



**POLITECNICO DI TORINO**  
Dipartimento di Georisorse e Territorio



GEORESOURCES AND ENVIRONMENT ASSOCIATION



ITALIAN TUNNELLING ASSOCIATION

**INTERNATIONAL CONGRESS**  
**MECHANIZED TUNNELLING: CHALLENGING CASE HISTORIES**

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**DOUBLE SHIELD TUNNELLERS IN THE CONSTRUCTION OF  
THE  
GUADARRAMA TUNNELS**

**Abstract**

The characteristics of the igneous and metamorphic bedrock, extrahard and abrasive, of the Guadarrama tunnels, a bi-tube project of length 28.4 km without any intermediate attack, are first commented upon. Next, a detailed discussion is given of the most relevant aspects of the performance of the four double shield type TBMs which have now excavated 83% of the total project length. The experience of this leads to various recommendations to be borne in mind in future designs of TBM having to work in rock of similar characteristics.