TRENCHLESSWORKS

THE VOICE OF THE TRENCHLESS COMMUNITY ISSUE 175 MARCH 2021

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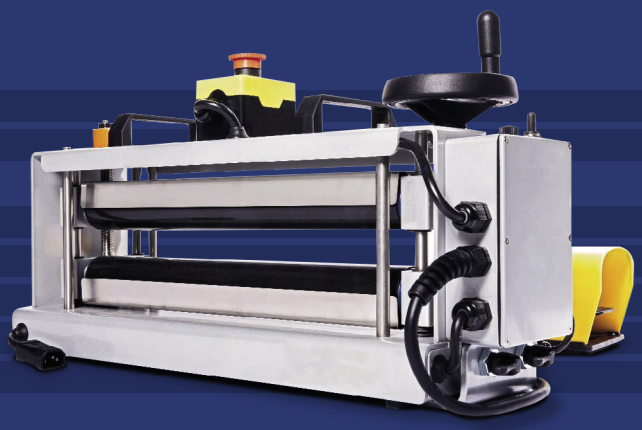

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Paul Harwood, Publisher
pharwood@westrade.co.uk

Ian Clarke, Editor-in-Chief
editorial@trenchless-works.com

Austen Lees, Editorial
marketing@westrade.co.uk

Gary King, Group Sales Director
gking@westrade.co.uk

Trevor Dorrell, Group Sales Manager
tdorrell@westrade.co.uk

Stuart Hillyard, Business Development Manager
shillyard@westrade.co.uk

Leigh Abbott, Group Marketing & Communications Manager
labbott@westrade.co.uk

Hollie Liddle, Media Coordinator
hliddle@westrade.co.uk

Julie Harris, Design & Production

Trenchless Works is published 12 times a year by Westrade Group Ltd I Carotino House| Bury Lane I Rickmansworth I WD3 1ED I UK

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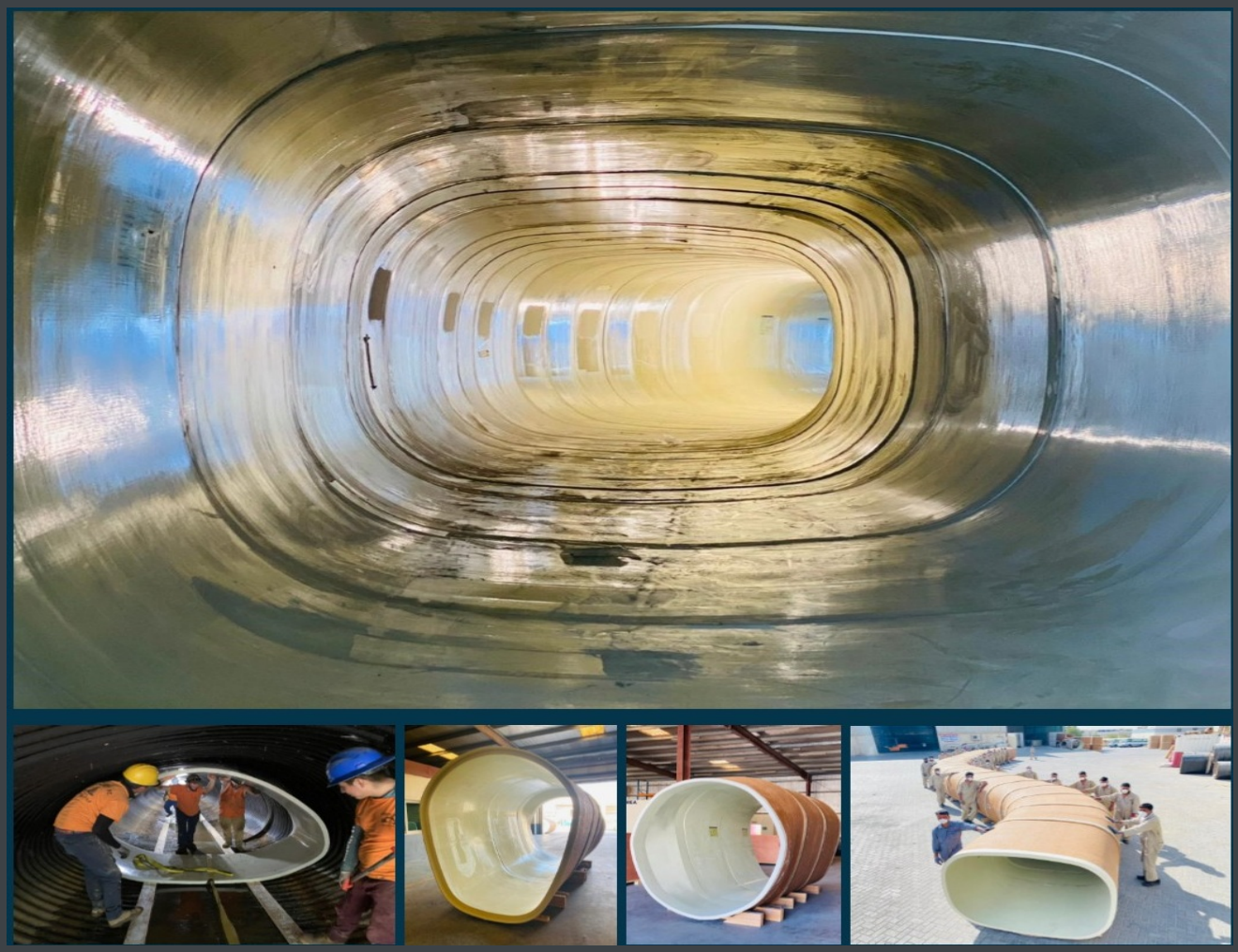
CHANNELINE
GRP Structural Lining Systems



ANY SHAPE – ANY SIZE

The general concept of the Channeline product is that a remarkably stiff and strong panel section is constructed, but with a relatively thin wall. The product differs from that of standard GRP hand or filament wound pipework in several fundamental and important ways. Normal GRP pipework consists of windings of layers of resin-saturated glass, which is impregnated with sand, achieving its stiffness by building up ever increasing wall thickness. Channeline however, derives its strength and stiffness through a different method, employing the mechanics of sandwich panel design, incorporating a unique polymer and aggregate core.

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Channeline International Fiber Glass Manufacturing L.L.C.
P.O. Box 8091 Dubai,
United Arab Emirates
Tel: +971 4 8848383
Fax: +971 4 8848384
E-mail: timwebb@apsdubai.com /
sales@channeline-international.com
Website: www.channeline-international.com

Channeline International North America
Tel: +1 514 2424495
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SPOTLIGHT

TRENCHLESS WORKS NAMED AS OFFICIAL ISTT MEDIA PARTNER

Westrade is delighted to announce that Trenchless Works is now the official media partner of the International Society for Trenchless Technology (ISTT). The Society's members will benefit from access to the latest industry news and insight via the Trenchless Works' platform that includes a digital monthly magazine (published in association with NoDig Media Services), website www.trenchless-works.com as well as its exciting new multimedia offering – Trenchless TV.

The appointment of Trenchless Works follows a highly competitive procurement process designed to ensure that all ISTT members derived the best possible value from the chosen media partner.

As the official publications of all the ISTT's affiliated bodies, both the magazine and website will include regular features from societies around the world helping share examples of best practice, knowledge and experience. The affiliation with Trenchless Works, widely regarded as the voice of the trenchless industry, will also provide the ISTT and its members with a range of modern, interactive and dynamic media platforms of which they can be rightfully proud.

Commenting on the appointment ISTT Chairman, Jari Kaukonen said: "Westrade's experience and global reach makes them the perfect media partner for the ISTT. We are confident that Trenchless Works will play an important role in enabling our members to access high quality trenchless content from around the world. We look forward to working with the Trenchless Works team to maximise member value and we are really excited about the further digital innovation they have planned."

Westrade's Managing Director, Paul Harwood, also commented, saying: "This partnership will bring Trenchless Works to an even greater audience, helping to promote the amazing work of this highly relevant and fast growth sector. We look forward to working with Jari and his team to provide an unrivalled resource of high-quality content while also promoting the environmental and commercial benefits of trenchless technology to companies, stakeholders and influencers across the globe."

Trenchless Works welcomes content from ISTT affiliated societies in their native language, and will be translated for use in both the magazine and online.

The first international feature will focus on the rapidly evolving Finnish trenchless sector, ahead of Helsinki hosting the world renowned and highly acclaimed International No-Dig Exhibition in October next year.

STOP PRESS

The first International feature will focus on FiSTT and will be published in the forthcoming April issue

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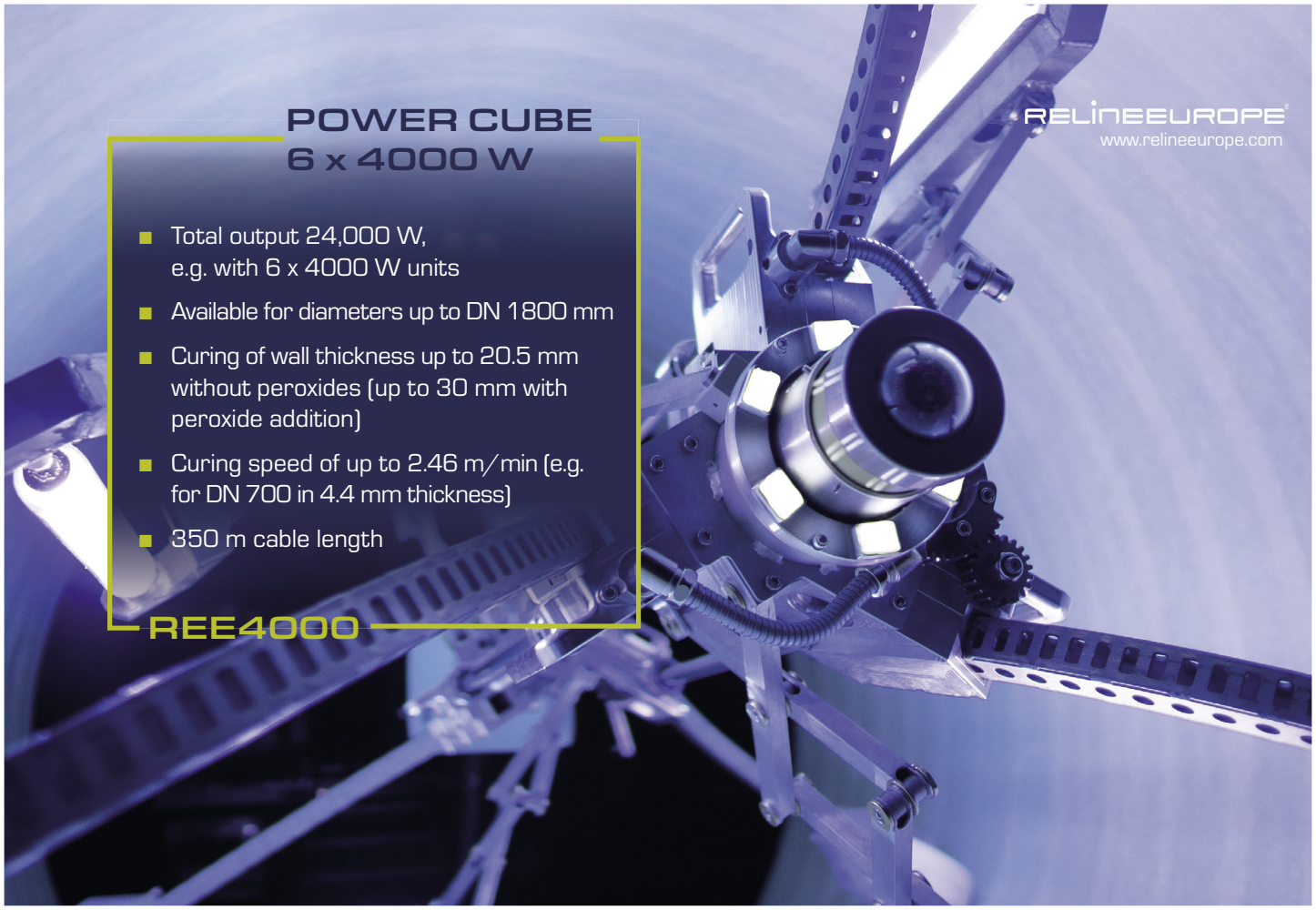
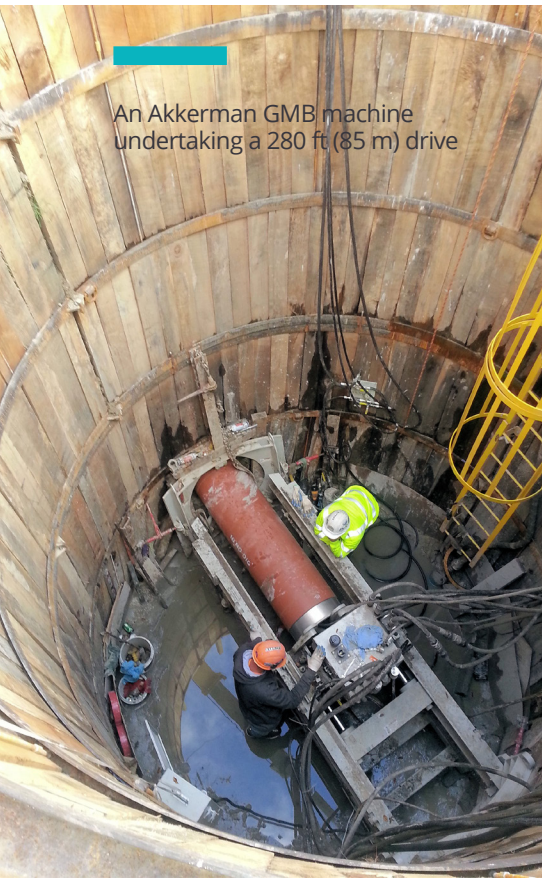


