SASTT reports back from *Washington DC*

Attending the annual International Society of Trenchless Technology (ISTT) No-Dig conference and exhibition in Washington, DC earlier this year, courtesy of the Southern African Society for Trenchless Technology (SASTT), yielded incredible value for the local trenchless sector. **By Alaster Goyns**

As No-Dig 2018 is to be hosted by SASTT, two SASTT board members attended No-Dig 2017 to get a feel for how these events are organised. The scale of the American event, hosted by the American Society for Trenchless Technology (NASTT), was enormous, with nearly 2 300 delegates, 160 lectures, six concurrent streams and 190 exhibitors.

Most new developments presented at the conference were actually refinements of existing techniques, with many of these being the adaptation of systems originally used for gravity applications to suit pressure systems, with particular emphasis on smaller-diameter pipes.

Unlike South Africa, where it is just contractors that focus on trenchless technology (TT), there were also consultants focusing their efforts in the field of TT at the American event.

There appeared to be a more flexible approach in choosing the technique to be used on a particular project and, at times, more than one technique would be used as the conditions along a project changed.

In South Africa, TT is most frequently used when an asset has seriously deteriorated, although this appears not to be the case for a number of other countries, where rehabilitation is carried out sooner.

NASTT's slogan is 'Educate Train Research Publish', and this event made it clear that a concerted effort has been made to put this into practice.

Urban services

Global population growth, especially in cities, and the provision of new and the upgrading of existing underground utility services, primarily for water supply and wastewater disposal, is an international problem.

It is increasingly difficult, and sometimes impossible, to use conventional open-trench techniques. The development of TT for installing new and rehabilitating buried pipelines has significantly reduced the social, commercial and environmental impacts of trenching.

A wide range of techniques is available for installing and rehabilitating services from less than 100 mm to in excess of 10 m in diameter and the various ancillary functions needed to support these techniques.

The difference between TT and other subsurface construction techniques depends upon the size of the passage under construction. Large-diameter tunnels, such as those constructed by tunnel-boring machines and drilling and

TRENCHLESS TECHNIQUES

Trenchless techniques can be broadly grouped as:

- renovation and repair, which consists of the restoration of defective pipelines and other underground structures
- on-line replacement of existing pipelines, which consists of the breaking or pulling-out of existing pipelines and simultaneously installing new ones
- installation of new buried pipelines where digging trenches is difficult or impossible
- several supporting activities essential for the success of any trenchless activity, such as inspecting pipeline and site conditions.

blasting techniques, are larger versions of subsurface construction and major tunnel projects of this nature are infrequent for most cities.

In South Africa, the urban population is growing at about 2.5% per year. This is compounded by the deterioration of ageing water services and the backlog in providing new services. As a result, it is essential to look at how these problems have been addressed elsewhere and how solutions can be adapted to local conditions. The interest in TT started in the western world in the early 1980s, and in 1986, the ISTT was established. The SASTT was established in 1992, and in 1994, it was one of the first societies to become affiliated with the ISTT.

Notably, the NASTT was founded two years before the SASTT and the Australasian Society for Trenchless Technology formed a year later. These have both made great strides in adopting and adapting the technologies developed in Europe and, in certain fields, have become the world leaders.

South Africa has not kept pace with these developments. Although most of the techniques have been used in South Africa, the potential for using these and extending their application has not been realised.

There are several reasons for this, including a lack of uptake from decision-makers and a lack of education, training and certification structures for practitioners.

The NASTT has been proactive in addressing similar issues through several measures, including the publication of 'good practice' manuals and training courses, free TT webinars, funded and co-funded research, ASTM standards and TT chapters at no less than 18 universities.

It would certainly be a challenge for the SASTT to try to emulate what has been done by the NASTT but, conceptually, there is a lot that could be done in adopting and adapting the ideas.

CIPP curing with ultraviolet light

2017 conference and exhibition

Full papers from No-Dig 2017 could be downloaded from the ISTT website. This meant that, to benefit from attending a particular presentation, it was necessary to download the paper and study it.

It was clear from attending these presentations that more effort was put into assessing the condition of services and designing their rehabilitation than is taken in South Africa. Although the techniques and materials on display at the exhibition stands showed that there were many refinements, there was little that was

Horizontal directional drilling

radically new. However, there were developments in the equipment used for the inspection and condition assessment of services. Of particular significance was the development of multisensor equipment, which could determine whether there were cavities in the soil around a pipeline and the thickness of the pipe wall.

Techniques and materials

There are several requirements to meet for any buried services. For water services, these are hydraulic capacity, water tightness, strength and durability. The techniques and materials used need to be selected based on the intended use, surface constraints and subsurface conditions.

