pipeline industry and inspiring others along her path.

The upcoming Pipeline Industries Guild 58<sup>th</sup> Northern Branch Dinner on 3 November holds special meaning for MacGregor. This year, she has chosen to support a homeless charity in Manchester, offering lifesaving assistance to vulnerable individuals.

"In these difficult times, we must contribute to our communities." She emphasised. "Not only does it enhance our sector's reputation, but more importantly, it aligns with doing what is right." ■



An aerial overview of the  
RSM Open Day



# RSM OPEN DAY

An aerial overview of  
the RSM Open Day

Thursday 7 September saw the return of highly popular RSM Open day, hosted at the company's new state-of-the-art facility in Balby, Doncaster, UK.

Bathed in glorious late summer sunshine over 250 guests enjoyed the opportunity to see RSM showcase all of its equipment and materials options in a single location. This included the full range of inversion drums, slucers, impregnated liner samples, cutting equipment, hot water and steam boilers, and UV LED curing equipment. >



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At over 45,000 ft<sup>2</sup> (13,700 m<sup>2</sup>) RSM's new state-of-the-art facility in Doncaster proved the perfect open day venue. In addition to the additional warehousing capacity, which has significantly increased the company's day-to-day stockholding, guests were able to view the expanded service and repair centre and a bespoke training centre which incorporates ample classroom space and an outside area for practical training. RSM's commitment to best practice and continuous improvement is evidenced through the huge success of its EU Skills and WRc approved lining and training course, which has been successfully completed by over 500 engineers in the last 3 years. >





Networking and demonstrations formed a significant part of the day's



One of the event highlights was always going to be the launch of RSM's new Gecko Cam. Gecko Cam comes in a variety of reel sizes from 40 m to 120 m and boasts a host of innovative features designed to optimise the user experience. The camera's incredible versatility makes it suitable for use in diameters ranging from 50 mm to 300 mm and its robust design includes a detachable monitor for easy viewing (and charging) onsite. The system's integrated reporting software allows users to compile detailed reports while working on site. To further enhance the reporting the user can add personal observations and additional detail to the report, including still images and video. The report can also be kept open while moving from one site to another. Additional features include WiFi connectivity, impressive internal storage and USB storage capability, Large HD screen protected by gorilla glass and a self-levelling camera head.

The event was supported by many of RSM's key suppliers including Applied Felts, BKP Berolina, Dancutter, Krasotech, Picote, Sewertronics and Superjet, many of whom had their own dedicated exhibition space where visitors could talk to their product experts and see their latest products and innovation first hand. The interactive nature of the day was further enhanced by a series of live demos. These included:

- Picote Brush Coating & Flexisliplining System
- RSM Echo Liner and Crystaliner with Sewertronics SpeedyLight+ VX System
- UV liner & Sewertronics LEDRig
- RSM Fero Force Pressure Pipe Liner >



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The Open Day was not all work and included a celebratory gathering after the event



"It was great to be able to host our 5<sup>th</sup> Open Day, especially after such a long gap due to the global pandemic. We always receive brilliant feedback from our guests who enjoy the networking, hospitality, and entertainment."

Over a fantastic lunch, in some cases enjoyed with a cold beer, guests also heard from RSM's Sales Director, Phil Steele, who welcomed them to the new facility and provided an update on the company's plans for continued growth and its latest and best-selling products.

Commenting on the success of the day RSM's Managing Director, Richard Davis, said: "It was great to be able to host our 5<sup>th</sup> Open Day, especially after such a long gap due to the global pandemic. We always receive brilliant feedback from our guests who enjoy the networking, hospitality, and entertainment, but more importantly appreciate being able to see our extensive CIPP portfolio brought together in a single location. This year's event was made even more special as it was the first at our new facility and we were able to launch a fantastic new piece of equipment in the form of Gecko Cam. This is our first ever camera system and I believe it is the perfect complement to our existing range. It was also great to be able to showcase what has become our fastest growing product range, Fero Force, the only structural reactive pressure pipe system available on the market. I would like to take this opportunity to personally thank all our customers and partners for taking the time to come and visit us and their continued support."

The RSM Open Day however is not all about the love of lining, it is also a thank you to all the customers and partners who have supported the business since it was founded in 2003. Throughout the day guests enjoyed a complimentary bar and food and things really stepped up a notch in the evening with a guest set from one of the world's best known dance music DJ's – Judge Jules. What a way to end a hugely fun and highly successful day! ■



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Working with a Saertex  
liner H2O

## SAERTEX-LINER H2O COMPLETES SUCCESSFUL APPRAISAL WITH WSAA

“With so many complex and varied projects now realised right across Australia and New Zealand with SAERTEX-LINER® MULTI, we are excited to have this latest WSAA appraisal to help customers towards future potable water projects.”

Pipe Core, distributor for SAERTEX multiCom® in Australia and New Zealand, has welcomed the news that SAERTEX-LINER H2O Type S+XR for the renovation of drinking water pipes has successfully completed appraisal by the Water Services Association of Australia (WSAA).

Alongside being successfully tested to AS/NZS 4020 standards by AWQC, the liner continues to allow installers to provide a pressure-resistant and hygienic option to customers for the rehabilitation of potable water pipes.

Katharina Helming, Business Development Manager SAERTEX multiCom® confirmed: “Our UV-cured GRP pipe liner is approved in over 14 countries and has also won the ISTT Innovation Award in 2019. This appraisal will give further confidence to the innovative technology used to create a liner with a smooth surface and low wall thickness to maximise flow rate in supply pipes.”

The tight-fitting, Class A classified independent pipe liner withstands inner and outer loads and can be installed for operating pressures up to 33 bar, making it a versatile UV-CIPP solution. >

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Installing a Saertex  
liner H2O



The light train  
used for curing  
the liner

Sergej Fast, Manager at Pipe Core commented: "With a growing contingent of customers in Australia and New Zealand frequently choosing to install SAERTEX-LINERs, we are pleased to be able to back this product in the market with this successful appraisal."

There have been some of the impressive installations of SAERTEX-LINER H2O from around the world, including across the Concorde Bridge in the city of Montreal, Québec and more than 500 m of SAERTEX-LINER H2O potable water UV liner installed in Valencia. SAERTEX-LINER® H2O proved itself again in the rehabilitation of potable water pipeline in Poland.

Success stories such as this demonstrate the versatility of the liner which can be used in circular host pipe profiles independent of the host pipe material.

SAERTEX multiCom® also continues to take a unique approach as a complete solution provider by supporting its customers with product experts and engineers who follow the project from initial planning and bidding to on-site support and project completion after installation.

Supported by Pipe Core, SAERTEX multiCom® also provides local certified theoretical and practical training for applications in gravity and pressure pipe systems to customers in Australia and New Zealand.

"This comprehensive training programme is an opportunity for our experts to pass their knowledge on to the installers," said Helming. "Our advanced training opportunities are aimed at teaching the products and technologies required for trenchless pipeline rehabilitation using practical, real-life content."

"With so many complex and varied projects now realised right across Australia and New Zealand with SAERTEX-LINER® MULTI, we are excited to have this latest WSAA appraisal to help customers towards future potable water projects." said Fast. ■

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# BARHALE TO UPGRADE NORTH LONDON WATER ARTERY

Part the route through which the new water trunk main will run

Thames Water has awarded civil engineering and infrastructure specialist Barhale a £16.8 million contract to upgrade an important water trunk main running through the London Boroughs of Barnet and Enfield.

The work, which forms part of Thames Water's AMP7 Conditional Allowance Trunk Main Schemes, will protect future water supply in the area.

Just over 2.3 km of pipe will be replaced by Barhale along a new route running north west from Pert Close, Barnet to the southern end of Cannon Hill, Enfield. The new pipeline will be laid through the Friern Barnet retail park, and within: Station Road; Inverforth Road; Upper Park Road; Palmers Road; Bowes Road; Brookdale; Arnos Park; and Arnos Grove.

Sections of the route will be tunnelled beneath the A406 North Circular Road, the East Coast Main Line and Pymmes Brook, eliminating disruption at these critical infrastructure crossings.

Barhale will replace the existing 24 in (610 mm) diameter steel pipe with a combination of ductile iron or steel and high-density polyethylene pipe laid using open cut trenches and microtunnelling.

Shafts will be excavated either side of each tunnel section to serve as launch and reception chambers for the tunnelling works, which will make up 250 m of the total length.

Shane Gorman, Barhale's Water Director – Southern Region, said: "Now is this right time to upgrade this aging main pipe. Installing a new trunk main will ensure this section of the water network is in optimum condition for the future. This is a significant mains upgrade programme in a busy part of London and we have worked closely with Thames Water to ensure that the design maximises value while minimising potential disruption." The works are expected to be completed by December 2024. ■



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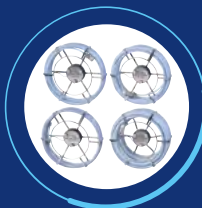
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## AUTOMATION IN THE PIPELINE: ATKINS REHABILITATION AUTOMATION TOOL FOR SEWERS AND STORMWATER

By Andy Taylor & Chris Mollett, Engineering Services, Atkins

Typical defects uncovered during pipeline inspection runs

As the climate crisis takes hold, flooding is becoming increasingly frequent and more severe. This can cause widespread damage and along with population growth puts the existing sewer system under increased pressure. It is clear that going forward, the condition of sewers, culverts and drains is critical for the resilience of our planet and its people.

These assets have great power to alleviate or exacerbate the impact of increased rainfall on homes and businesses, essential infrastructure, and the environment. Furthermore, in these days of needing to do more for less, the ability to quickly and accurately extract value from CCTV survey data has never been greater.

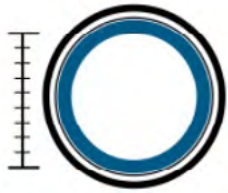
Predominantly manual and largely reactive, the current industry approach to CCTV inspections and sewer rehabilitation planning is time-consuming and monotonous, which inevitably leads to human error. It is also fairly subjective, which makes it prone to inconsistency. Add to that increased demand and customer expectations, as well as an industry-wide skills shortage at a time when budgets are at breaking point, and we have got the perfect storm. >

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### Full length reline

A Cured in Place Pipe Liner from manhole to manhole.



### Excavation

An excavation to repair a defective pipe.



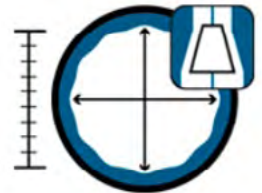
### Patch repair

A Cured in Place Pipe Liner up to 1m in length.



### Engineer review

A complex scheme requiring specialist Engineer review.



### Re-round and reline

Restoring the capabilities of a deformed or misshaped pipe.

## A digital dawn

### RATS recommendations

Atkins' pioneering Rehabilitation Automation Tool for Sewers and Stormwater (RATS) significantly automates the CCTV review process, making it up to 50% faster and cheaper than manual methods. Using a standardised and reliable approach, RATS processes coded .XML data (from CCTV survey contractors) and recommends appropriate rehabilitation solutions. It is also sophisticated enough to automatically flag up anomalies and complex defects, which are referred to an engineer to review.

RATS can recommend five options for sewer rehabilitation:

- Full length re-line
- Excavation
- Patch repair
- Re-round and re-line
- Engineer review

Developed by engineers for engineers, RATS draws on the extensive experience and expertise built by the Atkins team over the last 20 years. RATS is extremely versatile, and can be applied to the water sector, as well as highways, rail and even estate management, anywhere with a substantial drainage system and a responsibility for its maintenance. The technology is suitable for culverts, drains and sewers and works effectively across a range of materials, including concrete, clay, pitch fibre, cast iron and asbestos cement.

As part of an ongoing Environment Agency project, RATS eliminated the need to review more than 16 km out of 55 km of surveys, freeing up the equivalent of nearly three weeks of inspectors' time. Significant time and resource savings like this enable businesses to act on the data quickly and undertake improvements with the greatest value.

The automation provided by RATS gives clients a better oversight of their networks and enables them to make proactive data-driven decisions, support future investment planning, and prioritise works appropriately.

## Customised applications

While originally designed to align with the UK Manual of Sewer Condition Classification, one of the key strengths of RATS is its capacity for adaptation and customisation to suit exact client specifications. As standard, each application of RATS is configured to the client's coding scheme, but beyond that, it can be tailored to suit other client needs, including those outside the UK. >

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Defects uncovered on a US survey

Atkins recently worked with a client in the US, where RATS was adapted to work alongside the North American Pipeline Assessment Certification Program (PACP). It has significant differences in defining the location of defects, as well as additional codes denoting the nature of the defect, and the requirement to identify cross-bores. Notably, PACP also uses imperial measurements, so a conversion to metric units was built into RATS in order to streamline the process.

In addition to customisation of RATS, Atkins offers a range of add-ons to suit client requirements. As part of our current review of 350 km of CCTV survey data for Thames Water, we are now producing Sewer Rehabilitation Briefs (SRBs) which are produced if an asset meets either of the client's key drivers: if it is either not structurally sound (or is likely to fail soon) or if the defect identified is likely to be causing flow restrictions. Using a VBA script, the main structure of the SRB document is created automatically, with key asset information and RATS recommendations applied. An Atkins engineer assesses the feasibility of the works, taking in various considerations specific to that particular site. The SRB is then sent directly to the client for approval, and on to contractors to price up and undertake the works agreed.

Thames Water's Asset Performance Insight Manager, Chris Hinton, illustrated how valuable RATS has been saying: "At Thames Water we are always looking for innovative ideas. Using Atkins' RATS digital tool and engineering expertise has enabled us to efficiently scale up our planned CCTV survey programme to identify and prioritise sewer rehabilitation, while maintaining high confidence in the proposed rehab solutions."

### An automated future

Our focus now is to investigate the possibility of integrating RATS with emerging AI technologies that are being used for defect recognition and coding. This would significantly remove subjective decision-making and expedite routine inspections and solution planning.

We are also exploring how we can encompass more client considerations into RATS calculations, particularly the integration of carbon assessment and accounting. This will support data-informed decision making across every aspect of proposed improvement schemes, so that the best possible solution can be identified, for customers and the environment.

RATS is driving an exciting, automated future for sewer inspection and rehabilitation, and paving the way for collaborations to maximise the potential of new technologies. Continuous enhancements and improvements will enable this innovative tool to be scaled-up and streamlined, saving clients even more time and resource, while remaining fundamentally flexible in order to meet the specific needs of different sectors throughout the world. ■

Website: [rehabilitationautomationtoolforsewers.com](https://rehabilitationautomationtoolforsewers.com)

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## TRACTO PASSES ACHILLES WITH FLYING COLOURS

Gary Preston  
with the Achilles  
D accreditation  
document

TRACTO UK has completed its annual Achilles D audit for 2023 with outstanding results that even eclipsed 2022's pretty near perfect scores. Following the ever-rigorous assessment, the company was awarded 100% for its Management Systems and 99% for Health & Safety site audits.

Gary Preston, Training Manager for TRACTO UK, has overall responsibility for ensuring the company adheres to industry practices and continuous improvement policies throughout the year and is delighted with the result saying: "The Achilles D Audit is an independent and comprehensive assessment that evaluates organisations in terms of H&S, Environmental and Quality Management, Corporate social responsibility, and other critical aspects. It is a big job keeping on top of all the requirements, but the hard work from the team here has paid off with these great results. They demonstrate to our customers that we are committed to delivering the highest level of quality and service." ■



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## WITHSTANDING THE PRESSURE - TESTING LINERS FOR PRESSURE SEWERSAPACE

Simulation of external water pressure: After flooding, part of the test setup is reflected in the water

Pressure sewer pipes like gravity sewers that are getting on in years need to be renovated. But which methods are suitable? What are their strengths and weaknesses? A recent IKT comparative product test on pressure sewer liners provides answers.

Pressure sewers are critical and sensitive elements of urban wastewater infrastructure. Many are ageing so sewer network owners are increasingly having to deal with their rehabilitation and there are different methods available on the market for this.

