



POLITECNICO DI TORINO
Dipartimento di Georisorse e Territorio



GEORESOURCES AND ENVIRONMENT ASSOCIATION



ITALIAN TUNNELLING ASSOCIATION

INTERNATIONAL CONGRESS

MECHANIZED TUNNELLING: CHALLENGING CASE HISTORIES

Politecnico di Torino, 16 – 19 November 2004

THE ABDALAJIS TUNNEL **The new Double Shield Univerale TBM challenge** **(Malaga- Spain)**

Abstract

The new high speed railway lines under construction in Europe require to execute very long large diameter tunnels under the most variable rock conditions.

Standard Single Shield and Double Shield TBMs are not always the right answer for the execution of these tunnels, especially when very adverse rock conditions are expected with rapid squeezing ground and/or face collapses.

The Abdalajis tunnel is twin 10 m diameter 7,1 km long railway tunnel to be bored in under high cover trough very variable and adverse rock conditions.

Due to the adverse geology, already in the design phase it was foreseen the tunnel to be interested by rapid convergence as well by instabilities of the tunnel face.

To face these difficult foreseen conditions SELI and Mitsubishi jointly developed a new type of TBM, named Double Shield Universal (DSU TBM)

This new TBM type has been designed to cope with squeezing ground better than standard Single or Double Shield TBM and to be able to stabilise the tunnel ahead of the face by a combination of piles and grouting.

The tunnelling conditions actually encountered until now in the tunnel are worse than the more pessimistic forecasts due to the presence of high inflows of methane gas combined with squeezing ground and face collapses.

The new DSU TBM proved not to suffer at all the squeezing ground and this result, combined with the treatment of the ground at the face and ahead of the face, up to now proved to be sufficient to advance the TBM even in the worse sections without requiring any hand mining work.

The continuation of the tunnelling activities in the Abdalajis tunnel will provide more complete indications about the DSU TBMs behaviour and about possible improvements in its design and features.