APOLLO BRINGS AKKERMAN EQUIPMENT TO A BROADER MARKET



An Akkerman GMB machine undertaking a 280 ft (85 m) drive

Established in 2018, Apollo Techno International FZCO is solely responsible for the marketing, distribution and creation of dealerships, agents and reseller networks globally, for products manufactured by ApolloTechno Industries Pvt Ltd.

The company's product line has to date included the R Series of HDD rigs which was launched onto the international market with successful penetration in UAE, Oman, KSA, Russia and Egypt. Apollo also holds a large warehouse with parts availability at Dubai UAE, as well as a team of qualified and trained technicians to meet any challenges and keep these rigs productive for clients.

In 2020 the company launched its new comprehensive website www.apollotechnoint.com and now in 2021 it is to introduce to the Middle East, African and Indian markets a full range of Akkerman tunnelling and auger boring equipment. Apollo Techno International FZCO will be solely responsible for Sales, Marketing, Service and Parts for the Akkerman product range.

WORLD-RENOWNED SYSTEMS

Akkerman's product range includes Guided Boring Machines, Microtunnelling Systems, Tunnel Boring Machines, Excavator Boring Shields and Earth Pressure Balance (EPB) Systems.

The Guided Boring Machine (GBM) systems are a leading solution for accurate and extended drive lengths in soft ground to rock geology for 4 to 48 in (100 to 1,200 mm) o.d. pipe and larger >

An Akkerman MTBM, microtunnelling machine breaking through on the second twin 380 ft (116 m) drives

An Akkerman microtunneller about to start a new drive

diameters with the guided auger boring application. GBM jacking frames connect with a host of pipes, tooling, skid extensions and shaft adapters for versatility on a multitude of pilot tube projects. The GBM systems are comprehensive and feature robust and intelligent design, adaptable functionality and sensible ease of use features.

Microtunnel Boring Machines (MTBMs) generally install gravity flow pipelines or carrier pipes that require precise line and grade in poor soil. Microtunnelling is a remote controlled, continuously supported pipe jacking method. Standard centre drive and face access, periphery drive MTBMs are sized in the 30 to 114 in (760 to 2,900 mm) o.d. range. Microtunnelling operations are managed by an operator in an above ground control container alongside of the shaft and a complete slurry microtunnelling system commonly comprises a pipe specific MTBM, control container, guidance system, remote hydraulic power pack, keyhole jacking frame, a series of pumps, water cooling tank, slurry and additional lines, and a slurry separation plant. The launch shaft is outfitted with a pit seal to prevent shaft flooding and a project specific thrust block to distribute jacking forces.

Akkerman's Tunnel Boring Machines (TBMs) are used to install 48 to 96 in (1,200 to 2,400 mm) o.d. jacking pipe and are controlled from within the TBM by an operator. TBMs excavate soil at the face of the bore using hydraulic motors to rotate the inner drum, the cutter head excavates and soil is transported via conveyor and haul unit for disposal from the launch shaft. A pipe laser in the launch shaft projects a laser point on the cutter face for the operator to monitor and make steering corrections as necessary. For extended length drives, the AZ100 Total Guidance System is used for tunnel navigation. The all-in-one Tunnel Boring System easily adapts to any jacking pipe with an appropriately sized TBM, yoke and skid sections. A complete Tunnel Boring System is comprised of a TBM, pump unit, yoke, skid, haul unit, conveyor, pipe laser and often a bentonite pump.

The company's Excavator Boring Shields (EBSs) and EX-50 Excavators are used for 100 to 168 in (2,500 to 4,300 mm) o.d. pipe jacking, and liner plate and ring beam lagging tunnelling applications. EBSs perform best in sand, medium to stiff clay, dry or dewatered soil, and weathered rock in regions without ground water. The EX-50 Excavator is positioned in a slide mount to the interior top of the EBS and is interchangeable between EBS models.

The operator controls the EX-50 Excavator's backhoe claw with a joy stick and foot controls to excavate soil at the face of the bore which is deposited onto the belt conveyor and transported with a 1548 Haul Unit for removal in the launch shaft. The EX-50's rotating boom has a full range of motion and can extend beyond the face of the bore to remove obstructions. EBSs come standard with sand shelves and can be equipped with close able hydraulic doors to prevent subsidence from entering the interior. >

Another of Akkerman's GBM machines on a 400 ft (122 m) drive

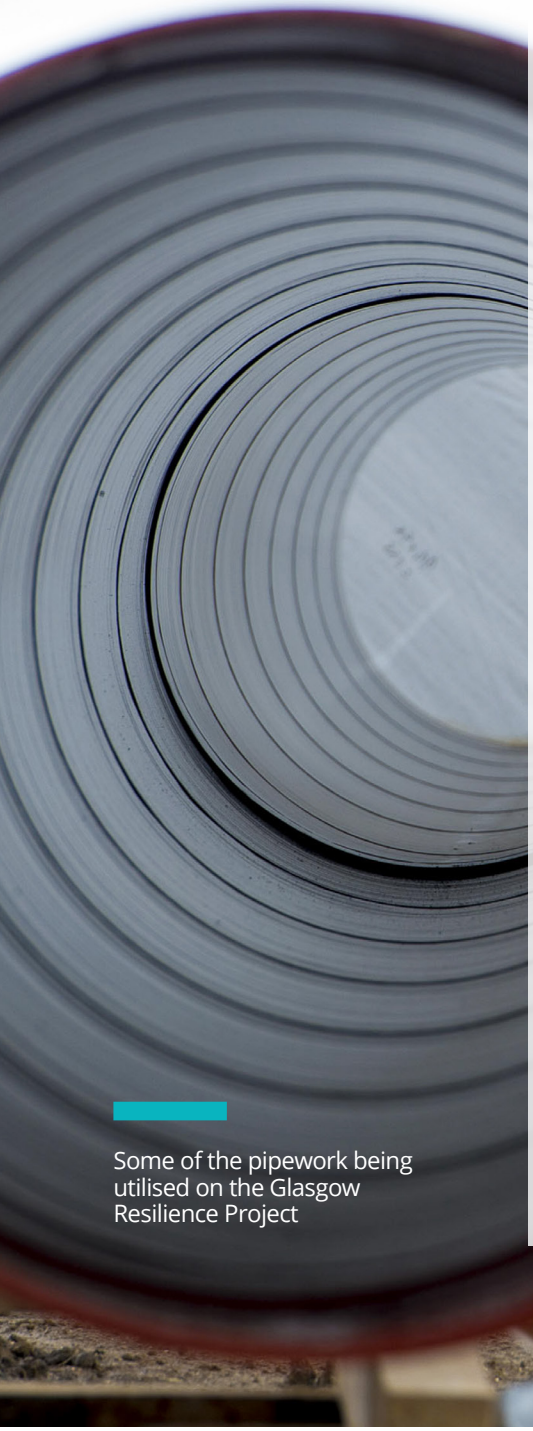
Akkerman's Earth Pressure Balance Machine (EPBMs) Systems are used for direct pipe jacking, concrete segments, liner plate and ring beam and lagging tunnel installations of 102 in (2590 mm) o.d. pipe and larger on runs generally exceeding 1,000 ft (300 m) lengths in poor soil conditions. EPBMs excavate soil while balancing machine advancement and soil pressures to minimise ground settlement. Excavated soil from the EPBM cutter chamber is injected with foam and slurry to counterbalance the face pressure which is then removed through the screw conveyor and haul unit. The operator guides the EPBM and monitors targeting data, pressures, position, speed, torque and flow from a control console to pilot an accurate course and achieve maximum productivity rates. A series of back up cars, each with a special function follow behind the EPBM. The power container distributes power to EPBM operations and foam and slurry plants provide additives which aid in soil removal. The EPBM cutter head design and power source can be configured to best meet project geological and performance requirements.

"We are absolutely thrilled to have Akkerman in the Middle East & Asia"

Subhash Sadashivan, Director – Sales for Apollo Techno International FZCO said of the new arrangement: "We are absolutely thrilled to have Akkerman in the Middle East & Asia. Akkerman has comprehensive quality management systems in place so our customers can feel confident in knowing that the equipment that is manufactured is subject to the highest standards and continuous improvement at every step in the manufacturing process. The quality management system ensures that from design conception to final product testing, the equipment is produced with quality and value at the forefront. Throughout the Middle East and India, the technical requirement for the use of tunnels for major infrastructure schemes is becoming more relevant, we have learned through our customers that they require machines that are flexible to cope with various ground conditions, high production and keeping the cost low; Akkerman is the answer to this."

www.apollotechnoint.com

CALEDONIA WATER ALLIANCE SET TO DELIVER GLASGOW RESILIENCE PROJECT



Some of the pipework being utilised on the Glasgow Resilience Project

Scottish Water is about to begin work to improve its water mains network in the south west of Glasgow by installing more than 7 miles (11.3 km) of new pipes.

