Rehab record for Interflow

Interflow, an Australian pipeline renewal contractor, recently installed the world's longest and largest continuous spirally wound pipe liner from a fixed winding machine as part of a sewer rehabilitation project in Sydney.

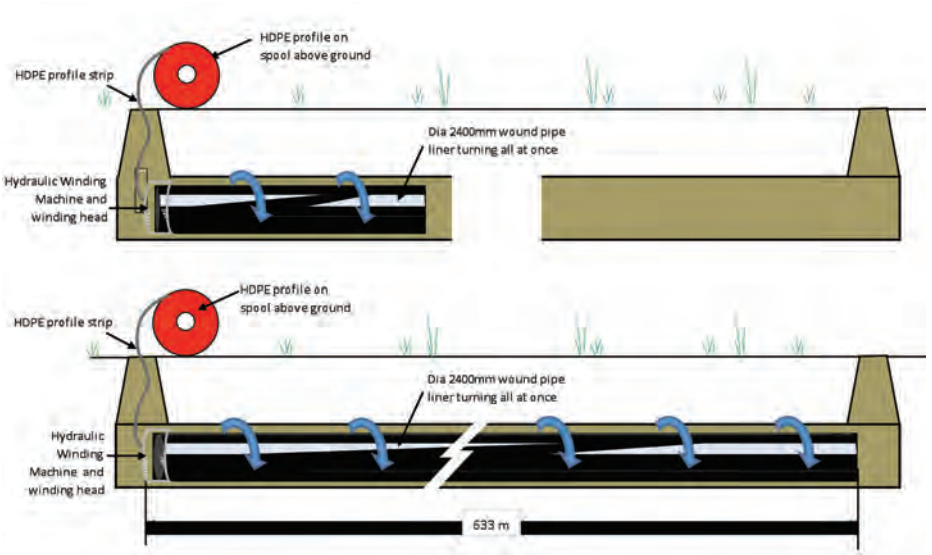
The pipe liner was 633 metres long, the equivalent of more than six football fields in length, 2.4 metres in diameter, and weighed almost 100 tonnes.

The previous record for the longest continuous spirally wound pipe liner installed from a stationary winding machine was 340 metres of an 800 mm diameter pipe liner.

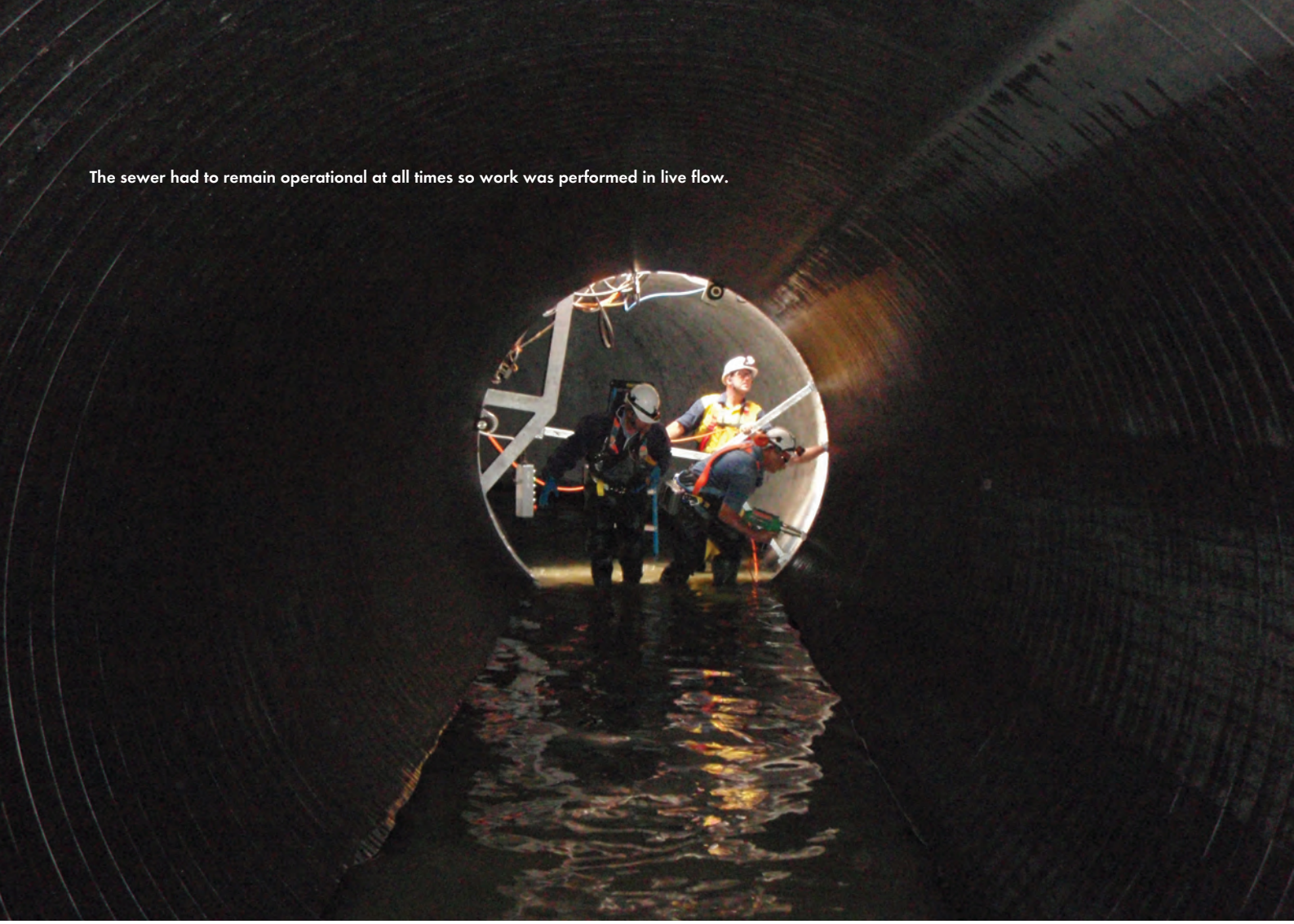
The installation method used by Interflow involved producing an in-situ pipe by spirally winding a composite plastic strip at a fixed diameter within the host pipe.

