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GEORESOURCES AND ENVIRONMENT ASSOCIATION



ITALIAN TUNNELLING ASSOCIATION

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MECHANIZED TUNNELLING: CHALLENGING CASE HISTORIES

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THE MONTE GIGLIO CONVEYORBELT TUNNEL TBM tunnelling with variable slopes in difficult rock conditions (Bergamo - Italy)

Abstract

The Monte Giglio tunnel is a 5 m diameter 9 km long tunnel needed to transport the excavated rock material from a quarry uphill to the cement factory.

The tunnel slope vary along its alignment from -10%, to almost flat and than to +25%.

A continuous conveyor provided by the Client is installed behind the TBM to transport out the muck during tunnel excavation as well to transport the quarry material during future tunnel operation.

An open type TBM associated to NATM supporting system was initially adopted to bore the tunnel.

However, after having excavated few hundred meters in difficult ground with very low advance rates it was decided to stop the tunnelling activities and take out of the tunnel the open type TBM.

SELI was than invited to join the initial Contractor Joint Venture and, following a new study of the construction methodology, it was decided to adopt a double shield TBM associated to a precast segmental lining.

For the transport of the precast segments and back-fill material it was developed, by a cooperation SELI-ROWA, a special train able to climb down and uphill with 25% inclination. After an initial learning curve mainly affected by conveyor and climbing train set up problems the Double Shield TBM reached very high advance rates with peaks over 35 m/day and averages over 600 m/month.

These advances rates, considering the adverse geology and the transport limitations caused by the variable slopes, constitute a great achievement of the new technologies adopted and open the door to future applications of the system to other tunnels to be bored along complex vertical alignments.