

A model for optimising the use of local trains

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The University of Seville has participated in a project dedicated to optimising both planning and transport systems. David Canca (University of Seville) and Eva Barrena (University Pablo de Olavide) led the study in which they considered the importance of where to locate the yards where local trains are kept overnight.

The planning of rail transport is a complex problem that is generally tackled sequentially. The habitual procedure is to address consecutively the design of the infrastructure network, the route of the lines on this network and their frequency, determination of timetables (arrival and departure times at the stations, and in their case, on busy networks, the sequencing of trains to avoid conflicts), the management of the rolling stock, the establishment of shifts for drivers and crew, depending on the area, and finally assigning staff to these shifts.

The sequential structure traditionally used in railway planning means that optimal solutions can be missed. Thus, within the project "Structural Analysis of Mathematical Models for the Optimisation of Transport Location and Planning," research was undertaken that proposed the integration of two types of decision when establishing the management of rolling stock.

Given that at the end of daily services, trains have to move to the yard where they spend the night, dealing separately with the movement of trains and the location of yards often means unproductive journeys with empty trains. This project proposes a new optimisation model that simultaneously determines the weekly planning of train movements and

the position in the network of yards.

In this way, the number of empty trains traveling to yards is minimised, which reduces the amount of fuel used, rail congestion, and long-term [network](#) costs. In addition, the solutions obtained balance the length of the weekly circuits done by each train, making it easier to design rotating maintenance plans.

More information: David Canca et al. The integrated rolling stock circulation and depot location problem in railway rapid transit systems, *Transportation Research Part E: Logistics and Transportation Review* (2017). [DOI: 10.1016/j.tre.2017.10.018](https://doi.org/10.1016/j.tre.2017.10.018)

Provided by University of Seville

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