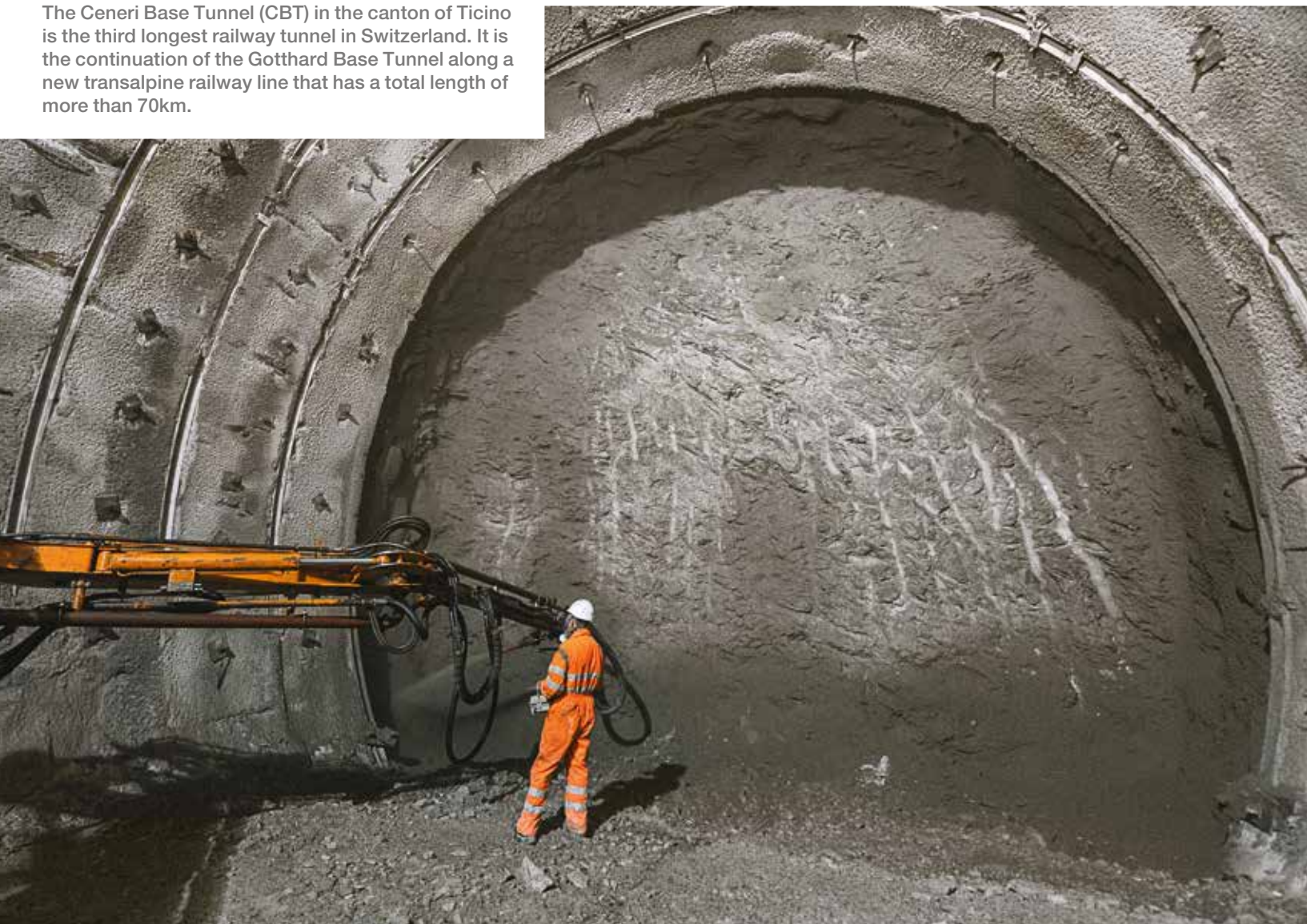


## The Ceneri Base Tunnel: DYWIDAG supplies Ground Support Products for Switzerland's third largest Tunnel

The Ceneri Base Tunnel (CBT) in the canton of Ticino is the third longest railway tunnel in Switzerland. It is the continuation of the Gotthard Base Tunnel along a new transalpine railway line that has a total length of more than 70km.



*Photos reprinted courtesy of Consorzio Condotte-Cossi, Italy*

The modern and flat route will allow speeds between 200 and 250km/h. In contrast to the existing section, where additional locomotives are required to push the trains in order to cope with a slope of up to 26 ‰, the trains will no longer have to be pushed on the new section, which is also 40km shorter than the existing section.

The 15.4km long Ceneri Base Tunnel is being built as a double tube tunnel with a cover of 10 to 850m. The parallel tubes are single track tubes separated by a space of 40m.

Every 325m, the tubes are connected via crosscuts.

Via a 2.5km long approach adit, an intermediate heading was driven near Sigrino from which the main tunnel is being simultaneously excavated at four different locations. The main section – Lot 852 – consists of two 8km long drifts towards the North and of 2 approx. 6km long drifts towards the South.

The new tunnel is located in the crystalline rock of the Southern Alps in heterogeneous rock

strata. Due to the fault zones that are expected in this area, tunnel advancement is primarily carried out using the conventional blasting method. In order to cope with the very different geological conditions, the project is divided into 10 different excavation sections.

The areas located in the most stable rock formations required flat inverts, few short rock bolts and a thin shotcrete lining. The sections where intermediate fault zones are prevalent were advanced using curved inverts, steel ribs in the crown, rock bolts in the tunnel walls





and thick shotcrete lining. The areas located in the strongest fault zones were excavated using circular invert, steel ribs in the crown and invert, many long rock bolts and a thick shotcrete lining.

For all 10 excavation sections, DYWIDAG supplied R 32 and R 38 Ø DYWI® Drill Rock Bolts with a total length of approx. 149,500m, all of which were flexibly adapted to on-site conditions. The self-drilling DYWI® Drill Hollow Bar System proved to be ideal in these difficult ground conditions because it can also be

installed trouble-free and safely in a single step in unstable boreholes.

In addition, DYWIDAG supplied a total of 93,000 Type EFB-160 and EFB-240 OMEGA-BOLT® Rock Bolts. The expandable friction bolts achieve immediate full load bearing capacity over the entire installed bolt length and are therefore very suitable for advancing the Ceneri Base Tunnel in the prevailing fault zones.

#### Owner

Federal Council of the Swiss Government, Switzerland

#### Operator

AlpTransit Gotthard AG (ATG), Switzerland

#### Contractor

Joint Venture Consorzio Condotte-Cossi, consisting of Società Italiana per Condotte d'Acqua S.p.A., Cossi Costruzioni S.p.A. and LGV Impresa Costruzioni SA, all of them Italy

#### Engineering

Joint Venture ITC ITECSA-TOSCANO, consisting of ITECSA – Ingengneria Tunnelling e Consulenze SA, EDY TOSCANO AG, Pini Swiss Engineers and Amberg Engineering, all of them Switzerland

#### DSI Unit

DYWIDAG S.P.A., Italy

#### DYWIDAG Scope

Production, supply, technical support

#### DYWIDAG Products

R 32 and R 38 Ø DYWI® Drill Rock Bolts, total length = 149,500m; 93,000 Type EFB-160 and EFB-240 OMEGA-BOLT® Rock Bolts