The Glasgow Resilience Project will connect the Glasgow area's network and the system in Ayrshire to increase resilience and protect supplies for Scottish Water customers and will involve the use of innovative construction materials and techniques to reduce carbon emissions and power requirements.

Around one million people will benefit from the two networks being connected.

This project will be delivered by Scottish Water alliance partner Caledonia Water Alliance (CWA) and is expected to be completed by 2023. It is the third stage of the overall multi-million pound scheme which has already delivered improvements in Ayrshire.

The new water main will be installed in the Ibrox, Mosspark, Pollok, Priesthill, Nitshill, and Parkhouse areas of Glasgow.

Two Way Supply

Connecting the networks will provide a two-way water supply between the Milngavie Water Treatment Works (WTW) system, which provides water for more than 700,000 people across much of the Glasgow area, and the Bradan WTW system which supplies more than 200,000 customers across much of Ayrshire. It will also benefit almost 50,000 customers in East Renfrewshire.

The new main will run from Ibrox to a reservoir storage tank in the Parkhouse/Darnley area. >

A new pumping station will be built at Ibrox which will push water to an existing pumping station in Parkhouse/Darnley for onward distribution to Ayrshire.

Four tunnels will form parts of the project with one under the M8 motorway and the Glasgow-Ayr railway line, another under the Paisley Canal railway and White Cart Water, another under the Glasgow-Barrhead-Kilmarnock railway, and one under the Levern Water. All are 1,500 mm diameter tunnels with two drives at about 250 m length and two of about 50 m length.

Locations

There will be road crossings where the main will be installed at 15 locations including, from north to south: Edmiston Drive, Mosspark Boulevard, Corkerhill Road, Kinnell Avenue, Linthaugh Road, Braidcraft Road, Barrhead Road, Nitshill Road, Darnley Road, and Corselet Road.

It will also be installed in a number of parks, including Bellahouston Park and Househill Park.

In the event of a disruption to water supply in either Ayrshire or Glasgow, the new system will allow millions of litres of water to be transferred in either direction, minimising the impact on customers if there is a burst main or other operational issues.

Both traditional and trenchless methods will be used in the construction of the Glasgow Resilience Project pipelines

"Linking our supply systems will ensure that high quality drinking water can continue to be supplied to current customers and for generations to come"

Jane McKenzie, the project's Communications Manager, commented: "There will be a significant amount of construction activity and while there will be some disruption in communities and for road users, we will do our very best to minimise this. We will ensure that affected customers and road users are kept informed about our work."

Mark Dickson, Scottish Water's Director of Capital Investment, said: "Linking our supply systems will ensure that high quality drinking water can continue to be supplied to current customers and for generations to come. The investment in new pipelines and associated infrastructure below ground will also support the continued development above ground in communities across these areas and will enable them to continue to grow and thrive."

The design of the new network incorporates carbon reducing construction materials and methods including innovative self-restraining pipe. Solar panels will also offset the power demands at the new Ibrox pumping station, with the new mains using gravity to reduce power use by 60%.

www.morrisonus.com

NEW PRODUCT RANGES SOLD THROUGH THE DITCH WITCH® DIVISION

An American Augers DD-240T10 HDD rig, one of the American Augers range now available through the Ditch Witch dealer network

"This is a great opportunity for our Trencor and American Augers' customers to receive all the benefits our Ditch Witch customers have been accustomed to for more than 60 years.

Customers of Ditch Witch and Subsite® Electronics products have been receiving world-class service and support from their local Ditch Witch dealership for decades, and now with the addition of two new product lines, underground construction professionals around the globe can reap the same benefits.

The Ditch Witch Division (a Toro Company division) will offer the full product lines, parts and service for both the American Augers and Trencor brands. Dealership and factory personnel have been working together to prepare for distribution of these two strong brands through the worldwide Ditch Witch dealer channel. The manufacturing of Ditch Witch products will remain in Perry, Oklahoma, and American Augers and Trencor products will continue to be built in West Salem, Ohio.

"This is a great opportunity for our Trencor and American Augers' customers to receive all the benefits our Ditch Witch customers have been accustomed to for more than 60 years." said Kevin Smith, general manager of the Ditch Witch Division. >

"These brands have excellent reputations in our industry and our dealers are committed to providing quality sales, services, parts and support to all current and new customers."

"We are excited about the integration of these two brands into our organisation. Our dealerships, along with the current product support expertise provided by the factory, are fully prepared to extend their outstanding services to even more customers all over the world."

American Augers began in 1970 and has been the leader in large-diameter underground construction since the beginning. With horizontal direction drills ranging from 110,000 to 1.1 million pounds (50 t to 500 t) of thrust and pullback; auger boring machines, including a 600,000 lb (270 t) electric unit; mud pumps and cleaning systems. Now with the Ditch Witch Division, the brand is well-positioned to continue its success far into the future.

Trencor manufactures mechanically driven trenchers and rugged surface miners with upwards of 950 HP. Trencor has a long history of success in the industry as the brand got its start in 1945.

"These brands have excellent reputations in our industry and our dealers are committed to providing quality sales, services, parts and support to all current and new customers." said Smith.

www.ditchwitch.com/find-a-dealer

HAMMERHEAD TRENCHLESS ANNOUNCES LEADERSHIP TRANSITION

Jeff Gabrielse has been appointed Managing Director of HammerHead® Trenchless

HammerHead® Trenchless recently announced that Jeff Gabrielse has been named Managing Director, assuming leadership of the HammerHead brand within the newly formed Rehabilitation and Replacement (R&R) division of The Toro Company.

Gabrielse will be overseeing the HammerHead R&R business, continuing its focus on delivering innovative trenchless equipment and solutions for the water, wastewater and gas markets.

"The rehabilitation and replacement of underground utility infrastructure is so important in the life cycle of the pipe." said Angie Drake, vice president, Construction of The Toro Company. "Jeff's skills, knowledge and experience in the underground construction industry make him a perfect fit to drive the future growth of the HammerHead R&R business for The Toro Company family of brands."

Gabrielse has a proven track record of success in leadership positions within the Charles Machine Works (CMW) having most recently served as director, customer services for Subsite Electronics and HammerHead Trenchless. In this role, he managed all customer support, product support, training, applications specialists and professional services. Gabrielse began his career with HammerHead in 2008 as a regional sales manager. In 2017, he transferred to CMW's then-owned MTI Equipment to be the sales and purchasing manager and was subsequently promoted to general manager prior to the sale of that business in 2019 after which he rejoined the HammerHead leadership team.

"This is an exciting time for HammerHead and I am honoured to have the opportunity to lead the organisation." said Gabrielse. "HammerHead is uniquely positioned to serve the growing need to address deteriorating underground utility infrastructure through its combination of rehabilitation and replacement product offerings. I am excited about Hammerhead's position in the market and the opportunities we have to continue to deliver an innovative suite of trenchless equipment and solutions while also being a trusted partner to our valued customers."

"This is an exciting time for HammerHead and I am honoured to have the opportunity to lead the organisation"

www.hammerheadtrenchless.com

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TRENCHLESSWORKS

Jon Barry Managing Director of Scanprobe displaying the Made In Britain mark

MADE IN BRITAIN? DEFINITELY!

Scanprobe's range of drain cameras have been made in Britain from the very beginning, but 2021 has added some extra weight to that claim, as it has been officially confirmed that the company meets the criteria to display the Made in Britain logo.

Scanprobe owner and Managing Director Jon Barry said: "Personally, I am delighted. I see a strong quality alignment to products that are truly made in Britain. Sure, due to costs of parts and labour this generally means our products can cost more than those found abroad, but to Scanprobe there is real value in quality. So being able to proudly display this logo alongside our other promotional efforts, it is another string to our bow. Quality is such a big focal point for us so hopefully this helps that message to come across even more."

Using the Made in Britain logo on promotional material is more than just a simple matter of 'copy & paste', gaining authorisation to use the logo requires companies to hit some very specific criteria including:

1. An overview of the business model and how it fits with the Made in Britain brand.
2. Evidence that the company's products are made in Great Britain.
3. Evidence that 80% of the value chain is in the UK. >

Proudly
MADE IN BRITAIN
Since 1985

The Made In Britain emblem

With Brexit now a reality it is arguably more important in 2021 than it has ever been to promote a company for all the strengths it has to offer, both for domestic customers and those abroad too.

The year has barely begun and there has been a lot made of the problems with goods crossing the English Channel, so with Scanprobe's products being made in Britain it helps to settle any fears over supply to the company's markets.

Ben Gane, who heads up all of the marketing activity for Scanprobe is equally excited by this confirmation saying: "I think it is great! It is a standard cliché but a picture speaks a thousand words, and so in this case it is everything that you might associate with this logo. As Jon said, there is quality associated with this logo, stability of supply in these testing political and economic times, and lastly for me, pride. So, the fact that through our marketing output I can get all of these messages across just by using this logo, is fantastic. Honestly, I do not know why we did not apply for the Made in Britain logo sooner!"

"I do not know why we did not apply for the Made in Britain logo sooner!"

For Scanprobe, sourcing its components, and undertaking the manufacture of its products not just in the UK but also in its own manufacturing premises is vital. It allows the company to maintain a handle on not only the quality of its products, but also its accompanying reputation. At Scanprobe, the company proud to be made in Britain, and equally proud of everything that comes with this tagline, and this is going to be important as the country navigates the new age of international trade.

www.scanprobe.com

SPARTAN PROTECTING THE LEGACY THROUGH THE NEXT GENERATION

Spartan Tool, established in 1943, has become a leading name in the design, production and supply of sewer and drain cleaning equipment. Based in Niles, Michigan, USA, Spartan has been part of The Heico Companies, a privately held manufacturing company based in the Chicago area, since 1978.

Rolfe and Dale Brooke of Spartan UK

The Model 300 electro-mechanical pipe cleaning system

For the past 25 years the company has had Rolfe Brooke alone as Spartan Tool's exclusive distributor in the UK

For much of the past 78 years Spartan's product range has centred on its line-up of cable-based, electro-mechanical pipe cleaning systems and their support ancillaries.

More recently the organisation has diversified and now offers a range of products which include video inspection systems, sewer jetters, buried service locating equipment and trenchless pipe bursting systems, as well as Picote's High Speed Flexible Shaft milling machines for pipe cleaning and other operations.

With distributors currently operating in some 26 countries, the Spartan name has become synonymous with the sewer and drain cleaning markets world-wide.

Protecting the legacy

Having spent those 25 years driving his company forwards into new product areas and markets, Rolfe has now decided that it is time to take something of back seat. Therefore, the Spartan UK company has announced that as of 1st June it is to start handing the helm to Rolfe's son Dale.

Dale has been with the company since 2014 having left School and started working with a friend in the Hospitality Industry, He has, under Rolfe's tutelage, since developed an extensive understanding of the products and clients serviced with Spartan Tool products across the UK. >

The Model 717 Cart Jetter

The Model 100 cable machine

Spartan Tool equipment has developed a reputation globally for long life and hard work with generations of engineers across the world having utilised Spartan equipment, which in turn has passed from generation to generation within companies.

Many of these machines centre on the traditional Spartan Tool range of drain cleaning machines. However, more recently, the company has taken to innovation in the drainage field with gusto and moving with the times now offers a complete range of high speed, flexible shaft machines, with what is claimed to be the broadest range of accessories in the business.

