

TERRATEC SUPPLIES FIRST NEW MUMBAI METRO TBMS



TERRATEC delivers the first of seven Tunnel Boring Machines bound for Mumbai Metro's highly anticipated 33.5km Line 3 underground corridor, in India.

Australian-based TBM manufacturer, TERRATEC, celebrated the delivery of the first two of a number of new TBMs destined for the Mumbai Metro's Line 3 project, in India, following successful factory acceptance tests this August.

The first of these was a 6.68m diameter dual-mode hard rock TBM (T58) that will be one of two new machines deployed by Hindustan Construction Company – Metrostroy JV

to build the twin tunnels on the line's 4.049km UGC-02 contract, which was awarded by the Mumbai Metro Rail Corporation Ltd (MMRCL) in July 2016.

The T58 machine, along with its sister machine (T59), will be deployed later this year from the Chhatrapati Shivaji Terminal TBM launch shaft towards Kalbadevi Station and onward to the Mumbai Central Station TBM receiving shaft for a total

of four (4) drives each over the course of the project.

The second machine delivered this month (T60) was the first of three new TERRATEC 6.68m diameter dual-mode hard rock TBMs ordered by the J. Kumar – China Railway No. 3 Engineering Group JV for the excavation of sections on the line's 4.94km contract UGC-05 and 4.45km contract UGC-06, which were also awarded by MMRCL last July.



TERRATEC MARKS CONTINUED GROWTH IN TURKEY

TERRATEC TBMs are proving their metal in Turkey with a further four new Tunnel Boring Machines ordered for Istanbul's ongoing Metro expansion.

Australian-based TBM manufacturer, TERRATEC, has secured an order to supply four new 6.56m diameter Earth Pressure Balance Tunnel Boring Machines (EPBMs) for Istanbul's Ümraniye-Ataşehir-Göztepe Metro Line from the Turkish tunnelling Joint Venture of Gulermak, Nuro & Makyol.

This will see a total of seven TERRATEC EPBMs working simultaneously on the Istanbul Metro by the middle of 2018.

The order comes following the very strong performance of a TERRATEC EPBM delivered two years ago to the Mahmutbey-Mecidiyekoy Metro Line, which is being built by the Gulermak, Kolin & Kalyon Joint Venture; and the current progress of two other 6.56m diameter EPBMs that were purchased last year by the Şenbay Madencilik-Kolin-Kalyon Joint Venture for the Dudullu-Bostancı Metro Line project (see map on next page). Both customers have been highly

satisfied with the performance of these machines.

The robust TERRATEC TBMs have versatile mixed-face cutterheads with an opening ratio of about 35% that have proven to work extremely effectively in Istanbul's mixed geology – which includes low-strength sandstones, siltstones, limestones and shales – as well as other state-of-the-art features such as VFD electric cutterhead drives, soft ground cutting tools that

These versatile TERRATEC single shield TBMs are equipped to operate in either Open or Closed mode in the predominantly fresh and slightly to moderately weathered Basalt and Breccia that are anticipated on these contracts. The robust hard rock cutterheads are mounted with heavy duty 17" disc cutters, which are interchangeable with ripper tools, and feature large bucket openings that provide a 10% opening ratio.

Other state-of-the-art features include 2,000kW Electric Variable Frequency Drives – that allow the cutterheads to cut efficiently in harder rock zones at maximum

speeds of 7rpm and deliver an exceptional torque of 8,000kNm to cope with more fractured zones of ground along the alignment – as well as active shield articulation and built-in two component backfilling grout systems.

In addition to the new TBMs, last month TERRATEC also completed the successful factory acceptance testing of two re-manufactured 6.61m diameter mixed/rock Earth Pressure Balance machines (S63 and S64), which will also be deployed by the J. Kumar – China Railway No. 3 Engineering Group JV in Mumbai. These TBMs were recently used on Delhi Metro's

new Pink Line and have since undergone extensive refurbishment in order to fulfil a section of highly weathered ground on contract UGC-05.

When complete, Mumbai Metro's much anticipated Line 3 will be the first underground metro line in the city. Construction of the 33.5km line, which includes 26 underground stations, is divided into seven tunnel-and-station packages that were awarded to five contracting joint ventures in 2016. These five contractors will deploy a total of seventeen (17) TBMs with TERRATEC being the lead TBM supplier on the project with a 37% market share.





are interchangeable with 17" roller disc cutters, high torque screw conveyors and active articulation systems.

"We have chosen TERRATEC because we view them as a solution provider for the project not just an equipment supplier," says Ufuk Yapıcı, Project Manager for Gülermak-Nurol-Makyol JV. "We are expecting great things and are confident that TERRATEC will deliver."