These also depend on whether the project is a new service installation or a rehabilitation project. Rehabilitation involves the improvement or restoration of an existing utility to enhance its performance and extends its service life. It can be performed on a whole pipeline or a short section, depending on what is needed.

Trenchless techniques involve pushing, pulling, expanding or a combination of these to place a product pipe or lining into its final location. How this is done will determine what pipe or lining material to use. For pushing, rigid pipe material with high compressive strength is used. Typically, concrete or clay pipe would be used for pipe-jacking or microtunnelling.

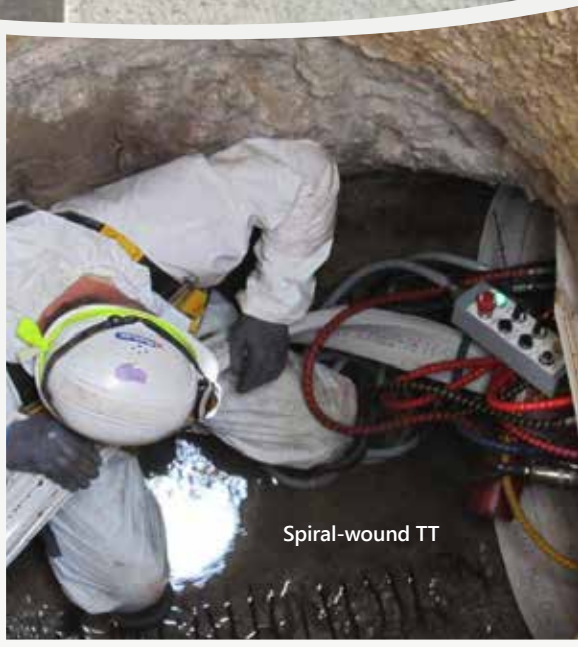
For pulling, flexible pipe material with a relatively high tensile strength is used. Typically, HDPE would be used for sliplining, on-line replacement and directional drilling. HDPE pipes have the flexibility to allow for tighter radius bends and, therefore, shorter access pits than other materials such as fusible PVC or steel.

HDPE pipe has an advantage in that it can be fusion-welded into a continuous length with a constant outside diameter and then pulled into place. This is a particular advantage when used for directional drilling where lengths in excess of a 1 000 m are sometimes installed.

These techniques can be used for both pressure and non-pressure systems.

For expanding a pipe into place, a material that is initially soft or deformed is used. It can be inserted into the host pipe before being pushed outwards to conform to the host pipe shape and then being cured or expanded to form a tight-fitting lining.

There are several ways that this can be achieved, each requiring different materials. The most commonly used is the cured-in-place pipe (CIPP), where a fabric tube is impregnated with a polyester, epoxy or other type of resin, which is inserted into a pipeline, inflated against the pipe wall and then cured. As these thermosets have higher strengths than thermoplastics, thinner wall sections are used and it is usually possible to rehabilitate a pipeline without compromising its hydraulic capacity.



Spiral-wound TT

CIPP is increasingly being used for pressure systems.

Techniques have been developed to form a liner inside an existing pipe by spirally winding a profiled PVC or HDPE

SASTT Executive Committee members Sam Efrat (left) and Alaster Goyns at No-Dig 2018 in Washington

strip that interlocks with the adjacent strip to form a pipe that spirals along the pipeline. The winding machine can be in a fixed location or travel through the host pipe as the pipe within the pipe is formed. These systems are only used for gravity systems. When the machine moves through the pipe, host pipes in excess of 2 m can be renovated. There are various other ways that a liner can be deliberately deformed before inserting it into a host pipe and then allowing it to revert to its original shape and fitting tightly inside the host pipe.

Available literature

This is where NASTT really shows commitment to its slogan. However, the ASTM standards for TT are written compactly with little explanation. It takes some time to understand them and put them into practice. The publications available for purchase at the conference gave comprehensive explanations of both the practice and theory that were far more reader-friendly than the ASTM's. Those purchased and which will be used to transfer knowledge to South Africa were:

- NASTT'S CIPP good practices guidelines
- NASTT'S pipe-bursting good practices guidelines
- NASTT'S laterals good practices guidelines
- NASTT'S horizontal directional drilling good practices guidelines.

Conclusion

The real benefit of attending a conference of this sort was going through the notes taken, getting in touch with the contacts made through the networking, and studying the publications purchased. The latter will be particularly valuable in disseminating useful information about TT in South Africa.

For a full list of references, please contact Alaster Goyns, one of South Africa's foremost experts on TT installation techniques, by email on alaster.goyns@mweb.co.za. 3S