

# Engineering feats on new railway line

**CONSTRUCTION GLORY:** The Ipoh-Padang Besar electrified double-tracking project is now 88 per cent complete. Ooi Tee Ching meets MMC-Gamuda executives in Taiping and gains an insight into the construction feats in this 329km railway stretch

**I**N giving a new lease of life to the decades-old KTM Bhd tracks, the electrified double-tracking project (EDTP) will see a new double-sided "spine line" traversing across Perak, Kedah, Penang and Perlis.

There is also a "spur line" that branches out from Bukit Mertajam to Butterworth and rejoins the main line at Penanti.

Besides laying fresh tracks, the EDTP involves the construction of 15 new stations, eight halts and three depots.

The twin tracks will run into tunnels, across bridges, flyovers and underpasses. There will also be pedestrian and motorcycle crossings to ensure a safe journey for commuters and heavy cargo.

"We're adopting a multi-layered construction approach," said MMC-Gamuda Joint Venture Sdn Bhd senior manager for planning and control Mohd Nizam Daut.

He said the construction sequence started with the foundation for the railway tracks. This was followed by stations and lastly, the installation of the signalling systems. "To save time,

we did this simultaneously in all four states," he said.

Present at the interview were MMC-Gamuda Joint Venture tunnel manager Ng Hau Wei and assistant signalling manager Sri Viknesh Permalu.

Ng said the 3.3km Berapit tunnels, built underneath a hill, currently held the record as the longest twin-bore tunnels in Southeast Asia.

The 9m wide tunnels were constructed using the "drill and blast" method because Bukit Berapit is mainly granite rock. The twin tunnels span 1km underneath Federal Route 1 and the North-South Expressway.

In implementing the "drill and blast" approach, the engineers drilled a few holes into the rock surface and packed small amounts of explosive into them. These are then detonated and the rubble removed.

"We then reinforced the tunnel surface to secure the excavated site. This was done repeatedly for 2km," Ng said.

Successful execution depended on the location and depth of the holes. The right amount of explosives placed in each hole was determined by a carefully devised pattern, which together with individual explosions, yielded a

horseshoe-shaped tunnel.

At stretches where the tunnel alignment is just 3m from the surface of Federal Route 1 and the NSE, engineers used mini-tunnel boring machines.

Moving on to another site, Ng said the single-bore 343m Larut tunnel was the first railway tunnel constructed for electrified trains in the country. The structure is the world's largest pipe arch built with a record 2.38

million man hours without a single fatality.

Another engineering feat is the 3.5km Bukit Merah viaduct, the longest marine rail-bridge in Southeast Asia.

The foundation of the marine viaduct consists of 900mm reinforced concrete spun piles plunged into the lake to support the piers.

Crossheads and T-beams were then installed on top of the piers. A total of 920 "T-beams", each weighing 45 tonnes, were placed 15m apart on each of the 230 spans.

"Logistics and transportation were a big hurdle. All materials had to be shipped to the site before

construction could begin. Furthermore, we adhered to strict water quality control by the Department of Environment and the Department of Irrigation and Drainage," Nizam said.

It was imperative to preserve the lake's pristine water as it supplies thousands of households in the Kerian district, including irrigating the padi fields in the surrounding area.

The Ipoh-Padang Besar project has now entered its final phase — the systems stage. When met in Penang recently, a Balfour Beatty

Ansaldo Systems JV representative, the main contractor, confirmed that the installation of the railway's operating systems was ahead of schedule.

The electrification and signalling design for the operating systems is now more than 70 per cent approved by the government. The first of the nine feeder stations — which power the main lines — at Lahat has been energised.

