

## Inside India's under-river metro: Decoding the tunneling tech used in Kolkata metro

**The tunnelling machine had a special feature allowing it to be converted into a submarine in case the river water entered the tunnel**

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The 4.8-km-long underground stretch and commercial operations on it began on March 15 (Image/IE)

Earlier this month, India witnessed the historic launch of the country's first under-river metro train service when Kolkata metro's Howrah Maidan and Esplanade corridor was opened to the public.

The service on the inaugural underwater transportation tunnel beneath the Hooghly River saw roughly 70,000 passengers on its first day. The boosted response from the public is a testament to Kolkata Metro's success. While the development is celebrated across the country, there were many roadblocks while the special project was in the initial phase of construction.

## **The India-German collaboration**

Project experts have now highlighted the unforeseen obstacles faced during its construction and the role that two specially designed German-made tunnel boring machines played in overcoming them, a report by PTI mentioned.

Multinational construction and engineering company Afcons Infrastructure Limited said the tunnel boring machines (TBMs) and their backup facilities, were unique in several ways and made a huge contribution to the construction. Notably, the machines costed about Rs 140 crore and weighed more than 550 tonnes,

“The soil of Kolkata and Howrah is very treacherous and unpredictable. It is because the Hooghly River, which is now concentrated on a particular path, had a bigger presence in the city in the past so even today there are underground narrow channels and aquifers spread all across the city with a connection to the river,” Tamal Biswas, Project Manager, Afcons Infrastructure Limited, said.

In 2010, the Mumbai-headquartered company won the contract through international bidding.

## **Understanding the tunnelling tech**

Before placing an order for German TBMs, a team of experts studied the soil conditions and other factors. Meanwhile, the German firm was instructed to manufacture machines along with several special features specific to the project requirements.

Notably, the Indian team found that it was safe to move the TBMs 31 metres to 39 metres under the river portion. Throughout the alignment, the depth of tunnelling is maintained as 16m to 39m, experts associated with the project said.

## **A multi-nation collaboration**

Besides Germany, Afcons joined hands with Russian, South African and European engineers who had expertise in constructing under-river tunnels.

“In the initial period, we recruited three to four foreign experts to understand the concept of the tunnel because we were new to this field,” another expert mentioned.

In normal circumstances, the boring machine starts from one underground station and keeps boring to the other station. Then it is taken out, serviced properly and again placed down to resume boring up to the next station.

“In our case, the TBMs were put down 16 metres below the ground at Howrah Maidan metro station and it kept moving underground a distance of 4.8 km covering three stations Howrah (at 30m depth), Mahakaran (at 24m depth) and Esplanade (at 28m depth) without being taken out because these stations were not ready by that time,” the expert said.

It is noteworthy that the tunnelling machine had another special feature allowing it to be converted into a submarine in case the river water entered the tunnel.

On March 6, PM [Narendra Modi](#) inaugurated the 4.8-km-long underground stretch and commercial operations on it began on March 15.