Commenting on his move to the head of the table Dale Brooke said: "I suppose it was always inevitable that someday I would join with my Dad in doing what he does best, supplying the Drain and Sewer Industry with High Quality Drain Cleaning Equipment. The actual time was never really discussed or set in stone but now just felt right and I am happy it is to happen as soon as it is! I am getting real enjoyment from meeting and dealing with businesses and customers that my Dad has dealt with for 25 Years and on the rare occasion even used to deal with my Grandad as well (Denny Brooke of Vactor)! I am looking forward, with Rolfe's guidance, to seeing what the next 25 Years and more has to offer!"

Spartan revolution – in more ways than one

In an example of where the company has directed its forward looking, innovative stance, little more than a year ago, as part of its drive to bring the best sewer and drain cleaning equipment to the contractors both at home and internationally, Spartan Tool introduced its latest offering known as the Spartan Revolution.

In partnership with Picote Solutions, Spartan Tool's Spartan Revolution is a high-speed, flexible shaft drain cleaning machine. The Spartan Revolution range is offered as five machine models known as the Spartan Revolution M1, M2, M3, M4 and M5.

Kevin Walsh, president of Spartan Tool, said of the new product line: "Since the launch of the Spartan Revolution, it has become a true game changer in the drain cleaning industry and we have seen a tremendous positive response from our customers. With a broad range of applications ranging from drain cleaning to pipe reinstatement, the Revolution line is safe, time-saving, powerful, and effective."

Commenting on the changing times and face of Spartan Tool Rolfe Brooke closed saying: "Right from day one in 1996 our emphasis has always been on looking after our customers with the supply of Spartan Machines and ancillaries but more importantly with after sales service when customers encounter problems. I am confident that Dale will carry on this tradition and travel wherever he is needed to keep our customers happy."

www.spartantool.com

STEVE VICK INTERNATIONAL WINS 'CHAMPION OF CHAMPIONS' TROPHY

Steve Vick International is delighted to announce that Andy Hutchison, Technical Support Engineer, won the coveted title of 'Champion of Champions' For ESEAL and FBOS at the recent Lions' Lair competition, organised by IGEM London, Southern and Eastern Section and the Pipeline industries Guild (PIG).

Andy with the Lion's Lair Trophy

This well attended event, which takes place annually, was held virtually, on the 24 February. The format changed slightly, for this year, with six previous winners returning to battle it out for the title 'Champion of Champions'. >

The finalists had five minutes to showcase their innovation followed by five minutes of questions from the 'Lions'. In 2019 Andy won Lions' Lair with Enhanced SEAL (ESEAL) and so in the spirt of the new format, he presented this again along with two further innovations that deal with the complexity of stubs/stranded mains; ESEAL 2, a safe and effective method of abandoning 100% of gas mains under 'live' conditions without removing the tee piece and SVI's latest innovation Foambag Operation on Stubs (FBOS).

"Andy delivered an excellent presentation and answered some challenging questions which, combined with the innovative products, won the judges over on the day"

FBOS is the long-awaited solution for fully decommissioning mains of engineering difficulty, such as stranded, one way fed, stubs or those found on mains replacement schemes. The FBOS technique fully decommissions mains right up to the last transition joint and is currently available for diameters of 4 in to 6 in (100 mm to 150 mm). These sections of metallic pipe and associated tee pieces into parent mains, can be impractical and costly to excavate due to the location often being under a busy junction or in a sensitive area. This makes the remote deployment of FBOS the ideal solution.

Andy delivered an excellent presentation and answered some challenging questions which, combined with the innovative products, won the judges over on the day.

The judging panel consisted of Chris Bielby OBE – Chair of Gas Industry Safety Group (GISG), Chris Clarke, Energy Strategy Director at Wales & West Utilities and James Harrison, Director of London Network at Cadent and Paul Denniff, Network & Safety Director at SGN.

Enhanced SEAL was developed by Steve Vick International in collaboration with Northern Gas Networks and FBOS in collaboration with Cadent. Both projects were funded by the Network Innovation Allowance.

Northern Gas Networks has estimated that Enhanced SEAL has saved them £2.75 million to date. In the last 12 months, over 244 operations have been completed for the rest of the UK networks, saving them approximately £1.3 million. ESEAL 2, over the last 12 months has saved NGN and other networks an estimated £1.58 million. Following successful field trials, FBOS, is currently being reviewed by Cadent for final policy sign off. Due to its low costs compared with more traditional methods, FBOS will also produce significant savings to the GDN's in the future.

www.stevevick.com

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BARHALE LAYS GROUNDWORK FOR STUDENT RESIDENTIAL SCHEME

Work being undertaken on the Lakeside Way project

Barhale has completed a key sewer diversion programme at Lakeside Way, York, UK to help clear the way for a major university accommodation project.

The work, carried out on behalf of Yorkshire Water, is part of a 1,480-bed student accommodation scheme for the University of York being built by construction company, GRAHAM. The works included installing two sewage pumping mains to enable the construction of the new buildings. The team also made alterations to the mechanical and electrical equipment on the mains to allow the construction of a new road through the campus.

In order to overcome difficult ground conditions, the team used directional drilling methods and a flexible, smaller bore 180 mm diameter MDPE plastic pipe.

Barhale Project Manager, Philip Walker said he was delighted with how the team had negotiated the project's challenges effectively which allowed them to complete the project four weeks early, ensuring that that GRAHAM could fulfil their demanding programme.

"Everyone has really risen to the task." he said. "We have worked closely with all of the stakeholders to overcome some tricky ground conditions to complete the project and to pave the way for the transformation of the Heslington East Campus."

"We have worked closely with all of the stakeholders to overcome some tricky ground conditions to complete the project and to pave the way for the transformation of the Heslington East Campus"

Phase 1 of the £130 million flagship scheme is scheduled to be completed ahead of the 2021/2022 academic year.

TURNING TO VIRTUAL REALITY FOR SAFETY TRAINING

An operative utilising the 360safe VR headset

Using innovative 360-degree virtual reality (VR) technology, Morrison Utility Services (MUS), a part of M Group Services, has joined forces with behavioural safety specialists, 360safe VR, to develop and produce pioneering training films that can be viewed via VR headsets.

The introduction of the 360-degree VR training is designed to complement the existing blend of behavioural safety training methods deployed across MUS. The technology provides participants with the benefit of immersive and engaging training sessions that place the viewer in authentic, 'high-risk' occupational scenarios, with no danger to themselves or others.

A pioneering VR content synchronisation app enables the VR films to be controlled and monitored from a central console to up to 8 individual VR headsets. The films are developed in-house using MUS people in scripted behavioural safety scenarios.

Paul Kerridge, Safety, Health, Environment and Quality Director, commented: "Participants will feel as though they have genuinely experienced the scenario which is a highly-effective way to deliver powerful behavioural change."

"Participants will feel as though they have genuinely experienced the scenario which is a highly-effective way to deliver powerful behavioural change"

Andy Carter, Director of IT, Innovation and Improvement, said: "This use of VR technology provides a good example of the important role that innovation plays in our training strategy. The creation of VR training films will enable us to raise awareness and understanding of difficult, but extremely important, safety themes by placing our people in an authentic, engaging and completely safe virtual environment. The solution also provides the capability to run site-specific pre-training surveys, followed by post-training surveys, to measure changes in understanding and attitudes to important areas such as site safety and occupational road risk."

MULTIPLE SUCCESSES FOR K-BORINGEN IN LIEGE AND SINT-TRUIDEN

Liege airport required a new sewer system, so a scheme was developed to install some 6.3 km of new sewers. The main contractor for the work was Denys.

The programme of work included the installation of some 933 m of 1,800 mm i.d. diameter pipe using microtunnelling techniques. Denys engaged experienced microtunnelling contractor K-Boringen to complete this part of the project. >

Breakthrough at Liege

The microtunnelling works were to be completed using the contractor's Herrenknecht manufactured microtunnelling machine which utilised a TUnIS Navigation MTGyro guidance system from VMT. What made this operation unusual is that, where normally an HWL (Hydrostatic Water Level) system would be used in conjunction with the Gyro system to establish elevation of the boring machine, on this project it was decided that this would not be utilised. This is believed to be the first time such a pipe jacking project has been undertaken by the contractor without the HWL. This was decided to simplify operations during excavation.

"Working without the use of the hydrostatic water level simplified the handling of the drive considerably"

In order to maintain the required tolerances and in particular not to create a counter slope, control measurements were planned at intervals of approximately 60 m. This corresponds to a typical control measurement interval when using gyro navigation systems.

The control measurements were carried out by the specialists from VMT, who were on site during the entire course of the project in order to optimally support the new generation system TUnIS Navigation MT. Since the intention was to extend the control measurement intervals to significantly more than 60 m, a tunnel laser was installed parallel to the gyro system, which was used to spot-check the determined position. >

The navigation with gyro compass and without hydro level has proven itself in this project, with the specified tolerances being adhered to at all times.

Given the location of the new sewer under the Liege - Namur high-speed double-track railway, the project also utilised a VMT MODUS (Modular System for automated Deformation Monitoring) system to monitor the deformation of the rails, an application which is rather unusual for microtunnelling projects where bore diameters are relatively small and ground deformation is usually extremely limited.

Commenting on the Liège project Wim Feyen of K-Boringen said: "Working without the use of the hydrostatic water level simplified the handling of the drive considerably. Due to production requirements the intervals of our check surveys to monitor the accuracy of the gyro guidance system were a little longer than we would have liked. However, despite this, the alternative calculation method for the vertical position has reached the accuracies that VMT had stated in advance and the bore has been completed within the required tolerances. For tunnels with very small gradients, it would not be optimal to rely solely on this new calculation method. However, this project has shown us that, with the right equipment and the right back-up, we can achieve the necessary accuracy of the drive without a hydrostatic water level."

"The sewer required the installation of a 1,600 mm i.d. pipe over a length of 548 m"

SINT-TRUIDEN PROJECT

Diestersteenweg in Sint-Truiden, Belgium was a street that was undergoing renovation which included new sewer and rainwater collection systems. Once completed, the project would greatly improve safety for cyclists and pedestrians in the area, which also houses a school.

K-Boringen was awarded the contract for the new sewer system, which would be installed using microtunnelling equipment. The sewer required the installation of a 1,600 mm i.d. pipe over a length of 548 m. Included in the drive were two curves forming an 'S' bend with one curve having a minimum 300 m radius and the second having a minimum radius of 600 m.

Being a long-term user of VMT Navigation Systems, K-Boringen opted to utilise VMT's new generation system TUnIS Navigation MT in combination with the similarly newly developed hardware platform MT.connect, in order to provide the highest accuracy for the drive (particularly through the curved sections).

For optimal transparency and overview of the tunnelling process, Jackcontrol provided their Microtunnelling Support System (MSS) together with their equipment for the monitoring of joint movements and pressures inside the pipe string. >

Inside the Sint-Truidnen drive

Based on the long-term partnership between Jackcontrol and VMT, Jackcontrol has recently decided to participate in the development of MT.connect. As a result, both companies are now using the same hardware platform for their systems, significantly minimising the hardware efforts for the jobsite and making handling much easier.

Tunnelling began in early October 2020 with breakthrough being achieved at the reception shaft on 9 December, just some 10 weeks later.

