

## **ABSTRACT**

### RAIL EXPANSION JOINTINGS LAYOUT STANDARDS ON HIGH-SPEED RAILWAY BRIDGES

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A basic railway bridge scheme is formed by rail and deck, both linked by ballast which is characterized by its non-linear stiffness behavior. Use of continuously welded rails on high-speed railway bridges causes high stresses in rails because of braking and acceleration forces and temperature differences between rail and deck.

It is important to study the interaction between track and deck because it causes overstresses in rails. These induced stresses must be restricted in order to avoid rail buckling or failure and relative movements between rails and structure to ascertain a reliable support of the rails by the ballast. One way to erase or reduce these stresses is to place railway expansion jointing. However, use of those devices has to be avoided whenever it is possible because of infrastructure maintenance and since it reduces comfort on railway movement.

With the help of a computation model, previously calibrated, the interaction between track and deck will be studied in order to ascertain overstresses in rails and relative movements between rails and structure.

With the aim of using the least amount of rail expansion jointings, a continuous concrete girder bridge has been studied in order to know which is the maximum length without those devices. If we have longer continuous spans, rail expansion jointings will be necessary. This aspect has been studied by a continuous girder concrete deck model with more than 300 m., fixed at one end and with one rail expansion jointing at the non-fixed abutment. One alternative to continuous span is simply supported span; moreover, this option has the advantage of not needing rail expansion jointings. In order to know this behavior, a 10-simply supported span model has been done and different situations have been studied depending on pier highs.

Once we have studied all situations explained before, some project recommendations are given. These proposals make explicit the results of the document, giving advices to rail expansion jointings layout on high-speed railway bridges.