

TERRATEC SECURES CONTRACT FOR PUNE METRO TBMS



TERRATEC Tunnel Boring Machines (TBMs) are proving their worth in India with another contract secured for the underground works on Line 1 of the Pune Metro.

Having delivered 22 TBMs to India in the last six years (more than all other manufacturers combined over the same period), TERRATEC is pleased to announce yet another order in the country, this time for the Pune Metro Rail Project, in Maharashtra.

Gulermak-Tata Projects Limited has selected TERRATEC to provide a number of 6.61m

diameter Earth Pressure Balance TBMs (EPBMs) for its two underground contracts on Line 1 of the new metro.

In February, Maharashtra Metro Rail Corporation Limited's (MMRCL) Executive Director, Atul Gadgil, announced that the joint venture had won both of the twin tube tunnel packages on the north-south corridor. The 5km underground

section of the 16.56km-long Line 1 corridor – which runs from PCMC to Swargate – is the most challenging portion of the line, as it passes through the densely populated areas of Kasba Peth, Budhwar Peth and Mandai market (pictured above).

The versatile TERRATEC EPBMs that will be delivered to Pune will have robust mixed-

face dome-style cutterheads designed to work effectively in the compact Basalt that is expected on these contracts at pressures of up to 4 bar.

As the TBMs progress along the project alignment, they will install 1,400mm wide by 275mm thick pre-cast concrete lining rings, which consist of five segments plus a key.

The order comes following the very strong performance of two 6.52m diameter TERRATEC EPB Machines that were used by Gulermak-Tata Projects JV to complete the TBM-driven tunnels on Phase 1A of the Lucknow Metro, which was completed two months ahead of schedule.

"With this TBM supply order, Gulermak-Tata JV has once again reaffirmed its confidence in TERRATEC's TBMs, having completed the Lucknow Metro tunnels well ahead of schedule. It has become a trend for our clients to repeatedly return to us, opting to select TERRATEC TBMs for their new projects due to the excellent performance of these machines," says Gulshan Gill, Managing Director of Terratec India.

"In recent years, TERRATEC has emerged as the leading TBM supplier in the Indian market, having supplied 22 TBMs in the last five years alone. TERRATEC's continuing success on projects such as Phase III of the Delhi Metro

Phase, Lucknow Metro, the Ahmadabad Metro and Mumbai Metro is a result of excellent tailor-made robust TBM design, prompt onsite assistance, a readily available stock of TBM spares, and highly-skilled specialised TBM support throughout the tunnelling operation," says Gill.

Pune is an industrial city that has witnessed much growth in the areas of corporate and industrial infrastructure over the last decade. Existing roads in the city currently carry an average of 8,000 commuters an hour in each direction. The city experiences high traffic

during peak hours that leads to long hours of traffic jams along with increased pollution.

The Pune Metro aims to provide a solution to the above issues by offering a safe and eco-friendly journey with a 50% reduction in travel time.

When complete, in 2022, Pune's Metro network will comprise three rail corridors with a total length of 54.5km. Construction of the first two phases is currently underway, while the third phase was approved for construction by the government of Maharashtra in October 2018.



TERRATEC TBM BREAKS THROUGH ON BANGKOK TIGHT RADIUS CURVE



TERRATEC's tight radius TBMs are enabling a highly challenging project alignment for Bangkok's Metropolitan Electricity Authority in one of the city's busiest downtown areas.