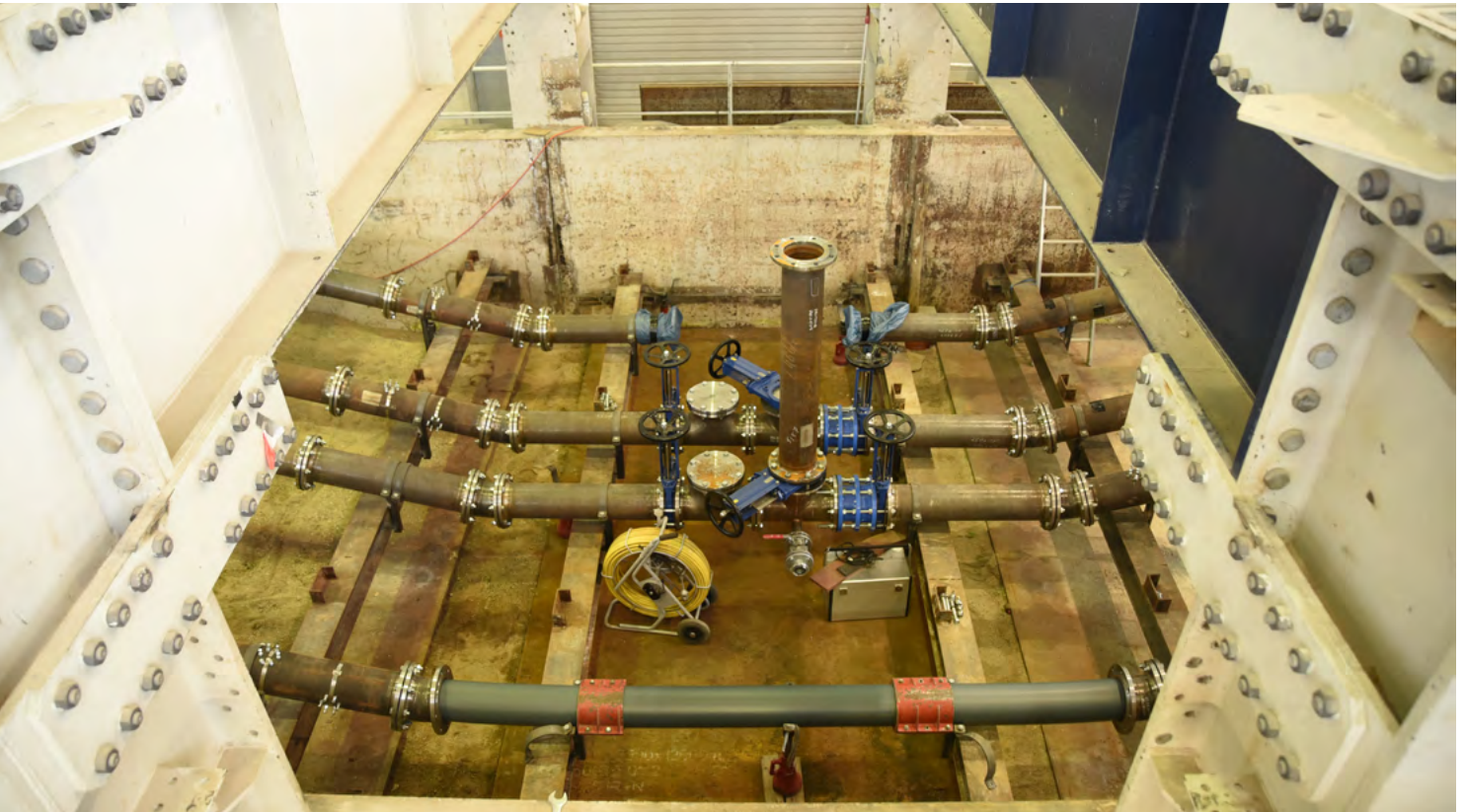
Consequently, the neutral, independent and not for profit IKT Institute for Underground Infrastructure, in Germany, has been examining rehabilitation solutions in an extensive comparative product test. Over a three-year period, an evaluation project was undertaken on behalf of six municipal network operators from Bottrop, Bremen, Burscheid, Iserlohn, Cologne and Voerde and two regional water associations, the Emscher-genossenschaft and the Wuppervverband.

The project was supported by the district government of Münster and the State Office for Nature, Environment and Consumer Protection of North Rhine-Westphalia (LANUV). It was financed jointly by the NRW Ministry of the Environment and the eight network operators. >

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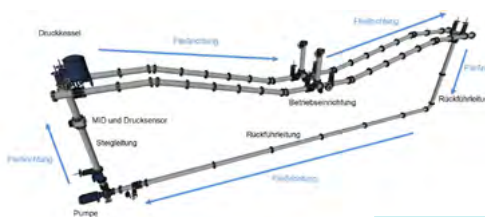




View of the built-in sewer pressure pipelines in the IKT large 1:1 scale test facility



Experimental setup of pressure sewer pipes in the IKT large 1:1 scale test facility



Schematic representation of the test setup in the IKT large 1:1 scale test facility

These organisations formed a steering group that determined the pressure sewer damage scenarios to be remedied, the testing programme and the evaluation of the results. IKT developed the test concept, set up the test rigs in its large 1:1 scale test pit and carried out the testing.

Six liners were looked at in the comparative product test. The steering committee selected the following lining technologies for the comparative product test:

#### For the Close-fit liner method:

- Compact Pipe (Wavin GmbH)
- egeLiner (egeplast international GmbH)

#### For the Cured in Place Pipe (CIPP) liner process:

- Esders HPS Liner (Esders Pipeline Service GmbH)
- Nordiflow WPE (NordiTube Technologies SE)
- SaniPipe (AMEX Sanivar AG)
- Starliner Structure-S (Karl Weiss Technologies GmbH)

#### Remediation task

For each liner system, the test setup consisted of a DN200 steel pipe with damage patterns such as holes, leaky connections, point loads, transverse and longitudinal cracks, ovalisation and incrustations. This realistically depicted the damage that network operators find in their pipes. >





Examination of the renovation results in the IKT large 1:1 scale test facility

### Class A liner systems

The central issue was whether the liners are suitable as Class A products. A Class A liner must be able to withstand internal and external stresses on its own, regardless of the condition of the host pipe. The stress testing programme conducted as part of the IKT comparative product test went well beyond the regular warranty period of five years in order to consider the entire useful life.

### Test programme and evaluation scheme

The test programme consisted of three phases: The first phase depicted the regular, normal operation of a rehabilitated pressure pipe. Internal water pressures of between 2 and 6 bar were applied at different flow speeds.

In the second phase, the degeneration of the host pipe was simulated over a prolonged period of time. For this purpose, some of the damage scenarios in the host old pipe were worsened in order to simulate progressive damage development and the resulting changes in external influences on the liner. Test pressures and flow rates remained the same as in the first phase.

Finally, the third phase served to simulate additional, non-every day and extraordinary loads on the liner that may occur over the course of its useful life. These included high-pressure cleaning at 80 bar, abrasive substances, the rapid switching on and off of the pump or elevated groundwater levels, such as those that occur when pipes pass under rivers. >





Optical inspection of rehabilitated sewage pressure lines in the IKT large 1:1 scale test facility

### Evaluation criteria

The overall grades for the liner systems are made up of the four main criteria of tightness, stability, operational safety and quality assurance. These are divided into nine sub-criteria. The range of grades lies between VERY GOOD (1.0) and INADEQUATE (6.0).

#### Watertightness criterion (weighting 45%)

The main weak points found in the four CIPP liner processes were the end connections to the host pipe, there were leaks. In contrast, the PE flange and electrofusion sleeve connections of the close-fit liners were reliably watertight.

The Compact Pipe and egeLiner close-fit systems proved to be watertight after renovation. In contrast, the picture for the CIPP liner end connections was very different: Nordiflow and SaniPipe each had to be reworked once to make them all watertight, whilst the Starline end connections had to be reworked twice in order to get them tight. The Esders HPS liner remained leaky even after the connections had been repaired twice and thus it failed on this criterion.

#### Stability criterion (weighting 25%)

The stability (load-bearing capacity of the structure) was classified by the steering committee as a central 'KO' (failure) criterion. It was gratifying that five of the six liner systems tested passed this criterion with GOOD or SATISFACTORY grades. They show no or only minor abnormalities such as local wrinkling.

The SaniPipe liner failed this criterion as it collapsed under external pressure. The reason for this was insufficient fabrication of the liner, which took place without static proof. It was therefore not a Class A liner and consequently received the overall rating INADEQUATE, regardless of performance against all other criteria. >

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Clearly recognisable longitudinal fold in an installed liner

### Operational performance criterion (weighting 15%)

This examined to what extent the liners can withstand normal operating conditions such as pressure fluctuations, abrasion, static pressures and high-pressure cleaning.

Here, Compact Pipe and egeLiner scored a GOOD grade. Also, they did not form folds and obstacles along their length. However, their installation leads to a hydraulic loss of 6% compared to unlined pipe this was in the middle range. The Nordiflow and Starline liners both had folds larger than 6 mm in the installed liners sheets and thus achieved a SATISFACTORY score. However, the hydraulic power loss of the Nordiflow was particularly high at 8%, whilst the Starline was the lowest at 3%.

With high-pressure cleaning, the Compact Pipe and egeLiner close-fit products achieved a VERY GOOD rating. Nordiflow and Starline withstood this operational stress SATISFACTORILY. On the other hand, Esders and SaniPipe failed this criterion because holes and delamination occurred. Chemical loads did not have a negative effect on any liner system.

### Quality assurance criterion (weighting 15%)

Although all the manufacturers provided an installation procedure manual, some of them have significant deficits in training, test certificates and external and internal monitoring. In addition, the installed Esders and SaniPipe liners each had a continuous longitudinal fold along the length and SaniPipe had design defects, which led to a devaluation of the grade.

### Overall result and conclusion

The IKT comparative product test 'Renovation process for sewage pressure pipes – Class A liner' confirmed that it is possible to achieve good renovation results. However, there are major differences in the performance of the six rehabilitation technologies examined, which are reflected in the test results awarded. One of the six liners could not qualify as a Class A liner. >



IKT - Institute for Underground Infrastructure



Overall Results: IKT-Comparative Product Test (IKT – Warentest) "Rehabilitation methods for wastewater pressure pipes - Class A liner".

**Task:**

Rehabilitation of an approx. 22 m long steel pipeline DN 200 with the following damage scenarios:  
Leaking joints (4x), pitting (2x - with condition deterioration), single hole 48 mm (2x), shear load (with condition deterioration), longitudinal cracks (with condition deterioration), 15°, leaky bend (2x - with condition deterioration), abrasion in the invert, axially displaced socket joint, single hole 8/48 mm (2x - with condition deterioration), ovalisation by 6%, double overlapping hole 2x 48 mm (optional), transverse cracks with angulation (optional), incrustation (optional), maximum rehabilitable bend (optional).



System		Compact Pipe	egeLiner	Nordiflow W PE	Starline Structure-S	Esders HPS Liner	SaniPipe
Manufacturer		Wavin GmbH	egeplast international GmbH	NordiTube Technologies SE	Karl Weiss Technologies GmbH	Esders Pipeline Service GmbH	Amex Sanivar AG
Renovation company undertaking installation		Dringer & Scheidel Rohr-sanierung GmbH & Co. KG	Esders Pipeline Service GmbH	Esders Pipeline Service GmbH	Karl Weiss Technologies GmbH	Esders Pipeline Service GmbH	Amex Sanivar AG
IKT - Test Rating*		GOOD 1.8	GOOD 1.8	SATISFACTORY 2.6	SATISFACTORY 2.6	DEFICIENT 5.3	INADEQUATE 6.0 <sup>1</sup>
Statically independent class A liner? (knock-out criterion)		yes	yes	yes	yes	yes	no Not usable as class A liner due to system collapse
Watertightness <sup>2</sup>							
Devaluation due to rework after installation	45%	1.0 none	1.0 none	2.0 Tight only after 1x rework <sup>3</sup> (-1.0)	3.0 tight only after 2x rework <sup>3</sup> (-2.0)	6.0 Leaky even after 2x rework <sup>3</sup>	3.4 tight only after 1x rework <sup>3</sup> (-1.0)
Exfiltration watertightness	80%	1.0	1.0	1.0	1.0	5.0	2.8
Infiltration watertightness	20%	1.0	1.0	1.0	1.0	1.0	1.0
Stability	25%	3.0	3.0	3.2	2.0	5.4	6.0
Load bearing capacity of the structure	50%	2.0 Deformations in the bend	2.0 Deformations in the bend	4.0 Wrinkles in the bend, holes, air pockets	2.0 Wrinkles in the bend	5.0 Continuous longitudinal fold, wrinkles in the bend, holes, risk of failure	6.0 Continuous longitudinal fold, wrinkles in the bend, holes, risk of failure, system collapse
Static proof	30%	4.5	4.0	2.5	2.0	5.5	6.0
Material and geometry target/factual comparison	20%	3.0 2 Deviations	4.0 3 Deviations	2.0 1 Deviation	2.0 1 Deviation	6.0 6 Deviations	6.0 6 Deviations
Operational performance	15%	2.3	2.4	3.3	2.7	4.1	4.5
Overall visual impression after refurbishment, HP cleaning and end of testing	25%	1.0	1.0	3.4	2.7	5.0	4.7
Hydraulic performance loss after renovation in percent <sup>4</sup>	28%	3.0 -6%	3.0 -6%	4.0 -8%	2.0 -3%	3.0 -5%	4.0 -8%
Wrinkling / Obstacles	25%	1.0 none	1.0 none	3.0 > 6 mm in bend	3.0 > 6 mm in bend	5.0 > 6 mm in liner section & bend	5.0 > 6 mm in liner section & bend
Cross-section reduction of the host pipe DN 200: max. ball passage line / bend / connection	25%	4.3 160 / 155 / 160 mm	4.5 160 / 155 / 155 mm	3.0 180 / 170 / 155 mm	3.0 180 / 160 / 160 mm	3.3 170 / 170 / 160 mm	4.3 160 / 160 / 155 mm
Quality assurance Procedures manual, training, test certificate, monitoring, special anomalies	15%	1.5	1.5	2.5	2.5	4.5 Continuous longitudinal fold	5.5 Continuous longitudinal fold and execution defects
<b>Additional information</b>							
Not part of the grade							
Robustness: shard load, metal tip (double overlapping hole), incrustation, angular deflection, maximum bend		0   -   +   +   22.5°	+   -   -   +   22.5°	+   -   -   +   15°	+   -   -   +   30°	0   +   +   +   30°	0   +   +   +   30°
Wall structure		PE pipe SDR17 PN10 PE100	PE pipe SDR17 PN10 PE100-RC	Preliner + GRP-reinforced needle felt + inner foil	Preliner + laminate with glass fibres + fabric sleeve + inner foil	Outer foil + laminate with needle felt + fabric hose + inner foil	Outer film + felt fabric and polyester fibres with resin casting + inner film
Wall thickness		approx. 13.4 mm	approx. 13.5 mm	approx. 4.9 mm	approx. 6.3 mm	approx. 7.3 mm	approx. 7.7 mm
Installation procedure		Close-fit insertion method	Close-fit insertion method	Inversion method with preliner	Inversion method with preliner	Insertion/Inversion Process	Insertion/Inversion Process
Curing method and time		Steam (120 °C), approx. 2 h	Steam (130 °C), approx. 1.5 h	Steam (80 °C), approx. 3.5 h	Hot water (40 °C), approx. 19 h	Steam (100 °C), approx. 1.5 h	Steam (80 °C), approx. 22 h
Connection type		PE flange/ electrofusion socket	PE flange/ electrofusion socket	Amex liner and cuff	Kempe liner and sleeve	Amex liner and cuff	Amex liner and cuff
Total working time / days on site		14.5 h / 2 days	15.5 h / 3 days	15.5 h / 3 days	11.5 h / 2 days	11 h / 2 days	14.5 h / 4 days

Those that passed the investigation were:

Table of results IKT comparative product test "Renovation of sewage pressure pipes"

- Compact Pipe (Wavin) GOOD (1.8)
- egeLiner (egeplast international) GOOD (1.8)
- Nordiflow W PE (NordiTube Technologies) SATISFACTORY (2.6)
- Starline Structure-S (Karl Weiss Technologies) SATISFACTORY (2.6)

Those that failed included:

- Esders HPS Liner (Esders Pipeline Service) DEFICIENT (5.3)
- SaniPipe (Amex Sanivar) INADEQUATE (6.0)

The further deterioration of the condition of the host pipe over time was found to have no effect on the success of the rehabilitation. This applied in particular to signs of corrosion such as simulated pitting and point loads. Only in one case did the complete loss of the supporting host pipe lead to liner failure under external water pressure.

All six of the liner systems could be installed through the four 15° bends included in the rig. Three of the liners were even able to install through a further 30° bend.

The systems were able to withstand normal operating conditions such as pressure fluctuations, abrasion and static pressure without any problems. However, there are clear limits to high-pressure cleaning and holes and delamination can occur here. Chemical stresses did not affect the tightness of the liner.

All liner systems lead to hydraulic performance losses in the pressure sewer the highest up to 8% at the top. The internal diameter was reduced by more than 20% in some places in some liners. Wrinkles >6 mm could be seen on all the CIPP liners. In contrast, the close-fit liners showed no creasing whatsoever, but there was clear ovalisation in the bends. ■

30° bend in a pressure sewer pipeline.



