

### Tsurumi calls in the "Puddle Suckers" for record-breaking tunnel project in Turkey

Engineers have long dreamed of connecting the European and Asian sides of Istanbul by tunnel, an idea first proposed by Sultan Abdul Mecit in 1860. But that dream is now being realised as part of the US\$3 billion Marmaray project, one of the largest transportation infrastructure projects currently taking place anywhere in the world. At 58m below sea level, the connection is the deepest immersed tube tunnel in the world.



Daniel Weippert, managing director of Tsurumi (Europe) GmbH, comments:

"This is a huge project of great historical importance for the people of Turkey, but it is also very significant in terms of infrastructure and trade for the city. The Bosphorus tunnel is a highly technical, complicated and record-breaking project that requires a unique solution, not on the scale of anything seen before. We worked closely with our local pump dealer to come up with an innovative pumping solution for this record-breaking job."

Tsurumi has 90 of its pumps in use on the Bosphorus connection, supplied by local dealer Bilgi Mühendislik Tic. Ltd. Sti. Tsurumi typically supplies its KRS and KTZ series pumps for tunnel projects and there are 50 of them on this job. But the most significant development in terms of pumps is the inclusion of 40 LSC series pumps - famously known as the "Puddle Suckers".

The LSC series are residual dewatering pumps that can drive large amounts of water down to a depth of just 1 mm. Mr Weippert explains: "They are not normally found on tunnelling jobs. But when the project details were presented to us the LSC range looked like the best option." On this project the 40 LSCs are dewatering 15 caissons to create a dry working space before they are cast in concrete. He adds: "Due to the sheer volume of work involved to clear the caissons, we opted for the LSC series. And they have proved highly effective. This is only the second time we have used an LSC in this way but seeing how successful it has been and with the industry's drive to create ever-deeper tunnels, we certainly see applications for LSC pumps in other tunnel projects in the future."

Scheduled for completion in 2011, the Bosphorus tunnel will be 1.4km long and its trains will carry up to 300,000 passengers per hour. The tunnel is made of 11 pre-fabricated sections, which weigh 19,000t each. The sections are floated out and sunk 58m into a trench on the sea-bed. The sections measure 135m long, 15.3m wide and 8.75m high, and are the largest immersed tube sections in the world.

The 50 KRS and KTZ series pumps in use on the project have two specific applications. Firstly, they are used to fill the ballast tanks attached to each of the 11 tunnel sections with water. These assist in the smooth placement of each section on the sea-bed. Secondly, once the pre-assembled tunnel sections are in place, they must be secured in position. The KRS and KTZ pumps are used in this application both for dewatering and pumping raw concrete.

The KRS series is a heavy-duty dewatering pump with a 4-pole motor for greater durability. The KTZ series is a submersible drainage pump for general applications.

The KRS, KTZ and LSC series are all part of Tsurumi's contractor pump range. Tsurumi's contractor pumps have a unique dry-running capability. Where most other pumps require a continual flow of water to remain cool, Tsurumi's pumps feature a patented lubrication technology and will not burn out under dry operation.

The Marmaray Project is the Turkish Ministry of Transport's plan to ease Istanbul's heavy road congestion by providing its 13 million residents with an effective transport alternative that encourages travel by train. Parsons Brinckerhoff is the project's main contractor.

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Tsurumi is one of the world's most experienced pump manufacturers. From its modern facility in Kyoto, Tsurumi produces more submersible pumps globally per year than any other pump manufacturer. There are currently over 1800 different pump models in the Tsurumi range, including semi-vortex, vortex, non-clog, cutter, contractor & dewatering, sewage & wastewater, aerators & blowers, decanting units and scum skimmers. Tsurumi operates on a worldwide basis with an extensive dealer network in Europe, North and South America, Asia, Australia and parts of Africa.

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