

## Monitoring of railway structure with bituminous underlayment

**The phenomenon of packing and wear of the ballast under dynamic stresses leads to high frequencies and maintenance costs.**

Several studies have shown that these settlements were linked to the high accelerations produced in the ballast by the passage of high-speed trains. The solution with bituminous underlay was used since the 1980s in several countries like the USA, Italy, Spain, especially on high-traffic and high-speed lines. In France, the interest for this technique is recent. Following the satisfactory behaviour of the East European high Speed Line (HSL), a layer of asphalt concrete was made under the ballast layer on a HSL, the Bretagne-Pays de la Loire (BPL) fast lane. It is intended to reduce the amplitude of the accelerations produced at the passage of the High Speed Train (HST). The HSL BPL has 105 km of innovative track with an asphalt concrete (GB)

sublayer under the ballast, and 77 km with a granular underlayer.

In order to study the dynamic responses of these different structures and understand the effect of the different layers on the dynamic response, and for the first time, four sections were instrumented (three with asphalt concrete and one on a standard granular structure) using, among others, accelerometers, strain gauges, temperature probes, etc. More than 100 sensors were installed on the structure in different positions and depths. The acquisition of the data was made during the speed up test phase under controlled conditions with the same train passing with speeds going up from 160 to 352 km/h. Afterwards, measurements of all the sensors were treated under actual traffic. The BPL lane was subjected to commercial traffic starting July 2017 •

