Optimization of preventive condition-based tamping for railway tracks - DTU Orbit
(27/09/2019)

Optimization of preventive condition-based tamping for railway tracks
This work considers the scheduling of railway preventive condition-based tamping, which is the maintenance operation performed to restore the track irregularities to ensure both safety and comfort for passengers and freight. The problem is to determine when to perform the tamping on which section for given railway tracks over a planning horizon. The objective is to minimize the Net Present Costs (NPC) considering the following technical and economic factors: 1) track quality (the standard deviation of the longitudinal level) degradation over time; 2) track quality thresholds based on train speed limits; 3) the impact of previous tamping operations on the track quality recovery; 4) track geometrical alignment; 5) tamping machine operation factors and finally 6) the discount rate. In this work, a Mixed Integer Linear Programming (MILP) model is formulated and tested on data from the railway corridor between Odense and Fredericia, part of the busiest main line in Denmark. Computational experiments are carried out to compare our model to the existing models in the literature. The results show that taking into consideration these previously overlooked technical and economic factors 3, 5 and 6 can prevent under-estimation of required tamping operations, produce a more economic solution, prevent unnecessary early tamping, and improve the track quality by 2 percent.

General information
Publication status: Published
Organisations: Department of Transport, Traffic modelling and planning, Transport policy and behaviour, Xi'an Jiaotong-Liverpool University
Contributors: Wen, M., Li, R., Salling, K. B.
Pages: 455-465
Publication date: 2016
Peer-reviewed: Yes

Publication information
Journal: European Journal of Operational Research
Volume: 252
Issue number: 2
ISSN (Print): 0377-2217
Ratings:
BFI (2016): BFI-level 1
Scopus rating (2016): CiteScore 3.83 SJR 2.489 SNIP 2.417
Web of Science (2016): Impact factor 3.297
Web of Science (2016): Indexed yes
Original language: English
Keywords: Management Science and Operations Research, Modeling and Simulation, Information Systems and Management, Maintenance, Mixed Integer Linear Programming, Preventive condition-based tamping, Railway, Scheduling , Preventive maintenance, Railroad tracks, Railroads, Transportation, Computational experiment, Economic solutions, Maintenance operations, Mixed integer linear programming, Mixed integer linear programming model, Standard deviation, Integer programming
DOIs: 10.1016/j.ejor.2016.01.024
Source: FindIt
Source ID: 2291815818
Research output: Contribution to journal › Journal article – Annual report year: 2016 › Research › peer-review