

## Digital Mapping and Modelling of Railway Infrastructure for Condition Monitoring of the Track

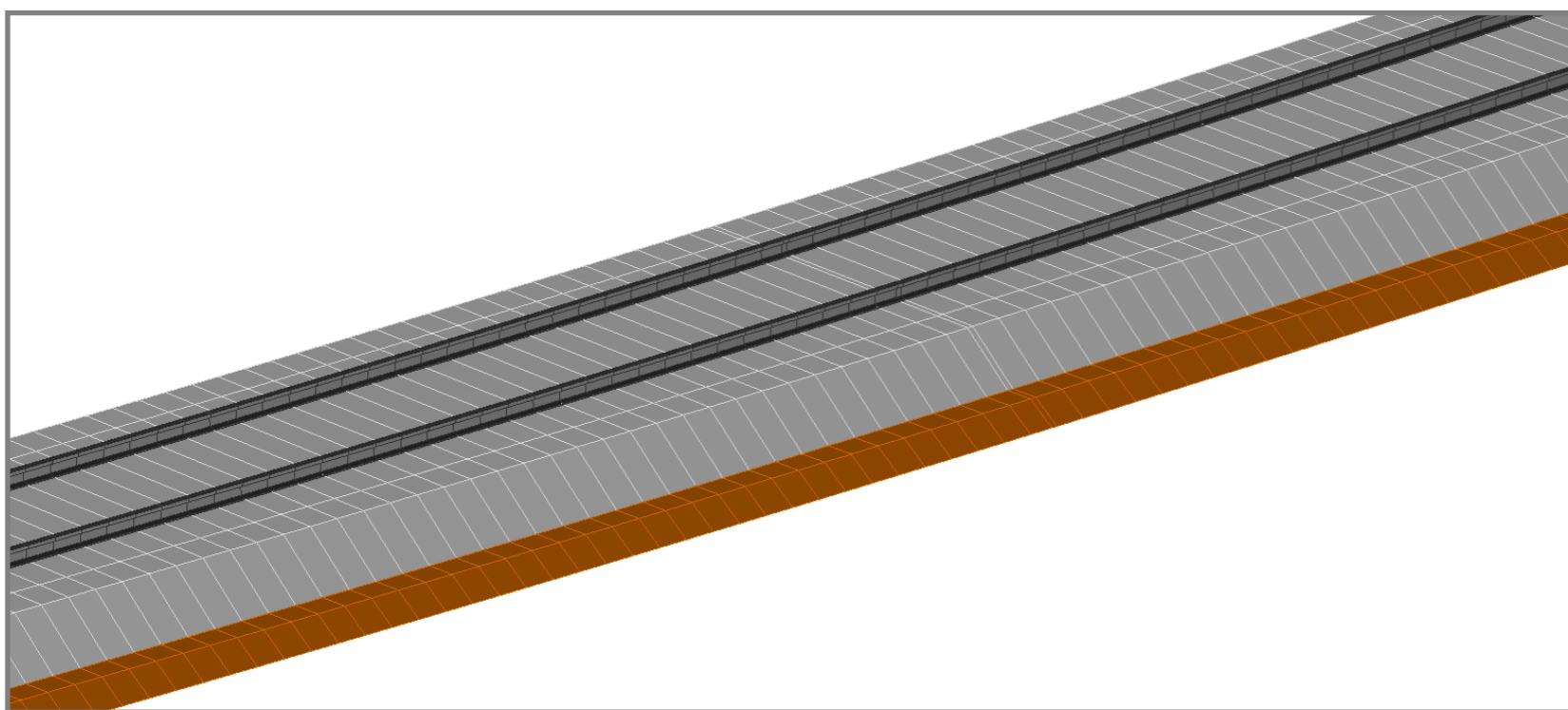
Railway track maintenance requires advanced approaches to plan and execute more cost-effective intervention activities. These maintenance strategies have emerged with a proactive approach in order to detect early signs of deterioration and faults based on the condition of the system. This represents an opportunity to integrate these maintenance strategies with innovative digital technologies to support infrastructure management.



Photo: Laura Tatiana Rodríguez Bayona

### Objective:

The objective of this work was to develop a three-dimensional (3D) digital model of the Tälesbahn railway line. A relational database was implemented as a centralized platform for the integration of infrastructure and track monitoring data, which along with an interactive visualization of the data supports comprehensive analysis of the condition of the track.



Overview of a section of the Tälesbahn 3D digital model.



Visualization of longitudinal acceleration measured from the car body.

### Principal outcomes:

- The georeferenced digital model of the Tälesbahn railway line has the capacity to represent the geometric and physical characteristics of the track, offering a comprehensive overview of the elements in a 3D environment.
- The integration of the data is effectively achieved using spatial and statistical analysis, providing a meaningful representation of the inertial measurements.
- Visualization of inertial signals provides insights into the operating and geometric characteristics of the infrastructure, as well as significant information regarding potential fault detection.

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