"We are definitely keen to work with the VMT and Jackcontrol combination again and plan to use MT.connect for our coming curved drives"

The project also marked the first use in Belgium of the TUnIS Navigation MTLaserTotalstation and MT.connect navigational hardware alongside the Jackcontrol tunnelling system. A few minor teething problems in the new navigation software were quickly overcome, with VMT providing site support and access to the Product Management Team at the head office in Bruchsal.

Commenting on the project for K-Boringen, Wim Feyen said: "Running the Jackcontrol and VMT systems over the same hardware platform, MT.connect, worked very well, making handling faster and easier. We are definitely keen to work with the VMT and Jackcontrol combination again and plan to use MT.connect for our forthcoming curved drives."

www.vmt-gmbh.de

ANOTHER PIPE-JACKING RECORD FOR HUNUA

Huana Microtunnel Breakthrough

Amīria, McConnell Dowell's microtunnel boring machine beat her previous project record by 80 m on 20 November 2020 on the Hunua 4, Section 11 tunnelling project in New Zealand.

The Herrenknecht-manufactured AVN2500 machine once again set a new pipe-jacking record for the longest single drive in the Southern Hemisphere by a TBM greater than 2.6 m diameter. The project set a 1,216 m record on completing the second drive for the pipeline earlier in the year.

Richard Atkin, the Hunua 4, Section 11 Project Manager, said: "I could not have asked for a more experienced tunnelling team to successfully navigate through Auckland's challenging volcanic fields which comprise of hard basalt (up to 160 MPa). To gain another record for this project after 18 months of tunnelling, across three individual drives, has put the team in good spirits as we near the finish line." >

"I could not have asked for a more experienced tunnelling team to successfully navigate through Auckland's challenging volcanic fields."

The new record is a hard-earned achievement for the team delivering the 3.5 km water main upgrade for Watercare. The final 1,296 m drive consisted mostly of basalt rock and tough clay ground conditions, but despite the geological challenges, the crew completed the final drive in less than three months.

Justin Shepherd, McConnell Dowell's Tunnelling & Underground Group Technical Director, praised the efforts made on Hunua 4, Section 11 by saying: "McConnell Dowell challenges both the norm and ourselves by thinking creatively, engaging our multi-discipline specialists, embracing new technology, and driving continuous improvement through our teams and projects. This project, which we believe to be the longest large diameter pipe-jacked drive through 'continuous hard-rock conditions' in the world, exemplifies McConnell Dowell's approach to successfully delivering award-winning, and record-breaking, tunnelling and underground work."

With 2.9 km of tunnelling now completed, Amīria, one of McConnell Dowell New Zealand's three MTBMs, will be refurbished by its in-house mechanical and maintenance team. The next step for the project team is the installation of the 1,575 mm diameter concrete-lined steel (CLS) water main pipes inside the tunnel which is planned for early 2021.

McConnell Dowell's proposed trenchless methodology won the contract to design and construct the final section of the Hunua 4 pipeline in 2018. Rather than digging trenches through some of Auckland's busiest roads, the tunnelling approach meant traffic continued to flow between Epsom and the city as the pipeline was built underneath.

www.mcdgroup.com

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Vermeer roller cone hole openers are now available for order through Vermeer dealers and the BORESTORE® HDD tooling and accessories warehouse at borestore.com. Vermeer roller cone hole openers are available in diameters of 8 in to 24 in (200 mm – 610 mm) in 2 in (50 mm) increments and includes a range of customisable options.

Built for quality and performance, Vermeer roller cone hole openers feature cutters that are built specifically for this application. “The cutters are not rebuilt or recycled from tricone pilot bits.” explained Jason Zylstra, Vermeer lifecycle product manager. “The cutters also feature metal-faced seals similar in style to what you would find on a dozer or excavator rather than conventional rubber seals. These seals add durability to the cutters as they maximise the wear life in gritty conditions.”

Vermeer roller cone hole openers are also built with a precision machining manufacturing process that allows the tool to have equal loading on each cutter. “Combining two machined surfaces, the cutter and the body, gives the tool concentricity, which maximises the life of the tool by evenly distributing the wear.” said Zylstra.

With a wide range of sizes and centraliser options, as well as two different cutter options for hard and medium hard rock and a multitude of customisable options, Vermeer roller cone hole openers are equipped to meet the specific needs of any jobsite.

www.borestore.com

POWERING THROUGH A GRANITE SHELF

Markey Drilling's Grundodrill 18ACS set up on site

It is not known as the King of Rocks for nothing, so when an underwater crossing to install a new water main meant drilling through hard rocks, the UK's only GRUNDORILL 18ACS was called in to tackle the job.

Markey Drilling Ltd based in Newry, Northern Ireland, works throughout the UK and Ireland on No-Dig and trenchless construction jobs. The company has been working on Scottish Water projects for a number of years and was appointed by a sub-contractor to Scottish Water Horizons, to carry out this trenchless project in Scotland.

"The GRUNDODRILL 18ACS is an amazing piece of kit and thanks to its compact footprint it enables us to undertake large, difficult jobs"

The water utility supplier is currently working for a building contractor on a project to install a three mile long network upgrade to support the building of around 2,500 new homes in Barrhead to the southwest of Glasgow. One particular section of the new infrastructure provided the biggest challenge of the project to date and that was to tunnel under a watercourse and through a large granite shelf to install a new water main. The geology of the area required a specialist drilling solution that would work effectively and efficiently through the notoriously hard material. >

The GRUNDODRILL 18ACS site was a very rural location

Sean Markey, Managing Director of Markey Drilling, has used his TRACTO-TECHNIK directional drilling machine on many difficult rock drilling jobs and knew it was the perfect machine to tackle the granite shelf under the river. It did so with ease and accuracy.

"The GRUNDODRILL 18ACS is an amazing piece of kit and thanks to its compact footprint it enables us to undertake large, difficult jobs without disrupting the local environment. This water course crossing for Scottish Water Horizons had a very tight window to set up a rock drilling site. The team at Markey Drilling set up the machine on one side of the river and drilled the pilot bore across to the exit pit at the other side in 3 days." said Sean. "The site was situated on a narrow road which had to remain open to traffic throughout due to a high school in the area. The compact machine footprint meant we could enable this to happen. We went through various types of rock on our descent down to the calculated maximum depth before we came across the granite shelf underneath the river. The process slowed down due to the strength of the rock but our GRUNDORILL 18ACS (King of Rock) just kept on powering through."

"The process slowed down due to the strength of the rock but our GRUNDORILL 18ACS (King of Rock) just kept on powering through"

The final product pipe to be installed was 280 mm diameter but required a hole diameter of 400 mm in order to cut through the granite shelf and cope with the changing formations on either side. The excellent stability and user-friendly controls ensured that this task was efficiently completed. Owning the machine, according to Sean, helps win these difficult contracts as they can offer a productive service for all lengths and sizes of directional drilling works – even in difficult site conditions.

Further to this, the machine is scheduled to head off to Scotland once more to complete four more crossings for Scottish Water in an area north of Ayrshire that has sensitive rock conditions. These crossings will facilitate trunk water mains to a rural Scottish village.

www.tracto-technik.co.uk

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PRIORITISING SAFETY THROUGH HIGH-TECH INNOVATION

Interflow's remote Rotaloc solution in action

As new and innovative technologies continually evolve in the water sector, safety consistently remains a top priority for councils, water authorities and service providers alike. When the partial collapse of a critical quad-barrel culvert posed imminent danger to the surrounding community in the City of Onkaparinga, Australia, an appetite for innovation proved to be the vital key to success. >

Operating the enhanced Rotaloc system on site

Culverts: supporting the community's critical infrastructure

Road and rail culverts play a crucial role in providing drainage, enabling traffic to travel over waterways, preventing erosion and providing safe and natural passage for fish and other aquatic wildlife. Often located in environmentally sensitive areas or beneath high-volume traffic flows, their integrity is vital to the health of the road and rail networks above, as well as the wellbeing of the surrounding environment and community.

When these structures fail, the results can be catastrophic. The City of Onkaparinga Council learnt this first-hand, when a quad-barrel culvert located under a high-traffic volume section of road partially collapsed.

The four corrugated iron culvert tunnels had deteriorated to such an extent that they posed a risk to the structural integrity of the road above and some 6,000 commuter vehicles that used the road daily.

Understanding that time was of the essence, Onkaparinga Council engaged specialist in water infrastructure, Interflow, to address this emergency situation.

Prioritising crew safety whilst balancing customer goals

With two culverts collapsed, and the integrity of the remaining two in question, the Council decided to proactively reline all four culverts, bolstering their structural integrity to protect the community's critical infrastructure going forward.

Considering the level of deterioration and the questionable stability of the road above, any man entry to the structures was strictly prohibited until the new structural lining was safely in place.

Interflow's Project Manager on the contract, Peter Button, described the challenges associated with this non-man entry approach. "Traditionally, a project of this nature would require either some form of entry into the unlined pipe or excavation and re-lay." he said. "Any approach that required man-entry was immediately ruled out as the risk of road collapse was far too high. However, the community and environmental impacts of excavation methods were also high."

Determined to challenge the traditional methods of culvert rehabilitation, Peter's team undertook the lining works, and all necessary cleaning and preparations, without excavation and without stepping foot inside the tunnels.

"We wanted to find a solution that could prioritise our commitment to safety whilst delivering favourable project outcomes to our customer and the community." he explained. >

"We wanted to find a solution that could prioritise our commitment to safety whilst delivering favourable project outcomes"

Peter Button

Challenging the traditional use of Rotaloc technology

Delivering a tailored response to their customer's unique situation, Interflow's team identified Rotaloc, a spiral-wound PVC liner, as the best solution to balance the safety and community requirements of the project.

The Rotaloc machine is usually directly controlled from inside the pipeline. In order to properly prioritise crew safety, this aspect of the machine's operation would require modification. Interflow's Product Development crew developed an innovative solution and altered the machinery's hydraulics to enable remote operation.

Interflow's Development Manager for South Australia, Boris Graljuk, explained how he got the crew up to speed on the machinery's enhanced application and capabilities. "I developed the new system to function in a similar manor to the conventional man-entry system that our team was already familiar with." he said. "We then ran through an intensive two-day training course in the workshop before the crew commenced work on site." Boris continued.

Innovation paves the way for a safer future

With Boris' training fresh in mind and a hunger to challenge the status quo, Interflow's crew commenced lining the quad-barrel structure via the enhanced 'remote Rotaloc' technique.

Once the robust new liners were in place, the void between the new pipe and the host pipe was backfilled with grout, creating a secure, renewed asset that will service commuters and the local community for years to come.

By challenging the conventional use of Rotaloc technology, Interflow's South Australian crew was able to eliminate the risk to their personal safety throughout the duration of the project.

Peter Button emphasised that safety and efficiency are key to developing high-tech innovations for customers. "Projects like these are redefining what we once thought to be the limitations of pipeline rehabilitation." he said. "It is a prime example of how the innovative use of technology can be used to enhance our commitment to the safety of not only our people, but the safety of the broader community."

www.interflow.com.au

"Projects like these are redefining what we once thought to be the limitations of pipeline rehabilitation"

THE STRONGEST QUAD FAN SUCTION EXCAVATOR IN THE UK!

RSP Quad Fan unit rear and front views

Earlier this year, RSP brought a newly designed truck to the global market, the Quad Fan. As what is claimed to be the highest-powered truck yet with a four-fan system mounted onto a Volvo FH16 650 chassis it is also a UK first!

