

**Tunneling****Reference Details:**

Owner Deutsche Bahn AG (German Railways), Germany +++ **General Contractor** JV New high speed line Nuremberg-Ingolstadt, Lot North Bilfinger Berger AG, Max Bögl GmbH, Germany +++

Design Consultant

External leaf: Ingenieurgesellschaft Lässer -Feizlmayr, Innsbruck, Austria; Internal leaf:

Amberg, Seidl & Partner, Regensburg, Germany +++

Consulting Engineers

Dipl.-Ing. Distelmeier, Germany Prof. Kirschke, Germany

DSI Services

Services Supply of 95,000 m SN Anchors; 140,000 m DYWI[®] Drill Hollow Bars used for temporary stabilization; 1,350 m IBI Anchors; 2 pc MAI mortar proportioning pump M400 including spare and wear parts; Technical assistance.

**DYWI[®] Drill Hollow Bars secure tunnel for ICE high speed railway****Near-surface tunnel Göggelsbuch, Göggelsbuch, Germany**

Construction of the new ICE high speed railway, designed for speeds up to 300 km/h, will reduce the travel time between Munich and Nuremberg, Bavaria's two largest cities, from currently over 100 minutes to less than 60 minutes. After completion of additional sections between Nuremberg and Berlin, the overall travel time from Munich to the German capital will take 4 hours instead of the current 6.5 hours. A special structure within the limits of the building project is the Göggelsbuch tunnel with an overall length of 2,287 m. This tunnel which has a full cross section of approximately 150 m² and includes a rescue shaft with two emergency exits in the center

of the tunnel is entirely embedded in a layer of Feuerletten, with an overburden of 4 to 20 m. The Feuerletten consists of claystone with fine and mid-sized sand, comprising sandstone sequences with a thickness of up to 5 m as well as alternating sandstone - claystone layers of up to 10 m in certain areas. The tunnel is lined over its entire length with a double reinforced internal leaf whose thickness on the floor varies between 75 cm and 125 cm and is a uniform 35 cm thick in the vault.

Due to its technical expertise in geotechnical applications, DSI Austria's Salzburg branch was awarded the contract for supply of the required anchor systems. Anchoring was executed using 25 mm dia.500/550 SN anchors with a rolled on screw thread for the anchor nut. In each 1 m roof section seven anchors with a length of four meters each were installed in the surrounding rock. In addition, DYWI[®] Drill Hollow Bars were installed to temporarily stabilize the working face.

The project was successfully completed in August 2001.