Trenchless technology builds capacity

In October, subject experts from around the world came together in Cape Town for International No-Dig South Africa. Hosted by the Southern African Society for Trenchless Technology (SASTT), No-Dig 2018 saw the conference's African debut. The opening paper expanded on the integral role that trenchless techniques play in socio-economic development. By Alastair Currie

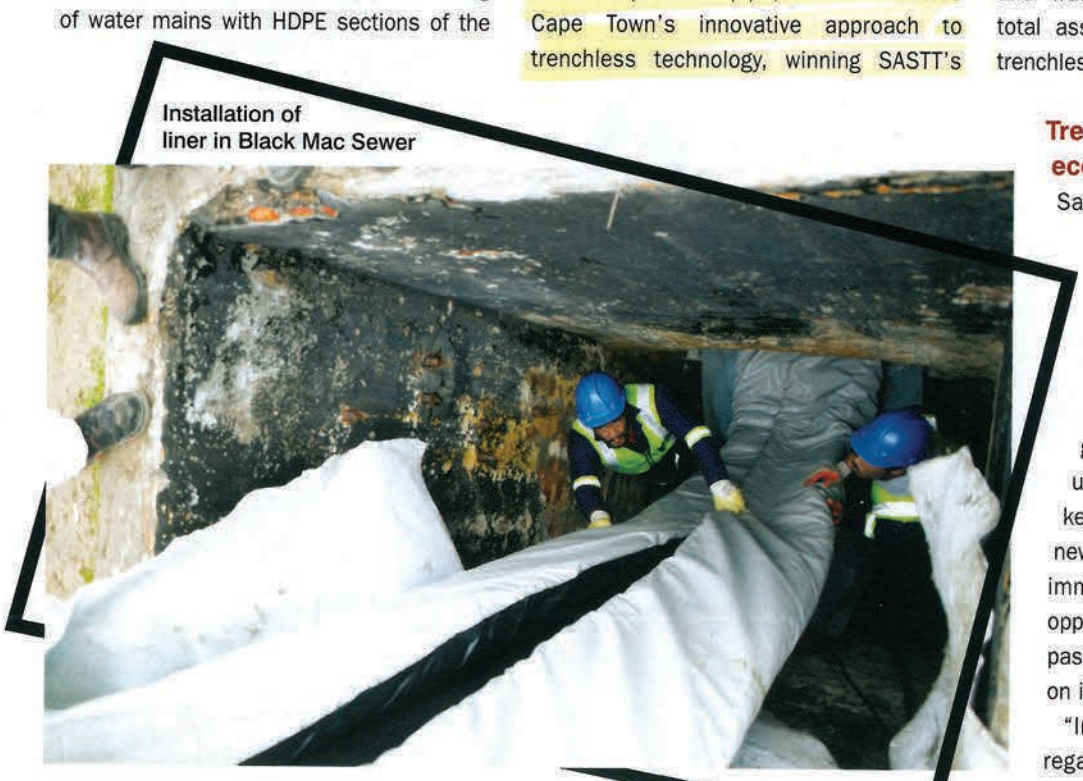
Speaking at the opening of No-Dig 2018, Deputy Mayor of Cape Town Ian Neilson said that, as a former consulting engineer specialising in water engineering, he has always taken a keen interest in the latest technologies and services for the construction and maintenance of infrastructure.

"I am encouraged by the possibility of applying some of the technologies presented at this conference in addressing key challenges we face as a rapidly expanding city," he said. "As the urbanisation trend grows, it is critical that we provide sustainable services."

The city adopted the use of trenchless technology as early as the mid-1990s for the upgrading of its sewer and water networks. During that initial period, the technology available was mostly based on slip-lining of existing sewers with smaller-diameter HDPE pipes, and pipe cracking of water mains with HDPE sections of the same or slightly larger diameter. Since then, Neilson said that the technology has increased substantially and the city is now making use of techniques like horizontal directional drilling, cured-in-place pipe lining, and piperamming used in combination with pipe cracking.

A pipeline project completed by the city using microtunnelling technology was the longest installation of its kind in Africa south of the Sahara. This entailed the installation of a 1.2 km long, 1 000 mm diameter pressure pipe, and underscores Cape Town's innovative approach to trenchless technology, winning SASTT's Joop van Wamelen Award of Excellence in 2017.

