References

Plastic pipes withstand factory process waters



Uponor involvement

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Stora Enso's factories in Imatra, Finland were looking for a long-term solution for transporting hot process waters containing chemicals. The Weholite system proved to be a suitable solution.
Stora Enso selected Weholite pipes manufactured from polypropylene when it was looking for a new solution for transporting process waters in its factories in Imatra. In contrast with the old concrete channels, polypropylene pipes can withstand the effects of hot water containing chemicals without corroding.

Project Facts:

Location

Imatra, Finland, Finland

Completion

2012

Building Type

Industrial buildings

Project Type

New building

Stora Enso's factories in Imatra, located on the southern shores of Lake Saimaa in Finland, manufacture approximately one million tons of packaging paper and board annually. The factory units in the Kaukopää and Tainionkoski areas of Imatra create raw materials for cartons that are used to package products such as juice and milk. Board is also used to make drinking cups and packaging for tobacco products and confectionery.

Board suitable for the graphics industry is used to manufacture cards, covers and luxury packaging. Until now, the process waters required to manufacture board and paper have travelled along concrete channels to the water treatment process before they are discharged into Lake Saimaa. Hot water containing chemicals has worn and corroded the concrete structures to such an extent that it was necessary to begin looking for a new solution for transporting process waters. Efora Oy, a joint venture between Stora Enso and ABB, was tasked with carrying out the project. The company specialises in providing industrial maintenance and other services to ensure undisrupted operation in factories.

Three alternatives

According to Project Manager Pasi Tiilikainen, there were three alternatives for modernising the concrete channels. "We considered lining the concrete channels with acid-proof steel four or six millimetres thick. We could also have used a reinforced plastic pipe but after we completed our calculations, we opted for Weholite pipes manufactured from polypropylene," Tiilikainen says.

Polypropylene pipes had previously been installed in Stora Enso's factories and the company had been satisfied with them. Acid-proof steel would have been the most expensive solution. According to Tiilikainen, the plastic pipe solutions were approximately the same price but Uponor Infra's timetable was the decisive factor.

"Time is what we live by. For Stora Enso, the best solution is the one that causes the shortest possible outage in the factory's operations," Tiilikainen states. When the Weholite pipe was installed, there was effectively no operational outage whatsoever as the installation work was carried out during the factory's annual week-long service shut-down in September.

The third criterion in the selection was related to working methods. In comparison with a reinforced plastic pipe, the advantage of Weholite is that it can be sliplined into the concrete channel. Sliplining is not a suitable application for reinforced plastic pipes – it would have been necessary to open up the concrete channels to allow for the installation.

The work was spread over two years

The project will be carried out in two phases as Stora Enso wanted to divide the costs arising from the work over two years. However, a more important reason was the factory's schedule: there is minimal disruption to operations when the installation work is carried out during the annual service shut-down. The first part of the project was done in just over two weeks in September.

"The first week was spent doing preparatory work and the second week was spent on installation," Tiilikainen says. During the first phase, 70 metres of piping with a diameter of 1.6 metres was installed in the factory. The pipe was sliplined into the existing concrete channel. In addition, two corner pieces were installed in anticipation of the next phase of the project, which will be completed next September.

During the second phase, the system will be connected to an additional 120 metres of pipes that will be installed underground. As the line contains curves, five or six corner pieces will also be needed during installation. The preparatory work and installation completed during the first phase was supervised by Kimmo Sjöman in Imatra. "Two of us were involved in the preparatory work during the first week and we were joined by two more in the following week. We also had two excavators, a loader and a lorry equipped with a winch," Sjöman says.

PP pipes can withstand high temperatures

Weholite pipes are manufactured from PE or PP profiles with spiral seaming. Polypropylene pipes are suitable for applications in which pipes are required to withstand high temperatures. Product Manager Anders Andtbacka explains that PP pipes can withstand temperatures of up to 80 °C. The temperatures of the process waters at the Imatra factories can be up to 60 °C. "In terms of their mechanical properties and chemical resistance, polyethylene and polypropylene pipes are as good as each other," Andtbacka says.

Polypropylene pipes are slightly stiffer than polyethylene pipes, which can sometimes be an advantage and sometimes a disadvantage. This is also how it was in Imatra: "We specifically wanted stiff pipes for the Imatra sites because the pipe travels close to ground level in some locations, so it will be subjected to traffic loads," Andtbacka says.

According to Sjöman, sliplining the stiffer pipe into a square tunnel was slightly difficult because space was restricted and the pipe did not bend easily. The external diameter of the pipe was 1.8 metres. The pipe was sliplined into a tunnel with a square cross-section measuring 2 x 2 metres. According to Sjöman, it was necessary to make more sliplining openings than originally planned but the work proceeded according to plan in other respects. "It was tough, but we did it," Sjöman says.

During the sliplining process, a wire was attached to one end of the pipe and used to pull the pipe, while excavators pushed the other end of the pipe into the concrete channel. According to Sjöman and Tiilikainen, the installations went extremely well and were completed on schedule. However, there was a minor setback during the commissioning phase when the inspection chambers were found to have a slight leak. The cause of the leak was fixed by sealing the welding seams. Now everything is ready for the next phase.

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