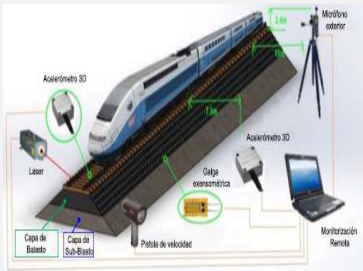


R&D PROJECT



BUSSINESS AREAS
Infrastructure area
COMSA, S.A.

DURATION
2018-2021

BUDGET
Consortium Budget:
617.845,32€
COMSA Budget:
323.212,69€

KEYWORDS
Optimised ballast, ballast, railway track
maintenance, ballast liquefaction

COORDINATOR
Joan Peset

EXTERNAL FUNDING



Title of the project

Optimised ballast with extended durability

Acronym

BALLAXT

Content of the project

The Ballaxt project aims to develop an optimised ballast of extended durability with controlled characteristics and improved performance over the natural ballast currently in use. The ballast, through the optimisation of parameters such as shape, size and unit weight, will give better performance in terms of durability of the ballast layer in existing and future railway lines. The particles that form the optimised ballast are synthetic elements in which two fundamental characteristics can be controlled: geometry (shape and dimension) and material composition. Compared to natural ballast, optimised ballast improves the mechanical behaviour and increases the service life of the ballast bed. It also reduces track maintenance costs and the environmental impact generated by the operation of natural rock quarries.

General objectives

- Complete modelling of the behaviour of the ballast from the mechanical point of view (vibrations and granular flow). From this analysis, the optimum density, shape and size of the particles to be developed is obtained.
- Tests of the mechanical properties (impact resistance, anti-abrasion, etc.) for optimised ballast sample. Laboratory tests under simulated train loading.
- Carrying out tests and field trials on railway tracks on the final solution, to evaluate the suitability of the product obtained

Results and conclusions

The results obtained in the project at the level of numerical simulation, laboratory and field test have been completely satisfactory:

- The results obtained in the simulations using DEM-FEM show an improvement in terms of reduced degradation of the artificial ballast and the track bed, which leads to a reduction in maintenance needs and a lengthening of the service life of the ballast.
- Laboratory tests empirically confirm the improved performance Ballaxt. The vibration and seating values obtained are significantly lower than the values recorded for conventional ballast, confirming the suitability of Ballaxt for extending ballast life and reducing maintenance costs, as well as the suitability of the product for reducing the overall thickness of the ballast layer section, especially for the rubber-coated model.
- The results obtained in the field tests show an improvement in stress transmission and stress distribution, thanks to the newly designed geometry, where the flat surfaces of the Ballaxt sides attenuate stress concentrations. The reduction of vibrations caused by passing trains is also confirmed, reducing the wear of the ballast and hence making it more durable.