

R&D PROJECT



Title of the project

Development of railway ballast and sub-ballast from electric arc furnace black slag

Acronym

BIRBALAS

Content of the project

Slag is waste obtained as a by-product of the steel manufacturing process in electric arc furnace steelworks. The manufacturing process has two distinct stages: a first one for melting raw materials in an electric arc furnace, and a second for refining the molten bath that ends in the ladle furnace.

General objectives

The project seeks to analyse the technical and market feasibility for the use of black slag from different steel mills in the Basque Country as ballast and railway sub-ballast, deepening in the fulfilment of specifications that guarantee both functional and environmental compliance of the product and facing traditional market barriers that the material has historically had to face in other sectors.

Results and conclusions

The steel aggregates have been analysed at laboratory level with the aim of checking compliance with the requirements for aggregates used as ballast and subballast specified in the specifications of the railway infrastructure manager, ADIF (TECHNICAL SPECIFICATIONS FOR PLATFORM PROJECTS (PGP-2011)). The geometric, mechanical, chemical and physical properties of the aggregates have been examined and their compliance has been verified.

In addition to that, in order to determine the behaviour of the material in real conditions, a pilot section in Derio (Vizcaya, Spain) has been monitored. The section is 108 metres long, divided into four subsections with four mix configurations (different compositions of natural aggregate and steel aggregates). Measurements have been taken with accelerometers installed in the sleepers, as well as periodic topographical surveys and in situ leachate tests. The results obtained are as follows:

- Lower settlement in the subsections with different dosages of steel aggregate compared to the control subsection (composed only of ballast and sub-ballast of natural origin).
- The results measured by the accelerometers indicate that the accelerations in the axis perpendicular to the plane formed by two sleepers (Z-axis) are higher in the subsections with the presence of steel aggregate, confirming that its stiffness is greater than the ballast and sub-ballast of natural origin.
- The in-situ leachate test shows a metal content of the mixes used that in no case reaches the limit values established in the two criteria considered: Decree 64/2009 Escor. Sid. Type 2 and Type 3.
- No interference with the track signalling system or the generation of stray currents is detected.

This project opens up a new line of products for the railway sector that are sustainable and environmentally friendly, with reduced production and maintenance costs and technical performance in compliance with regulations.



DURATION

01/04/2019 – 31/12/2021

BUDGET

Consortium Budget: 1.305.788,83 €

COMSA Budget: 249.442,17 €

COORDINATOR

José López Sánchez

EXTERNAL FUNDING

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– HAZITEK.

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