

# Infinite time horizon crew scheduling modeling for a train transportation problem

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## Abstract

This work introduces a crew scheduling problem for train operations, based on a rotative schema, where weekly trips are fixed along the time, meaning that the trip program doesn't vary along the weeks. Each schedule generates a 0-1 medium/large size (hundreds to thousands of variables and constraints) optimization problem, but with complexity on constraints due to the lack of structure. The special feature of this model rests on the property of being an infinite horizon schedule, due to the rotative schema, where every crew takes the place of the consecutive crew when a new week starts. The problem resolution is made through three steps: first, finding a feasible solution of infinite length, where schedules repeat in a rotative way between crews; then, an adapted local search is applied to improve the initial solution, in order to equilibrate the weekly working hours among crews and break the symmetry of the problem; finally, drivers are assigned to the scheduled weeks, solving a flow problem.

**Key words:** crew scheduling, integer programming, local search, heuristics.

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