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# Putzmeister

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## **MXKD 50 and BSA 2110 HP D concreting the underground rail station in Yenikapı / Istanbul**

In February 2010, the time had finally come: an MXKD 50 on a 15 m lattice tower and a BSA 2110 HP D stationary concrete pump began concreting the Yenikapı railway station.

This is the only station of the new Marmaray tunnel line being constructed using the cut-and-cover method. Its bottom surface measures approximately 300 m long and 35 m wide. For the concreting of the foundations, it was divided into a total of 29 sections. Each section – approximately 10 x 35 m and 2 m thick – is being concreted monolithically in multiple layers of 40 cm. Each layer contains some 120 m<sup>3</sup> concrete, which produces an average of 650 m<sup>3</sup> for each of the 29 sections.

Five set-up sites are planned for the MXKD 50, which will all enable it to reach each point of the foundation area. This means that it will have to be relocated four times. The boom anchor set is located in the centre of the reinforcement of one of the foundation sections. As the boom foundation needs to have a certain amount of strength before subsequent anchoring can take place, a defined workflow has been planned for the concreting of the individual positions. When each section gets its turn is absolutely crucial to avoiding unnecessary waiting times in the re-siting of the lattice tower. The concrete mix is particularly challenging. Despite a strength class of “only” C40, the high additives content makes it awkward to pump. These additives are necessary because the concrete must be able to withstand a high groundwater pressure.

In total, the concreting time of the subway station (foundations, walls, shafts, etc.) is estimated to take 15 months to complete.

## **MXKD 50 at the centre of an archaeological sensation**

The construction of a new, state-of-the-art transport interchange is supposed to be underway here, in Yenikapı, on the European side of the Bosphorus: a major rail transit station to serve the 15-million metropolis of Istanbul. When the ground was broken back in 2004, nobody thought that the project would be set back by the discovery of an important transport hub from Constantinople’s past.

First of all, the excavation of the pit for the new, 21st century subway station on the Marmaray tunnel line unearthed a series of ancient walls. As it turned out, these belong-ed to an important Byzantine

trading port, a transport hub of the “global world” dating back to around 400 AD. The “Port of Theodosius” – named after the last ruler of the Eastern Roman and Byzantine Empire – contained the remains of, to date, more than 30 ships, the largest single discovery of ship relics anywhere in the world. Among them were four Byzantine dromons, the oldest warships ever to have been discovered. They must have been sunk around 1000 AD.

What was a great moment for archaeology (Yenikapı is the largest urban excavation and one of the most significant finds in Turkey) has caused developers to suffer serious time delays and, of course, to incur enormous costs.

Yenikapı is situated on the southern shore of Istanbul’s old town on the Sea of Marmara. With the future construction of its major rail transit station serving the “Marmaray” undersea tunnel under the Bosphorus strait, Yenikapı is intended to offer passengers a means of changing from overground to underground trains. Originally, a new regional train station had also been planned in order to connect suburban commuter traffic to the East-West network. However, this aspect of the project had to be changed: such is the importance of the ancient port, the local heritage trust decided that it would have to remain exactly where it is.

#### Captions:

1620-2

Pipeline fastenings in the horizontal section ZX 125/5”-130 bar

1620-3

Discovery site of one of the wooden ships

1620-4

While some go to work with heavy machinery, others require rather more delicate tools, such as trowels and brushes. In the foreground are unearthed fragments of the ancient harbour wall.

1620-5

#### Technical data BSA 2110 HP D

Output up to	102 m <sup>3</sup> /h
Concrete pressure up to	220 bar
Engine	330 kW Diesel
Delivery cylinder Ø	200 mm
Stroke	2100 mm

1620-6

Hydraulic gate valve GVHM 2/2 converted for installation in a vertical line

1620-7

The hopper of the stationary concrete pump is cleaned under high pressure, and cleansing water is then pumped through forwards.

1620-8

The huge stationary boom at the start of foundation concreting. In the background are the tunnels of the future underground line.