

TERRATEC DELIVERS TWO MORE EPBMS FOR ISTANBUL METRO



Senbaş Madencilik-Kolin-Kalyon JV gear up for tunnelling works on the Dudullu-Bostancı Metro Line, in the latest addition to Istanbul's ongoing mass transportation expansion.

TERRATEC is pleased to announce the delivery of a further two 6.56m diameter Earth Pressure Balance (EPB) Tunnel Boring Machines for the ongoing expansion of Istanbul's Metro system, in Turkey, following a factory acceptance test on December 6th.

The new machines will be used by the Şenbaş Madencilik-Kolin-Kalyon Joint Venture – along

with two other TBMs – on the €1.4 billion Dudullu-Bostancı Metro Line project, which runs north to south across the densely-populated Anatolian side of the city. The 14.2km-long line, along with its 13 new stations, will be located entirely underground.

Members of the JV were so impressed with the performance of the TERRATEC

machine (S42) used on the new Mecidiyeköy-Mahmutbey Metro line – which is currently being built by the Gülermak, Kolin and Kalyon JV – that they were very keen to employ a further two machines, S50 and S51, on their second project for the Istanbul Metropolitan Municipality (IMM).

The customized TERRATEC TBMs have versatile mixed-face



cutterheads with an opening ratio of about 35%, designed to manage Istanbul's geology – which includes both rock and soil formations – and state-of-the-art features such as VFD electric cutterhead drives, soft ground cutting tools that are interchangeable with 17" roller disc cutters, high torque screw conveyors, and active articulation systems.

The tunnel linings will consist of reinforced concrete trapezoidal segments (5+1),

with an outer diameter of 6,300mm, an inner diameter of 5,700mm and a width of 1,400mm.

"I was very impressed by the TERRATEC machines when I attended the recent factory inspection and I am looking forward to great production records being set by the TBMs," said Feriha Mert, Anatolian Rail Systems Manager, for the IMM.

The fully automated Dudullu-

Bostancı Metro Line (GoA4) – with driverless trains, CBTC, and platform screen doors at stations – will provide numerous connections to other Istanbul transportation systems, such as the Bosphorus ferry (at Bostancı Harbour), the Marmaray railway, the Kadıköy-Kartal metro line and the Üsküdar-Çekmeköy metro line.

Tunnelling is expected to commence in early 2017 and be completed by mid-2019.

TERRATEC TBMS SUCCESSFULLY COMPLETE 20 BREAKTHROUGHS FOR DELHI METRO

Eight TERRATEC Earth Pressure Balance TBMs have successfully completed 20 drives, totalling approximately 18km of running tunnels, on four major Phase III contracts.

Two TERRATEC Earth Pressure Balance (EPB) Tunnel Boring Machines made a historic double breakthrough on 14th November, marking the end of tunnelling works on the 58.6km Pink Line (Line 7) on Phase III of the Delhi Metro project, in India.

J. Kumar Infraprojects Ltd. working with China Railway Third Group (CRTG) achieved the breakthroughs with TERRATEC's S25 and S28 TBMs on Contract CC-24 having completed the final 970m-long drives between Vinobapuri and

Ashram Stations.

The 6.61m diameter EPB shields feature state-of-the-art 900kw VFD electric driven cutterheads with a versatile configuration of cutting tools and 17" disc cutters that facilitated excavation through mixed face conditions of soil and hard rock. Both TBMs also feature active articulation and two-component grout backfilling systems.

In addition to marking the end of tunnelling works on the Pink Line (Line 7), the final S25 and

S28 breakthroughs also signify the successful completion of 20 TERRATEC tunnel drives on Phase III of the Delhi Metro.

Among its competitors, TERRATEC received the largest number of new machine orders for Phase III, with eight EPB machines working across four separate contracts on the project. In addition to supplying the machines, TERRATEC also provided comprehensive services on site to support the operation and maintenance of the equipment, assisting contractors in their achievements.



Two 6.61m diameter mixed/rock EPB shields – S23 and S24 – were deployed on Contract CC-07, part of the Violet Line (Line 6) Extension, by a joint venture of Russia’s Metrostroy and local firm ERA Infrastructure.

In addition to unexpected amounts of full face – very hard (up to 200MPa) and highly abrasive – quartzite, these machines encountered sections of highly variable mixed faced conditions with numerous large diameter boulders. The TERRATEC TBMs proved themselves up to the challenge however and successfully completed four drives between Jama Masjid and Kashmere Gate Stations.