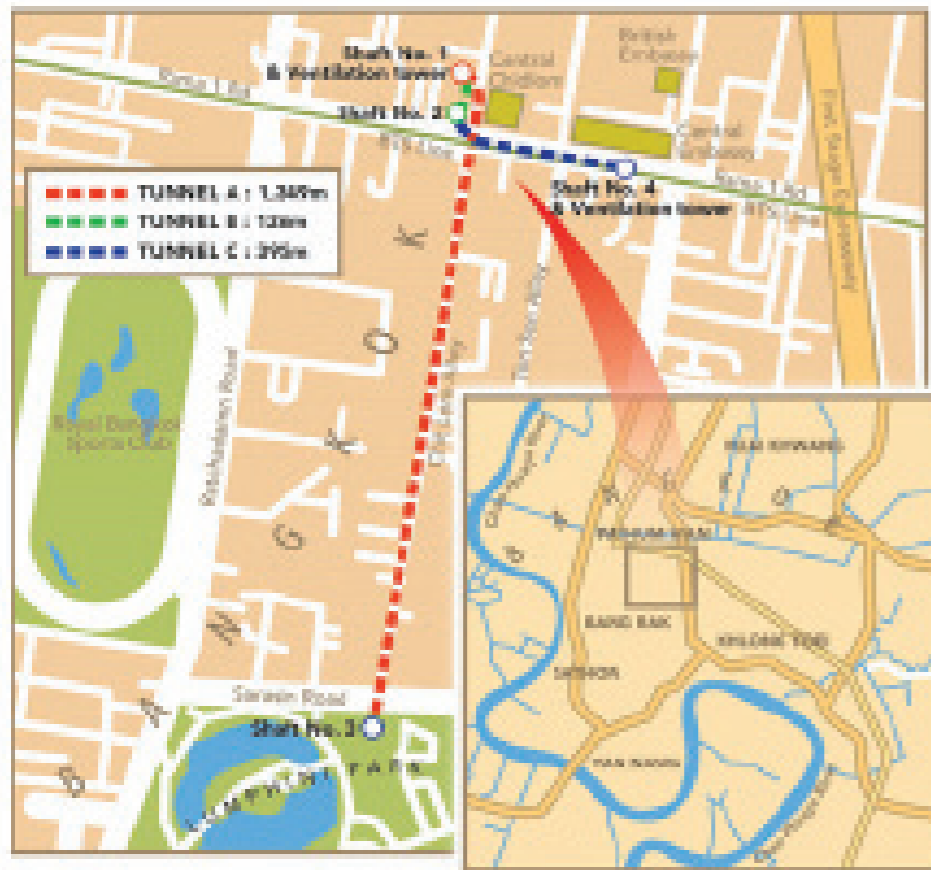
In May, TERRATEC joined representatives of Bangkok's Metropolitan Electricity Authority (MEA) and contractor Italian-Thai Development PCL (ITD) to celebrate the successful breakthrough of one of two TERRATEC Earth Pressure Balance Tunnel Boring Machines (EPBM) at work on the complex Chidlom Cable Tunnel Project, in Bangkok, Thailand. The 3.2m diameter

S48B machine completed a challenging portion of the project that included an extremely tight (35m-radius) curved drive.

Running from the Central Embassy 'ultra-luxury' mega mall, located on Phloen Chit Road within the former gardens of the British Embassy site, and MEA's Chidlom Terminal Electrical Station,

southwards to Lumpini Park, the project is located in one of the most exclusive and built up areas of downtown Bangkok.

In order to remain within public road easements, as well as negotiate building foundations and the deep piles of the BTS Sukhumvit Skytrain that run along Phloen Chit Road, the tunnel alignments are subject to strict constraints



that require several tight radius curves to bring them into MEA's Chidlom Terminal station. To achieve this, the TERRATEC EPB machines have been designed with a unique extreme X-type articulation system, which can accommodate very tight curves.

"We have worked closely with Terratec on several projects in the past and were keen to work with them again," explains ITD's Project Manager, Supak Khunviriyaya. "They have experience from similar projects in Bangkok, so there was a close collaboration from the tender stage. The TBMs are designed to achieve a high level of performance in difficult circumstances and we have

trust in Terratec's team, who have assisted us throughout the tunnelling operations."

The TBMs' soft ground cutterheads feature an open spoke design with knife bits to assist break-in and break-out of the concrete shaft eyes. Universal tapered precast concrete segments are typically installed as the machines progress, with shorter steel sets utilised during the course of the sharp curves. The geology along the project is typical for Bangkok, comprising stiff to very stiff clay, with lenses of sand and a groundwater head of 2 bars.

Tunnelling on the project commenced last September: "We started out straight into

the 35m radius curve with the S48B machine, going under a busy five-lane road and around the corner of an exclusive department store at the intersection with Phloen Chit Road," explains Khunviriyaya. "This is an old building, so the foundation piles extend down about 20m. The tunnel is at exactly the same level, so we had to be very careful not to cause any settlement. We also had to negotiate the BTS Skytrain foundations on the other side, giving us a window with about 1m either side of the machine through the intersection."

ITD had an array of monitoring equipment in place to check for any tunnelling induced settlement during the curved drive, but zero movement was recorded. ITD credits this to the skill of Terratec's field service team, whose experienced TBM operators steered the machine throughout the curve and are assisting TBM operations throughout the project.

Focus on the project has now switched to the other TERRATEC machine, the 4.27m diameter S69 TBM, which was launched in January and is currently excavating a 1,349m-long tunnel from Lumpini Park to the MEA's Chidlom Terminal Station. It is due to complete this drive in September. Each machine will then execute a further short curved drive to complete tunnelling on the project.

Designed to accommodate a new high-voltage cable system, the Chidlom Cable Tunnel Project is one of a series of tunnelling projects being undertaken by the MEA to answer increased power demands in the Thai capital. The projects will improve reliability and reduce the risk of damage to conventional above-ground power lines.

TERRATEC has a well-established regional base in Thailand, having sold its first machine in the country eight years ago for the Metropolitan Rapid Transit (MRT) Blue Line Extension Project. Since then, Terratec has become the country's leading TBM supplier, with nine machines supplied to Thai projects in recent years.





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