Case study

EXPERT AUDIENCE WAS “PATENTLY” CONVINCED IN MUNICH

MtH Pilot Project II – Munich

Introducing epros® DrainMtH

Trelleborg Pipe Seals is among the leading specialist companies in innovative technologies for the maintenance of sewer systems.

The epros® DrainMtH system is a no-dig rehabilitation method that is able to repair and seal both lateral connections and lateral pipes using a cured-in-place pipe (CIPP) lining technology. What's unique about this system is its ability to do this from the main sewer pipe – all against the direction of flow, and in just one step.

This main-to-house (MtH) method from Trelleborg thus solves some of the most pressing challenges faced by contractors in the trenchless CIPP rehabilitation of lateral connections.

For a start, this modern lining technique saves municipalities and public sector customers time and administrative effort as it is now possible – for the first time – to rehabilitate lateral pipes without needing to access private property. This eliminates the need to contact and inconvenience residents or tenants.

This resident-friendly approach also caters to the organisational and financial interests of the owners and estate management offices of large-sized business and industrial complexes as, in most cases, the installation of the MtH system goes unnoticed by the users of the building. This cuts down on expensive operational shut-downs and disruptions.

But these are not, by far, the only advantages. The epros® DrainMtH system is also able to rehabilitate lateral pipes of to a length of up to 30 meters [approx. 98.5 ft] while simultaneously connecting and sealing these lateral connections to the main sewer pipe in one homogenous operation.

What's more, because this is a trenchless technology that requires no excavations, high-value physical assets such as paved areas and green spaces remain untouched and require no restitution.

In June 2013, Trelleborg performed an installation of this revolutionary new MtH system for interested parties from the sewer rehabilitation industry. The location of the installation: the European Patent Office in Munich. And the result? Universal acclaim and a successful launch of the system in the German market.

A camera team was on location to record the installation. To view the documentation, please visit: ***www.youtube/c/trelleborgpipeseals***
A report of the successful installation can be found on the following pages.

Background

Trelleborg's epros® DrainMtH system is the product of more than six years of research and development in the field. Thanks to its fully autonomous technical components and its sophisticated methodology, the system provides unique features that outdoes all competing systems with apparently similar functions.

Since 2012, Trelleborg has conducted numerous successful installations of the MtH system in the U.S. market alone. It was then time to launch this product in the European market. To demonstrate the capabilities and advantages of the MtH system, two pilot projects in Germany were planned.

The first pilot project was performed for the municipality of Rheinberg in North-Rhine-Westphalia in November 2012. For more details of this project, please refer to our "MtH Pilot Project I" case study report.

BENEFITS OF THE MTH SYSTEM

- Removes the need to enter a building to rehabilitate lateral connection pipes serving the building.
- The main/lateral connection can be located up to 150 m [approx. 492 ft] from the entry manhole.
- The rehabilitation length from the lateral connection in the main line down to the point of repair in the lateral can be up to 30 m [approx 98.5 ft].
- Simple installation method + short steam-curing time of the Mth Liner means that an experienced team, with proper preparation, can complete up to three connections per pipe section per working day.

THE LOCATION

The European Patent Office in Munich. The main building on the Isar is an architecturally impressive structure designed by the renowned architectural practice of Gerkan, Marg & Partners. Erected between 1975 and 1979 in Erhardstrasse, it is located amidst a lush network of green spaces, paved areas and outdoor art installations.

During a regular sewer inspection, leaks were detected in some of the house connection pipes surrounding the building in a star-shaped arrangement – cast iron pipes dating from the 1970s.

THE PROJECT

Seven out of the twelve lateral pipes were in need of repair, with each damaged section some 4 to 5 m in length. What the pipes had in common was that they were hardly accessible or not accessible at all. Neither was there sufficient room for installing any technical equipment as would have been necessary with most rehabilitation methods.