December  
2023

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A street level view of a liner section



# AUSSIE REHABILITATION USING SEGMENTAL LINERS

Over the past couple of years there have been some interesting pipeline rehabilitation projects in Australia utilising segmental lining solutions, here are just a couple.

## Mooloolaba Box Culvert

Mooloolaba is a coastal suburb of Maroochydore in the Sunshine Coast Region of Queensland, Australia. It is located 97 km north of the state capital, Brisbane.


A large concrete box culvert in Mooloolaba suffered severe spalling and corrosion, necessitating urgent renewal. The culvert, located at Amarina Avenue, was constructed in 1975 and passed beneath a busy street, carrying run-off from the Sunshine Motorway to the Mooloolaba Canal. The culvert's structural damage posed a risk of collapse, requiring immediate action.

The Sunshine Coast Council's Stormwater Management Asset team conducted an inspection in 2020, revealing the deteriorated condition of the culvert. Flood modelling indicated that reducing flow capacity was not a viable option. Traditional methods, such as lining the culvert with smaller sections or excavation and replacement, would compromise flow capacity or cause significant disruption, including road closures and relocation of utilities. >




Culvert before rehabilitation





Installation in wet conditions



A final inspection of the lined pipeline

Contractor Interflow proposed an innovative and sustainable solution to renew the culvert. The company imported custom-designed and manufactured glass reinforced plastic box sections from Channeline. These sections, with thinner walls and a smoother interior surface, were specifically engineered to maintain flow capacity while addressing the structural issues. The installation process involved slipping the new sections into the existing culvert and filling the small annulus gap with grout, eliminating the need for excavation and minimising community disruption.

The implementation of the alternative solution was highly successful. Over a 12-day period, the large concrete box culvert was renewed without any environmental incidents or significant community disruption. The smooth internal surface of the Channeline sections reduced friction, ensuring that flow carrying capacity was maintained, despite a slight loss in internal cross-section. The renewed culvert is expected to have a service life of over 50 years, providing a long-term solution to the complex culvert problem.

This project demonstrated the effectiveness of sustainable and innovative approaches in addressing complex culvert issues. By thinking outside the box and utilising custom-designed materials, Interflow achieved exceptional results, exceeding the required outcome while minimising disruption and costs for the Sunshine Coast Council. Such solutions offer valuable alternatives for similar infrastructure renewal projects in the future. >





Storage of the liner sections before installation on the Penrith project

### Penrith Project

Penrith is a town in New South Wales, Australia, located in Greater Western Sydney some 55 kilometres west of the Sydney central business district on the banks of the Nepean River, on the outskirts of the Cumberland Plain.

The Penrith Water Recycling Plant (WRP) processes a daily volume of 24 million litres of wastewater. The existing culvert structure consisted of a precast reinforced concrete box culvert placed on a reinforced concrete base, with internal dimensions measuring 1,800 mm wide by 900 mm high.

Issues arose when surcharges occurred in the culvert structure due to high levels in the oxidation ponds, leading to increased pressure within the structure. These surcharges, combined with the poor condition of the culvert, posed risks to the local environment, and caused damage to above-ground infrastructure. To address these concerns, Sydney Water enlisted the expertise of Interflow to rehabilitate two downstream sections of the culvert using their patented Rotaloc system, covering a total length of approximately 67 m.

During the project, an additional 78 m of culvert were included in the scope of the works. However, upon inspection, it was discovered that the culvert did not maintain a consistent shape throughout. Between the two internal headwalls, a portion of the culvert tapered down to around 50% of its original height before gradually increasing back to its full capacity. >

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A workshop view of the unusual liner design for the Penrith project



The final liner section is installed

A 30 m section of the Penrith WRP Culvert 1 presented an unconventional shape and size, which traditionally would have required costly and time-consuming replacement. Calculations indicated that applying the twin Rotaloc methodology to this section would result in an unacceptable hydraulic capacity. The consideration of stainless-steel sleeving was dismissed earlier due to cost and weight concerns associated with each section. Thus, the delivery team needed to explore alternative solutions that were cost-effective, expedient to install, and ensured an acceptable flow level through the culvert.

Interflow successfully rehabilitated the problematic culvert section again using Channeline segmental liners, a versatile solution that can be customised to fit any shape and size. Channeline possesses superior flow-through characteristics, making it an ideal choice for Sydney Water's culvert problem. To ensure the efficacy of the design, a timber template was constructed and a trial installation was conducted before proceeding to full manufacturing. Since person-entry into this section of the culvert was prohibited, each Channeline segment was carefully winched into place and securely sealed.

The combined application of Channeline and Rotaloc has resulted in a rehabilitated culvert with an expected lifespan exceeding 100 years. Additionally, the culvert now possesses sufficient hydraulic capacity to sustain the Water Recycling Plant's operations well into the future.

Interflow effectively addressed the challenges presented by the Penrith Water Recycling Plant culvert by thinking outside the box and offering a cost-effective, efficient, and reliable resolution. ■

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Mark André Haebler  
(UHRIG); right: Frank  
Claassen (IBAK Robotics)

## IBAK SYSTEM FOR THE QUICK-LOCK COMPETENCE CENTRE

IBAK Helmut Hunger GmbH and UHRIG Kanaltechnik GmbH have recently further extended their sales cooperation. The Kiel-based manufacturer of inspection and rehabilitation systems has placed a mobile inspection system for main sewers permanently at the disposal of the specialists from Baden-Württemberg for civil engineering, sewer technology, attachment compactors and heat from wastewater. The 'MainLite easy' will be used to provide customers with hands-on training on the repair procedure with Quick-Lock sleeves at the UHRIG competence centre in Geisingen on the Danube.

### Time-tested procedure

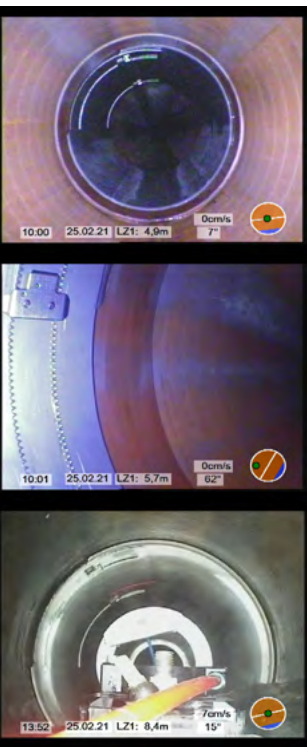
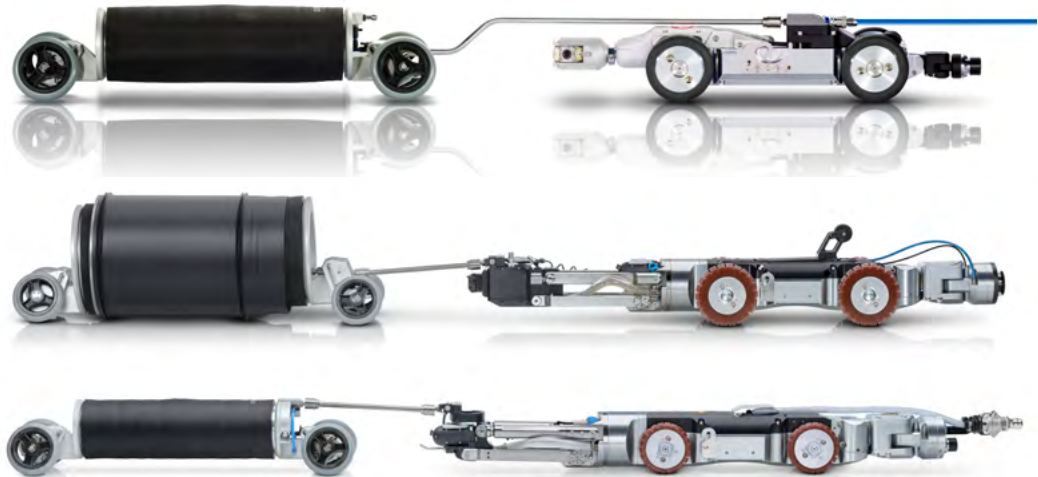
The UHRIG Quick-Lock system is a repair method based on compression and the durable materials 1.4404 stainless steel and EPDM and has been successfully implemented for 30 years for closed sewer rehabilitation. In addition to this, the procedure is used to connect pipe liner systems and to rehabilitate man-entry sewers. >

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Quick-Lock packers from UHRIG connected to an IBAK camera tractor, a MicroGator tractor, a MicroGator and a MicroGator Air



The Quick-Lock system seals and stabilises defects entirely mechanically, without the use of chemicals and irrespective of the host pipe material. The patented Quick-Lock fastener ensures the reliable compression of the seal. The sleeve remains flexibly mounted after rehabilitation and absorbs movements of the pipes. In the case of long, drawn-out defects, the Quick-Lock sleeves are installed in series, one after the other.

This functional principle depends on a basic requirement; that the Quick-Lock sleeve is transported by means of an inspection or robot system with which the Quick-Lock packer with the sleeve can be guided into the pipe in a controlled manner under camera observation and positioned exactly at the desired location. IBAK systems are eminently suitable for this purpose.

### Precision and observation

Push adapters and coupling rods for Quick-Lock packers can be installed on the IBAK T76 and T86 camera tractors. The same applies to the MicroGator electric cutter robot and the MicroGator Air pneumatic cutter robot. In this way, the repair procedure can be performed under continuous visual control. All steps of the procedure can be monitored without limitation via video images from the area of operation. In addition, precise operation by means of the IBAK control systems and the high range of the IBAK equipment in sewers are advantageous for the procedure.

### Cooperation for the benefit of our users

Scan the QR code for a user report: a case of application is described in which the adapter that can be mounted on the electric cutter robot MicroGator was used to operate the packers for the installation of stainless steel sleeves.

"As a worldwide active, family-run company with a long history of success, UHRIG joins forces with like-minded partners in order to provide groundbreaking solutions that improve the quality of repair methods and allow reliable and efficient workflows," said Mark André Haebler, head of international sales and development at UHRIG. He took reception of the MainLite easy transportable inspection system in Geisingen from Frank Claassen, international sales expert at IBAK Robotics.

"The focus of all of our systems is on flexibility and versatility. The wide variety of connection possibilities enables cross-system operation in the fields of rehabilitation and inspection. To provide our customers with solutions offering these advantages, compatibility focuses on procedures that have a high technical standard and that are continuously further developed. UHRIG fulfils these requirements. The cooperation enables us to provide our customers with a robust and profitable solution and ensure that you can systematically increase the range of operation of your equipment," said Claassen, emphasising the advantages that arise for users from the collaboration. ■

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# “SIMPLE AND EASY SYSTEM TO WORK WITH!”

Svanbjörg Vilbergsdóttir was tasked by the government of Greenland to oversee small diameter pipe rehabilitation projects in hundreds of apartment buildings. She chose NuCure CCUV because it combined quality control with a fast and easy-to-execute process.

**“I loved the simplicity of the NuCure UV system. And I like how fast UV works in our cold temperatures.”**

**“Once I learned that it also came with quality assurance documentation – I was sold! I can review the data, including before and after videos, to grade it and create a report right from the portal.”**

**“The training was excellent. And NuFlow Central offers training videos and support, so we can continue to learn on our own time. It’s a simple and easy system to work with, and easy to teach others.”**

**Svanbjörg Vilbergsdóttir**  
Consultancy - Ráðgjöf og eftirlit

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## TRENCHLESS PIPE REPAIR INSIDE BUILDINGS: THE FUTURE OF INFRASTRUCTURE MAINTENANCE

One of the rehabilitation areas inside the building

Gone are the days when fixing a broken pipe inside a building meant tearing up walls, flooring, and sometimes even the foundation. Trenchless pipe repair technology has revolutionised the approach to infrastructure maintenance, even within the confines of a building.

There are 2 main trenchless rehabilitation methods used inside buildings:

- Cured-In-Place Pipe (CIPP) involves inserting a felt lining saturated with a resin (often epoxy or polyester) through the damaged pipe. Once in place, the liner is cured creating a new pipe within the old one. It generally extends the life of the pipe by a minimum of 50 years when done to ASTM standards.
- Pipe Coating which is done by brushing or spraying a coating inside the damaged pipe. Once the material hardens, it forms a seamless, corrosion-resistant lining that can extend the lifespan of the pipe 30 or more years. One of the key benefits of coating is it eliminates the need for reinstatements, and it works extremely well in small diameter pipes as well as those with multiple bends. >



The Master Rooter team onsite



Pipe inspection prior to rehabilitation



Picote products awaiting use onsite



Brock Stone, VP of Coatings and Repair Materials at Vortex Companies who originally comes from the contracting side and still travels the country working with contractors said: "The trenchless in-building market is not only growing but it is exploding in the USA. There have been trenchless options available for a long time, however trenchless rehab methods have become more common and accepted as rehabilitation methods for inside buildings now. Trenchless technologies have opened up great opportunities for contractors in North America, including both CIPP and Coating. Sometimes these are large scale projects using multiple rehabilitation methods providing great business growth opportunities for contractors."

A prime example of this blending of in-building trenchless repair methods is currently happening in Arizona. Master Rooter, a full-service plumbing company is using a combination of Picote Solutions Brush Coating™ and CIPP lining for the rehabilitation of several luxury high rise condos in the Phoenix, Arizona metro area. Jason Lohoff, Owner/CEO of Master Rooter described this project: "About 50% of the residents live onsite year around. The logistics for a project of this scope are crucial. It is not just about lining pipe, you have to shut down fixtures sharing common piping etc. Planning and execution become key. When complete this project will consist of more than 5,000 ft (1,520 m) of 2 in (50 mm) diameter, 5,000 ft (1,520 m) of 3 in (75 mm) diameter, 16,000 ft (4,900 m) of 4 in (100 mm) diameter pipe including roof drains, waste and vent stacks as well as ancillary lines for 198 individual residences. We began this project at the beginning of June of this year (2023), the project was originally slated to last 14 months, we are currently about 25% complete."

The key benefits of trenchless repairs inside buildings include the minimal disruption involved. This means less mess, fewer structural disruptions, and quicker project timelines. It is also extremely cost-effective as it reduces overall labour hours, uses fewer materials, and reduces post-repair restoration work, all of which can lead to a more cost-effective solution in comparison to traditional methods. Trenchless repair can be applied to various piping materials like clay, concrete, PVC, metal, or cast iron, making it versatile for a wide range of buildings and the methods used in trenchless repairs often result in stronger, more durable piping systems that can extend the lifespan of the infrastructure 30-50 years or more. >

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One of the pipes  
being repaired



Working inside someone  
bathroom



Preparing rehabilitation  
equipment



Just like one tool in the toolbox is not always best for all situations, the same can be said for the various trenchless rehabilitation technologies. When asked about choosing to blend pipe coating and lining Jason stated: "As we have grown our lining division, Picote allows us to offer additional solutions to our customers beyond traditional CIPP. We offer solutions and education to our customers. Using Picote in conjunction with CIPP on many projects gives customers a non-invasive way of still rehabilitating their drain lines where either traditional CIPP will not work or we can use Picote in conjunction with traditional CIPP."

Trenchless pipe repair inside buildings represents a significant shift from the traditional, disruptive methods of the past. As technology continues to evolve and the knowledge of and demand for non-invasive repair solutions rises, trenchless methods inside buildings will become the norm rather than the exception. Brock stated: "HOAs are also becoming more educated about trenchless options today. It is an exciting era for infrastructure maintenance, where innovation is driving efficiency, cost savings, and minimising the impact on occupants and structures alike."

Picote is a great example of a success story of a contractor specialising in pipe rehabilitation inside buildings. Picote started as a trenchless rehabilitation contractor which had to develop its own tools to be able to efficiently operate and execute trenchless projects inside buildings. Today those innovations are sold globally, and the knowledge accrued over the years is shared with contractors around the world.

When asked where he sees as the future for Master Rooter, Jason said: "We focus almost entirely on commercial lining projects, because as lining becomes more well known amongst consumers commercial facilities are seeking us out to have the work done. The ability to allow the end user with minimal interruption to still occupy and use their space while the drain lines are rehabilitated is invaluable compared to the traditional method that would require the user to vacate the space, the project would take longer, and ultimately cost the consumer more when you add in build-back. Because of this I think you will only see more consumers going this way." ■

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Working with the new  
pigging station



## THE 'QUICK-PIG' ESTABLISHES

Pigging and access for a pipeline must become easier and safer! Without a complex manhole, without time-consuming ventilation of the manhole, directly from the street, made of PE 100 and corrosion-free. With these requirements, Hamburg's municipal drainage system (now Hamburg Wasser) approached Reinert-Ritz GmbH from Nordhorn. The fittings manufacturer developed a station that enables fast access, safe pigging without a manhole and has been used successfully in various projects to date. >



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Installing a  
pigging station



### Maintenance and cleaning of sewer rising main

Especially when working in manholes, accidents at work occur time and again, be it due to slipping from ladders or bumping into each other in the confined working space. A great danger when working in manholes is also the presence of sewer gases and/or gases escaping from the ground. Once these gases have been detected, the manhole must be ventilated using appropriate means and measures, and the resulting waiting time delays the start of the planned work. In addition, since the space required to accommodate and operate fittings in manholes must be taken into account for new construction as well as retrofitting, this can be associated with high costs.

