“EXPERIENCE IN THE HIGH-SPEED LINES TUNNELS CONSTRUCTION”

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Abstract

The necessities demanded by the current society of more efficient ways of communication and more respectful with the environment make nowadays the railway high-speed velocity tunnel an essential element for the future.

Consequently, we decided to realize these thesis which, far from pretending to deep in complex calculations of geotechnical and rock mechanics, what it pretends is to offer a Data-base which gives a clearly and global vision about the railroad high-speed velocity tunnels actuality, specially, about those of big lengths, which, due to their physical and functional characteristics, present more difficulties.

There is a direct-effect relation between high-speed drafting and tunnels design. Nowadays the gradients are being reduced and drafting are more gradual. This sort of drafting has a direct influence on the number and shape of the structures. In this way we require continuously the construction of more tunnels with bigger lengths.

Secondly, it is important to remark the velocity increase. This element pointed out the differences between the conventional tunnel and the high-speed tunnel and some problems which were imperceptibles just then, as an example, some travellers experimented unpleasant feelings, even pain, when the train passed through the tunnel. Consequently, the application of physics to the train and the study of aerodynamics appeared as a necessity.

Here, these phenomenon’s have been analyzed pointing out the importance in the design of the transversal section and the difficulty of find an optimal balance between the tunnel/train transversal section; the pressure variations; the train-air-tunnel friction-effect; and an adequate exploitation velocity and construction costs and tunnel exploitation.

Moreover, the different methods of excavation have been analyzed, showing us the significant improvement experimented in the outputs, costs and security, due to the utilization of new tunnelling boring machines instead of traditional excavation methods.

Tunnels are building works where the space is limited to the transversal section. As a result, tunnels are not accessible from anywhere and its physical characteristics are essential on the difficulty for resolve an emergency inside the tunnel. For this reason, we have studied the different measures of security which assure an acceptable risk-level, because security basic concepts must be assure above economic and social profitability.

Finally, current and future tendencies in design, projects and tunnel construction have been described.