

2.2 Construction of a large underground railway junction

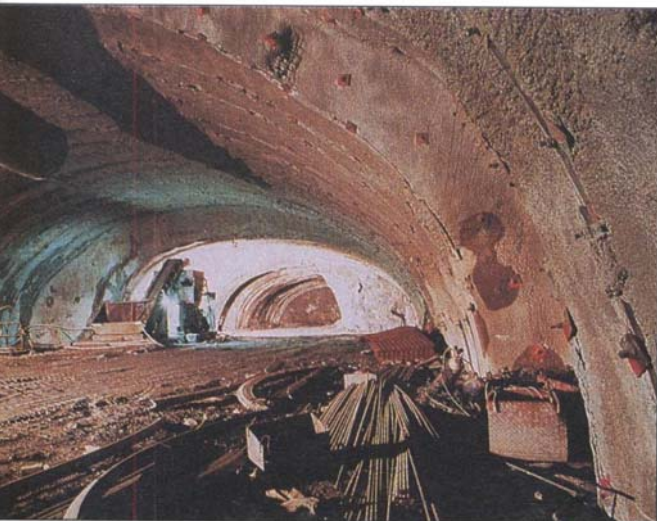
Inntaltunnel – Brenner Basistunnel

Project Description

One of the major north-south transit routes in the alps is the connection between Munich/Germany and Verona/Italy. To cope with the heavy traffic on the route through the Inn valley and over the Brenner pass in Austria a new railwayline in-



cluding the approximately 50 km long Brenner Basistunnel is planned. From 1989 to 1994 the 12,7 km long Inntaltunnel, bypassing Innsbruck was constructed. For a later connection to the planned Brenner Basistunnel an underground junction had to be constructed. The cavern required to accomodate



four tracks had a maximum excavation area of 316 m², and a maximum width of 27 m, with a height of 15 m. The overburden was approximately 200 m.

Solution

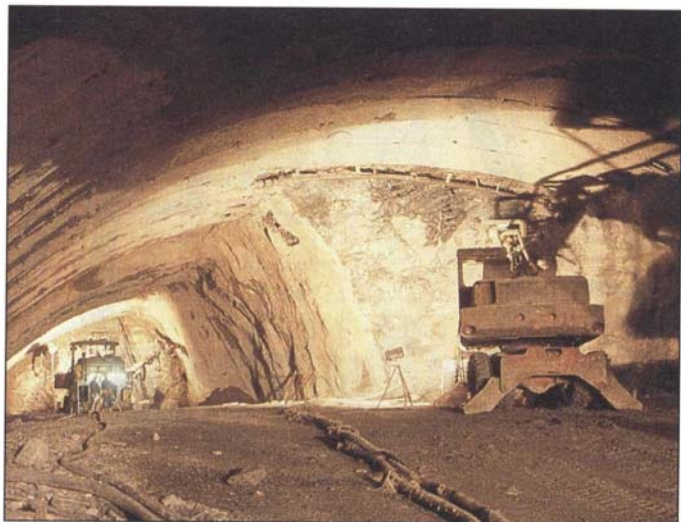
Heavily jointed and faulted phyllites were met in the area of the junction, making the construction a real engineering challenge.

From organisational and stability reasons the excavation was divided into a heading and two benches, with the heading again divided into three parts.

The primary support consisted of 6 to 8 m long grouted rockbolts, 20 cm shotcrete reinforced by wiremesh, and light steelribs.

Continuous geological mapping, as well as interpretation of the displacement and extensometer measurements allowed an optimization of the support. A systematic rockbolt pattern with a spacing of 1,5 x 1,75 m was used throughout the junction. Additional rockbolts were installed in areas, where faults or unfavourable combinations of joints were found, eventually leading to a bolt density of one rockbolt per 2,3 m².

200 m of the future connection to the Brenner Basistunnel were completed. The remaining rock pillar between the two



double track tunnels had a minimum width of approximately 1,5 m.

Construction of the 550 m long junction went rather smooth. The average rate of excavation was approximately 3,1 m per day, the heading was completed within 25 weeks.

The maximum measured vertical displacements of the crown were in the range of 15 to 20 cm, the horizontal displacements of the sidewalls in the range of 2 to 4 cm.

An excellent cooperation between contractor, geologist and geotechnical engineers was the key to success at this difficult project.

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