"Trenchless techniques ensure minimal disruption to supporting communities and have proven to be a cost-effective alternative to conventional construction for large-scale project roll-outs in congested urban areas," said Neilson. The city is planning to replace around 50 km of sewer and water networks in the current financial year. In the longer-term, the city ultimately plans to replace the entire sewer and water network, which comprises a total asset length of 20 000 km, using trenchless technology.



Installation of liner in Black Mac Sewer

Trenchless technology as an economic catalyst

Sam Efrat, president, SASTT, introduced keynote speaker Neil van Rooyen, a SASTT board member and director at Chrysalis Projects, based in Cape Town, who delivered a paper entitled 'Unlocking economic growth in South Africa through the use of trenchless technology'. A key theme was the need to create new SME contractors, as well as immediate direct employment opportunities, while at the same time passing on multimillion-rand savings on infrastructure investments.

"Innovation has always been regarded as the forerunner to economic growth so it's no coincidence that of the top ten trenchless societies worldwide, seven belong to countries with the highest ranked GDP outputs. These comprise Canada, China, France, Italy, Japan, the UK and the USA," said Van Rooyen.

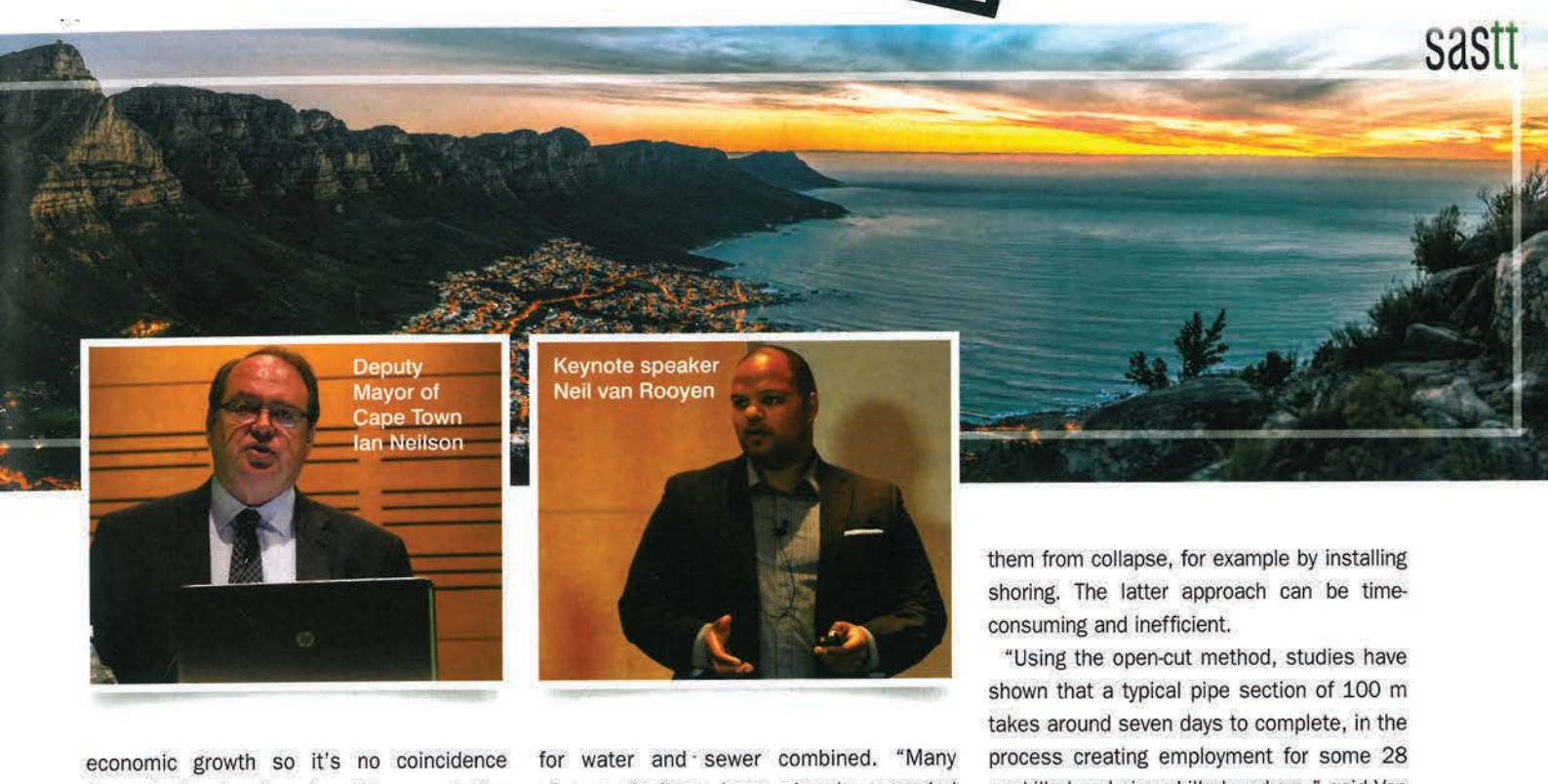
"These economies are able to grow because of their investment in infrastructure. They are also among the oldest, which means that they have the greatest need for pipe replacement."

