08] CEE Special - Terratec.qxp 9/30/2015 4:31 PM Page 8

It has been an excellent journey of growth for Terratec in India

— **Gulshan Gill,** Managing Director, Terratec India Pvt Ltd

Our principle business driver is to provide mechanized tunnelling solutions to solve our customers' problems. We want to cater to all these sections individually as per the upcoming demand.

Q When did Terratec enter the Indian market and how has the journey been thus far?

Terratec entered the Indian market in 2010 for the Bangalore Metro. Since 2012, Terratec has deployed a total of 8 TBMs (tunnel boring machines) for Delhi Metro Phase III. We have so far done around 12 km of tunnelling works with Terratec TBMs. It has been an excellent journey of growth and mixed geological challenges.

Q Name some important projects in India that have deployed Terratec TBMs.

Some projects are:

Delhi Metro Phase III

- CC07: Tunnel Jama Masjid-Lal Quila-Kashmere Gate
- CC20: Tunnel Mayapuri-Naraina Project
- CC24: Tunnel Nizamuddin-Ashram-Vinoba Puri-Lajpat Nagar
- CC34: Tunnel Dashrathpuri-Palam and between Janakpuri West St. and the beginning of the Cut & Cover Section.

Delhi Jal Board

- Interceptor Sewerage by Microtunnelling solution for abatement of pollution in Yamuna River of Delhi Jal Board

Q Apart from tunneling projects for underground metro rails, do you also cater to other areas like, for instance, hydropower?

Yes, over the last 25 years, Terratec has supplied tunnelling machines and equipment to every type of underground tunnel projects, metro, rail, sewage, hydropower etc.

Q Name some contractors that have used Terratec TBMs for projects in India.

Some such contractors are:

- HCC -SAMSUNG JV
- Metrostroy O.S. and ERA Infra Ltd. JV
- J.Kumar Infraprojects Ltd. and China Railway Third Group (CRTG) JV
- Seli Overseas S.p.A.
- DS Construction & Fegshun and Wabag JV
- Continental Engineering Corporation (CEC)

Q Do you feel that Indian companies have sufficient knowledge in handling/operating TBMs?

Yes, many of our clients deploy with their own crew. They have successfully broken through multiple times using Terratec TBMs. We do support them by providing key manpower as per the client's requirement and project needs case by case.

Q Tell us about how you go about training operators in using Terratec TBMs.

Our TBM experts have undergone job training in tunnelling in all kinds of geological conditions around the world.

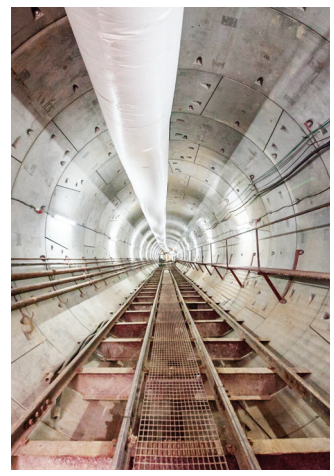
Q Can we assume that Terratec TBMs supplied to India are sourced from global Terratec factories? Do you envisage manufacturing TBMs in India in the foreseeable future?

TBM manufacturing is a very special process of interfacing multiple capital equipment from different origins. At present we are manufacturing our TBMs entirely outside of India, but certainly we will be looking in the future to manufacture more parts locally to reduce the transportation and custom duty cost for our clients.

Q What are "Raise Boring Machines" and where are they deployed?

Raise boring machine (RBM) offers several advantages over the conventional shaft construction method. The most important are safety, speed, physical characteristics of the completed hole, labour reduction and cost reduction.

No men are exposed to the danger of rock fall from freshly blasted ground or to the continual use of explosives, with their fumes and inherent danger of misfires. Raises can be safely drilled in ground that would be extremely hazardous, if not impossible, to drive by conventional methods.



A hole drilled by RBMs can generally be completed in a fraction of the time required for conventional methods.

The Indian mining industry is realizing the utility of RBM and we look forward to supplying to our Indian mining clients our most efficient RBMs which have proven track record in the global mining market

Q When Terratec supplies machines to India, is there any need to customize it to suit Indian terrain?

Our design team in Australia analyses all the basic design parameters and tailors to every TBM, which are governed by many factors including type of soil, overburden, water content, tunnel length, available space for launching and retrieval etc. Hence, no two machines are completely identical in design.

Q Given that Indian infrastructure is showing signs of revival, how do you see the road ahead for Terratec in India. Can we assume that metro tunneling jobs will continue to be your principal business driver?

Terratec designs and manufactures tunnel boring machines, microtunnelling systems, raise boring machines, conveyor systems and other custom-made products for tunnelling and mining applications.

Our principle business driver is to provide mechanized tunnelling solutions to solve our customers' problems. We want to cater to all these sections individually as per the upcoming demand. ■

Speedier dam construction by RCC

◀ PAGE 7

and had to go little deeper. The river bed rock level was uneven with several crest formations. These could not be leveled even as the machines could not reach these spots as the surface was uneven. Secondly, these could not be made flat by blasting as blast could created cracks in the bed rock which would weaken the foundation.

Apart from this, several streams of coal seam were found trapped in the bed rock level. These coal seams are loose and when it comes in contact of water, it turns mushy. Because the RCC could not be built on a loose foundation, these coal seams had to be removed carefully before the RCC work begins. But these coal seams could not be excavated by machines. Hence, a large team of workers was deployed to clear these coal seams manually which took a lot of time.

Shuttering

The shuttering used for the RCC dam is made of steel sheets; hence it is a heavy structure. To lift and place these shuttering hydras and tower cranes were used. As the RCC process is fast, managing time cycle for placing the shuttering was very critical as it is a time consuming process. This was managed by precision in planning.

Quality

This dam was built with the highest quality. This was realised through well crafted and regimentally implemented quality assurance plans and commensurate quality control testing. The quality assurance involved all the aspects of the project namely Raw materials, equipments, construction processes, shuttering and manpower resources.

Conclusion

HCC Team prevailed over these challenges to finish the RCC dam in a record 196 days on May 12, 2015. In the powerhouse, major works are completed and installation of equipment is in progress. After installing the equipment, finishing works will be taken-up and is expected to be completed by December, 2015. The project will be commissioned by January, 2016.