Therefore, Reinert-Ritz GmbH set to work, implementing the requirements specified by Hamburg's municipal drainage system in a way that was suitable for plastic and tested them in the company's own test centre. The result was a compact pigging station as an alternative to large, expensive concrete manholes, which can be installed under standard road covers next to existing pipes and cables. It eliminates the need to test for gas and pump out water, which can occur in manholes. The operation of the airlock is simple and fast thanks to the bayonet lock. According to the manufacturer, in addition to the construction costs, the life cycle costs due to maintenance operation are also significantly lower than the costs of the standard manhole solution. In addition, the pigging station facilitates the recording of the condition of the pressure pipe required by the various self-inspection ordinances of the federal states.

The first pigging station was installed in August 2014 in the Hamburg district of Lurup in Germany in an existing PE100 sewer rising main of 160 mm diameter with little construction effort. After the successful successfully commissioned, pigging can now be carried out quickly and safely. Furthermore, because the term 'Molch' is 'pig' in English, the name of the fast pigging station was also found: Quick-Pig. >



Installation of the pigging  
station is completed





Accessing an installed pigging station

The Zweckverband Lollar-Staufenberg (ZLS), which is active as a service provider in the areas of water supply, wastewater discharge and wastewater treatment, also used the Quick-Pig system for the first time in Hesse as part of a pilot project. The ZLS operates a total of seven sewage pressure pipes with a total length of about 5 km in its association area. They represent about 4% of the total network length of the ZLS. In the past, the operation and maintenance of the pressure pipeline systems, some of which are over 20 years old, focused primarily on the maintenance of the mechanical and electrical equipment of the pumping stations and pumping stations. In 2016, the rehabilitation of three older pumping stations was planned. For the cleaning of the pipelines, pig accesses were planned. The retrofitting of a pigging station was also planned for an existing sewer rising main.

Since the access, cleaning and inspection of sewer rising main was not possible with the usual method of gravity sewers, but at the same time the operational risk in the event of damage was much greater, the Quick-Pig system from Reinert Ritz GmbH was used.

In the meantime, more than 300 Quick-Pig stations have been installed in Germany for pipe dimensions from 63 mm to 400 mm diameter have been installed. Four Quick-Pig pigging stations of 315 mm diameter were even delivered to Switzerland. ■





# MECHANICAL POINT REPAIR YOUR PATCHING ALTERNATIVE

An installed  
mechanical point  
repair seal

Mechanical point repair systems are an efficient method of sealing pipes that are damaged and is the perfect alternative answer to a common patch repair.

Repairing a drain using a structural patch repair system is a common No-Dig service that most drainage businesses use. Providing professional contractors with a permanent and watertight finish to damaged pipes, that are not costly, time-consuming or require disruptive excavation work.

However, there may be cases where a patch repair is not necessarily the answer to a drain repair job. Operators could be faced with a pipe that has sections broken and missing and needs a structural repair because there is no option for excavation, or they could be working with a pressure pipe or a potable water line, that needs a stronger repair and be made of certified and approved materials.

That is where a mechanical point repair system becomes a perfect alternative answer to patch repair. [>](#)



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### What is Mechanical Point Repair?

Mechanical point repair systems are made from high-quality and long-lasting materials, such as EPDM rubber and stainless steel. The install requires no curing time and releases no emissions or foul smells. With a swift and simple installation process, just like a patch repair, a mechanical point repair system, does not involve excavation which helps reduce disruption and avoids any lane rental charges.

The systems are an efficient method of sealing pipes that are damaged due to corrosion, displaced joints, tree roots and ground movement, and are manufactured to suit an array of pipe materials including concrete, steel, cast iron, plastic, and glassfibre.

### How do Mechanical Point Repair systems work?

Thousands of sleeves have been installed globally for repairing the following types of defects in pipe: longitudinal, radial, and circumferential cracks, fragmentation, leaking joints, displacement, or joint misalignment, closing or sealing unused laterals, corrosion, spalling, wear, leaks in the barrel of the pipe, deformation in the pipe and root penetration. There are no limitations on the diameters of the laterals that can be sealed.

Point Repair systems can be installed differently depending on the manufacturer and the size of the pipe and the type of repair, however they all provide the same results.

### Quick-Lock System

The Quick-Lock system by UHRIG group, is a mechanical trenchless repair sleeve with a locking gear mechanism.

The rubber jacket is put on the steel sleeve, the sleeve is then placed inside the pipe at the point of repair via a packer, crawler, and push bar. Inflating the packer inside the pipe allows the circumferential seals on the rubber jacket to be compressed against the host pipe, as the packer inflates the locking gear runs along the toothed strip, thus keeping the sleeve expanded when placed at the point of repair. With the rubber seal compressed against the pipe this creates a watertight seal, while the flared end of the sleeve faces the direction of the flow thus improving the hydrodynamics, as well as preventing solids from depositing. >



## K-Prema System

With a larger diameter pipe that has manhole entry, a system such as the K-Prema Internal Pipe Seal System should be installed. This mechanical point repair system consists of a large EPDM rubber sleeve and retaining clamping bands which are made of high grade 304 stainless steel.

This internal seal is installed manually by laying the rubber seal in the bottom of the pipe and position symmetrically across the point of repair, after the retaining bands are placed in the bottom half of the rubber seal. Once in the correct position, stainless steel shims are placed between the rubber and the bands and the remaining top halves of the retaining bands are placed in position. Using a hydraulic ram, the retaining bands lugs are expanded to put in the space wedges, this process is completed multiple times until all junctions of the retaining bands have the maximum sized spacers fitted and the seal is fully fixed.

## What are the benefits of Mechanical Point Repair

Not only is it the perfect alternative to traditional patch repair, but there are also multiple benefits to using a mechanical point repair system for your next trenchless project.

- Approved and Certified systems that are manufactured from a WRAS-Approved material.
- Simple and fast installation, from as little as 30 minutes using an effective and uncomplicated mechanical assembly.
- No excavation required and only one entrance to the pipeline required, reducing the environmental disruption.
- Provides a durable and watertight seal with high elasticity to maintain contact.
- Cost effective solution for many applications as can be used to repair a variety of pipe materials.
- Can withstand high maximum internal pressure.
- Ecologically harmless and can be dismantled and reused.
- All mechanical with no chemicals used, and there is no curing time.

## Summary

Mechanical point repair systems have been used thousands of times globally, however it continues to be unknown to some contractors in the industry as an alternative to common patch repair systems. As a trenchless system it still can reduce costs by 40% to 60% and result in fewer disturbances to people and the environment when compared to excavation methods.

At S1E Ltd the company supplies certified and quality mechanical point repair systems from both UHRIG and K-Prema. Both the Quick-Lock range from UHRIG, and K-Prema also provide liner end seals to seal the gap between a CIPP liner and the host pipe. ■



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Fast and easy to apply with minimal waste.







## RISING TO NEW HEIGHTS WITH GUIDED BORING

An artist's impression of how the new One Za'abeel building will look

Since the construction of the Dubai World Trade Centre in 1979, Dubai has become the most innovative city to showcase modern architectural marvels in the world. Scheduled to open in December 2023, Dubai is set to open another record-breaking Middle East icon, One Za'abeel which will become the world's longest occupied cantilevered building, and the newest addition to Dubai's breathtaking skyline.

One Za'abeel is a symbol of ambition, innovation, and the pioneering spirit of Dubai. Consisting of two towers standing at 304 m and 241 m in height, the buildings straddle a six-lane bridge and are 'linked' by an impressive 225 m long cantilevered building near the top to achieve Guinness Book of World Record accolades. Trenchless technology is not commonly associated as a key attribute in the construction of such iconic structures, however the developer, Ithra Dubai, required the finesse of multiple Akkerman Guided Boring Machines to assist construction of this world record breaking structure. >

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The One  
Za'abeel  
construction site

### Enabling construction to grow up

As with most underground construction, notoriety is often lost without visibility. One Za'abeel is just as impressive below ground as the visible architecture above. Designed to a depth of 38.5 m below ground, the basements for each of the towers include 7 individual floors with space for over 2,500 parking spaces, storage units, and maintenance rooms requiring engineering firsts in foundation construction. The two towers and associated basements are connected by two underground tunnels which further complicated foundation construction due to the proximity of the existing highway bridge piers and its foundation.

APCC Piling and Contracting L.L.C. (APCC) was awarded the foundation work for the One Za'abeel Mixed Use Development Project with WSP as the consultant engineering firm. Since the foundation for both tower 1 and tower 2 is near the bridge foundation, the Investment Corporation of Dubai required supportive D-Walls on both sides of the bridge to be 'linked' together with tension cables to minimise any risk of settlement or deviation to existing structures.

### Trenchless technology tests – HDD vs. Pilot tube

Nearly two years into the construction phase, site excavation and foundation work slowed as the first layer of D-Walls could not be fortified using the original design method. Initially, a horizontal directional drill (HDD) rig was to install a drill rod for 150 ft (45.7 m) from one D-Wall support to an adjacent D-Wall support at the other side of the bridge. Each pilot required entry and exit through a pre-existing 8 in (200 mm) o.d. x 8 ft (2.4 m) long steel casing that was grouted into the structure. With intention of pulling back 6 in (150 mm) diameter HDPE to house a series of high-tensile strength cables, APCC would then use specialised cable tensioners to solidify the foundation between towers 1 and 2 by putting the series of cables into tension.

Although highly skilled operators and HDD equipment were available, extreme passive interference from the active bridge structure, 11 kV power lines, and other existing utilities on the construction site would not allow an HDD pilot rod installation to within tolerance guidelines. After several attempts, experts were not happy with the results and required an alternative trenchless installation method. The installation of the tension cables required an extremely straight and accurate bore path to ensure the cables would remain in proper tension for the lifespan of the structure. >





Foundation piles at the One Za'abeel site

To successfully continue work on the iconic One Za'abeel project, APCC required technology not often utilised in foundation construction. With a background in Civil Engineering and being known as an extreme innovator, Managing Director of APCC Elie M El Moussa reached out to Terranaut Technologies of Kuwait and Akkerman Inc. in the USA for an alternative solution concept.


Due to the high-profile nature of the project, the construction schedule was of the utmost importance. To maintain the schedule, a total of 296 crossings were to be completed at six different elevations within a three-month period. Tension cables on each level needed to be properly installed, inspected, and approved prior to excavation of the next subterranean level. To expedite a proficiency test for approval, Terranaut Technologies mobilised its Akkerman Guided Boring Machine (GBM) system from Kuwait to Dubai, while Akkerman dispatched tooling suitable for the sandstone rock, as well as a technician to assist with the installation. Approximately six days after the initial inquiry by APCC, the first guided pilot tube installation was successfully completed in Dubai and the Pilot Tube Method was approved by the owner and consultant engineering teams.

### Pilot tube installation method

To complete the project on schedule, APCC commissioned two additional Akkerman GBM systems to work in concert with the GBM system supplied by Terranaut Technologies. Since the project required the rapid installation and quick mobility of the frame, Akkerman 240A GBM systems were sourced for the project. These units can install a complete pilot tube in one advance sequence and are much lighter to mobilise around the project site than the larger Akkerman 4812A GBM system initially acquired from Terranaut Technologies.

While pilot tube installations have been commonplace in soft, displaceable ground conditions, navigating through hundreds of 150 ft (45.7 m) long crossings in sandstone rock required an alternative solution. Akkerman fitted all GBM systems with a Rock Drill Adapter, which allows conventional pilot tube systems to use steerable rock tooling in conjunction with the line-of-site, theodolite-based GBM guidance system. The combination of these components allowed successful excavation of the sandstone while maintaining an accurate bore path along the entire alignment. Since the guidance system provides instantaneous feedback along the entire alignment and does not require a beacon locator, so interference issues evident in previous HDD trials were non-existent. >





The site of the multiple bores for the One Za'abeel support cables



A completed pilot bore.  
Below: A bore with the case pipe installed



Once the pilot tubes were installed, the steering head was removed at the reception side and replaced with a pull-back tool customised to fit the 6 in (150 mm) diameter HDPE. During both the installation and pull-back sequence of the pilot tube, a bentonite lubrication mixture was pumped through the dual-wall pilot tubes from the launch shaft to minimise forces and move away chips created from the cutting action of the steering head. Unlike in HDD, flowrates are extremely low during the pilot tube process as the overcut diameters are minimal to achieve line and grade tolerances.

### Project challenges

Outside of the tight schedule demands, the One Za'abeel project was faced with some extreme challenges that required perseverance, innovation, and execution.

**Equipment Setup:** With a massive foundation excavation serving as a launch shaft, the team had to be creative on how to set up the equipment both efficiently and effectively. APCC chose to build custom platforms which the Akkerman GBM systems could firmly attach themselves to while allowing full adjustability for slope correction. This configuration was like the Guided Auger Boring industry setup, however the custom skid allowed APCC to rapidly transfer the GBM to the next pilot hole location with onsite construction equipment.

Instead of a thrust reaction wall to counteract the thrust forces required to advance the pilot tubes, the front of the GBM frames were mechanically linked to the D-Walls and secured. During the installation of the pilot tubes, the mechanical linkage was placed in tension while pull-back operations reacted through the front adapter ring on the GBM frame itself. >





A detailed view of the bore site with tension cables shown protruding from previously completed bore holes

**Preliminary Survey Points:** Trenchless contractors understand the importance of jobsite set up and how any deviations in the initial survey will affect the accuracy of the final product. Typically survey points for critical line and grade bores are well-established and can be replicated with relative ease. In most cases, stringlines are dropped from predetermined points at the surface of the launch shaft to verify line, while elevation and grade are transferred. Due to the massive scale of the excavation, the construction team created mobile stringline stands to set up the guidance system. While this method was very functional once initially set up, the stands proved to be easily manipulated by anyone that accidentally bumped into it. If the incident was not reported immediately and the stand not resurveyed, the guidance system was set to an improper alignment causing borehole to be grouted and pilot tube to be re-installed at a later point.

### Starter Casing Alignment

As mentioned earlier, every pilot tube shot started into an 8 in (200 mm) o.d. x 8 ft (2.4 m) long steel casing that was installed and pre-grouted into the D-Walls on both sides of the excavation. These starter casings were critical in the cable tensioning process to secure the D-walls on either side of the bridge structure. Since these casings were pre-installed into the D-Walls prior to the pilot tube installation, all 297 pilot tube shots needed to match existing casing installations earlier in the construction schedule. In many cases, this caused additional evaluation of the existing structure to properly set up the equipment. >

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How the One Za'abeel will look once completed

During the pilot tube installation, it became apparent that some of the 297 crossings did not have starter casings that were concentric on both sides. If the starter casing on either side was installed at an acute angle, there was a risk of not intersecting the i.d. of the opposing side. In many cases, the pilot tube would intersect the 8 in (200 mm) i.d. casing with ample clearance to install the 6 in (150 mm) diameter HDPE, however in some cases the 8 in (200 mm) diameter steel casing had to be removed and re-installed. Every installation required inspection and evaluation prior to moving onto the next borehole.

### Operational Training

With a tight construction schedule, it was important for APCC to install as many as 4 to 5 pilot shots per day. It was important to properly train the three teams to correctly operate the equipment as well as function as a unit to expedite the installation process. Even though the UAE often has a highly skilled labour force available, these teams can be comprised of members from multiple nationalities creating language barriers. To assist training efforts, multiple Akkerman technicians as well as experienced GBM operators from nearby regions worked with technical interpreters to ensure operations ran smoothly.

### Results

With a milestone ceremony in November 2017, construction crews began pouring 26,000 cubic meters of concrete into the completed 7,600 square meter foundation that served as a launch shaft for the three Akkerman GBM systems a few short months earlier. Issam Galadari, Director and CEO of Ithra Dubai, announced at this time that: "With the appointment of ALEC Engineering & Contracting as the main contractor, the project entered an exciting phase of construction. After the pour, it is only a matter of time before One Za'abeel and its 'Linx', the panoramic sky concourse traversing the two towers, reshape the ever-exciting Dubai Skyline."

