



The pipes were pulled into place using a winch truck and a hydraulic ram.



Sami Niemi preparing the relining pipe.



The new pipes were inserted into the old ones in three stages. Each individual pipe had a length of 18 metres.

The great relining of Tervasaari

A tricky sliplining job was carried out at the UPM Tervasaari mill in Valkeakoski, Finland, in June–July 2005. A 710-millimetre polypropylene pipe was inserted into an existing 900-millimetre pipe for its entire 600-metre length.

The Tervasaari pulp and paper mill has a single large-diameter pipe taking most of its wastewater to a biological treatment plant. The pipe carries the process water produced by three paper machines and three pulp lines plus all other wastewater generated by the mill, so it is vital that it functions smoothly. If the pipe is out of order, the mill will shut down.

“The temperature of the wastewater running in the pipe is between 40 and 50 degrees but it may sometimes be higher,” explains Tero Lahtinen, maintenance engineer at UPM, who worked as the manager for the relining project. “There is considerable variation in the flow inside the pipe and it can occasionally reach 500–600 litres per second.”

The old pipe, made of glass-fibre-type material was already in poor shape and in fact it had ruptured twice in spring 2005 resulting in small amounts of wastewater ending up in the surrounding lakes. Before that there had been ruptures in 1997 and 2001.

As Pauli Lepo, maintenance engineer at UPM, points out, “We had a lucky escape as the leaks only caused minor damage. The pipe, installed in 1982, was built for lower pressures and temperatures, and changing usage over the past two decades also caused the temperature inside the pipe to rise. Besides, the infill in the foundations was not solid enough.”

The management at the Tervasaari mill were well aware of the poor condition of the pipe and design work on the replacement began in the summer of 2004. Be-

fore the year was out, UPM had made the necessary investment decision, followed by the selection of KWH Pipe as the supplier.

As Tero Lahtinen says: “UPM had a number of piping options to choose from. Several alternatives and rehabilitation methods were considered but in the end it was decided to insert a plastic pipe inside the old pipe. This meant less excavation and saved time. The material can also withstand the temperatures arising inside the pipe and the impact of the chemicals flowing in it. Price was also a major factor.”

According to Pauli Lepo, there were two main reasons for choosing the pipes offered by KWH Pipe: quick delivery and the fact that in the KWH Pipe option the traffic in the mill area could continue during the installation work. The option chosen allowed UPM to keep downtime to a minimum.

NUMBER OF CABLES A SURPRISE

Relining work started in week 25.

According to Tero Lahtinen, the stop-

page in the Finnish paper industry meant that work could start earlier than envisaged even though, at the time, the contractor did not have the whole of the work force required. Although involving a number of challenges, the project was completed on schedule.

The problem spots in the old pipeline were surveyed in advance using a camera, and a few sections requiring repairs were found. The pipe was cleaned of sand and the supports inside it were removed. The work took one full day instead of the expected three hours.

The earth-moving work and the excavations needed for the relining were the responsibility of a contractor working directly for UPM.

A number of previously unknown cables and pipes were discovered during the excavation work. The soil was also fairly rocky.

According to Lahtinen, there were no up-to-date maps for each section of pipeline. Summing up the work of his team, he acknowledges that the supports keeping the pipe in place underground could have been planned earlier.

A pipe rack was laid on top of crushed stone below the pipeline. Sand was used to provide an even surface for the bases.

WORKING UNDER THE GLARE OF THE SUN

The 600-metre pipeline was installed by KWH Pipe. The pipe sections were joined using butt welding and between three and five fitters worked on the site.

The relining was carried out in three stages. The individual pipes were 18 metres long and they were supplied by KWH Pipe's Vaasa plant. One transport vehicle could carry nine pipe sections at a time.

According to Ari Vaarala, Operations Manager at KWH Pipe Finland's rehabilitation department, the first section of liner was about 175 metres, and the longest of the three sections had a length of 250 metres. He adds that the pipes were pulled into place using a winch truck and a hydraulic ram and that the wire in the winch truck was 300 metres long.

Working conditions at Tervasaari were ideal. There was a splendid lawn behind the mill with plenty of working space, and the sunny weather also helped to speed up the project.

Even though the long pipe sections were difficult to handle, everything went as planned and KWH Pipe took a flexible approach to the work. The relining work itself was easier than handling the pipes on the ground.

THE TERVASAARI MILL

○ **The Tervasaari mill** has four paper machines producing label paper, envelope paper and sack paper. The mill also has three pulp lines and an energy-generating facility.

○ **The mill provides** employment for about 830 people and has an annual production capacity of 400,000 tonnes. The Tervasaari mill, located in the centre of Valkeakoski, started production way back in 1872.

THE VALKEAKOSKI PIPES

- PN 4 polypropylene pipe 710 mm
- Pressure chamber 710 mm

The new pipe was secured in place by filling the space between the old and the new.

KWH Pipe also supplied the Tervasaari mill with a pressure chamber made of polypropylene. The 710 mm angle chamber was installed at the same depth as the pipeline and was the only angle piece required.

Wastewater started flowing in the new pipe in late June and by mid-July everything was ready, except for minor finishing work and tidying up the yard. ●

The lawn behind the mill offered ideal working conditions.