"We are delighted to be able to bring the Quad Fan to the UK. It is unique in its design and our most powerful truck yet." said Charlie Gardener, Director of RSP UK.

The Quad Fan offers more options on specialist applications. With the increased strength of RSP's global patented suction excavator technology the Quad Fan represents a versatile addition to industry.

RSP continues to develop its technology within the suction excavator market based on customer needs and tailoring solutions with them in mind.

"We have some big announcements due this year and are very excited for the next few months. Our passion is working collaboratively with our customers to find the right solution for them and their business." said Lloyd Gardener, Director of RSP UK.

www.rsp-uk.co.uk

DYER & BUTLER INVESTS IN MINIATURE VACUUM EXCAVATORS

Air Vac II

Investing in innovation and the continued enhancement of its excavation safety procedures, Dyer & Butler, a part of the M Group Services Transport Division, has introduced a fleet of remote controlled, miniature vacuum excavators to its plant and fleet portfolio. >

The AIR VAC II as a track-mounted unit

Following its investment in the Vac-Ex AIR-VAC II excavators, procured and supplied by M Group Services Plant & Fleet Solutions, Dyer and Butler has mandated use of the machines as the primary solution in the hierarchy of control. Training on the excavators has been delivered to teams across Dyer & Butler's highways, aviation and rail divisions.

Richard Walker, Managing Director at Dyer & Butler commented: "These compact and manoeuvrable excavators, along with enhanced excavation safety procedures and our further investment in flame arc clothing, are delivering significant benefits across our organisation. Our adoption of this technology ensures that services are safely exposed and reduces the potential risk of utility strikes, as well as minimising the potential for significant disruption, environmental damage and expensive delays to projects."

The AIR-VAC II excavators were piloted by Dyer & Butler teams working on the remodelling of a road junction, heavily congested with underground services, as part of works to form the Eastern Access route into the 88-acre 'Green Quarter' regeneration project in Ealing, West London, UK.

Steve Broom, Safety, Sustainability and Training Director at Dyer & Butler, commented: "The risk of injury, incidents and disruption caused by damage to underground services is an ever-present threat in our sector and we continually invest to enhance our working processes, training and equipment to ensure that our approach to working in these complex environments is both safe and innovative. The introduction of the AIR-VAC II excavators has been a game changer in the delivery of safe excavation, enabling our teams to work carefully, considerately and effectively in and around underground services. We believe that these machines, coupled with our experience and knowledge of safe excavation procedures around underground services, provides Dyer & Butler with a unique advantage in the delivery of schemes such as this."

M Group Services Plant & Fleet Solutions is responsible for the supply and management of specialist equipment and vehicles across the whole of M Group Services, supplying its multiple businesses operating in the UK Utilities, Transport, Data and Telecom sectors.

www.dyerandbutler.co.uk

"These compact and manoeuvrable excavators, along with enhanced excavation safety procedures and our further investment in flame arc clothing, are delivering significant benefits across our organisation"

LARGE DIAMETER LIVE WATER PIPE INSPECTION AND LEAK DETECTION

The Floating cable used for the Pluto system

The Pluto system arriving on site.

PIPA an independent UK based company specialising in the design, manufacture and assembly of non-evasive and revolutionary pipe inspection, leak detection and cleaning products for the water, gas and oil industries was recently contacted by a water utility client in Hong Kong and its contractor API.

The utility had identified a high risk water main that supplied water to an airport, and was laid under the sea bed. The entry point on the bitumen coated steel pipeline was in a water treatment works area. The client needed a long range tethered solution, to check the pipe for leaks and potential blockages.

Challenges

The pipeline is a raw water outlet submarine main that is deeply buried under the sea bed. It is an 1,800 mm diameter pipe operating to 6 to 10 bar pressure which was installed some 35 years ago. The pipe length is 4.4 km which includes several bends. >

The pipe to be inspected

The client required telemetry to include water temperature, pressure, acoustic leak detection and visual CCTV assessment.

The client discussed options for using alternative methods including:

- Noise correlators – no leaks identified (not accurate on large diameter metallic pipes)
- Free floating devices – Due to the pipe being sited under the sea bed, the client could not risk the system getting stuck or lost within the pipeline
- Using human divers to visually assess the pipe externally. This would have been time consuming and potentially dangerous

The client needed to risk assess the asset and to confirm there were no hidden internal defects or blockages.

> "The client needed to risk assess the asset and to confirm there were no hidden internal defects or blockages"

PIPA uses technology that includes a pressure rated camera and hydrophone capsule called PLUTO™ tethered to a 5,000 m long cable to give the operator video and recorded audio data during an inspection. The system enters a pipeline via a 150 mm diameter riser, and is fully chlorinated during its Insertion. The system works on a live basis, with no Interruptions to the client's services. The system can cover a distance of up to 5 km per day.

How it works

The technology requires a pipe entry point and pipe exit point. Upstream a pressure rated camera is inserted to launch a weightless cable and Hydrochute™, this is all sealed within a pressurised housing. The water flow enables the Hydrochute and cable to travel down the pipeline to the required distance. Downstream an expanding net and camera is inserted into the pipe to stop the Hydrochute travelling any further and to remove the Hydrochute and cable during live water conditions. >

The Hydrochute used to propel the Pluto system through the pipeline

The PLUTO system is attached to a secondary cable, and this is pulled back through the pipeline using a motorised cable drum, pausing every metre to overlay distance meterage on to the final report. All data is captured onto an internal drive, and a detailed date report is supplied for the client.

Survey results

The results of the pipeline survey included:

- API-PIPA successfully surveyed the entire 4.4 km length in a single insertion, which is believed to be an industry first
- The tethered insertion technology system allowed for precise location of the leaks or defects to be identified and offered a low risk approach to long range pipe inspection
- The acoustic system is very sensitive and was able to pick up small and large leaks
- The operator was able to identify other points of interest, air pockets, joint and bend locations
- Pipe telemetry was successfully recorded to supply the client with acoustic, pressure and water temperature data

The conclusions from the data gained included that it would have been very difficult and expensive for the utility/contractor to confirm issues within the water main. The CCTV and acoustic capability proved indispensable for locating issues and trouble shooting.

PIPA and API completed the inspection in 1 working day which included cable installation and a nightshift to complete the long range pipe inspection survey. The contractor also resolved the ongoing issue by removing the guess work at a fraction of the cost and time that would have needed to be invested in other pipe inspection methods.

A PIPA representative said: “The project was a great success, ideal due to pipe location and material and also a great case study for our company. The contractor had exhausted all other pipeline inspection avenues, and was more than relieved when we offered a solution.”

“The project was a great success, ideal due to pipe location and material”

The Hong Kong PLUTO project was believed to be an industry first, by delivering a 4.4 km pressurised and tethered pipe inspection survey. PIPA now offers all of its technology to water utility companies all over the World, including remote training and reporting data support.

www.pipa-uk.com

MUS TRIALS GROUND-BREAKING AUGMENTED REALITY EXCAVATION TECHNOLOGY

The Augmented Visualisation of Underground Services (AVUS) grid overlaying a site view

Morrison Utility Services (MUS), a part of M Group Services, is partnering with Eurovia UK on the trial of Augmented Visualisation of Underground Services (AVUS) technology on its Thames Water and Yorkshire Water contracts.

MUS engineers are using AVUS to plan and manage works more effectively by mapping and viewing underground services in 2D or 3D augmented reality (AR) via smartphone and tablet screens, prior to excavation.

AVUS is designed to minimise the risk of underground service strikes and third-party asset damage, improving operational efficiency and productivity by removing the need for specialist surveys. The solution also ensures that the accuracy of underground service data is improved and maintained over time. >

The trial introduction of AVUS will also enable teams to benefit from as-built video capture of geospatial information prior to reinstatement of an excavation

The technology offers the benefit of precise pipe location identification to within 50 mm, as well as the capability to capture accurate geospatial information of as-is/as-built services before reinstatement.

The trial introduction of AVUS will also enable teams to benefit from as-built video capture of geospatial information prior to reinstatement of an excavation. The resulting footage is used to create detailed 3D point cloud models – ensuring accurate visual records and 'x-ray vision' of the work completed, utility layout and geology for future works.

The initial trial was successfully conducted by a Morrison Utility Services team working on a bypass and pressure relief valve (PRV) installation in Roehampton, South London in October 2020.

Andy Carter, MUS Director of IT, Innovation and Improvement, commented: "Innovation is a key consideration across every aspect of our business. Areas in which we are always looking to innovate are born from real-life business challenges. AR is paving the way for many operational processes in our sector to become safer and simpler and the benefits presented by AVUS mean that this technology is a real industry game changer. Using emerging and innovating technologies such as AVUS ensures safer working practices and minimises the risk of service strikes by enabling our engineers and operatives to view buried networks virtually via smartphone devices. As well as this, the geo-positioning precision offered by the technology means that the essential infrastructure works that we undertake can be delivered more quickly and more efficiently to keep disruption to the public to a minimum."

"Innovation is a key consideration across every aspect of our business"

Eurovia UK Director of Innovation, Yogesh Patel, added: "When we developed the AVUS technology, we always knew that it would make a big impact on the safety and success of planning and programming of works. We are excited to see the benefits of AR applied to the utilities sector – we all have a collective responsibility to manage our infrastructure safely and sustainably. AVUS is a step in the right direction towards this vision."

www.morrisonus.com

EUROPEAN NO-DIG 2021

UNITED KINGDOM

Wednesday 15th September 2021
Peterborough, UK

1st European No-Dig Conference

Rehabilitation Design for Pressure and Gravity Pipes

A high-level technical conference with internationally respected and acknowledged expert speakers from 5 European countries covering the design methods and codes of practice for rehabilitation design across the Continent along with examples of their application.

The Conference Chair will be Dr. Dec Downey, former Chairman of ISTT and UKSTT.

Keynote speakers will be Dr. Olivier Thépot of Eau de Paris in the gravity liner design session and Dr. John Gumbel of JG Pipeline Consultancy in the pressure pipe rehabilitation session.