Excavation was not an option because the laterals were partially located beneath the building and embedded in concrete, and also because of the location's complex landscaping and outdoor art installations. The challenge, therefore, was to repair the lateral connection pipes without disturbing the cultural and natural environment of the location while keeping social disruptions to a strict minimum.

The contractor for this difficult relining project was Stingl GmbH – a company which has a respected reputation spaning more than a 100 years in South Germany and which specialises in heating, ventilation, sanitary and sewer technologies.

In 2012, at the IFAT* in Munich, Stingl took notice of the novel MtH system offered by Trelleborg Pipe Seals because sewer and pipe rehabilitation projects with no or almost no access to the damaged pipe section are actually quite a common problem faced by contractors such as themselves.

So the solution presented by Trelleborg was impressive in theory – but would it actually pass the test?

This project for the European Patent Office in Munich presented the right moment to test the system, which had already been successful for some time in America. Supported by Trelleborg's engineering team, the installation took place during the first two weeks in June 2013.

With permission from the Patent Office, the construction site was opened for one day in order to share the performance potential of this state-of-the-art technology with members of the sewer rehabilitation industry.

** International Trade Fair for Water, Sewage, Waste and Raw Materials Management*

THE TECHNICAL COMPONENTS

The MtH System features three basic packers for different main pipe diameters with correspondingly sized calibration hoses variants.

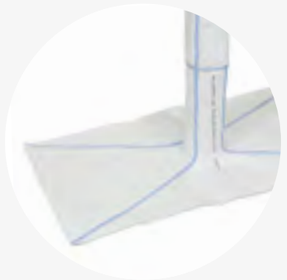
Each packer is equipped with wheelsets, both at the inversion end and at the steam swivel joint end, as well as a rotary drive and camera for positioning the packer. The wheelsets, which are adjustable to the given main pipe diameter, optimize the packer's center of gravity. This helps with the best movement and positioning of the packer within the main line.

A winch at the exit manhole pulls the packer along the main line to the lateral connection. The camera and the rotary drive then help with the exact positioning of the system within the main pipe, in front of the lateral connection, prior to the inversion of the MtH Liner.

The packer is also connected to the MtH Inversion Hose, which can be adjusted to accommodate the length of the MtH Liner, as well as the MtH Control Unit via the supply hose. This hose contains pneumatic and electric lines for operating the system.

The packer also features a hose connection port that allows it to be connected to the steam generator – the epros® SteamGen M 150 – which provides a steam-air mixture in accordance to the curing needs and technical parameters of the MtH system.

For this particular pilot project, the MtH Packer Type I for a main pipe diameter of DN 200 – DN 225 [8" – 9"] was used.



RESIN SYSTEM AND LINER

The specially developed epros® DrainMtH Liner consists of a pipe liner, matched to the diameter and length of the lateral pipe to be rehabilitated, and two flaps at the end, so that multiple main pipe diameters can be rehabilitated.

Produced in-house and in accordance to DIN IS0 9001 and 14001 standards, the MtH Liner is made out of polyester felt with a flexible PP coating on one side. The special structure of the felt ensures the product's excellent impregnation and installation qualities.

Complementing the MtH Liner is Trelleborg's epoxy resin system – the EPROPOX HC120 – which combines an exceptionally long working time (pot life) with a short curing time. Steam curing the MtH Liner takes only 45 minutes at 80 °C [176 °F].

The resin also features additional excellent processing properties – it is easy to mix, penetrates the liner felt well, and, after curing, results in good mechanical properties that meet the strict structural design requirements and standards of the German Institute for Building Technology (DIBt).

The Installation

The MtH Packer Type I for small pipe diameters was first carefully prepared for installation. The visitors watched with interest as final adjustments were made to the wheelsets and calibration hose.

The resin was then gently mixed, in the specified quantities, with a double stirrer to prevent air from being trapped in the resin. The blue-coloured two-component epoxy resin system EPROPOX HC120 was selected because of its rapid steam cure time and its ample pot time of two hours at 25° C [77 °F].

