DESIGN ASPECTS FOR HIGH-SPEED RAILROADS

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ABSTRACT

This thesis wants to describe some important aspects of the design for High Speed railroads nowadays. Basically there is an intention to study the elements that form the infrastructure of the road, especially those which define its platform. The study principally pretends to describe the type of sleepers that are used usually for that kind of transport roads, pointing their roles in the exploitation of the line, as well as the influence of the sleepers on the maintenance of the road. It will finally be of great interest to extend the objectives of the work, trying also to focus the economic applications of the design, besides its technical character.

Although the main habitat of the present thesis is the European High-speed railway system, there is also the motivation to particularize the case of the Spanish railroads. It can be therefore a good procedure to specify the general topic of the work, using the line that will hopefully bind soon the cities of Madrid and Barcelona as a good example of our future High-speed system.

After explaining the methodology that the study will follow and having declared the general considerations of the thesis, I will try to give a first approach to the present European rail services. That is why it is useful to comment some general data about the railway webs of the main countries of the study, describing the existing rail lines for each case, including the conventional railways and the High-speed roads. This first sight will be completed with the help of several maps and other figures of interest. Further, I include a long row of images which try to illustrate the present High-speed trains of the most important European nations.

It is also necessary to introduce the typology of the European sleepers, and more precisely, their relations with the tensional distribution across the rail platform and their influence on the geometric dilapidation of the lines. In order to try to differentiate the origins of the train charges, these will be split in two groups, static and dynamic. Both of them will be important concepts for the High-speed study. Every point of this part is completed with numerical results, useful graphs and further conclusions.

It deserves a special mention analyzing the results coming from the main European sleepers and trying to compare this information with a new kind of sleeper, the so-called wide sleeper. This new element clearly has a bigger cost than the rest of sleepers, but it will certainly have a different efficiency, so it will need to be considered as a possible alternative for the sleepers used at the rail line between Madrid and Barcelona.

The thesis is finally completed with the already commented technical-economical study, whose contents do not claim to be a base for any possible rigorous or accurate economical study. Instead, it just tries to be an example of the importance of certain design aspects in the exploitation of the railroads.