The new TBMs will be used by the Gülermak, Nurol & Makyol JV on the €600 million Ümraniye-Atasehir-Göztepe Metro contract, which was awarded in April 2017. The

13km-long line, along with 11 new stations and NATM-built connections, will form a second north to south rail corridor under the densely-populated Anatolian side of the city and will be located entirely underground at an average depth of about 30m.

The TBMs are currently in production and will begin Factory Testing in the final weeks of 2017.

The Ümraniye-Atasehir-Göztepe project is one of five new metro lines currently being built by the Istanbul Metropolitan Municipality. Due for completion in 2019, the new lines will increase the

city's current 145km Metro network to more than 480km.

In recent years, TERRATEC's order book has demonstrated significant growth around the world. Machine performance and client satisfaction have provided the foundations of a loyal customer base and are making the Australian manufacturer the first choice for more and more contractors.

Earlier this year, TERRATEC opened a new large-diameter TBM facility that will deliver more than 12 new machines in the second half of 2017 and beginning of 2018, including the four new EPBMs for Istanbul.

TERRATEC TBMS COMPLETE SUCCESSFUL BREAKTHROUGHS AT LUCKNOW METRO'S HAZRATGANJ STATION

Australian-based TBM manufacturer, TERRATEC, recently joined dignitaries and officials from Gülermak-TATA Projects JV and the Lucknow Metro Rail Corporation (LMRC) to celebrate the successful completion of the city's first TBM-driven tunnels, as part of the the 22.88km-long (Phase 1 A) Lucknow Metro North-South line (see map on next page), in Uttar Pradesh, India.

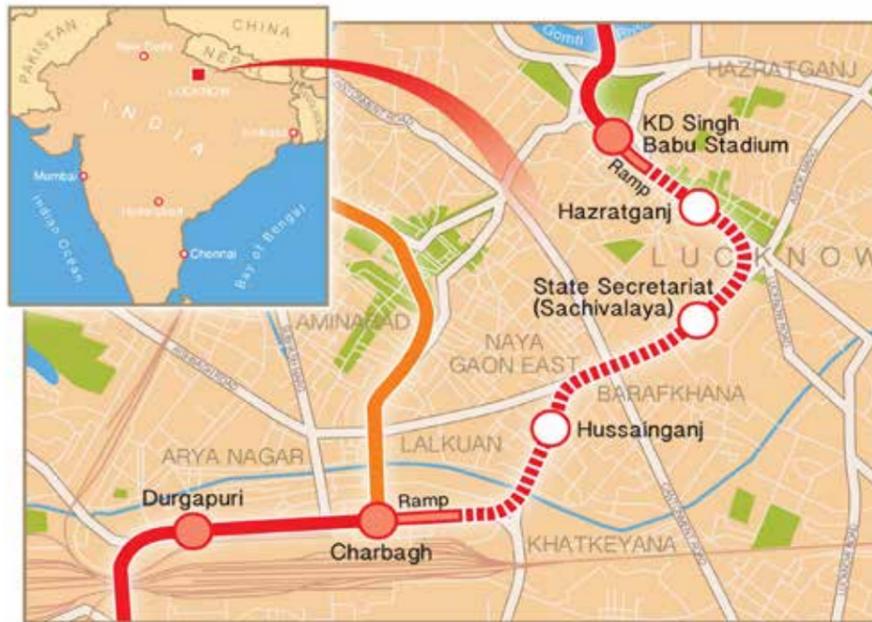
The first of two 6.52m diameter TERRATEC Earth Pressure Balance (EPB) Machines working on the project, the S52 TBM named 'Gomti', was launched from Sachivalaya Station's Bapu Bhawan Shaft in January. It took Gomti just four months to complete the first down-line tunnel on the line's 3.44km LKCC-06 underground section, arriving at Hazratganj Station in late May. Following a

2.5-month wait for the official ceremony, the TBM broke through the station wall on August 07, followed a day later by its sister machine, the S53 TBM named 'Ganga', on the up-line tunnel.

The EPB machines feature a classic soil configuration and are equipped with a spoke-style cutterhead with a 57 percent opening ratio.

Gülermak-TATA Projects JV celebrate the successful completion of the city's first TBM driven tunnels on Phase 1 A of the Lucknow Metro, in Uttar Pradesh, India.