The pipe liner was formed by feeding a profiled composite strip into a hydraulically powered winding machine positioned inside the existing access chamber. Adjacent profile strips were extrusion welded together inside the winding machine to form a high strength, water tight pipe. As more strip was fed into the machine the newly formed pipe corkscrewed its way to the upstream access chamber. The total length of 633 metres was achieved over a period of several weeks.

Spirally winding pipes and pipe liners is not a new method. Various systems and techniques have existed for decades. Up until this point the practical limitation for the maximum length and size of pipe that could be produced was governed by the torque of the winding machine and its ability to overcome the frictional forces of the newly wound pipe as it rotated inside the host pipe. In the last few years, Interflow has perfected a technique for reducing the frictional forces by floating the newly formed pipe while being wound. In doing this Interflow is able to use the flow inside the pipe to its benefit and obtain the added bonus of not needing to bypass the sewer in the act of renewal. Interflow's technique



The installation method, as more profile is fed into the winding machine the pipe travels towards the downstream access chamber. By the time it reached its destination 100 tonnes of pipe was all turning at once.



The sewer had to remain operational at all times so work was performed in live flow.

involves controlling the water levels inside and outside the liner to achieve optimum buoyancy. In performing this work, there was no indication that 633 metres was the limit of the technology. Based on the performance of the machine and the torque readings, Interflow has its sights firmly set on breaking through the one kilometre barrier in the future.

This record installation by Interflow is a significant innovation for the trenchless sewer renewal industry not only because of the feat itself but also for the fact that it has opened up the potential for creating very long pipelines from a single location, whether it be for pipe relining, tunnel boring or another similar application. Interflow has plans to build on this platform and explore further opportunities.

In this particular project, installing a pipe liner at this diameter and this length was essential because the distance between successive access chambers was uncharacteristically long. In a sense, there were few other options available to reline the pipe, demonstrating once more that the Trenchless Technology industry continues to respond to the ever increasing challenges that asset owners put to the market.

The Project

The North Georges River Submain (NGRS) is a 2.515 metre diameter concrete sewer that runs from the Sydney suburbs of Landsdowne in the West to Arncliffe in the East. It was constructed in the 1950s and in some parts was gas attacked and in need of rehabilitation. The major challenges for Interflow were firstly to provide a structural pipe liner at such a large diameter and secondly to install the liner from existing access chambers and in continuous lengths between access chambers.

In the trenchless sewer rehabilitation market, where the majority of pipe diameters are less than 1 metre, the most commonly used pipe products are made from plastic or resins. At these diameters plastic can provide a cost effective pipe, stiff enough to resist the applied loads. However, as pipe sizes increase beyond 1 metre in diameter, the range of plastic products that can provide a pipe stiff enough to resist the applied loads diminishes, making it increasingly difficult to provide a practical and cost effective liner.

Interflow's product of choice for these large diameter projects is Ribline™, a unique steel reinforced spirally wound high density polyethylene liner. Ribline was developed by Rib Loc in 2005. A major advantage of Ribline is that the composite action between the steel and the plastic produces a pipe liner with a high strength to weight ratio and gives both the strength of steel and durability of polyethylene. For this application, the Ribline pipe liner was designed to the required stiffness by using a specific size of steel reinforcement inside the plastic ribs of the profile that form the liner. This allowed Interflow to offer its client a strong pipe with a minimum loss of cross sectional area. In fact, the hydraulic performance of the lined pipe is actually enhanced as a result of relining.

To put the strength to weight ratio of Ribline into perspective, a 1 metre long section of liner at 2.4 metres in diameter weighed only 150 kilograms. An equivalent concrete jacking pipe of the same diameter and the same strength would have weighed almost 3,000 kilograms!

The steps involved in renewing the pipe include the following. Firstly the existing pipe was cleaned, with all the debris and silt removed. The next step was to set up the Ribline installation equipment at the downstream access chamber. From here, the profile strip was fed from spools above ground into the Ribline winding machine stationed in the access chamber below. Controlled from above ground,