Inside the Gotthard Base Tunnel

Report by Markus Grämiger and George Raymond

An IRSE Swiss Section inspection trip on 19 September gave 25 members and guests a close look at the Gotthard Base Tunnel (GBT), including inside the tunnel's twin 57 km bores. Our host was Charly Simmen, who is overseeing railway equipment installation. At the time of our visit, the tunnel was about 80% equipped; it is slated to enter commercial service in December 2016.

WHY BUILD A 57 KM TUNNEL?

The GBT is the new heart of the Gotthard transit route linking northern and southern Europe. Its construction reflects a 1994 referendum that amended the Swiss Constitution to restrict trucks on cross-alpine routes such as the overloaded motorway between Basel and Chiasso.

The Gotthard mountain route, famous for its spiral tunnels, opened in 1882 and will continue to carry some traffic after the GBT opens beneath it. Along with the 15 km Ceneri base tunnel between Bellinzona and Lugano, to be opened in 2019, the GBT will increase trains from the 1400 tonnes possible on the mountain route to 4000 tonnes. The new route will also save an hour for passengers, who will travel through the tunnels at up to 250 km/h. The GBT will see up to 300 trains per day.

AUTOMATED TRACK LAYING

The company AlpTransit Gotthard is in charge of building the GBT. At the AlpTransit visitors' center in Biasca, near the GBT's south portal, films showed us processes such as the custom-built, automated system that aligns sleepers before pouring the concrete that will hold them for many decades. It progresses up to 280 m a day.

We also saw how one of the master systems will let supervisors monitor and control underlying systems for traction power, signalling, traffic control, drainage, fire protection, door control, ventilation and people detection. The system gives supervisors an overview, avoids information overload and lets them to drill down to more specific indicators and controls.

PREPARING FOR THE WORST

In an emergency such as a fire, the first goal is to bring tunnel operations into a stable state as a basis for further decisions. As far as possible, trains will drive out of the tunnel; ETCS was modified to allow them to back out. If required, passengers can move into the other bore, either at the cross passages located every 325 m or at one of the two "multifunction stations" at Sedrun and Faido. These divide the tunnel into three sections and are the best places for trainloads of people to move from one bore to the other.

The view for 35 miles
Photo G Pauli

In normal operation, only the piston effect of trains will ventilate the tunnel. In an emergency, active ventilation will extract smoke or bad air and inject fresh air via the tunnel portals and Sedrun's 800 m vertical and Faido's 2.6 km lateral access shafts. The multifunction stations also let trains cross from one bore to the other. In case of fire, doors and the ventilation system will keep the air pressure in safe tunnel sections higher than in the burning section.

IN WE GO

Before entering the tunnel, we each received a coat, a helmet and an emergency oxygen supply. A short, diesel-hauled train, usually for workers, took us into the west bore, to a cross passage about 2.73 km north of the Bodio portal. After we alighted, our train pulled further north until only its lights were visible. But the diesel's rumble continued to fill the tunnel.

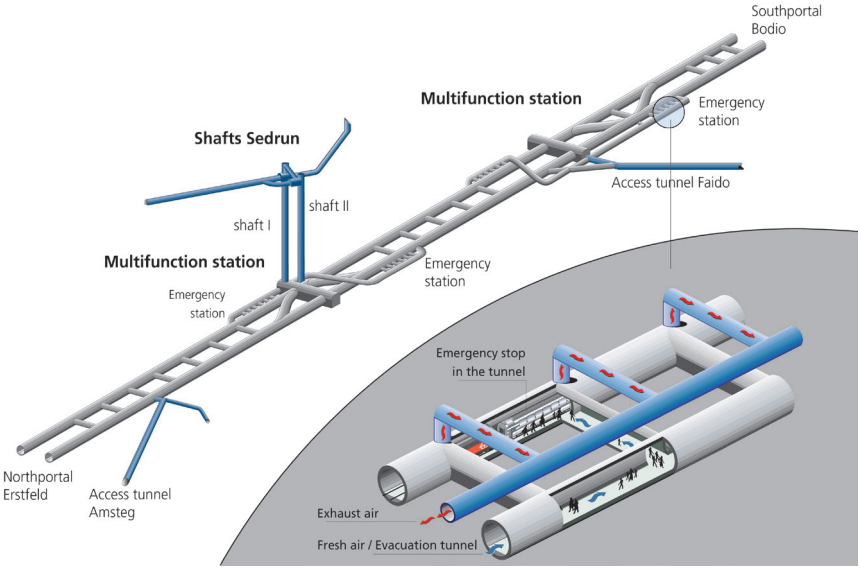
We each received an emergency oxygen supply
Photo R Werner

Outside the cross passage
Photo G Pauli

A gap between the mountain stone and the concrete tunnel lining lets water flow around the tunnel lining and into a drainage pipe beneath the track. This helps keep the tunnel dry, which should reduce maintenance needs. Up to 400 litres per second of water at 25°C exit the south portal. Proposed uses range from energy extraction to fish farming.

The roughly 30 metre cross passage connects the west bore with the east bore, which was still fitted with temporary construction track. Equipment cabinets lined the passage. All systems, including the tunnel's ETCS Level 2 signalling and traffic control, are built and thoroughly tested in cabinets off-site. Crews then install the cabinets in the tunnel and connect them to the tunnel's fibre-optic cables. Other cables will provide traction power. Antenna cables will enable both GSM-R signalling and cell-phone service for passengers.

Boarding the tunnel workers' train
Photo G Raymond



The tunnel system
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Cross passage linking the east and west bores
Photo R Werner

Appointment of new Licensing Registrar

Paula Persson, the current Deputy Licensing Registrar, has been appointed as Licensing Registrar with effect from 1 November 2014. Paula joined the Institution's staff in September 2013.

She succeeds Richard Hobby, who resigned in September following his move to Australia, having been in the role since 2005. Our thanks are due to Richard for his work in maintaining the currency and integrity of the licensing scheme as well as his support for other areas of the Institution's activities.

Colin Porter

Richard Hobby