The recipient of several notable construction achievements such as the 'Iconic Project of the Year' at the Big Project Middle East Awards 2022 and 'Project of the Year at Innovation in Construction' at FM Awards in 2019 and 2020, One Za'abeel is a must-see destination when traveling to the region.

Author: Jason Holden, Vice President, CRO – Akkerman Inc.





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## GUIDED AUGER BORING SAVES TIME AND MONEY IN LEEDS

The guided boring unit is positioned in the drive shaft


After a flooding event adjacent to a foul sewer in Great George Street, Leeds, UK, client and network owner Yorkshire Water (YW) investigated the pipeline. These investigations found that a DN300 VC foul water sewer pipeline was 100% full of concrete. The foul sewer was then placed on mitigation until a solution was found.

A solution was presented to YW by a contractor which required the replacement of 60 m of the DN300 VC at a depth of 3.5 m using open cut installation techniques. The proposed solution would have required a full road closure in the busy city centre for a duration of 16 weeks. Leeds City Council Highways department rejected the proposal.

### Trenchless Works

Trenchless Solutions Limited was appointed to undertake a trenchless installation solution to the problem, including constructing the necessary shafts and provide attendances utilising a PBA 85V GAB Guided Auger Boring system. The new section of pipeline was constructed using DN300 Naylor Denlok NC vitrified clay jacking pipe and following installation the new pipeline was connected into the existing foul sewer in the drive and reception shafts by a selection of bends and stub pipes. Ultimately the out-turn cost of the project was circa £200,000. >





Maintaining access to Graet George Street was a must

In determining the selection of the trenchless solution, it was interesting to see the relative comparison of the open cut versus trenchless option. With the open cut option over the proposed 16 Week Open Cut Construction period there would have occurred:

**Restricted Access including:**

- Leeds General Infirmary
- Local Business and Residents
- A Full Road Closure for 16 Weeks
- Increased Construction Traffic
- Road Diversions

**Health & Safety risks including:**

- Risk from Existing Utilities
- Temporary Deep Trenches
- Increased Temporary Works

**Cost implications including:**

- Proposed 16 Week Duration of Project
- Material Reinstatement Costs, Tipping/Inert

**Environmental implications including:**

- CO2 Emissions (tonnes) as Built - 52.8
- Noise
- Dust





The new pipe is installed



Installing the DN300 Denlok pipe

With the trenchless option however looking at the same criteria offered the following over an As-Built Trenchless Construction period of just 5 weeks instead of 16 weeks:

#### Restricted Access

- Leeds General Infirmary
- Local Business and Residents
- Reduced Construction Traffic
- No Road Diversions

#### Health & Safety

- Reduced Risk from Existing Utilities
- No Temporary Deep Trenches
- Reduced Temporary Works

#### Cost Savings

- As Built 5 Week Duration of Project
- Reduced Material Reinstatement Costs

#### Environmental

- CO<sub>2</sub> Emissions (tonnes) as Built - 12.5
- Reduced Noise
- Reduced Dust

The trenchless option became the obvious solution with reduction in disruption to local businesses and residents as well as the reduction in construction time and the supplementary advantages of reduced site traffic and the need for importation of back fill materials as well as carbon emission reduction of over 75%. ■

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# ROADWAY PIPE RAM HANDLES HEAVY TRAFFIC

The 54 in diameter casing was being installed to serve as a sleeve for a 36 in diameter ductile iron water transmission line. Ramming the 140 ft of casing took eight days in total

In the utility construction world, road crossings are some of the most common and often challenging projects for any contractor. From traffic control to preserving the integrity of the roadway, contractors face a multitude of challenges anytime they attempt one of these projects.

Recently, trenchless contractor Staggs Environmental Construction, Inc., (Staggs Environmental) of Muscle Shoals, Alabama, USA, took on a significant casing installation project under a highly travelled roadway, Memorial Drive, near Atlanta, Georgia.

Staggs Environmental president and owner John Staggs said: “The project was done in Dekalb County, Georgia. That entire area is basically under a consent decree and existing sewer systems need to be upgraded and to be in compliance. They are also doing work on the water system. This portion is a 36 in (900 mm) diameter watermain project that is been going on for about a year. The project has moved forward until it reached this major highway, Memorial Drive, and stopped.”

In order to allow the 36 in (900 mm) diameter ductile iron watermain under the road, a 54 in (1,370 mm) diameter steel casing needed to be installed under the road to act as a sleeve for the new water main. The project was initially slated to be completed by a different pipe installation process, however, with the soil conditions in the area, there were concerns that that type of project could affect the stability of the road. Staggs said: “So, after the project sat for about a year, one of the county officials got in touch with us. I told them that I thought we could pipe ram it and that would be the safest, most sure way to get across the road. After about three weeks of deliberation, that is the route we took.” >





For the project, the contractor utilised a Grundoram Taurus pipe ramming system from TT Technologies

Trenchless Specialists Eddie Ward and Rick Melvin from trenchless equipment manufacturer TT Technologies of Aurora, Illinois, USA provided technical and equipment support on the project. Ward said: "Pipe ramming is often the method of choice for road and railway crossings because of its ability to install casings without creating voids or surface slump. That was key on the Memorial Drive project."

To install the 140 ft (42.7 m) of 54 in (1,370 mm) diameter casing, Staggs Environmental choose a 24 in (610 mm) diameter Grundoram Taurus pipe ramming system from TT Technologies.

### Getting Underway

Staggs Environmental Construction has over 20 years of trenchless experience and was the right contractor to get the Memorial Drive project moving again. Staggs said: "I started and incorporated the business in February of 2003. We originally focused on manhole rehab point repairs and service replacements for the cured-in-place industry. Then we decided to get into the pipe bursting and the pipe ramming business in about 2006. Trenchless utility contracting is all we do. No private or residential work."

Before Staggs Environmental could get started with pipe ramming, the ramming pit needed to be excavated. Staggs said: "It took the general contractor about two weeks to finish the excavation for the ramming pit. It was kind of in a tight area. So, it took about two weeks of prep to get the launch pit ready for us to come in and put the casing in. The overall pit length was 44 ft (13.5 m), and it was at least 10 or 12 ft (3 or 3.7 m) to the top of our casing." >

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"We were very efficient ramming the 20 ft (6.1 m) sections of 54 in (1,370 mm) diameter pipe, averaging about 45 minutes per round."

According to Melvin, the pit excavation revealed several key findings. He said: "You might expect the infamous red Georgia clay, but that was not the case here. It was a silty sandy soil. It was actually great soil. Not wet, very conducive for pipe ramming. However, there was the potential for some big boulders and cobbles. Some large diameter boulders were encountered while digging the pit."

Once the pit was excavated and shored, steel road plates were used to create a solid and stable pit floor. The plates were tied into the shore box to keep them in place during ramming. A creative approach was taken to guide the casing during ramming.

Melvin explained: "Staggs Environmental used angle irons to keep the casing centred. They ran 3 in (75 mm) angle irons on either side of the casing and welded them down to the plates. First, they positioned the first casing in the pit and got it aligned. Then they put down the angle irons and tack welded them to keep them positioned properly. Then removed the casing and fully welded the irons in place. That was how they guided the casing and kept it aligned throughout the ram. This was not grade critical, but it needed stay on target."

Crews also installed a cutting shoe overcut band on the outside of the casing. The cutting shoe provides some reinforcement on the lead end of the casing in case it encounters any rocks like the ones removed during excavation and helps reduce friction.

Once the cutting shoe was in place and the pipe aligned, the connection between the 24 in (610 mm) diameter pipe rammer and the casing was made through standard ramming gear. Ward said: "Standard 54 in (1,370 mm) ram gear consists of a 54 in (1,370 mm) diameter segmented ram cone that makes direct connection with the casing. Then 48 in (1,220 mm) and 31 in (787 mm) diameter ram cones facilitate the connection with the casing and the 24 in (610 mm) diameter rammer. For this project, we ran with a single 1,800 cfm air compressor to power the rammer."

### Roadway Ramming

According to Melvin, the location of the project added a level of difficulty. He said: "First there was Memorial Drive. This is a main traffic artery and definitely a 'No-Dig' highway. It was also a very tight neighbourhood and work window. They ended up having to close an adjacent road to stage casings and equipment. It was very congested. Lots of old trees, houses in a concentrated area."

Once ramming was underway, Staggs Environmental crews were able to reach a high level of productivity. Staggs said: "We were very efficient ramming the 20 ft (6.1 m) sections of 54 in (1,370 mm) diameter pipe, averaging about 45 minutes per round. It went really well and there was a tremendous amount of sandy soil. So, I do understand why others were not interested in going under Memorial Drive. The welding times on each new segment of casing typically took between four to six hours per joint. We welded most of them in the morning and then we rammed them in that evening. After we got our first two sections in, we started cleaning them out as we went and then dropped one in and welded again." >





Trenchless contractor Staggs Environmental Construction was subcontracted to install the 140 ft of 54 in diameter casing under a high traffic roadway near Atlanta, Georgia, USA

The Staggs Environmental crews were on schedule to have all the ramming done in seven days, but the weather had other plans. Staggs said: "Weather was our biggest challenge on this project. It was just terrible out there. We had some rain that caused a two- or three-day delay. But we were going through a rainy period and a hot period here all at the same time. The 100°F (37.8°C) heat was extremely difficult. Keeping everybody cool and hydrated was the big thing. We made sure everybody had water. We had blower fans on site and put tents over the bore pit to keep the sunshine off and provide shade for everyone working in the pit."

In the end, ramming the 140 ft (42.7 m) of casing, seven sections of pipe, took eight days in total. Staggs Environmental crews were on the job for three weeks from start to finish. Staggs said: "They said the thing came out right on target. On grade and on point there. Perfect with everything."

Melvin said: "It was a solid project and John and his crew did an excellent job. They are highly skilled and know what they are doing." ■

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# FINAL BREAKTHROUGH FOR THE SILVERTOWN TUNNEL

After the breakthrough of the first tunnel in February 2023, the Herrenknecht specialists rotated the 1,450 t shield machine together with the cutting wheel by 180° to drive the second tunnel in the opposite direction



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Tunnelling at the Silvertown project in London, UK is on track for success. Using the largest tunnel boring machine (TBM) in the UK, miners from Riverlinx CJV completed tunnelling for the second tunnel ahead of schedule. Previously, after the first tunnel had been driven, experts from manufacturer Herrenknecht had turned the entire machine around in an unusual procedure on nitrogen-filled cushions.

To counter chronic congestion in the Blackwall Tunnel, which dates back to Victorian times, London is building the Silvertown Tunnel in the east of the city, the first newly constructed underground road link between the two banks of the Thames in over 30 years. Over a total length of 1.4 km, two lanes run through each side of the tunnel. The diameter of the tunnel boring machine (TBM) of the EPB Shield type (Earth Pressure Balance Shield) designed and supplied by Herrenknecht is correspondingly large. The TBM, christened 'Jill' by the miners, is the largest ever used in the UK. The shield diameter is almost 12 m. Including the gantries, the machine weighs 1,800 t and is 82 m long. By the time work was completed on July 23, 2023, 'Jill' had installed 1,120 segmental rings, each weighing around 70 t, to line the tunnel. >





In July 2022, the 'Big Lift' takes place with the cutting wheel lifted into the launch shaft for assembly

The contracting joint venture Riverlinx CJV thus completed the tunnelling with the highest precision and within less than one year. Breakthrough of the southbound tunnel took place in mid-February 2023.

### ABOUT-TURN

When building twin-tube tunnels, usually either two TBMs are used or a single TBM is dismantled and returned to the original launch site for the second drive. However, due to the highly complex underlying conditions in terms of construction technology, time and finances, the project managers opted for a different, innovative approach for the Silvertown Tunnel. After completion of the first tunnel, the entire machine was rotated by 180° in order to subsequently bore the northbound tunnel. To this end, the tunnellers specially excavated an 18 m deep and 40 m long shaft that was open at the top. >



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The EPB Shield for the Silvertown Tunnel project in London is ready for customer acceptance at the Herrenknecht plant in Schwanau, Germany, in December 2021

In fact, turning such a huge machine required a special procedure developed by Herrenknecht. The shield machine and the cutting wheel were placed on a kind of sled. This in turn slides on cushions filled with compressed nitrogen so that with the help of pneumatic chain hoists the machine can be turned precisely and brought into the new position. The method had already been successfully used in Paris and on the new Stuttgart-Ulm railway line. The 180° turn of the 1,450 t shield machine in London was accomplished by the Herrenknecht specialists in a single day.

### STRONG PARTNERS

Behind the new Silvertown Tunnel is Transport for London, the institution responsible for road, rail and public transport in the UK capital. It awarded the contract for the design, construction, financing and operation of the project to the Riverlinx CJV (Construction Joint Venture) in November 2019. The joint venture comprises Ferrovial Agroman, BAM Nuttall Ltd and SK Engineering & Construction Ltd. ■



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# CANADIAN TUNNEL OF THE YEAR

The Herrenknecht Combined Shield TBM in the workshop in Schwanau, Germany

The Tunnelling Association of Canada (TAC) selected the Trans Mountain Expansion Project - Burnaby Mountain Tunnel Project as the 2023 recipient of TAC's Canadian Project of the Year (Under C\$100 million) Award.

Herrenknecht, provider of the tunnelling machine used on the project, is proud to be a member of the team that achieved this remarkable project success together with Trans Mountain, McNally, Kiewit and Hatch. The 4.355 m diameter Herrenknecht Combined Shield, which is capable of tunnelling both in closed EPB mode and in open mode, achieved the final tunnel breakthrough in September 2022 after tunnelling over 2.6 km through challenging geology. The Herrenknecht team is looking forward to meeting the tunnelling community in Toronto at the TAC Conference in September. ■

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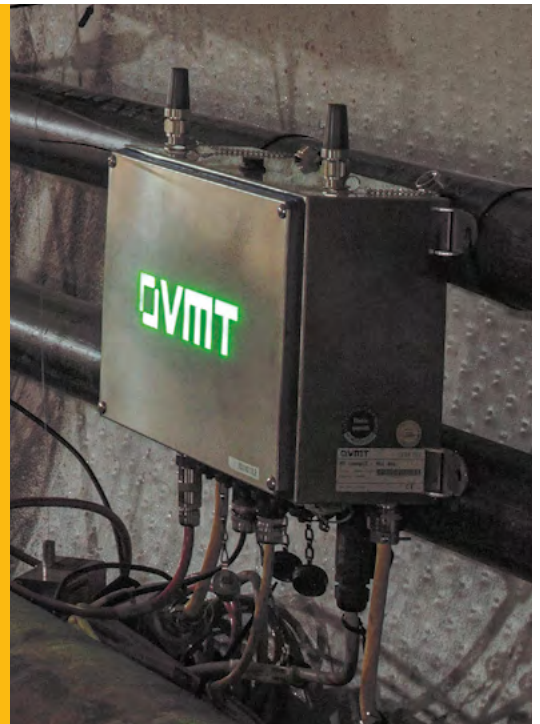


