

2017 / III.

A Hybrid Algorithm for the Vehicle Routing Problem with Three-dimensional Loading Constraints and Mixed Backhauls

This page contains material of the following paper:

Koch, H.; Schlöggel, M.; Bortfeldt, A. (2017): A Hybrid Algorithm for the Vehicle Routing Problem with Three-dimensional Loading Constraints and Mixed Backhauls.

Abstract:


In this paper, a variant of the vehicle routing problem with mixed backhauls (VRPMB) is presented, i.e. goods have to be delivered from a central depot to linehaul customers, and, at the same time, goods have to be picked up from backhaul customers and brought to the depot. Both types of customers can be visited in mixed sequences.

The goods to be delivered or picked up are three-dimensional (cuboid) items. Hence, in addition to a routing plan, a feasible packing plan for each tour has to be provided considering a number of loading constraints. The resulting problem is the vehicle routing problem with three-dimensional loading constraints and mixed backhauls (3L-VRPMB).

The simultaneous transport of linehaul and backhaul items presents a particular challenge of the problem. We consider two different loading variants in order to avoid any reloading during the tour: (i) rear loading with separate linehaul and backhaul sections and (ii) loading at a long side.

In order to solve the problem, we propose a hybrid metaheuristic consisting of a reactive tabu search for the routing problem and different packing heuristics for the loading problem.

Numerical experiments are reported with benchmark instances from the literature for the one-dimensional VRPMB to examine the performance of the routing algorithm and with newly generated instances for the 3L-VRPMB.

Typ	Titel	Content
	> 3L-VRPMB- instances	This file contains all data files for the Vehicle Routing Problem with Mixed Backhauls and 3D Loading Constraints. Best solutions are also provided.

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