

## **“SINGULAR PROJECTS IN THE DEVELOPMENT OF THE EUROPEAN HIGH SPEED RAILWAY”**

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### **Abstract**

After the success of the first European high-speed line between Paris and Lyon in 1981, the idea of an European high-speed network progressed quickly. In this way, in 1988 the Community of European Railways proposed a network that would reach 8.000 km of new lines and 11.000 km of upgraded lines for 160/220 km/h in 2015. In this network, some singular projects were identified, on the basis of the difficulty with the orographical conditions in the corresponding layouts. All of them were considered like key links for the creation of an authentic network with high performances, since they belong to international sections placed at the main European transport corridors.

In this minor thesis, the main characteristics of some of these singular projects were analysed, specially those that cross the Alps and that correspond to the following relations: Lyon-Turin, Zurich-Milan via the Saint-Gothard, Bern-Milan via the Lötschberg and Innsbruck-Verona. The emphasis was put on the design parameters used in these projects, in comparison with those of the European high-speed lines that do not cross important mountainous chains.

The difficulties of the present layouts in the transalpine lines lead to very high journey times and accordingly to a low passengers volume in these international sections. Therefore the new transalpine lines, some of them in advanced state of construction, are being designed for mixed traffic (passengers and freight). This operating system forces to moderate the top speed to 200/240 km/h, beside the usual high-speed lines designed for 300/350 km/h.

The geometric parameters of the lines chosen to reach the design speed (the minimum radius of curvature and the maximum gradients) force to the construction of very long base tunnels, to overcome the difficult topographical conditions of the regions that the singular lines pass through. All of them will consist of two single-track bores, one for each direction, in order to follow the international safety recommendations for mixed traffic. The investment necessary for the construction of these transalpine railways is very high, four times greater than the most expensive European ones.

The construction of the new singular lines will increase the competitiveness of the rail in the international services for both passengers and freight transport. The higher speeds and the smaller layouts will mean substantially shorter journey times. Moreover, the design parameters used, in particular the lower gradients, will improve significantly the quality of freight traffic, shifting it from the roads to the rails.