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Bringing fresh water from mainland China to the dry islands of Quemoy

Providing dry island communities – those with no natural source of fresh water – with drinking water supplies can be a major engineering challenge. The failure of submarine pipelines can be very expensive, and metal pipes are vulnerable to rapid corrosion in salt water. In Europe this has led to a number of high-profile submarine projects being constructed using polyethylene pipes, which are completely resistant to the damaging effects of seawater.

This technology is now being applied on the coast of southern China to link the dry Taiwan-administered islands of Quemoy to the city water supply of Xiamen on mainland China.



China is experiencing tremendous economic growth, but this industrial expansion is at the root of many social and environmental problems. Water is one of the critical issues because, while China ranks fourth in the world for renewable water resources, its large population and increasing industrial consumption are placing very heavy demands on this resource. Good water management systems are therefore key to future growth and prosperity, and the adoption of high-quality pipeline materials and the use of modern installation techniques are an important element of that.

The coastal city of Xiamen, which lies in the southern part of Fujian province, was one of the four original special economic zones in China. This stimulated considerable growth, and today it has a population of nearly three million. In recent years Xiamen has received a number of environmental awards and become established as a major tourist centre.

A short distance off the coast, in the mouth of Xiamen Bay, is a group of small Taiwan-administered islands called Quemoy (also known as Jinmen Islands). Their population of just over 80,000 earns a living mainly from farming and because the islands have no natural source of water, other possibilities are limited.

Fresh water delivery solution

To help provide a solution to this problem, the Municipal Government of Xiamen, while drawing up a plan to construct a subsea fresh water pipeline from the city's water treatment plant across the Xiamen bay to its newly built residential areas, included an undersea extension of the pipeline to serve the needs of Quemoy. Because of the importance of the project, the general manager of the Xiamen Water Group was designated the project's leader.

In March of 2007 construction began on the first part of the project linking Xiamen to the new residential areas of the city. A special railway was built to transfer the required 12.6 km of 800 mm diameter polyethylene pipe sections from the work site to the sea. The pipeline was floated out to sea and, with the help of a number of small boats, was positioned above a pre-cut trench in the seabed and then lowered into it.

The initial project design was based upon the use of a 1200 mm pipeline until the Shanghai pipe producer Chinaust Plastics, supported by Borouge, proposed the alternative of twin 800 mm and 560 mm diameter polyethylene lines. The benefits of lightweight, non-corrodible PE pipelines for submarine installation were extremely significant and after a feasibility study, the revised scheme was accepted by the design institute and the Xiamen Water Company.

The next step, now underway, is connecting the Xiamen water supply to Quemoy via 7 km of twin 560 mm diameter pipes.

Long-term water supply line security

Chinaust Plastics of Shanghai produced all the pipes to construct the submarine pipelines. To provide the greatest security for this high-profile project, the highest quality raw material was selected - BorSafe™ PE100 from Borouge.

The long-term durability of submarine pipelines is of paramount importance to ensure supply line security and avoid the difficulty and high costs of repair. Supported by a feasibility study, this persuaded the Xiamen Water Company to choose polyethylene pipelines, which are completely resistant to corrosion caused by seawater.

Resolving technical challenges

The project design was based on the use of twin 800 mm pipelines under the Xiamen Bay and twin 560 mm submarine pipelines from Xiamen to Quemoy. The pipes were butt welded in 300 m strings, winched forward and welded to the previous sections and then floated out to sea to be submerged in-place.

The project has created much interest in China. It demonstrates the ability of polyethylene pipe materials to cope with difficult installation and in-service environmental conditions in a highly cost effective way. Based on the success of the scheme, Chinaust and Borouge are confident that there will be many more future projects of this type in China.



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