Another two 6.61m diameter mixed/rock EPB shields – S26

and S27 – completed 2.2km of tunnels on J. Kumar/CRTG JV’s second Pink Line (Line 7) contract (CC-20) – which runs from Mayapuri to Delhi Cantt – earlier this year.

The final contract, on the Magenta Line (Line 8), was the first to be completed in full. Delivered by a joint venture of Hindustan Construction Company (HCC) and South Korea’s Samsung Engineering and Construction Group, Contract CC-34 forms the most westerly section of the new line between Janakpuri and Palam Station.

The Contractor selected TERRATEC to manufacture two 6.52m diameter EPB machines with a traditional soil configuration, equipped with a

spoke-type cutterhead with a 57% opening ratio. The geology along the 3.6km alignment composed of very wet silty clay and dry sandy soil.

Both TBMs passed underneath residential areas and came in close proximity to a number of sensitive structures, such as the foundation piles of existing elevated metro stations and a highway flyover, requiring very accurate settlement control in critical zones.

The CC-34 contract drives were completed last August, with the second TBM (S36) breaking through at Palam Station a month after its twin (S37). The performance of the machines was recognised at the breakthrough ceremony by Mr. Raman Kapil, Project Director of the joint venture:

"We are thankful to all our sub-contractors and equipment suppliers, especially TERRATEC, as these TBMs have excavated very smoothly and this has helped to complete the works ahead the planned schedule."

With the completion of these last drives, the Delhi Metro Rail Corporation (DMRC) is nearing the end of tunnelling on one of the largest urban tunnelling projects ever undertaken. With more than double the amount of tunnelling on both Phase I and Phase II combined, a total of 30 TBMs were used to bore the 80 kilometres of underground tunnels on Phase III.



TERRATEC DELIVERS LUCKNOW’S FIRST TBMS

Tata/Gulermak JV gears up to commence tunnelling on Phase 1 A of the Lucknow Metro, in Uttar Pradesh, India, with the city’s first Tunnel Boring Machines.



Two 6.52m diameter TERRATEC Earth Pressure Balance (EPB) TBMs are ready to be delivered to Tata-Gulermak JV, for the North-South line (Phase 1 A) of the Lucknow Metro, in India.

Following successful Factory Acceptance Tests at TERRATEC’s facility in Delhi, the TBMs will be transported to Lucknow and reassembled for the twin 1,812m long tunnels on contract LKCC-06 of the project, which run from an underground ramp near Charbagh Metro Station to the end of an underground ramp near KD Singh Babu Stadium.

The 36-month contract, which was awarded to Tata-Gulermak JV in April 2016, also includes the construction of three new underground stations at Hussainganj, State Secretariat (Sachivalaya) and Hazratganj.

The first of the two TERRATEC TBMs is due to be delivered to the Sachivalaya station site in mid-November, with the second TBM expected to arrive on site in early December.

The machines will initially be launched on twin 780m drives towards Hazratganj, where they will bore through local geology consisting of

stiff to hard clayey silt and medium to dense silty sand, with an average overburden of 4m to 10m. As the drives progress, the TBMs will install 275mm thick x 1400mm long, reinforced concrete Universal-style, pre-cast lining rings – comprising five segments + key – which are being manufactured at a local casting yard in Vrindavan.

Following the initial drives to Hazratganj – where the TBMs will pass beneath historic buildings in the Capital Plaza of Hazrat Ganj – the machines will return to the shaft at Sachivalaya and be deployed on their next,



613m-long, drives towards Hussainganj. From there, they will continue a further 419m – crossing under the Haide Nalah (canal) – to the cut and cover ramp near Charbagh Station.

The EPBMs feature a classic soil configuration, equipped with a spoke-style cutterhead

– with a 57% opening ratio – and cutterhead tools that are interchangeable with 17” roller disc cutters to allow the TBMs to bore through station D-walls and cope with the presence of any unexpected obstacles.

Lucknow is the capital of Uttar Pradesh, the most populated

state in India. The city’s rapid growth combined with substantial traffic congestion has prompted the need for a modern public transportation system. Phase 1 of the two-line Lucknow Metro system is being built at a cost of 6,928 crore (US\$1 billion). Phase 2 of the system is due to commence in 2018.

WATCH US ON

Check out TERRATEC’s DN1500 microtunnelling systems at work on the Bangkok Metropolitan Electricity Authority’s (MEA) MRT Green Line (North) Cable Tunnel Project, in Thailand!



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