

Trenchless Technology for watermain renewal



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The increasing application of Trenchless Technology to watermain rehabilitation has been a stand-out feature of the Australian industry over the past twelve months.

MAJOR WATER AUTHORITIES in Victoria, New South Wales and Queensland have issued multi-year term contracts for renewing watermains by a range of technologies that minimise the need for excavation and can be completed with minimal community disruption.

This increasing demand can be attributed to new technologies becoming available and more widely accepted, and the availability of major pipeline rehabilitation contractors.

A prime example is Interflow; since incorporating Infratec into the company, the group has been successful in obtaining term contracts for watermain rehabilitation across Australia. While Interflow has been one of the Australian pioneers of trenchless sewer renewal over the past 20 years, introducing numerous world leading developments, the company is now experiencing a rapid growth in demand for its watermain rehabilitation services.

Interflow is leveraging Infratec's experience to meet the requirements of these major contracts. Infratec is now fully incorporated into Interflow.

Typically a term watermain rehabilitation contract requires the contractor to have a range of technologies available, including pipebursting, sliplining, directional drilling and open-cut pipe replacement. The contractor should have expertise in the installation of line stopping devices to minimise the length of main affected, installation of fittings, connection of property services, chlorination and pressure testing. To minimise community service interruptions the provision of temporary water supply services is always specified.

A major watermain rehabilitation contract will require experienced engineers to carry out the design work. Design will typically require investigation of existing services, design for construction, including the efficient location of fittings and the provision of



Interflow crews inside a newly rehabilitated pipe.

construction drawings. The design stage is when the appropriate technologies to complete the works are chosen. Trenchless techniques are preferred.

Design and planning for the project also has to consider safety aspects, traffic management and community issues.

A typical project carried out by Interflow will aim to maximise the use of pipebursting. Pipebursting requires the excavation of launch and winch pits, as well as excavation to reconnect each lateral service, but avoids the need to excavate continuous trenches, usually in built up business or residential areas.

Pipebursting provides a new polyethylene pipeline, with successive lengths butt welded together. The process allows the existing pipeline, typically cast-iron, to be replaced with either the same size polyethylene pipeline or upsized to a larger diameter. Lateral service connections are usually made with electrofusion welded polyethylene fittings.

An important feature of trenchless watermain rehabilitation design is minimising disruption to water authority customers. This is done by:

- Minimising the number of residents and businesses affected
- Providing temporary water supply while the main is off-line.

Work on a watermain requires emptying it and removing it from service. To minimise the length of watermain taken out of service, and hence the number of consumers affected, Interflow uses its patented Infrastop line stopping device.

The Infrastop is installed immediately upstream of the section of main where the work is to be carried out, stopping flow to the affected section and allowing it to be drained. It can also be installed immediately downstream of the works if necessary. This ensures that only the minimum length of watermain is isolated. The Infrastop requires a small excavation and can be installed and operating within 90 minutes without interrupting supply to consumers upstream.



The Titeflow system.

Approximately 10,000 Infrastops have been installed since their introduction by Infratec, and they have been a factor in increasing the feasibility of Trenchless Technology for watermain rehabilitation.

In conjunction with Infrastop installation, consumers along the route of the section of pipeline to be renewed are connected to a temporary water supply system. This involves configuration of 25 mm or 32 mm above ground polyethylene pipework from the main upstream with connections to each consumer.

Care must be taken to ensure the above ground pipework does not compromise safety and so involves the consideration of pipe routing and the installation of protective measures to avoid trip hazards.

Another safety issue arises because the black polyethylene pipework is often exposed to full sun. This means that the temperature of the water stored in the pipework can reach a level that could cause injury to a consumer turning on a tap in their residence.

To alleviate this danger, Interflow installs a temperature control box that activates replacement of the water in the above ground pipework when it reaches a pre-determined temperature.

NEW DEVELOPMENTS

The increasing demand for trenchless solutions for watermain rehabilitation means that Australia is likely to see new technologies, whether developed in Australia or overseas, being introduced.

