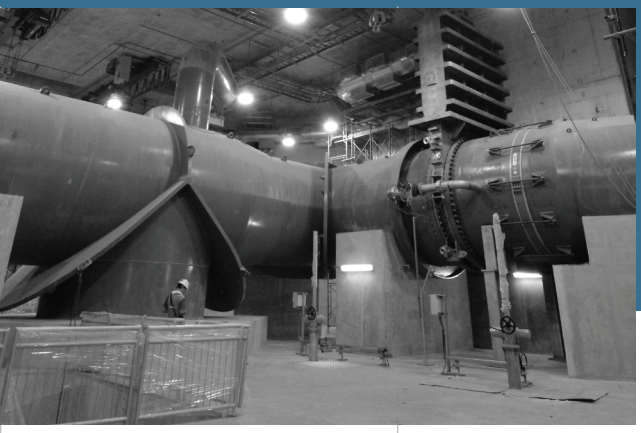
Singapore: A central waste water treatment system for the future

straub®
the right connection
an Aliaxis company

SOLUTION



Der Neubau der Abwasserreinigungsanlage zum Anschluss der schmutzwasserführenden Zuleitungsrohre an die Pumpstation.

Extreme deformation and a big gap between the pipe ends.

1230 kg Sikadur 30, 20 kg Sikafloor 156 (Primer) and 20 kg Sikagard 63N (Coating) were used to build up the pipe ends.

Singapore is one of the cleanest cities in Asia. As long ago as the end of the 19th century, the first structures were put in place for emptying chamber pots every morning. The first sewerage works started operation in 1910 and additional sewerage installations were added over the course of the years. In 2001, the city administration passed a resolution to replace the various ageing sewerage works, which were distributed across the island, with two new modern facilities: Changi on the east and Tuas on the west side of the island. This was partly to meet increasing demand and partly to reclaim land for the construction of new homes on the cleared sites.

The wastewater systems, which had been completely separate up to this point, were connected by a new pipe system leading to the new facilities.

The challenge

The wastewater influent tunnel to the Changi Water Reclamation Plant is almost 4 metres across. This made it virtually impossible to avoid a certain construction tolerance, and at the point of link-up to the installation, there were axial deviations of up to 45 mm. Following initial attempts at welding, the engineers from the company coordinating the project, CH2M HILL of Washington DC, quickly realised that it would not be possible to stay on schedule using conventional means to connect the sewer infeed to the installation. There was also the risk that the heat generated by the welding process would destroy the internal cement coating. Exacerbating the problem of bridging the axial offset was the fact that the extremely uneven pipe ends and tensions in the pipe system also had to be taken into account. Thus, a problem had developed that threatened progress on the construction of the entire facility.

The individual request to STRAUB

In the course of discussions, the idea came up that the problem could possibly be solved with a type of pipe clamp. An enquiry was sent from the headquarters of CH2M HILL to STRAUB Werke AG in Wangs, Switzerland. From the very outset, however, it was obvious that the situation would need close onsite inspection. A few days later, engineers from STRAUB Werke AG visited the Changi construction site and analysed the connection problem.

It was evident that it would not be easy to create a permanently flexible and tight joint. The compensation of the axial offset, in conjunction with the eccentricity of the pipe ends, presented a major challenge to the STRAUB Werke AG
engineers. Since the pipes had already been securely installed, it was necessary to come up with materials that could be applied on site.

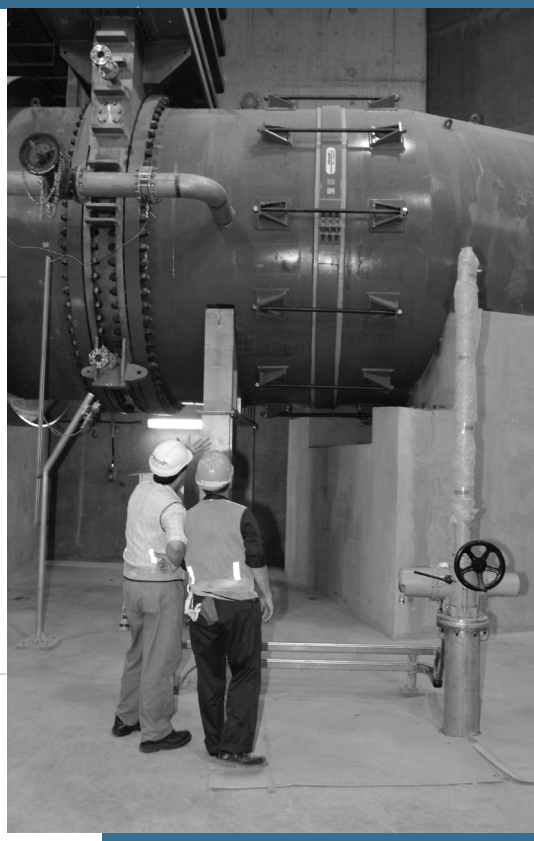
The solution

Possible approaches to a surface build-up were discussed at the headquarters of SIKA, a Zurich based construction chemicals specialist. This resulted in the suggestion that the axial offset and deformation could be compensated for by applying a number of Sikadur 30 plastic coatings to match the outer diameters of the pipe ends to one another. First, however, it was necessary to carry out tests in a neutral laboratory to demonstrate and guarantee the adhesion and elasticity values of the intended coatings.

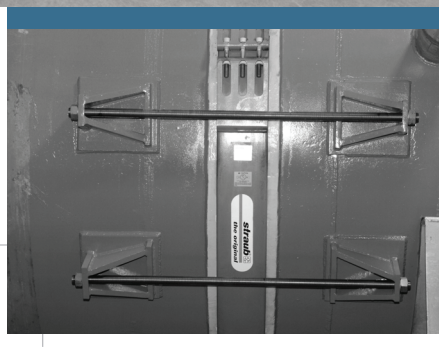
To ensure perfect adhesion, the pipes were initially sandblasted and primed. It was then possible to apply a number of coats of the reinforcing adhesive and to protect the inside and outside of the entire pipe joint with a special preservative coating as corrosion-proofing. This was carried out on site by SIKA Singapore PTE.

In parallel with the adhesion tests, STRAUB Tadco Inc., the Toronto subsidiary, was commissioned with doing the calculations for dimensionally accurate STRAUB pipe couplings. Since the pipes were already installed, the opening variant, STRAUB-OPEN-FLEX with a plastic-coated casing, was chosen. This could be readily positioned around the pipe joint and tightened. The internal rubber collar with edge seals allows these couplings to compensate for temperaturerelated changes in length, creating a reliable seal to the required test pressure of 8 bar.

With the professional knowledge of the various specialists involved and the experience of the STRAUB engineers, the couplings were successfully installed in the pumping stations, and tested and approved just 7 months after the initial request had been made. In the end, the project was not delayed. The wastewater treatment facility in Changi started operations at the end of 2005.



Four 3.6 m diameter couplings were installed.



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- **The most effective solution**
- **Perfectly matched components**
- **Flawless operation**

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Perfectly matched components

Module: System procurement

The most effective solution

Module: Situational analysis

Module: Pre-Engineering

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Flawless operation

Module: Installation / Commissioning

Module: Service and maintenance

For more information on the modules, please visit www.straub.ch

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