

SNCB

Elimination of uncomfortable vibrations

At the Belgian railroads national company (SNCB), a failure analysis carried out on railcars AR 41 allowed to identify the causes of vibrations felt by passengers, and to implement simple solutions to eliminate them. Explanations...

SNCB was confronted with vibration problems occurring in a very irregular way on its diesel railcars AR41 which run on regional lines in Belgium. Disturbing the passengers' comfort, these vibratory phenomena risked, on the long run, to damage the loaded machine parts. To ensure the reliability of these vehicles and the quality of the passengers' transportation, the company entrusted Cetim for a study in order to understand the origin of the phenomena and to propose solutions to eliminate the problem. "We had regular relations with Cetim for many years, and I had already opportunities to attend fatigue tests on tram bogies in Saint-Etienne, explains Alexandre Beaussart, engineer at the Bogie-studies

division at SNCB. Thus we addressed quite naturally to Cetim in order to find solutions to these difficulties."

Simple but efficient

Very quickly, the test campaign carried out in SNCB's maintenance workshop at Merelbeke, near Ghent, at the engine start and after three hours of operation, highlighted the evolution of the hydraulic group resonance frequency according to the temperature variation of the mounts.

"The studies carried out by Cetim showed that the vibratory levels recorded in the cars while the engine was running idle at 800 rpm prevail definitely at a frequency of 20Hz, says Alexandre Beaussart. Then characterization tests using



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the shock hammer, with stopped engine, showed the existence of a resonance around 21Hz at the hydraulic group suspended on its mounts, which leads to a significant amplifying effect." Considering these results, simple solutions were recommended. The first consisted in slightly increasing the rigidity of the hydraulic group suspension mounts, or to adjust their position to create a light drift of the resonance frequency, moving it away from the excitation frequency. The second solution concerned directly the excitation, modifying slightly the engine's idle rotation speed. At 760 rpm, the excitation frequency decreases up to 19 Hz, and this is enough to decrease markedly the vibratory phenomenon.

OUR CUSTOMER

Corporate name
SNCB

Activity
Railway operator

Workforce
18.000 people



Cetim's asset

Taking benefit of having experts in multiple fields (e.g.: power transmission, noise, vibrations, metrology, etc), Cetim combines its forces to carry failure analyzes missions at its customers' request.