New technologies Interflow currently has available include:

JD7 Watermain Inspection: A range of systems is available to provide up-to-date analysis of underground water networks with minimal or no excavation or service interruption.

The JD7 uses revolutionary camera and sensory equipment to determine the condition of the watermain.

Typically JD7 investigation equipment can be introduced to the watermain through a non-spring hydrant or gate valve. The watermain can continue to operate at its normal pressure during the investigation.

All systems include high resolution CCTV inspection and recording.

When only leak detection is required, the JD7 system uses an on-board hydrophone, and can operate up to a distance of 1,000 m between insertion and retrieval points.

More advanced models couple the hi-resolution CCTV with internal ultrasound probes to produce a full dimensional survey in pipelines. Suitable for all types of pipe materials, wall thicknesses and corrosion depths can be determined and the precise types and locations of flaws identified.

The technology can distinguish between the thickness of a cement lining and the thickness of the metal pipe wall, allowing accurate estimation of the remaining life of the pipe. This advanced model has a range of 100 m upstream or downstream of the insertion point.

These systems can locate every service and identify exactly where work needs to be carried out. With the capability to investigate live mains, there is no disruption to water supply and less water is wasted.

Compact Pipe: Compact Pipe is a close-fit, fully structural polyethylene liner that can restore the pressure carrying capacity of a water, sewer or gas pressure main. Supplied by Wavin (Netherlands-head office), Compact Pipe is factory extruded as a circular polyethylene pressure pipe then folded into a C-shape, so reducing its cross section. Compact Pipe is inserted into the deteriorated pipeline and the folding process reversed using steam.

Compact pipe provides a structurally independent pipe with the quality and durability of a newly installed pipe. It is available for diameters from 100-500 mm, and depending on diameter and pipeline configuration can be installed along continuous lengths of up to 900 m.

Titeflow: Interflow's Titeflow provides a die-reduction polyethylene tight fit liner that restores the pressure and flow carrying capacity of a deteriorated pressure pipeline. It is suitable for high pressure and large diameter watermains, and can be installed over long lengths for diameters from 75-1,000 mm.

The Titeflow process takes standard polyethylene pipes and temporarily deforms them to allow installation. Once in place the pipes are reverted to their original diameter, this allows a wide range

of diameter and pressure classes to be installed.

Once started, the process of installation is smooth and continuous until the liner is positioned in the host pipe between the launch and winch points.

Tight fitting polyethylene compression fit liners installed by similar methodologies have been providing reliably renewing leaking and defective water, gas and sewer pressure mains around the world for over a decade.

Interflow is currently completing a project with Titeflow to renew over 5 km of 115-year-old steel watermain. PN16 polyethylene pipe with a nominal external diameter of 560 mm is being drawn through the Titeflow diameter-reducing dies and into the host pipe.

The 20 m long individual lengths of polyethylene pipe are first welded into continuous lengths before being drawn into the pipeline.

Titeflow installation requires excavation of entry and exit (winch) pits at the extremities of each continuous lengths being installed.

The location of these pits is determined by the requirement to minimise community disruption and they are sited where excavation is most convenient. The ability for Titeline to be installed over long continuous winching lengths means that distances between entry and exit pits of over 600 m have been possible.

The distance between pits can also be governed by discontinuities in the pipeline such as bends or the location of valves or other fittings. The benefits this offers over replacement of the watermain by continuous trenching are obvious.

Trenchless Technology for renewing of deteriorated sewers has been accepted by water authorities in Australia for the past 20 years. By minimising the need for excavation, and working at times that cause minimal traffic disruption, this project is a demonstration of the benefits that Trenchless Technology can bring to watermain rehabilitation.

CONCLUSION

Interflow is committed to driving the watermain renewal industry forward such that the traditional dig and replace methods are displaced by trenchless techniques. By developing and bringing to the market cost-effective and innovative technologies and methods, Interflow aims to duplicate its track record of success achieved in trenchless sewer pipe renewals.

To find out more about Interflow's watermain and sewer renewal solutions please visit booth 30 at No-Dig Down Under 2013.