€250 Standard Rate

€200 Early Bird (19th May 2021)

Students FOC

UKSTT & ISTT Affiliated Societies all receive a 50% discount

PROGRAMME

SESSION 1
GRAVITY SEWER REHABILITATION

KEYNOTE LECTURE: GRAVITY SEWER LINER DESIGN, Olivier Thépot, Eau de Paris, France

Design of Liners in Germany according to A143-2, Mark Klameth, IKT, Germany

WRc Sewer Rehabilitation Manual - Key Changes in Design Methodology, Nick Orman, WRc, UK

External Pressure Tests on Large Diameter Jacking Pipe Systems, Högni Jónsson Amiblu Technology, Norway

"Real-time Monitoring of UV Lamps as Requirement for Controlled and Protocolled Curing of Large Diameter Liner with Big Wall Thickness", Firmino Barbosa, Reline Europe, Germany

Questions & Discussion Dec Downey

SESSION 2
PRESSURE PIPE REHABILITATION

KEYNOTE LECTURE: PRESSURE PIPE REHABILITATION, John Gumbel, JG Pipeline, UK

Status Quo of the CIPP Product Standards for Water & Gas Networks, Ricky Selle, Selle Consult, Germany

Key Design Considerations for PE80 and PE100 Pressure Pipe Liners, Steve Brogden, Die Draw Ltd, UK

"Response of a Cured In Place Liner in Cast Iron Water Pipe due to Joint Expansion due to Permanent Ground Deformation or Seismic Wave" Olivier Thépot, Eau de Paris, France

"A Unique Example of Close Fit Lining Technology for the Renewal of Water Pipes aling the Bridge ""Ponte Punta Penna"" in Taranto", Federica Fuselli, Rotech SrL, Italy

Questions & Discussion, Dec Downey

Closing Remarks by Conference Chairman, Dec Downey

Register today: www.1steuropeanconf2021.nodiglive.co.uk

Technical Programme by: UKSTT, ISTT, GSTT TRENCHLESS MADE IN GERMANY, ITALIAN ASSOCIATION FOR TRENCHLESS TECHNOLOGY

In conjunction with: 2021 NO-DIG LIVE

Organised by: WESTRADE GROUP LTD

Official Media Partner: TRENCHLESSWORKS

Westrade Group Ltd, Carotino House, Bury Lane, Rickmansworth, Hertfordshire WD3 1ED, UK +44 (0) 1923 723990 trenchless@westrade.co.uk www.nodiglive.co.uk

ROADVACS INVESTS IN NATURAL GAS

Vacumaster F 80 KH front view

Roadvacs is proud to announce that one of its key strategic partners', Muller, is leading the way in environmentally friendly vehicles by producing a vehicle with a natural gas drive to operate within inner cities. This means that the vehicle is exempt from driving bans in environmental zones within cities which will become more prevalent in years to come across all European cities.

Roadvacs is proud to announce that one of its key strategic partners', Muller, is leading the way in environmentally friendly vehicles by producing a vehicle with a natural gas drive to operate within inner cities. This means that the vehicle is exempt from driving bans in environmental zones within cities which will become more prevalent in years to come across all European cities. >

Vacumaster F 80 KH rear view

The low-profile Vacumaster F 80 KH is a suction vehicle with an 8,000 l tank, and a hydraulically driven, swivelling, lifting and telescoping pipe boom. The on-board liquid ring vacuum pump is a CVS Vacustar WR 2500, with the high-pressure pump being a Uraca P3-10 plunger pump.

The special feature of this vehicle is the Mercedes-Benz chassis. It is the new Actros NGT, which is equipped with a natural gas drive. In conjunction with the body from MÜLLER, this is claimed to be the first sewerage vehicle ever built in Germany to run on natural gas.

This natural gas technology was developed with the objective of improving air quality as well as increasing human life expectancy, by reducing up to 95% less CO_2 emissions with biomethane.

Some other key features of this new machine include:

- Significantly lower noise levels than a conventional diesel engine
- Allison automatic transmission
- Minimal maintenance requirements
- CNG tank made of composite materials and weighing 400 kg as compared with conventional steel tanks
- Refuelling is as easy as with other traditional fuels.
- Operating costs are lower than for diesel engines

It is with great pride that Muller is keeping with its commitment to the environment by supplying the super structure for this first sewer cleaning vehicle with natural gas from Germany.

www.roadvacs.com

“This natural gas technology was developed with the objective of improving air quality as well as increasing human life expectancy”

WESTRADE GROUP LTD

NO-DIG EVENTS

International No-Dig events brought to you by the industry's world experts

NO-DIG LIVE 2021

15th Biennial Exhibition, Live Demonstrations and Technical Sessions
14-16 September 2021
East of England Arena and Events Centre, Peterborough, UK
15 september 2021 - UKSTT Gala Dinner & Awards Ceremony in association with Westrade
www.nodiglive.co.uk

TRENCHLESS ASIA 2021

12th International Conference and Exhibition
Featuring the ISTT's 38th International No-Dig Conference & Exhibition
16-17 November 2021
Kuala Lumpur Convention Centre, Kuala Lumpur, Malaysia
www.trenchlessasia.com

TRENCHLESS MIDDLE EAST 2021

12th International Conference and Exhibition
13-14 December 2021
Festival Arena by InterContinental, Festival City, Dubai, UAE
www.trenchlessmiddleeast.com

TRENCHLESS ASIA 2022

13th International Conference and Exhibition
May 2022
Manila, Philippines

NO-DIG HELSINKI 2022

ISTT's 39th International No-Dig Conference and Exhibition
3-5 October 2022
Messukeskus Helsinki Expo and Convention Centre, Helsinki, Finland
www.nodighelsinki.com

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SOCIETY NEWS

ISTT News brought to members by Trenchless Works

A MESSAGE FROM THE CHAIR

Jari Kaukonen, Chair, International Society for Trenchless Technology

"It is good to see that the world is slowly starting to open up again and I look forward to being able to meet many of you again in person later this year"

It is good to see that the world is slowly starting to open up again and I look forward to being able to meet many of you again in person later this year. Whilst I'm obviously of an age where it's likely to be some time before I receive my vaccine, I am always willing to digitally support Society members either by attending their meetings or speaking at conferences and events. I wanted to take this opportunity to update ISTT members on a number of developments ahead of what looks set to be a really exciting year.

Following the discontinuation of Trenchless International, the ISTT Board invited a number of media companies to pitch solutions for continuing with a member magazine and other information channels and how these could be developed going forward. The ISTT Outreach and Marketing Committee Chair, Trevor Gosatti, has done a great job as there were a number of excellent proposals and the decision was not easy. The ISTT Board of Directors did, however, make its selection at the January 2021 meeting and I'm delighted to be able to confirm our new media partner - Trenchless Works - and welcome them into the ISTT community. Hopefully you have all now seen the first issue of the e-magazine and agree with me that it holds many exciting possibilities for the future. Your comments about the magazine are always welcome.

As we return to normality, we can look forward to the 38th International No-Dig in Kuala Lumpur. The event takes place on the 16 and 17 November 2021 having been rescheduled from November 2020. We will also hold the International Council meeting on 15 November, the day before International No-Dig show begins. I have been in >

istt.com

SOCIETY NEWS

ISTT News brought to members by Trenchless Works

"Our Technical and Education Committee, led by Albert Shou, has been very active in preparing the series of ISTT webinars"

contact with Westrade, who are confident that the event will take place, and that travel to Malaysia will be possible and safe by this date. On this basis, it is probably worth those planning to attend starting to consider their travel arrangements (https://trenchlessasia.com/conference-2020).

Our Technical and Education Committee, led by Albert Shou, has also been very active in preparing a new series of ISTT webinars. Registration is available via the ISTT website (www.istt.com) where you can also view recordings of previous webinars. Additionally, we are now on LinkedIn. There is lots of excellent information on LinkedIn about trenchless so please do give us a follow.

Other key events this year include the NASTT No-Dig show in Orlando, Florida (28 March to 1 April) followed later in April by conferences in Sao Paulo Brazil, Suzhou China, and Krakow Poland where I hope I can be present!

Finally, I would like to recognize the efforts of all six ISTT committees who have worked extremely hard and efficiently over the past few months. We have established a new committee - the ISTT Governance Committee - which will formalise the ISTT's policies and procedures. The Chair of this committee will be decided during the next board meeting in March. I have also started to prepare our Chairman's advisory panel with Dec Downey and Peter Smeallie which should be ready in April.

My best regards to you all,

Jari Kaukonen, Chairman, ISTT

istt.com

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)
18 Frinton Place Greenwood,
6024, WA, Australia
Phone: +61 (0)8 9420 2826
Email: jeffpace@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

Colombian Institute for Subterranean Infrastructure Technologies and Techniques (CISTT)
Autopista Medellin (Calle 80) 3.5km Via Bogota Siberia Costado Sur,
Terminal Terrestre De Ca Cota
Cundinamarca Colombia
Phone: +571 8764675
Email: cistt.arlex.toro@ictis.org
Web: www.ictis.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: zoradcrc@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 / WSP Finland Oy
Kiviharjunlenkki 1 D,
FIN 90220 Oulu 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

istt.com

AFFILIATED SOCIETIES

ISTT Affiliated Societies around the world

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

Japan Society for Trenchless Technology (JSTT)
135-0047; 3rd Reed-C Building. 2-11-18
Tomioka, Koto-ku, Tokyo ttt Japan
Phone: +81 3 5639 9970
Email: office@jstt.jp
Web: www.jstt.jp

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)
14500 Lorain Avenue #110063
Cleveland, OH 44111 United States
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)
Severny 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, Eldoraigne 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)
SSTT Service AB, Box 22 307 104 22,
Stockholm, Sweden
Phone: +46 8 508 938 00
Email: Kontakt@sstt.se
Web: www.sstt.se

Turkish Society for Infrastructure and Trenchless Technology (TSITT)
Kucukbakkalkoy Mah. Ali Ay Sok. No:3/2
Atasehir 34750 Istanbul, Turkey
Phone: +90 216 469 75 65
Fax: +90 216 469 75 69
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

SOCIETY NEWS

UKSTT

ukstt.org.uk

Society News brought to members by Trenchless Works

HELLO FROM THE CHAIR

Dawn Greig, Chair, UKSTT

"I would like to invite all UKSTT members to join us at our next Council meeting on the 22 April"

Hello everyone, first of all DO NOT pack away your kilts yet! We are all set for the Awards Dinner in September and the Red Hot Chilli Pipers have confirmed they will be there! Not long now.

We are delighted to have scheduled in some online events so that you do not have to leave the comfort of your office, including two fascinating Trenchless Tea Breaks and a three-part virtual Mini Masterclass, more about that in this month's edition of Trenchless Works. Are there any Trenchless topics you would like to learn more about, techniques, methods, innovations, standards? Let us know and we will do our very best to oblige. In the meantime, relax, enjoy this fabulous magazine.

Lastly, I would like to invite all UKSTT members to join us at our next Council meeting on the 22 April, please email Lynn lynn@ukstt.org.uk if you would like to attend. We would love to see you there!

Stay safe x

Dawn Greig

TECHNICAL ENQUIRY SERVICE

The Technical Enquiry service is free and available to everybody through the UKSTT website. Anybody thinking of trenchless technology for a project, or with a problem for which they think there may be a trenchless solution, for example, can submit an enquiry and UKSTT will respond to the best of its ability and knowledge.

Last year the organisation received a number of enquiries from a very wide range of people and organisations. Most are from contractors or consulting engineers who find themselves involved in projects where they think trenchless may be a viable option but need to know more about feasibility. Some are looking for specific product information, and some market information. They cover rehabilitation and new installation as well as inspection and detection. Several relate to health and safety. Quite a few also come from abroad.

UKSTT has a filtering system to decide how to respond to the enquiries it receives. If there are no concerns with confidentiality or commercial sensitivity, they are circulated to the Society's corporate members to respond if they wish to do so.

UKSTT can often take knowledge of trenchless technology for granted but it remains relatively unknown across a broad swathe of the civil engineering and utilities sector. The Technical Enquiries service is a good way to help people solve problems and also to make the knowledge of trenchless technology and its benefits more widely known.

www.ukstt.org.uk

UKSTT GALA DINNER & AWARDS CEREMONY 2021 – NEW DATE!

UKSTT is pleased to announce that the Gala Dinner & Awards Ceremony will now take place on 15 September 2021 in association with Westrade Group. The safety of everyone attending remains the highest priority and UKSTT sincerely hopes you will be available on the new date.

UKSTT is pleased to announce that the Gala Dinner & Awards Ceremony will now take place on 15 September 2021 in association with Westrade Group. The safety of everyone attending remains the highest priority and UKSTT sincerely hopes you will be available on the new date.