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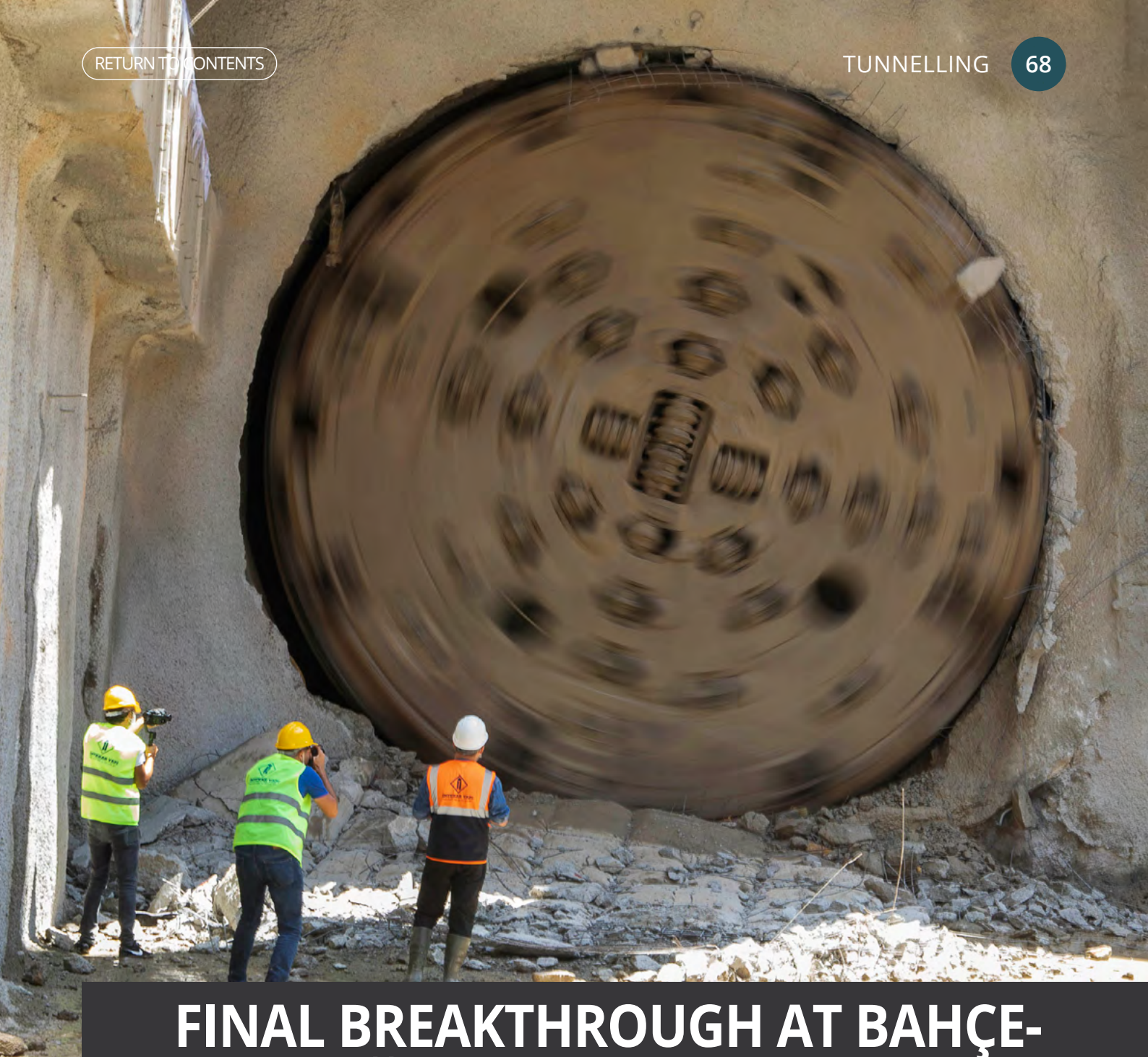
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## FINAL BREAKTHROUGH AT BAHÇE-NURDAĞI RAILWAY TUNNEL

The Robbins TBM completed 9.6 km of tunnelling, adding on to the 9.2 km it completed in its initial railway tunnel in 2020, for a total of more than 18 km bored

In June 2023, a resilient 8.0 m diameter Robbins Single Shield completed its second tunnel at Turkey's Bahçe-Nurdağı Railway project. The machine completed 9.6 km of tunneling, adding on to the 9.2 km it completed in its initial railway tunnel in 2020, for a total of more than 18 km bored.

"We are very proud to complete this tunnel in difficult rock formations with our excellent team by utilising an extremely powerful and strong Robbins Single Shield TBM." said Deniz Şahin, TBM Chief for contractor İntekar Yapı Turizm Elektrik İnşaat San. ve Tic. Ltd. Şti.

Geology in the second tunnel was comparable to the first, including incredibly hard and abrasive metasandstone with quartz, with an average of 220 MPa (31,900 psi) UCS and a Cerchar abrasion value of 3.87. The rock has some of the most extreme hardness and abrasiveness ever measured in Turkey. >

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The Robbins Single Shield TBM was designed to bore in incredibly hard and abrasive geology including metasandstone with quartz, some of the hardest rock ever encountered by a TBM in Turkey



In June 2023, a resilient 8.0 m diameter Robbins Single Shield completed its second tunnel at Turkey's Bahçe-Nurdağı Railway



After its first bore in the difficult ground, the machine required some inspection and repairs. "Robbins Field Service was always available when we requested," said Şahin. "The biggest repairs we undertook with Robbins Field Service technicians were the main bearing seal change and checking and repairing of the TBM before launching it on the twin tunnel after the completion of the first tunnel. Both operations were completed in a short time due to good planning with Robbins technicians."

The machine began its second bore in February 2021, achieving a best monthly advance rate of 411 m. "During tunnelling we performed a normal maintenance programme as given in the TBM manual, and the machine had minimum downtime, which shows the durability of Robbins TBM in very hard and abrasive rock," said Şahin.

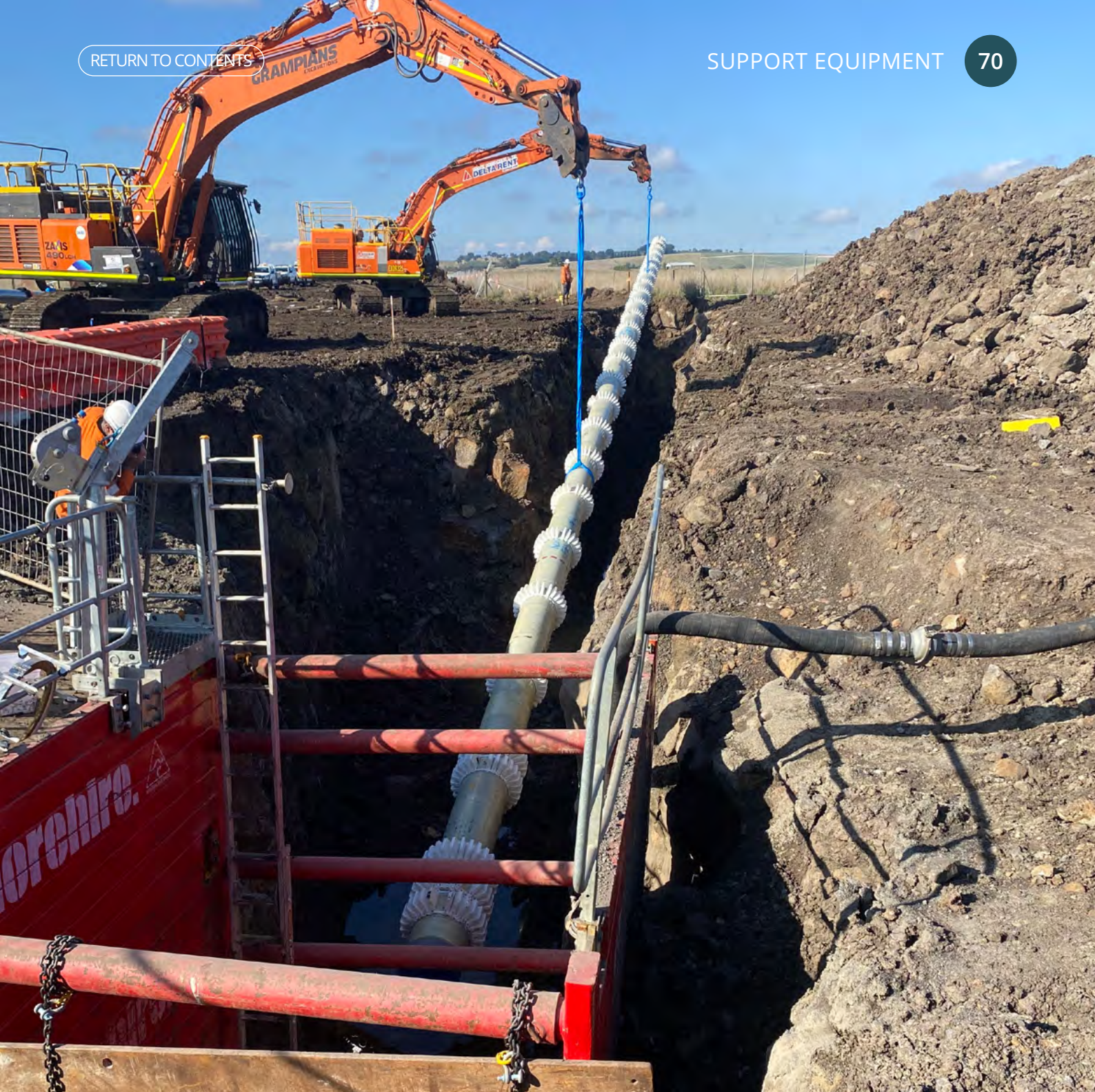
"The Robbins TBM has performed extremely well in this project with minimal downtime and good advance rates to complete the longest twin tube railway tunnels in Turkey," said Yunus Alpagut, Robbins representative in Turkey.

The twin rail tunnels, for owner Turkish State Railways Directorate (TCDD), will provide an economic boost to a region recovering from two consecutively devastating earthquakes with magnitudes of 7.8 and 7.6 that occurred in February 2023. The project site is located very close to the intersection of two large active fault zones, the East Anatolian Fault (EAF) and Dead Sea Fault (DSF). The tunnels were inspected after the event and were found to have sustained only minor cracking in a few segments. The new rail line will provide service between the towns of Bahçe and Nurdağı and is part of the TCDD's plan to overhaul the railway connection in southeastern Turkey by providing a shorter, faster route in one of the country's busiest railway corridors. ■

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# KWIK-ZIP PUTS ITS MARK ON WORM

The pipeline will be constructed from high-strength steel line pipe with an external epoxy coating and be buried for its entire length to a minimum depth of 900 mm


The Western Outer Ring Main (WORM) project is a high pressure, buried gas transmission pipeline, approximately 51 km long. kwik-ZIP's input involved the utilisation of various products for numerous cased crossings along the project pipeline route.

The gas transmission pipeline aims to provide a new connection between existing pipelines at Plumpton in Melbourne's west and Wollert in the north, in Australia. Several different kwik-ZIP spacers including HDX-38's, HDX-125 and HDXT-63's was utilised on different cased crossings along the pipeline route. >

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Several different kwik-ZIP spacers including HDX-38's, HDX-125 and HDXT-63's were utilised on different cased crossings along the pipeline route



Without the project being delivered, the Australian Energy Market Operator has forecast that parts of Victoria may soon face natural gas supply shortages by 2023

The pipeline will address a key capacity constraint in the Victorian Transmission System (VTS) by providing a new high-pressure connection between existing sources of natural gas supply in Victoria. Addressing this missing link will deliver improved network reliability by increasing the amount of gas that can be stored for times of peak demand. It will also ensure sufficient volumes of gas can be moved where it is needed most.

Importantly, without the project being delivered, the Australian Energy Market Operator (AEMO) has forecast that parts of Victoria may soon face natural gas supply shortages by 2023. The pipeline will be constructed from high-strength steel line pipe with an external epoxy coating and be buried for its entire length to a minimum depth of 900 mm.

As well as assisting with the sliplining process because of the spacer runner system having a very low co-efficient of friction, kwik-ZIP's all thermoplastic design ensured that the pipes protective coating would not be damaged during installation, thanks to the runners ensuring that the pipe would not make contact with the enveloper during and after installation.

kwik-Zip was deemed the right choice for the WORM project, as the company's large range of spacers cater for a wide range of carrier and casing pipe size combinations as well as providing flexibility to deal with different project requirements. ■

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





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## SUNBELT RENTALS INVESTS £2.6 MILLION IN NEXT-GENERATION MCELROY EQUIPMENT

Sunbelt Rentals, one of the UK's largest rental companies, recognised for its commitment to sustainable practices, has announced a £2.6 million investment in the latest TracStar® fusion machines from McElroy, a global leader in pipeline fusion technology. The investment includes the purchase of McElroy's TracStar® 900i Butt Fusion and TracStar® 500 Series 3 Automatic machines, offering improved reliability and productivity for customers in the utilities sector.

"Our ongoing partnership with McElroy allows us to provide our customers with the most advanced fusion machines available in the market," said Brent Smith, Director of Utilities at Sunbelt Rentals. "The investment in the TracStar 900i and 500 Series 3 reinforces our commitment to delivering innovative solutions while maintaining our position as a leader in the industry. We are excited to offer these cutting-edge machines to our customers and are confident they will exceed their expectations in terms of efficiency and quality."

Sunbelt Rentals has a long-standing relationship with McElroy, and this latest investment is a testament to the strong partnership between the two companies. McElroy's commitment to innovation and customer satisfaction aligns with Sunbelt Rentals' core values, making it an ideal supplier of choice for the company.

"The TracStar iSeries machines represent the latest technology in fusion machines and are designed to improve jobsite reliability and productivity for our customers," said Alex Palaiologos, International Business Manager UK Region of McElroy. "We are thrilled to have Sunbelt Rentals as our partner in bringing these advanced fusion machines to the utilities sector."

The TracStar 900i features a range of enhancements, including new emissions-compliant engines, a CAN bus control system, and various hydraulic, mechanical, and electrical upgrades. The machine features an integrated software-controlled system that provides operators with a range of automation levels, ensuring greater consistency and adherence to standards. The TracStar 500 Series 3 is a self-contained, self-propelled machine that produces consistently high-quality PE pipe butt fusion joints. ■



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# SOCIETY NEWS

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Society News brought to members by Trenchless Works

## WELCOME FROM THE CHAIR



Ian Ramsay, Chair, UKSTT



The Stream crossed by Ian and the hiking group

The recent heavy rains all over the UK, following on from a very dry spell in June, has not only highlighted climate change but also many issues within our sewer network. Infiltration has always been a major concern to wastewater networks as the increased volume of water entering the system, dilutes existing sewerage and causes the overall volume needing to be treated to rapidly increase. Treatment plants often cannot cope with the increased volume which then leads to sewer spills/discharges into the rivers and sea. Only last month there was a report from Sunderland, after at least 57 people fell ill after competing in sea swimming events at the World Triathlon Championship Series, due to possible pollution from wastewater in the sea.

Many of you know that I often like to hike with a local group. Last weekend we undertook a hike (a little muddy) and during part of it, we had to cross a small stream flowing into the River Wear. This is well up stream and a popular fishing area. While crossing the stream everyone could smell wastewater that had been released there, which of course led to a debate, but fundamentally these instances are increasing due to the lack of investment in the wastewater networks by the Water Companies.

We know and understand the root causes and we also know the fantastic trenchless solutions that are available to help solve these problems. These can be cost effective, environmentally friendly, long-term and structural.

The UKSTT continues to discuss these challenges with partner organisations, to educate and try and push the Government and Water Companies into investing and to comply with current wastewater regulations. It is a long slow process but we must do it.

We are working on additional events and have regular strategy discussions with other organisations such as the NADC, IWA and the Green Alliance to increase the pressure and try to get things moving faster.

As always, your support is appreciated.

Until next month

Ian Ramsay

UKSTT Chair

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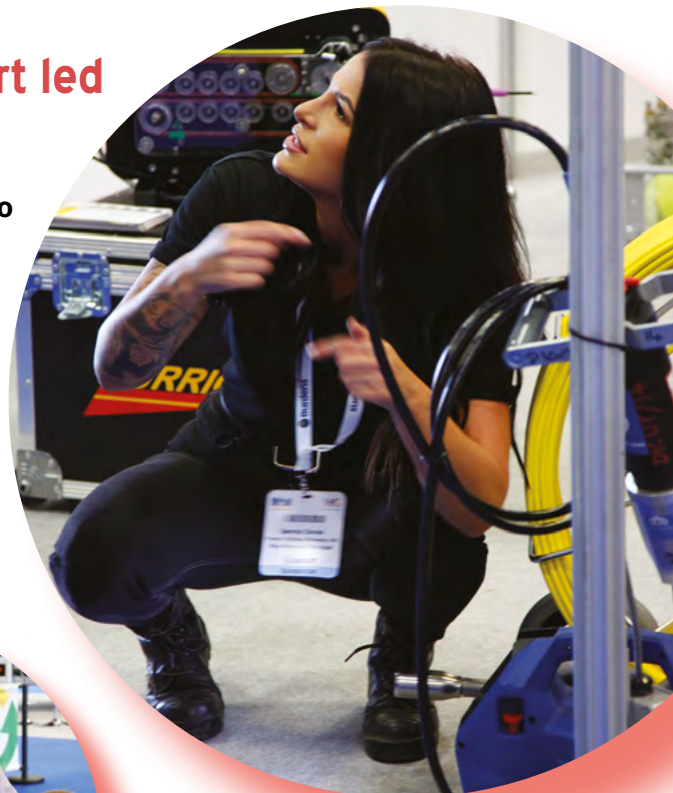
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# UKSTT Annual Awards Dinner 2023

Join us for the annual UKSTT Awards Dinner on the evening of Wednesday 29 November in partnership with Westrade Group at the Bristol No-Dig Roadshow, De Vere Tortworth Court.