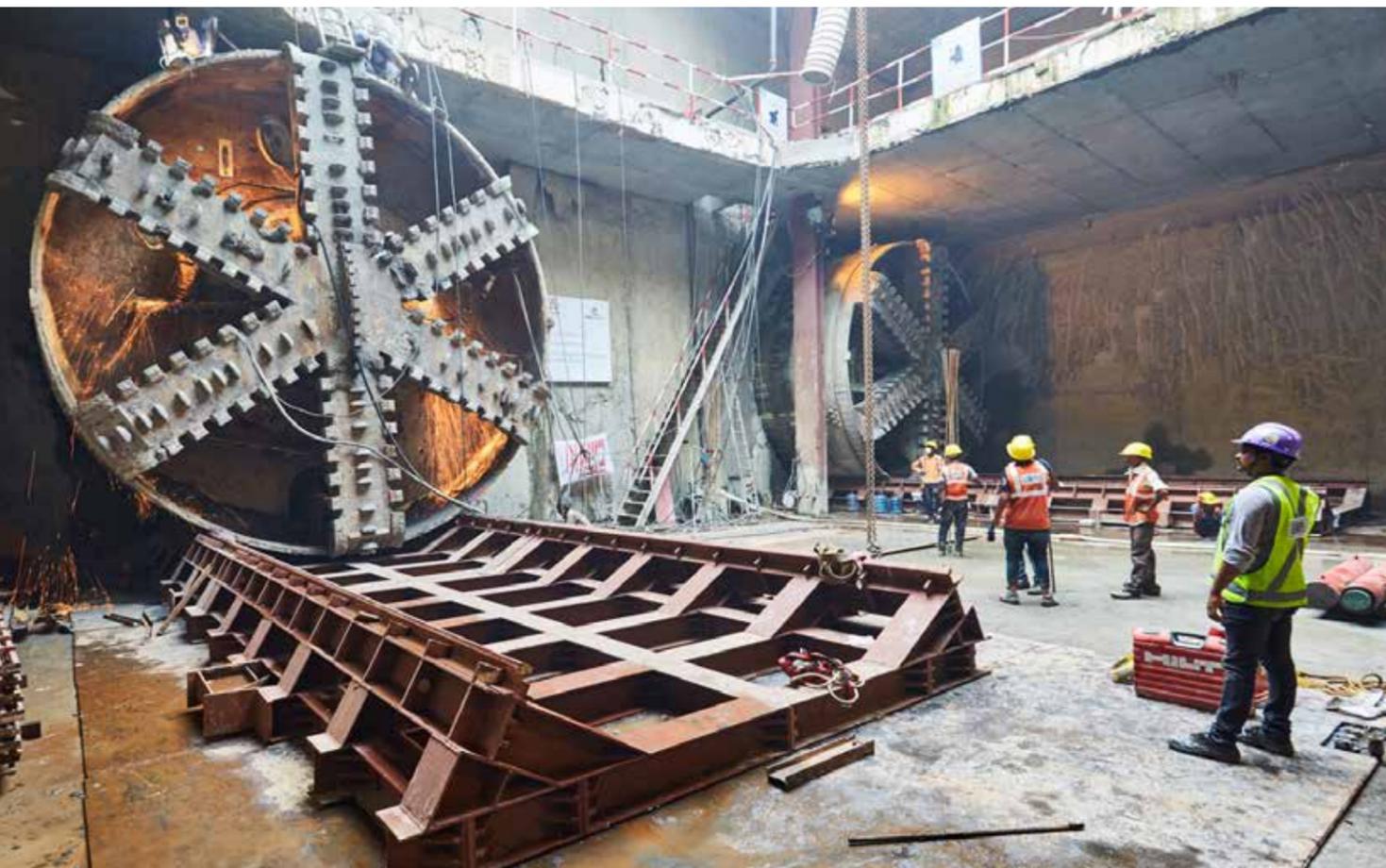
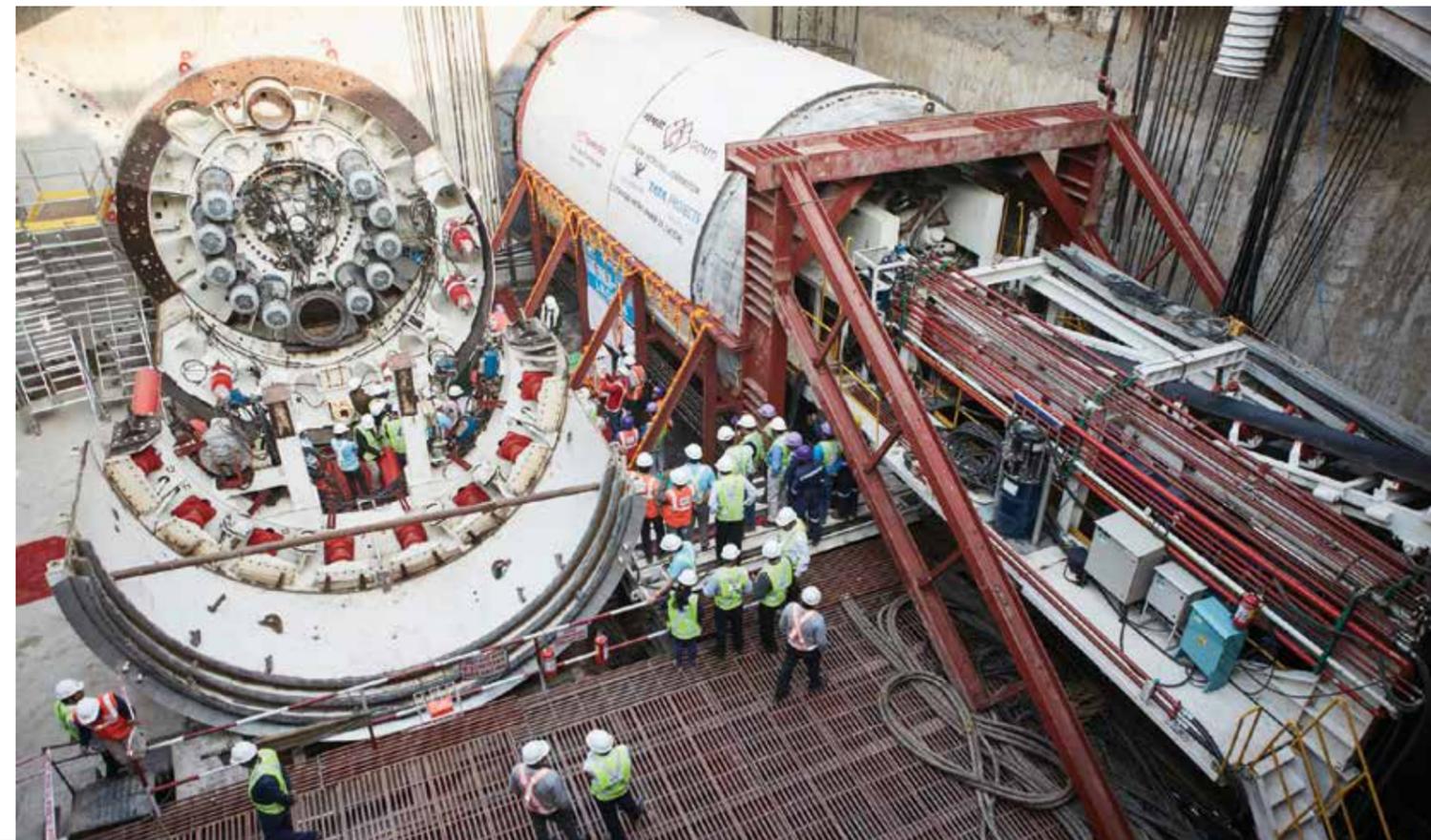