This ample pot time made the installation convenient for the crew, despite the hot June temperatures in Munich on that day. There even was enough time left to answer questions posed by the attending experts from the sewer rehab industry!

The installation crew from Stingl then impregnated the MtH Liner with the resin – a process that amazed the gathered parties because of how easy and quick it was to impregnate the liner, thanks to the perfectly match between the resin's viscosity and the liner.

The EPROPOX HC120 Resin System offers excellent impregnation qualities

All system components of the MtH system are designed to pass through a standard manhole cover of 600 mm [approx. 23.6”] in diameter. The packer, for example, features an articulated joint which can be locked/unlocked at the press of a button. This ensures the smooth introduction of the packer into the main pipe even under confined conditions.

The epros® LinerEndCap – which had been previously glued to the liner – was then closed and attached with a steam outlet valve. The prepared liner was then pulled into the MtH Packer and extended into the inversion hose. The two liner flaps for the main pipe were cut to size and wrapped around the packer.

The packer, together with the inversion hose and the impregnated liner, was then lowered into the entry manhole and inserted into the main pipe.

THE EPROS® LINER END CAP

The epros® LinerEndCap makes it possible to install an open-ended liner in the same way as a closed-ended liner without the use of an additional calibration hose. The LinerEndCap is removed after the curing process at the end of the job. The pipe with the newly installed liner is thus open, with no need for cutting.

CONDENSATION DRAINAGE

With all steam-curing systems, it is important to ensure the constant drainage of condensation. This can be done through the outlet valve in the epros® DrainMtH Packer. This guarantees a perfect cure.

Using a winch located at the exit manhole, the packer was pulled slightly beyond the lateral connection and rotated, with the help of the control unit and camera, until the packer basket was aligned with the lateral connection.

The packer basket was then lifted until it touched the pipe wall.

The packer was then gently pulled back until the packer basket locked into place in the lateral connection pipe. This locking-into-place was verified remotely using the camera and manually using the push rods. The system operator also used the camera to ensure that the packer basket was now centred in the lateral pipe. This makes sure the MtH Liner will fit perfectly into the lateral upon inversion and can be inverted under low pressure.

The calibration hose was then filled with compressed air until the flaps of the MtH Liner were pressed against the main pipe. The system operator could then start inverting the liner. He or she could also monitor the progress of inversion and, when necessary, intervene by raising or lowering the air pressure.

Once the liner was fully inverted and pressed firmly against the pipe wall, a mixture of steam and air was applied until the internal temperature of the compound reached 80 °C [176 °F]. The curing time of 45 min could now begin. The curing pressure was required to be kept constant during this process.

For quality monitoring, the temperature of the steam/air mixture and the curing pressure were measured and recorded throughout the entire installation.

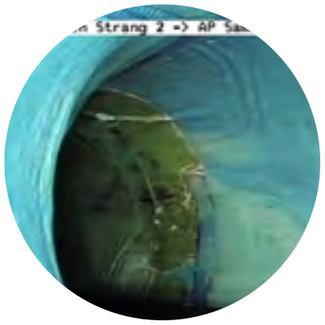
At the end of the curing process, the epros® LinerEndCap was pulled out using a guiding rope. A vacuum was then applied to fully deflate the calibration hose, upon which the packer could be removed from the pipe.

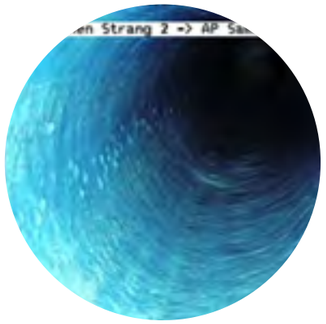
For this pilot project, the epros® DrainSteamGen Type M150 steam generator, which is appropriate for curing liners with nominal sizes between DN 100 and DN 300 [4” and 12”], was used.

The Results

A CCTV-inspection conducted after installation the showed that the liner had been installed excellently – without wrinkles and correctly positioned within the lateral connection.