The Awards Dinner will take place in The Atrium, East of England Arena, Peterborough, PE2 6XE at 7pm in conjunction with No-Dig Live 2021.

The Gala Dinner is one of the highlights of the UK trenchless calendar and will be raising funds for 'Mates in Mind', a charity which provides advice and support to anyone experiencing a mental health problem across all industries with a special focus on the construction industry.

The evening will provide entertainment from the 'Red Hot Chilli Pipers' (the most famous Bagpipe band on the planet!) and an announcement will be made soon to confirm who will be accompanying UKSTT Chair, Dawn Greig, as host of the evening. Watch this space!

Tickets include a sparkling drinks reception, amazing food, fantastic entertainment as well as the opportunity to rub shoulders with industry colleagues and friends.

For further information please visit the website: https://www.ukstt.org.uk/annual-dinner-awards-ceremony-2021/

Tickets and table bookings can be purchased by contacting Hollie Liddle at hliddle@westrade.co.uk or calling 01923 723990.

Sponsorship opportunities are available, for more information please contact Trevor Dorrell tdorrell@westrade.co.uk

UKSTT MINI-MASTERCLASS WEBINAR SERIES – TRACTO-TECHNIK UK LTD

UKSTT has announced a series of live webinars that will be presented by Tracto-Technik UK Ltd focussing on traditional trenchless pipe reinstatement processes. This webinar series will focus on traditional methods of trenchless technology including Pipe Bursting and Pipe Ramming for pipe installation and replacement.

15 April, 11am – Overview of Traditional Pipe Reinstatement Processes

Recent years have seen much innovation in the field of trenchless pipe reinstatement; however, some new methods are failing to reliably achieve the proposed service life expectancies for the repair. Is it time to re-consider the advantages of replacing failed assets with new ones, rather than just 'papering over the cracks'?

29 April, 11am – Static & Dynamic Pipe Bursting

There is more to bursting than just pushing rods up a straight section of old round pipe and pulling in a new one in its place. We will probably never be able to burst around a sharp bend, but different bursting methods can cope with a wide variety of challenges, and the dynamic methods seems to have been all but forgotten. This webinar will highlight what can be done but will also be frank on the limitations of the bursting processes.

13 May, 11am – Pipe Ramming

Strictly more of a pipe installation process, pipe ramming can also play a vital role in the renewal or replacement of underground infrastructure. The simplicity and power of the ramming process makes it versatile and often highly cost effective.

Registration details will be available shortly. In the meantime potential attendees can register interest by emailing lynn@ukstt.org.uk and the link will be sent directly as soon as registration is open.

UKSTT PROUD TO SUPPORT DOFE INTERN – THISTLEROSE

THE DUKE OF EDINBURGH'S AWARD

Thistlerose

"Businesses need to lead the way in offering opportunities that not only build the right technical skills, but help young people become the best they can"

The Duke of Edinburgh award (DofE) is a youth achievement award open to young people up to the age of 24. Through the DofE programme young people can improve their self-esteem and build their confidence whilst gaining essential skills and attributes for work and life such as resilience, problem-solving, team-working & communication.

Last year UKSTT was approached by student Thistlerose for support in providing a skills task to enable her to complete the Silver Level DofE award. Promoting young professionals fits in with UKSTT's values and a research project, based on Thistles interest, was agreed. Over the last couple of months Thistle has been researching past members going back to 2005 with the intention of re-connecting where possible. A full report will be provided on completion.

Thistlerose said: "The UKSTT has welcomed me as a volunteer to help me achieve my Silver Duke of Edinburgh award. So far, I have completed the expedition, trekking through the country for three days and camping for two nights. I have also completed my physical section, and am now working on my skill and, through the UKSTT, my volunteering section. In this part I will volunteer with the UKSTT for 6 months, allowing me to give a little of my time to a wonderful organisation, with high environmental standards, which is very important to me".

UKSTT's Business Development Manager Lynn Maclachlan said: "Businesses need to lead the way in offering opportunities that not only build the right technical skills , but help young people become the best they can. UKSTT is proud to support Thistlerose while she completes her Silver DofE Award and looks forward to sharing the results of the research project she has been working diligently on."

MEET THE TEAM BEHIND THE UKSTT

The UKSTT is an active, thriving Society, and the driving force behind this is the 20 dedicated volunteers who make up the Council. As part of the ongoing series Trenchless Works is taking a look at the faces behind the Society and how they got involved in Trenchless Technology and the UKSTT. This month we catch up with Leon Woods, Membership Services Chair and Scott McMurray who was recently elected in 2020.

Leon Woods

Leon Woods – UK Technical Sales Manager, Amiblu Norway A S

Q: What is your background and what brought you into the trenchless industry?

I started my career in the civils industry in 1996 working for Instarmac and since then have worked in different areas of business development and marketing in construction and civils, with companies like Groundforce, Polypipe Civils and Naylor pipe manufacturers and specialist aggregates producer Leca®.

I joined Amiblu in 2018 and found that the business manufactured ranges of pipes specifically for Trenchless installations be they jacking pipes or rehabilitation pipes in circular or non-circular options.

Q: How/why did you get involved in UKSTT?

I live in the same town so it is easy for me to be available for meetings and also, with being new to the trenchless industry it was a very good vehicle for me to network quickly and get to know who's who in the industry.

Q: What goals do you want to achieve as a UKSTT Council Member?

The council is a team, and in the main made up of volunteers, so it is not about personal goals but being part of the collective whose purpose is to continue to build a strong and respected society and keep it moving with the times. >

"The council is a team, and in the main made up of volunteers, so it is not about personal goals but being part of the collective"

"Knowledge – there definitely seems to be a gap in education in respect of Trenchless Technology,"

Q: What do you see as being your own greatest personal achievement in the trenchless industry?

I think I am away off great achievements in the trenchless industry just yet but working on some very interesting projects has improved my knowledge which helps me build customer confidence and win new clients, so watch this space.

Q: What do you currently see as the industry's most urgent challenges?

Knowledge – there definitely seems to be a gap in education in respect of Trenchless Technology, so I would like to see the methods and products available being added to the college and university curriculums.

Q: Where would you like to see UKSTT in 5 years?

I would like to see a larger membership, with a lot of interaction and engagement between members, sharing their successes and advice for improvements. It would also be great to be a recognised educator and advisor to clients, contractors and consulting engineers working with Trenchless Technology.

Scott McMurray

Scott McMurray – General Manager, S1E Ltd

Q: What is your background and what brought you into the trenchless industry?

Having studied at Manchester Building College, I followed my father into civil engineering supply working for a business called J F Donelon in Bolton within their merchant division. With various roles under my belt within the distribution side of the construction industry, I took a role within Flexseal Couplings, the sister company of S1E Ltd where I now look forward to many years yet to come.

Q: How/why did you get involved in UKSTT?

With my inexperience and unfamiliarity of the CIPP Industry and having only joined S1E Ltd some 8 months ago, getting involved with the UKSTT will help to bring much-needed understanding of this specialist Market. This, I hope, will assist me to promote, advertise and bring value within the water industry. >

"I would like to fully understand what the Water Companies priorities are regarding compliance and how the UKSTT can be of help in promoting trenchless to them"

Q: What goals do you want to achieve as a UKSTT Council Member?

I want to help with awareness and promotion of the learnings of the UKSTT to the market. I would like to fully understand what the Water Companies priorities are regarding compliance and how the UKSTT can be of help in promoting trenchless to them as a solution.

Q: What do you see as being your own greatest personal achievement in the trenchless industry?

Having only recently joined the industry, it is very difficult to quote any personal achievement as yet, however from the warm reception given by other members and the sheer engagement at such an early stage.... who knows what is around the corner.

Q: What do you currently see as the industry's most urgent challenges?

With many challenges for everyone around the world today due to the pandemic, what is important now is to ensure we look after our environment for our children to enjoy tomorrow.

Q: Where would you like to see UKSTT in 5 years?

Bringing together focus on better practice with the involvement of all the various bodies within the industry.

5th EDITION

Trenchless Romania

Conference & Exhibition

SAVE THE DATE — **16th of June 2021** — **Bucharest**

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www.trenchless-romania.com

EVENTS AND MEETINGS

2021

March 28-April 1: NASTT 2021 No-Dig Show
Orlando, Florida.
Details from: www.nastt.org/events/nastt-2021-no-dig-show-orlando-fl/

April 15, 11am: Mini Masterclass Series 1 of 3
Presented by Tracto-Technik UK Ltd - Overview of Traditional Pipe Reinstatement Processes.
Register: https://bit.ly/3vYl6Sv

April 16-18: 3rd junior talent development forum – Star of the Youth Conference
China. Details from: www.soy.cstt.org.cn

April 19-25: RO-KA-TECH 2021
Kessel, Germany. Details from: www.vdrk.de

April 20-23: bauma CONEXPO INDIA
Delhi, India. Details from: www.bcindia.com

April 21-23: No-Dig Poland
Kraków, Poland. Details from: www.nodigpoland.pl

April 29, 11am: Mini Masterclass Series 2 of 3
Presented by Tracto-Technik UK Ltd - Static & Dynamic Pipe Bursting
Register: https://bit.ly/3tV2fHa

May 13, 11am: Mini Masterclass Series 3 of 3
Presented by Tracto-Technik UK Ltd - Pipe Ramming
Register: https://bit.ly/2OZnOYA

June 13-16: RETC
Las Vegas, USA. Details from: www.retc.org

June 16: Trenchless Romania
Bucharest, Romania.
Details from: http://trenchless-romania.com/

June 20-24: Singapore International Water Week
Marina Bay Sands, Singapore.
Details from: www.siww.com.sg

September 14-16: No-Dig Live 2021
Peterborough, UK.
Details from: www.nodiglive.co.uk
Includes the UKSTT Gala Dinner and Awards Ceremony

September 15: European No-Dig Conference
Peterborough, UK. In conjunction with No-Dig Live 2021 Details from: www.nodiglive.co.uk

September 15-18: Geofluid
Piacenza, Italy. Details from: www.geofluid.it

October 5-8: No-Dig Down Under
Sydney, Australia
Details from: www.nodigdownunder.com

October 13-14: 8th NSTT No-Dig Event
Nijkerk, The Netherlands.
Details from: www.no-dig-event.com

November 16-17: (NEW DATE) Trenchless Asia 2020 featuring the ISTT International No-Dig
Kuala Lumpur, Malaysia.
Details from: www.trenchlessasia.com

December 13-14: (NEW DATE) Trenchless Middle East 2021
Dubai, UAE.
Details from: www.trenchlessmiddleeast.com

No-Dig Roadshow 2021
Glasgow, Scotland.
Details from:
www.nodiglive.co.uk/glasgow-roadshow-2021

2022

April: SAO Paulo No-Dig Show
Sao Paulo, Brazil. Details from: www.saopaulonodig.com.br

May 30-June 3: IFAT 2022
Munich, Germany.
Details from: https://www.ifat.de/en

June 17-24: North American Tunnelling Conference (NAT) 2022
Philadelphia, USA.
Details from: http://natconference.com/

May: Trenchless Asia 2022
Manila, Philippines

October 3-5: No-Dig Helsinki 2022
Helsinki, Finland
Details from: www.nodighelsinki.com

If you have an event, course or meeting scheduled and would like to add it to this listing please forward details to: editorial@trenchless-works.com