TERRATEC designed the cutterheads with cutting tools that are interchangeable with 17" roller disc cutters, allowing the TBMs to bore through

station diaphragm walls and cope with the presence of any unexpected obstacles along the tunnel alignment. The TBMs mined through

geology consisting of stiff to hard clayey silt and medium to dense silty sand, passing beneath historic structures in the Capital Plaza of Hazratganj (heritage district) without any disturbance to buildings, public utilities or traffic.

Speaking at the ceremony, LMRC's Managing Director, Mr. Kumar Keshav said: *"This unique achievement was only possible due to the hard work and commitment of the Lucknow Metro project team. The tunnelling in this stretch posed an enormous technical challenge as the route passes beneath highly congested areas at a depth of 12 to 15 meters below ground. With this breakthrough, LMRC has achieved one of the*



biggest milestones in form of completion of first TBM drive in the construction of underground metro in the state of Uttar Pradesh."

"Due to many heritage structures, the stretch was highly challenging. With excellent guidance from the LMRC team, state-of-the-art TBMs, and a dedicated, passionate, project team, the daunting task was completed in a world-class manner with outstanding quality and before-time completion. We all at TATA projects feel very proud of this accomplishment," added TATA Projects' Managing Director Mr. Vinayak Deshpande. With tunnelling completed

between Sachivalaya & Hazratganj stations, there are now four tunnel drives (and breakthroughs) remaining. The TBMs are currently being reassembled at the Sachivalaya (State Secretariat) Station's western-end to build twin 613m tunnels towards the Hussainganj Station. From there, they will continue on a further 419m – crossing underneath the Haide Nalah (canal) – to a cut and cover ramp near Charbagh station.

The TBMs are installing 275mm thick x 1400mm long, reinforced concrete Universal-style, lining rings – comprising five segments + key – which are being manufactured at a

local casting yard in Vrindavan. The 36-month EPC 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.

Lucknow's rapid growth combined with substantial traffic congestion has prompted the need for a modern public transportation system. Aiming to bring world-class infrastructure to the city, 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

A video featuring TERRATEC's S52 EPB TBM, named 'Gomti', breaking through at Lucknow Metro's Hazratganj Station can be found here: [Watch now!](#)



WHEREABOUTS

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EXCONTM
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Excon 2017
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