All components are ready to be deployed to Sungai Siput, Taiping, Bukit Merah, Simpang Ampat, Tasek Gelugor, Gurun, Tunjang

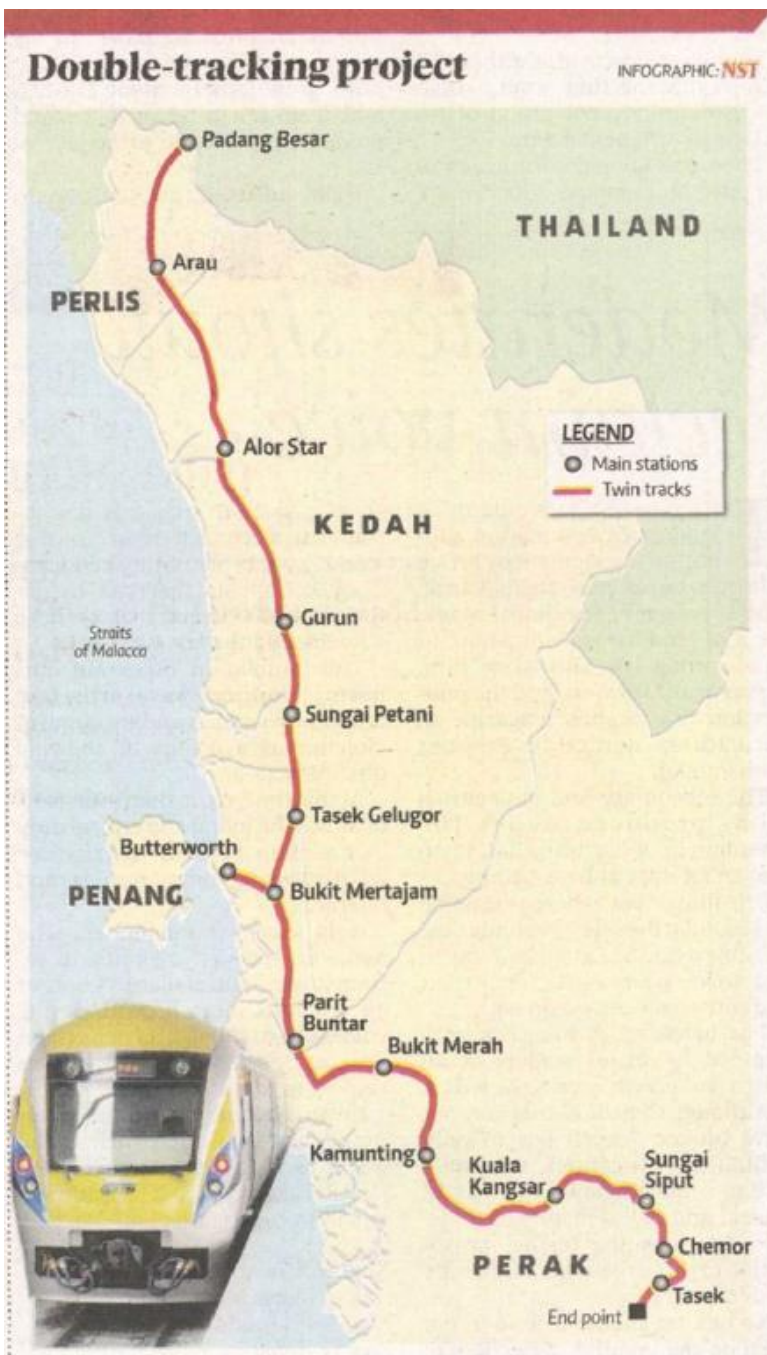
and Bukit Ketri.

Viknesh said railway signalling was a system used to control traffic and prevent trains from colliding. All over the world, the centralised signalling system is touted as being at the forefront of train safety technology as it is designed to be fail-safe, eliminating chances of conflicting commands.

Viknesh said the EDTP had presented many challenges. "It has been a steep learning curve, but at the same time, we also feel honoured to be contributing to the nation's economy."

*"It has been a steep learning curve, but at the same time, we also feel honoured to be contributing to the economy."*

**Sri Viknesh Permalu**  
assistant signalling manager





*(From left) MMC-Gamuda Joint Venture senior manager Mohd Nizam Daut, assistant signalling manager Sri Viknesh Permalu and tunnel manager Ng Hau Wei at the **Berapit tunnels**, which hold the **record** as the **longest twin-bore tunnels** in Southeast Asia. Pic by Yong Chee Choong*