**Venue:** De Vere Tortworth Court, Tortworth,  
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**Dress Code:** Black Tie Preferable

**Date:** Wednesday 29 November

**Time:** 7.00pm till late

**Tickets:** £210 + VAT

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Our guest speaker will be **Kyran Bracken MBE** sponsored by **OCU Group Ltd.**

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Further details are available - [www.nodigroadshows.co.uk/ukstt-awards](http://www.nodigroadshows.co.uk/ukstt-awards)

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- Your company profile on the UKSTT event website with logo
- Opportunity to place one promotional video on the UKSTT website
- UKSTT direct marketing via website, social media sites (FB, LinkedIn & Twitter), newsletter, enews and emails
- Trenchless Works social media and magazine coverage

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# SOCIETY NEWS [istt.com](http://istt.com)

ISTT News brought to members by Trenchless Works

## A MESSAGE FROM THE CHAIR



Keh-Jian (Albert) Shou,  
Chairman, ISTT

Hi ISTT members

I would like to share with you what I experienced at the 2023 No-Dig Down in Brisbane, Australia. It was held extremely successfully over three days between 12 and 14 September, 2023, with a record-breaking number of around 50 papers and 110 exhibitors. Over the next few months, in addition to the International No-Dig Mexico, I plan to attend No-Dig Poland in Krakow and No-Dig Turkey. Again, I must say our field is extremely vibrant, especially in the emerging market countries, as the exhibitions were full of people. Furthermore, I will try my best to join as many events as possible to encourage our Affiliated Societies.

Preparations for the International No-Dig Mexico, which is being held between 17 and 18 October, 2023 in Mexico City, are well underway. To encourage and allow more attendees, we have decided to provide the concurrent Spanish translation. Please be aware that we will have other activities like ISTT International Council Meeting and the ISTT Awards as usual, as well as a Student Paper competition, etc. Please submit your papers and applications in good time. To make sure you can have an easy trip, please book your air ticket, hotel room, and Award Dinner tickets as early as possible.

As you know, we keep hosting the various ISTT educational webinars, that can be replayed in the member space. We have undertaken educational webinars over the past few months and will have more soon. ISTT is trying to provide more services to its Affiliated Societies through the website. Please keep watching our new developments, and feel free to provide us with your comments or suggestions. I am looking forward to seeing you soon either at our International or regional No-Dig events.

With my Best Wishes!

Keh-Jian (Albert) Shou  
Chair, ISTT



No Dig Down Under 2023, Brisbane

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# **i**INTERNATIONAL **NO•DIG** 2023 MEXICO THE 39th INTERNATIONAL NO-DIG

Conference and Exhibition  
**17-18 October 2023**  
Expo Santa Fe, Mexico

## **NO-DIG MEXICO - THE COUNT DOWN BEGINS!**

ISTT and the event organiser are thrilled to announce the opening of registration for the 'International No-Dig Mexico' event! Whether you are a professional, expert or a beginner curious about trenchless technology, this event promises to be an enlightening experience.

Secure your spot now! [Register Here](#)

### Event Details:

- Date: 17-18 October 2023
- Venue: Expo Santa Fe México
- Website : <https://www.no-digmexico.com/>
- Conference Programme: <https://www.no-digmexico.com/conference-programme/>

### Special Offer for Residents of Mexico

With a commitment to fostering local engagement and growth in trenchless technology, the International Society for Trenchless Technology (ISTT) is waiving the registration fee for residents of Mexico. ISTT strongly encourages attendees to consider joining the Mexico Chapter of the North American Society for Trenchless Technology (NASTT) and become an integral part of the trenchless community.

Potential visitors may also be interested to note that the Full Conference Programme for the Mexico event is now available to view online which may just whet the appetite for those still considering whether to visit or not. The website address where you will find the Programme is: <https://www.no-digmexico.com/conference-programme/>

See you in October!



# INTERNATIONAL NO-DIG 2023 MEXICO

THE 39th INTERNATIONAL NO-DIG

Conference and Exhibition  
**17-18 October 2023**  
Expo Santa Fe, Mexico

## NO-DIG MEXICO - CONFERENCE PROGRAMME

International No-Dig Mexico 2023 17 - 18 Oct 2023 All times in CST



### Tuesday, 17 October

9:30am	<b>Opening Ceremony</b> <i>Hall A</i>
10:30am	<b>Exhibition Hall Open - Exhibition Hall (Registration) Open</b> <i>Hall A</i>
10:30am	<b>TM-T1 - Session: Condition Assessment, Pipe Inspection, Underground Detection, Others</b> <i>Room B3</i> Chaired by: Jens Hölterhoff (Germany)
10:30am	<b>Increasing sewer inspection efficiency through AI: United Utilities Case Study</b> » <u>Katy Bevan</u> (United Kingdom) - United Utilities, Nathan Muggeridge (Australia) - VAPAR Pty Ltd
10:55am	<b>Integrated Approach for Pressure Pipe Condition Assessment and Rehabilitation: A Phased Approach</b> » <u>Deon Pohorille</u> (South Africa) - SASTT
11:20am	<b>Predictive Life Cycle Analysis of Large Diameter Wastewater Pipelines</b> » <u>Veronica Alvarez</u> (United States) - RedZone Robotics
11:45am	<b>Corrosion Grade Diagnosis of Steel Telecommunication Conduits Based on Image Recognition</b> » Fumito Kudou (Japan) - NTT Access Network Service Systems Laboratories, <u>Daisuke Uchibori</u> (Japan) - NTT Access Network Service Systems Laboratories, Yousuke Sakurada (Japan) - NTT Access Network Service Systems Laboratories

12:10pm	<b>Using Gyro-mapping technology to obtain highly accurate As-Built data.</b> » <u>Otto Ballintijn</u> (Belgium) - Reduct NV
10:30am	<b>TM-T2 - Session: Rehabilitation: CIPP - 1</b> <i>Room B4</i> Chaired by: Milton Chávez Gasca (Mexico)
10:30am	<b>90 year old Collector rehabilitated using CIPP in México City</b> » <u>Francisco Javier Peralta Vazquez</u> (Mexico) - INBODE
10:55am	<b>CIPP UV rehabilitation of drains in Mexico City due Earthquake damages 2017</b> » <u>Daniel Posadas Ortiz</u> (Mexico) - INBODE
11:20am	<b>Use of High Performance Preliner in CIPP Rehabilitation</b> » Marc Joos (Belgium) - Valéron Strength Films, <u>Grégory Lemaire</u> (Belgium) - Valéron Strength Films
11:45am	<b>Success story of trenchless solutions in Mexico City</b> » <u>Milton Chávez Gasca</u> (Mexico) - INBODE
10:30am	<b>TM-T3 - Session: Spanish Presentations - 1</b> <i>Room B5</i> Chaired by: CESAR ALVARADO (Mexico)
10:30am	<b>Construction and Rehabilitation of the main pipeline of the TIBITOC-CASABLANCA aqueduct of 78" for 53 kilometers.</b> » <u>GINO GONZALEZ</u> (Colombia) - LAMSTT, <u>Mauricio Jimenez</u> (Colombia) - LAMSTT
10:55am	<b>6.6 km de microtunel Urbano para alcantarillado sanitario en San José Costa Rica, Colectores Sur: Desvió Tiribí</b> » <u>Raymundo Gonzalez</u> (Mexico) - Bessac



# INTERNATIONAL NO•DIG 2023 MEXICO

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International No-Dig Mexico 2023 17 - 18 Oct 2023 All times in CST



Continued from Tuesday, 17 October

- 11:20am **CIPP con curado UV en Brasil - Estudios de caso de rehabilitación de tuberías por Gravedad y a Presión**  
» [Felipe Montuori](#) (Brazil) - SAERTEX multiCom
- 11:45am **Revitalizing the Future: Innovative Solutions to Extend Useful Life of Sewerage Systems - Revitalizando el Futuro: Soluciones Innovadoras para Prolongar la Vida Útil de los Sistemas de Alcantarillado**  
» [Ricardo García](#) (Colombia) - LAMSTT
- 12:10pm **Structural Rehabilitation of Water Transmission Mains with Advanced Carbon Fiber Wrap Composites**  
» [Tomas Jimenez](#) (United States) - FyfeFRP, LLC
- 1:30pm **Panel Discussion: CIPP Roundtable Discussions**  
*Room B3*  
Chaired by: Kimberlie Staheli (United States)
- » Declan Downey, etc. - Trenchless Opportunities
- 2:30pm **TA-T1 - Session: Horizontal Directional Drilling - 1**  
*Room B3*  
Chaired by: Samuel Ariaratnam
- 2:30pm **Case Study: Lake Sakakawea, Missouri River, ND 4,702m Intersect**  
» [Thomas Forconi](#) (United States) - Browline, James Cloud (United States) - ISTT
- 2:55pm **Advancements in Guidance Technologies Combine to Maximize Positional Accuracy in HDD**  
» [Jed Sheckler](#) (United States) - Vector Magnetics
- 3:20pm **Accuracy of horizontal directional drilling in sedimentary soils**  
» [Henk Kruse](#) (Netherlands) - Underground infrastructure

- 2:30pm **TA-T2 - Session: Microtunneling and Pipe Jacking - 1**  
*Room B4*  
Chaired by: Matthew Wallin (United States)
- 2:30pm **Investigating Box-Jacking Forces in Soft Soils of Tokyo, Japan: A Comparative Study**  
» BOSONG YU (Japan) - Kyushu University, Hideki shimada (Japan) - Kyushu University, [Takashi Sasaoka](#) (Japan) - Kyushu University
- 2:55pm **Prediction Equation of Jacking Force for Different Shapes of Rectangular Pipe Jacking**  
» [Hideki shimada](#) (Japan) - Kyushu University
- 3:20pm **Comparison of Observed and Predicted Settlements: City of Dubuque Bee Branch Parallel 101" Microtunnels under Canadian Pacific Railyard**  
» [Matthew Wallin](#) (United States) - Bennett Trenchless Engineers, LLP, David Bennett (United States) - Bennett Trenchless Engineers, LLP, Sandie Dudley (United States) - Bennett Trenchless Engineers, LLP
- 2:30pm **TA-T3 - Session: Spanish Presentations - 2**  
*Room B5*  
Chaired by: Carlos Munera (Colombia)
- 2:30pm **Implementation of Directional Boring Methods for Unstable Ground Conditions and Hard Rock / Implementación de métodos de perforación para condiciones de suelo inestables y roca de alta dureza**  
» [Roberto Zillante](#) (United States) - Petra, [Thomas Egan](#) (United States) - Petra
- 2:55pm **PERSPECTIVES FOR THE IMPLEMENTATION OF TRENCHLESS TECHNOLOGIES IN LATIN AMERICA / PERSPECTIVAS DE IMPLEMENTACION DE TECNOLOGIAS TRENCHLESS EN LATINOAMERICA**  
» [Juan Fernando Pareja](#) (Colombia) - LAMSTT

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Continued from Tuesday, 17 October

- 3:20pm **Non-Destructive Methods for Water Pipe Leak Detection and for the Understanding of the Sewer System**  
» [Carlos Munera](#) (Colombia) - LAMSTT
- 3:45pm **Estándar de diagnóstico y la localización de tuberías para Latinoamérica**  
» [ARLEX TORO](#) (Colombia) - LAMSTT
- 4:10pm **Proyecto de Rehabilitación de Alcantarillado Sanitario Cuenca La Chala, Guayaquil**  
» [Miguel Freire](#) (Portugal) - IMPREG
- 7pm **Award Dinner**  
*Loma Linda*

Wednesday, 18 October

- 8:30am **Exhibition Hall (Registration) Open**  
*Hall A*
- 9:30am **WM-T1 - Session: Horizontal Directional Drilling - 2**  
*Room B3*  
Chaired by: [Kimberlie Staheli](#) (United States)
- 9:30am **HDD Crossing of a Fault Zone Beneath the Mad River**  
» [Matthew Wallin](#) (United States) - Bennett Trenchless Engineers, LLP
- 9:55am **Using a Pilot Probe to Determine HDD Feasibility**  
» [Kimberlie Staheli](#) (United States) - Staheli Trenchless Consultants, Inc., [Tim Collins](#) (United States) - City of Portland, Portland Water Bureau

- 10:20am **Coos Bay, Oregon installs HDD New Force Main over 40 m deep Under a Slough**  
» [Kimberlie Staheli](#) (United States) - Staheli Trenchless Consultants, Inc.
- 9:30am **WM-T2 - Session: Asset Management, Pipe Cleaning, Environment**  
*Room B4*  
Chaired by: [Declan Downey](#) (United Kingdom)
- 9:30am **Structural Classification Requirements for Trenchless Rehabilitation Methods used on Pressure Pipes**  
» [John Matthews](#) (United States) - Trenchless Technology Center (TTC), [John Kraft](#) (United States) - Trenchless Technology Center (TTC)
- 9:55am **Water Supply Pipelines - there's no quick fix!**  
» [Declan Downey](#) (United Kingdom) - Trenchless Opportunities Ltd
- 10:20am **Pipe insertion type reinforcing and rehabilitation member for prevention of cutting accidents, applicable to very shallow buried pipelines**  
» [Hidetaka Watanabe](#) (Japan) - NTT Access Network Service Systems Laboratories, [Junichirou Tamamatsu](#) (Japan) - NTT Access Network Service Systems Laboratories
- 10:45am **Reducing carbon footprint by utilizing high-speed pipe cleaning technologies**  
» [Dave McArthur](#) (United States) - Picote Solutions, Inc., [Tony DeCavitch](#) (United States) - Picote Solutions, Inc., [Dawn Greig](#) (United Kingdom) - Picote UK Ltd
- 11:10am **Trenchless rehabilitation of pressure pipes and CO2 Reduction - The Perfect Combination**  
» [Luis Guajardo](#) (Spain) - Rädlinger primus line GmbH
- 9:30am **WM-T3 - Session: Microtunneling and Pipe Jacking - 2**  
*Room B5*  
Chaired by: [Jari Kaukonen](#) (Finland)

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Continued from Wednesday, 18 October

- 9:30am **The role of mechanized shaft sinking with VSM for urban infrastructure**  
» [Erick Strauss](#) (Germany) - Herrenknecht AG, [Stefan Frey](#) (Germany) - Herrenknecht AG
- 9:55am **Trenchless shore approaches: the role of Pipe Jacking and Direct Pipe for pipeline landfalls and water intakes**  
» [Peter Schmäh](#) (Germany) - Herrenknecht AG
- 10:20am **Successful Subaqueous Microtunneling in Densely Urbanized Environments – A Large-Diameter Microtunnel Case Study in Tampa, Florida**  
» [David Sackett](#) (United States) - Brierley Associates Corp
- 10:45am **Development of Small-Diameter Pipe Jacking Method**  
» Yoshimitsu Aikawa (Japan) - FUSO, [Bruno Meneghesso](#) (Japan) - FUSO
- 1pm **Panel Discussion: Municipal Leaders from Mexico**  
*Room B3*  
Chaired by: Milton Chávez Gasca (Mexico)
- 2:30pm **WA-T1 - Session: Rehabilitation: CIPP, Fold and Form, Others**  
*Room B3*  
Chaired by: John Matthews (United States)
- 2:30pm **Detailed overview of work phases, benefits and challenges of CIPP lining rehabilitation inside buildings.**  
» [Mikko Saarijärvi](#) (Finland) - Picote Solutions Oy Ltd
- 2:55pm **50 Years of Cured in Place Pipe**  
» [Declan Downey](#) (United Kingdom) - Trenchless Opportunities Ltd

- 3:20pm **REHABILITATION OF 2.44 METER COLLECTOR WITHOUT EXCAVATION USING TCES TECHNOLOGY (CIPP) IN MEXICO CITY (Considered the largest TCES work in diameter, thickness and length carried out in all of Latin America)**  
» [Daniel Posadas Ortiz](#) (Mexico) - INBODE
- 3:45pm **Advanced Thermoplastic PVC Fold and Form Potable Water and Pressure Pipe Lining**  
» [Wing Chan](#) (Canada) - P3i-Tech, Jessica Wu (China) - Zhangzhou Anyue A
- 4:10pm **Styrene-Free and Structural Fold and Form PVC Liners for Sewer and Culvert Rehabilitation**  
» [David Ohayon](#) (Canada) - Warrior Trenchless Solutions
- 2:30pm **WA-T2 - Session: Rehabilitation: Slip Lining, CIPP and Others**  
*Room B4*  
Chaired by: Mari Andre Haebler (Austria)
- 2:30pm **Case study on challenges encountered in long-distance pipeline slip lining in mountainous areas and countermeasures**  
» [hanhsiang ju](#) (Taiwan) - Taipei Water Department, Ching-Liang Tseng (Taiwan) - Taipei Water Department, Hsueh-Ching Lu (Taiwan) - Taipei Water Department
- 2:55pm **Introducing Flexi-Sliplining, a totally trenchless manhole-to-manhole rehabilitation method**  
» [Richard Swan](#) (United Kingdom) - Picote UK Ltd, [Dawn Greig](#) (United Kingdom) - Picote UK Ltd
- 3:20pm **Introducing Precision Pull-in-Place CIPP Lining into Emerging Markets**  
» [Deon Pohorille](#) (South Africa) - NuFlow Technologies, Grant Whittle (United States) - NuFlow Technologies
- 3:45pm **Timely responding to emergencies in Mexico City**  
» [ALDO GUERRERO FLORES](#) (Mexico) - INBODE

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Continued from Wednesday, 18 October

- 2:30pm **WA-T3 - Session: Student Papers (Spanish)**  
*Room B5*  
Chaired by: Milton Chávez Gasca (Mexico)

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# INTERNATIONAL NO•DIG 2023 MEXICO

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## NO-DIG MEXICO -TECHNICAL PROGRAMME COMMITTEE

Position	Name	Society name
Chair	John Matthews	NASTT (North America)
Member	Kia Aksela	FiSTT (Finland)
	Ceasor Alvarado	Reviewer for the Spanish papers
	Samuel Ariatanam	NASTT (North America)
	Wout Broere	NSTT (Netherlands)
	Milton Chávez Gasca	Reviewer for the Spanish papers
	Declan Downey	UKSTT (United Kingdom)
	Tiia Lampola	FiSTT (Finland)
	Carlos Munera	LAMSTT (Latin America)
	Keh-Jian (Albert) Shou	CTSTT (Taiwan)
	Choo Chung Siung	MATT (Malaysia)
	Kimberlie Staheli	NASTT (North America)
	Raymond Sterling	NASTT (North America)





# TRENCHLESS ASIA 2024

26-27 June

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TRENCHLESS ASIA is the major annual international gathering for trenchless technologists to meet and discuss the latest industry developments featuring:

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31 October-1 November 2023

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# NASTT SOCIETY NEWS



NASTT News brought to members by Trenchless Works

A busy month for NASTT – Grab your sombreros and tuques!