The aim of rehabilitating the lateral connection pipe and sealing the connection, quickly and in a single step, was thus achieved.





PRODUCTIVITY & EFFICIENCY

The first advantage of the MtH system – when compared to other systems – is its cost-effectiveness: it is able to achieve an excellent end-product while improving productivity.

The simple method of installation plus the short steam-curing time of the Mth Liner means that a properly trained team, with proper preparation, can complete up to three connections per pipe section per working day. The length of the liner to be installed is not critical and does not have a major impact on the time required for installation. The quality of the installation is not compromised.

The second crucial advantage of the MtH system is that it is able to rehabilitate lateral pipes and connect these laterals to the main sewer pipe in one homogenous operation. This means that the connection is rehabilitated as well – thus creating a perfect seal and totally eliminating the risk of infiltration/exfiltration at the connection.

The MtH system also uses standardised liners, which helps cut costs in projects that involve a dense network of laterals. The MtH Liner can be cut to the required length of the lateral connection pipe as well as customised to the diameter of the main pipe by cutting the liner flaps to size. The wheelsets of the MtH Packer, as well, can be quickly adjusted to different pipe diameters.

FEEDBACK FROM EXPERTS ON-SITE

“For decades, there has been a search for rehabilitation systems that are able to work from the main pipe. Systems that would allow municipalities to finish their rehabilitation work at the boundary of the private property. And today, here, I’ve finally seen a relining technique that is very quick and provides good control, in terms of preparing the liner, setting up the packer and fitting it into the main pipe,” said **Dipl.-Ing. Gerhard Michel, engineer from PKT Rohrfrei GmbH in Paderborn,** who added: “We are very interested in this system and will certainly use it in the near future.”

Ralf Nölscher, Managing Director of R+M Umweltservice in Sindelfingen is also convinced: “The system makes a very good impression; after many years of trying and testing you can say it is mature. You see here the installation goes rather smoothly -- and this is something very important for the crew on site.”

Thomas Bittermann, Sewer Rehabilitation Manager with Stingl, and Benjamin Schwarz, his project manager, are happy with the success of the operation, which has met their expectations thus far: “The system was offered to us to fulfil the complex customer requirements and actually met the high expectations of all parties involved. So we were able to pioneer this technology in South Germany and gain valuable experience in the application of the MtH system. In the future, that can help us to use this system in the market to generate benefits in the CIPP business as an advantage over many competitors.”

CONCLUSION

The MtH method is a state-of-the-art solution – technically convincing and especially interesting for municipalities, consulting engineers, and large-size sewer rehabilitation companies with a large number of potential customers in the public sector.

For municipalities, it is a solution that requires fewer points of contact with property owners and, thus, can be described as a resident-friendly and administratively convenient alternative to conventional methods.

For engineers, it offers a technical solution that resolves problems faced in the past (i.e., inaccessible pipe sections).

For sewer rehabilitation specialists, the MtH system offers a unique selling proposition in terms of an innovative technical solution that leaves almost nothing to be desired during practical application.

CREDITS

Trelleborg would like to thank its contacts at the European Patent Office in Munich, Stingl GmbH, PKT and R+M, as well as the camera team of mediaBOX TV and all other parties involved for their kind support and assistance in the documentation of this project and the production of the accompanying film.

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TRELLEBORG

Trelleborg is a world leader in engineered polymer solutions that seal, damp and protect critical applications in demanding environments. Our innovative engineered solutions accelerate performance for customers in a sustainable way. The Trelleborg Group has local presence in over 40 countries around the world.
Trelleborg Pipe Seals is a world leading supplier of new and rehabilitation sealing solutions for concrete and plastic pipes and manholes used for water, sewerage and drainage.
We deliver continuous innovation to customers across the globe, with a logistics and sales network. Comprising the most advanced polymer technology, our high performance seals ensure fulfillment of the highest possible reliability standards.

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