Within the South African context, a sharp contraction in GDP and a drop in business confidence levels have impacted on domestic and foreign investment inflows, increased unemployment levels to around 27%, and caused a backlog in infrastructure delivery, which poses a major risk to macroeconomic growth. This places an even greater emphasis on the need to develop creative solutions that drive down costs and accelerate construction projects.

South Africa's current network comprises around 197 000 km of reticulation pipeline for water and sewer combined. "Many of our pipelines have already exceeded their lifespan, resulting in failures and an ensuing impact on health and well-being. The problem is being compounded by the inflow of rural job seekers to urban centres. That places further pressure on the existing infrastructure, which is struggling to keep pace with current demand. So are we hanging on a ledge, or can we change the way we tackle the problem?" Van Rooyen continued. "As SASTT, we believe trenchless technology is a major part of the solution."

Van Rooyen said an important starting point was to dispel misconceptions about trenchless technology as a potential competitor to open-cut techniques, which some regard as being more conducive to labour-intensive techniques, and thus job creation. "However, as with the case for trenchless applications, mechanical excavation techniques perform the bulk of the work on open-trench projects. Plus open-cut trenches must comply with strict health and safety regulations to protect them from collapse, for example by installing shoring. The latter approach can be time-consuming and inefficient.

"Using the open-cut method, studies have shown that a typical pipe section of 100 m takes around seven days to complete, in the process creating employment for some 28 unskilled and nine skilled workers," said Van Rooyen. "For the same project, the timeframe would be similar for a trenchless application and require the same number of personnel. The key difference is that the number of skilled workers is much higher. Creating jobs for skilled workers translates into higher wages, and other career opportunities in the construction sector."



Deputy Mayor of Cape Town Ian Neilson

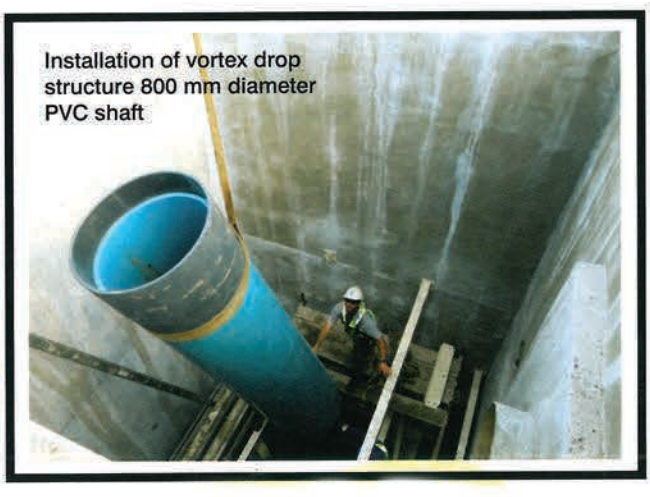
Keynote speaker Neil van Rooyen

Case studies

On a recent project in Gauteng, a comparative and parallel study was undertaken to evaluate the economic advantages of trenchless technology versus open-cut. The project value was approximately R1 million in each case and entailed the installation of a 160 mm diameter HDPE sewer pipeline. Around 1 000 m of pipeline was laid using open-trench methods, compared to some 1 300 m using trenchless techniques.

In another project example, a comparison was made between open-cut with and

The jacking frame within the jacking shaft



Installation of vortex drop structure 800 mm diameter PVC shaft

Photos by Terry February