2023 is a unique year in NASTT history, the first time that there has been a national or international show in each of the countries we are proud to represent, Canada, the United States of America and Mexico.

After the 32<sup>nd</sup> No-Dig Show held earlier this year in Portland, Oregon, USA, on 24-25 October we are proud to host the 4<sup>th</sup> No-Dig North in Edmonton, Alberta, Canada, after the ISTT International No-Dig, Santa Fe Mexico City, Mexico on 17 and 18 October.

This represents a real achievement by those involved in the NASTT, the MEXTT Regional Chapter, and the ISTT. In August 2021 the NASTT Mexico Regional Chapter was formed to develop the understanding and knowledge of trenchless technology in the area. From that first meeting has been created a membership magazine, Spanish language Good Practice courses and trained instructors, and two Student Chapters at UNAM School of Engineering and Instituto Politécnico Nacional.

Matthew Izzard, Executive Director,  
North American Society for Trenchless  
Technology (NASTT)

In November 2022 NASTT supported ISTT and Westrade with a hugely successful International Trenchless Seminar. Following this the MEXTT Board of Directors recently held a Rehabilitations Seminar at UNAM in September 2023, with a full technical programme and the signing of a joint promotion agreement with AMITAS. This reflected the hard work done by the MEXTT Board of Directors, in particular Sergio Alvarado, Itsel Mora and Milton Chavez, and further grows the platform of interest for the upcoming International No-Dig.

The Santa Fe Expo Centre in Mexico was selected by the ISTT, supported by LAMSTT (South America) and NASTT (North America), following the issue caused with the selected Panama venue being demolished. Honestly. I would like to recognise Westrade, ISTT, LAMSTT, MEXTT and the NASTT team who have done such an incredible job in those unique circumstances to bring together such a great technical programme both in Spanish and English, attracting sponsors and exhibitor floor with a series of networking and social events. This provides great opportunities to the many gas and water rehabilitation projects being designed in the city and the demand for information and contacts is reflected in the early registration interest. It should be a great show – here is the registration link: <https://www.no-digmexico.com/registration/>

The legacy created by this conference will be a 2024 series of regional events and municipal training sessions, further increasing the network of trenchless professionals in Mexico and delivering a continuing programme of knowledge, networking and education.

Then, head up almost as far north as you can sensibly go, to NASTT No-Dig North in Edmonton, Alberta, Canada. This is also a model of collaboration as the three NASTT Canadian Regional Chapters and Student Chapters host the largest annual trenchless event in Canada. A three-day programme including a sold-out exhibitor floor, two day technical programme and pre and post Good Practice courses attracting nearly 1,000 people.

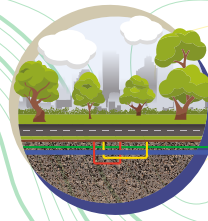
The circle completes in 2025 in Vancouver, Canada as No-Dig North is proud to be the host venue for the ISTT International No-Dig, allowing us continue to globally grow the trenchless market, creating networking opportunities and especially provide education and career paths to all students who are interested in building their future in through trenchless technology.

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Matthew





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GREEN BELOW.**

## THE NASTT 2024 NO-DIG SHOW MUNICIPAL & PUBLIC UTILITY

# Scholarship Program

The NASTT No-Dig Show Municipal & Public Utility Scholarship Award has been established to **provide education and training** for North American municipalities, government agencies and utility owners who have limited or no travel funds due to restricted budgets.

Selected applicants will be awarded **complimentary full conference registration** to the NASTT 2024 No-Dig Show in Providence, Rhode Island, April 14-18, 2024. One day conference registrations will also be available. Registration includes **full access to all exhibits and technical paper sessions...** all you have to do is get yourself to the conference! Selected applicants will also be eligible to receive **overnight accommodations**. Selection based on responses to the application as well as need.

**APPLY TODAY!** Application deadline is November 1, 2023.



NETWORKING EVENTS | EXHIBIT HALL | TECHNICAL SESSIONS

Visit **[nodigshow.com](http://nodigshow.com)** to learn more



*The No-Dig Show is owned by the North American Society for Trenchless Technology (NASTT), a not-for-profit educational and technical society established in 1990 to promote trenchless technology for the public benefit. For more information about NASTT, visit our website at [nastt.org](http://nastt.org).*





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# NASTT SOCIETY NEWS

[nastt.org](https://nastt.org)

NASTT News brought to members by Trenchless Works



## NASTT UPCOMING EVENTS

**October 11**

RMNASTT Trenchless Elevated  
GOLDEN, COLORADO, USA

**December 13-14, 2023**

Pipe Bursting Good Practices Course  
VIRTUAL

**October 17-18, 2023**

39th International No-Dig Mexico  
EXPO SANTA FE, MEXICO CITY, MEXICO

**April 15-17, 2024**

NASTT 2024 No-Dig Show  
PROVIDENCE, RHODE ISLAND, USA

**October 23-25, 2023**

No-Dig North 2023  
EDMONTON, ALBERTA, CANADA

**October 21-23, 2024**

No-Dig North 2024  
NIAGARA FALLS, ONTARIO, CANADA

**November 7-9**

Western Chapter Good Practices  
Course and HWEA Conference  
HONOLULU, HAWAII, USA

**March 30 – April 3, 2025**

NASTT 2025 No-Dig Show  
DENVER, COLORADO, USA

**November 13-14**

Northeast Regional Conference  
ALBANY, NEW YORK, USA

**March 29 - April 2, 2026**

NASTT 2026 No-Dig Show  
PALM SPRINGS, CALIFORNIA, USA

**November 16, 2023**

Municipal Sewer Grouting Good  
Practices Course  
VIRTUAL

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For more information and the latest course offerings, visit [nastt.org/training/events](https://nastt.org/training/events).





# AFFILIATED SOCIETIES

## ISTT Affiliated Societies around the world



### Austrian Association for Trenchless Technology (AATT)

c/o TU Wien Resselgasse 5,  
1040 Wien, Austria  
Phone: +43 664 5184084  
Email: office@grabenlos.at  
Web: www.grabenlos.at



### Brazilian Association for Trenchless Technology (ABRATT)

Alameda Santos, 1773 – Jardim  
Paulista Sao Paulo  
01419-002 Brazil  
Phone: +55 11 983893450  
Email: hrosas@abratt.org.br  
Web: www.abratt.org.br



### Australasian Society for Trenchless Technology (ASTT)

PO Box 2242,  
MALAGA LPO, WA, 6944  
Phone: +61 419 918 449  
Email: secretary@astt.com.au  
Web: www.astt.com.au



### Bulgarian Association for Trenchless Technology (BATT)

Kaprinka Lake Village Kazanlak  
6100, Bulgaria  
Phone: +359 2 4901381  
Email: info@batt-bg.org  
Web: www.batt-bg.org



### China Hong Kong Society for Trenchless Technology (CHKSTT)

Tsimshatsui Post Office 91499 Kowloon  
Hong Kong  
Phone: +852 9201 1952  
Email: chkstt@gmail.com  
Web: www.chkstt.org



### China Society of Geology - Trenchless Technology Committee (CSTT)

Xicheng District Room 151, 26  
Baiwanzhuang Street, Xicheng District,  
Beijing 100037 China (PR)  
Phone: +86 10 6899 2605  
Email: yan64843889@126.com  
Web: www.cstt.org



### Chinese Taipei Society for Trenchless Technology (CTSTT)

3F, No 92, Roosevelt Rd., Sec. 4,  
Zhongzheng Dist, Taipei City, 100  
Taiwan  
Phone: +886 2 2362 0939  
Email: zoradrc@gmail.com  
Web: www.ctstt.org.tw/en\_index.asp



### Czech Society for Trenchless Technology (CzSTT)

Bezova 1658/1, 147 14 Praha 4 Czech  
Republic  
Phone: +420 244 062 722  
Email: office@czstt.cz  
Web: www.czstt.cz



### Danish Society for Trenchless Technology - NoDig Infra (DKSTT)

Odinsvej 29 Silkeborg Denmark  
Phone: +45 50894489  
Email: tina@juul-consult.dk  
Web: www.nodiginfra.dk/nodig-infra/  
startside



### Finnish Society for Trenchless Technology (FISTT)

c/o Sari Pietilä, Haapasuonkankaantie 10  
90830 Haukipudas, Finland  
Phone: +358 504132484  
Email: info@fistt.net  
Web: www.fistt.net



### French Society for Trenchless Technology (FSTT)

4 rue des Beaumonts, F-94120  
Fontenay Sous Bo, France  
Phone: +33 1 53 99 90 20  
Email: contact@fstt.org  
Web: www.fstt.org



### German Society for Trenchless Technology (GSTT)

Kurfürstenstr. 129 (Building:  
German construction association)  
Berlin, Germany  
Phone: +49 30 81 45 59 84  
Email: beyer@gstt.de  
Web: www.gstt.de



### Italian Association of Trenchless Technology (IATT)

Via Ruggero Fiore, 41 Rome Italy  
Phone: +39 06 39721997  
Email: iatt@iatt.info  
Web: www.iatt.it



### Iberian Society for Trenchless Technology (IBSTT)

C/ Josefa Valcarcel, 8 – 3a  
PTLA 28027, Madrid, Spain  
Phone: +34 913 202 884  
Email: ibstt@ibstt.org  
Web: www.ibstt.org





# AFFILIATED SOCIETIES

## ISTT Affiliated Societies around the world



### Japan Society for Trenchless Technology (JSTT)

3rd Floor, Reed-C Bldg., 2-11-18,  
Tomioka, Koto-ku, Tokyo 135-0047 Japan  
Phone: +81 3 5639 9970  
Email: office@jstt.jp  
Web: www.jstt.jp



### Latin American Society for Trenchless Technology (LAMSTT)

Medellín Highway (Calle 80) KM3.5  
via Bogotá-Siberia south side, Bogotá  
Terrestrial Cargo Terminal, Office C-12,  
Cota – Cundinamarca, Colombia  
Phone: +57 1 8764675  
Email: cistt.arlex.toro@lamstt.org  
Web: www.lamstt.org



### Malaysia Association for Trenchless Technologies (MATT)

No 44, Jalan Dungun, Damansara Heights,  
Kuala Lumpur 50490 Malaysia  
Email: trenchless@matt.org.my  
Web: www.matt.org.my



### North American Society for Trenchless Technology (NASTT)

22722 29th Drive SE, STE 100,  
Bothell, WA 98021  
Phone: +1 888 993 9935  
Email: info@nastt.org  
Web: www.nastt.org



### Netherlands Society for Trenchless Technology (NSTT)

Postbus 79, 3769 ZH Soesterberg,  
Netherlands  
Phone: +31 346 723450  
Email: info@nstt.nl  
Web: www.nstt.nl



### Polish Foundation for Trenchless Technology (PFTT)

Ul. Warkocz 14, 25 - 253 Kielce, Poland  
Phone: +48 41 34 24 450  
Email: parkaa@tu.kielce.pl  
Web: www.pftt.pl



### The Russian Society Trenchless Technology Association (RSTT)

Severnoy proezd 12, Balashikha Moscow  
region, Russian Federation  
Phone: +7 (495) 521 78 82  
Email: gnb.06@mail.ru  
Web: www.s-gnb.ru



### Southern African Society for Trenchless Technology (SASTT)

1053 Hyde Avenue, Eldoraing ext 1,  
Centurion Gauteng, South Africa  
Phone: +27 (0) 82 551 7458  
Email: director@sastt.org.za  
Web: www.sastt.org.za



### Singapore Society for Trenchless Technology (SgSTT)

84 Toh Guan Road East, Singapore Water  
Exchange, #02-02 608501, Singapore  
Phone: +(65) 97124054  
Email: singaporestt@gmail.com  
Web: www.sgstt.org.sg



### Scandinavian Society for Trenchless Technology (SSTT)

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Sweden  
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Email: Kontakt@sstt.se  
Web: www.sstt.se



### Trenchless Romania Club

Roma Street, No. 16, Ap.2, District 1  
Bucharest Romania  
Phone: + 40724 550 830  
Email: maria.nae@trenchlessromania.ro  
Web: www.trenchlessromaniaclub.ro



### Turkish Society for Infrastructure and Trenchless Technology (TSITT)

Gayrettepe Mah. Huzur Sok. No:1A  
Besiktas 34349 Istanbul, Turkey  
Phone: +90 212 603 11 01  
Email: info@akated.com  
Web: www.akated.com



### Ukraine Association for Modern Trenchless Technology (UAMTT)

83A Srednyaya Str., Odessa 65005 Ukraine  
Phone: +380 50 3953280  
Email: trenchless.as@novatec.ua  
Web: www.no-dig.odessa.ua



### United Kingdom Society for Trenchless Technology (UKSTT)

Camden House, Warwick Road,  
Kenilworth, Warwickshire, CV8 1TH, UK  
Phone: +44 (0)192 651 3773  
Email: admin@ukstt.org.uk  
Web: www.ukstt.org.uk



# EVENTS AND MEETINGS

## 2023

October 17-18: International No-Dig Mexico 2023  
ISTT's 39<sup>th</sup> International No-Dig Conference  
and Exhibition

Expo Santa Fe, Mexico  
[www.no-digmexico.com](http://www.no-digmexico.com)

October 31- 1 November: 7<sup>th</sup> Water Loss Forum  
and Exhibition

Wow Istanbul Hotels and Conference Center  
[www.waterlossforum.org/en\\_US/](http://www.waterlossforum.org/en_US/)

November 1-2: No-Dig Turkey 2023  
Conference and Exhibition

Darulbedai Cad. No 4 Harbiye Sisli,  
Istanbul 34367, Turkey

November 1-3 November: 18<sup>th</sup> International  
ACUUS Conference

Singapore  
[www.acuus.org](http://www.acuus.org)

November 8-9: STUVA-Expo 2023 in Munich  
Messe München, Messegelände, Hall C1

81823 München, Germany  
[www.stuva-expo.de/en/start-stuva-expo-2023.html](http://www.stuva-expo.de/en/start-stuva-expo-2023.html)

November 29: No-Dig RoadShow Bristol  
& UKSTT Annual Awards

De Vere Tortworth Court, Wotton Under Edge  
[www.nodigroadshows.co.uk](http://www.nodigroadshows.co.uk)

## 2024

March 5-6 European No-Dig 2024:  
Hotel Andels Vienna House, Berlin

June 26-27 Trenchless Asia 2024:

SMX Convention Center Manila, Philippines  
[www.trenchlessasia.com](http://www.trenchlessasia.com)

October 1-3 No-Dig Live 2024:

NAEC Stoneleigh Park, Warwickshire  
[www.nodiglive.co.uk](http://www.nodiglive.co.uk)

18-19 November: International No-Dig  
Dubai 2024

ISTT's 40<sup>th</sup> International No-Dig Conference  
and Exhibition

Dubai World Trade Centre, Dubai