2017 / II.

Hybrid Algorithms for the Vehicle Routing Problem with Pickup and Delivery and Two-dimensional Loading Constraints

This page contains material of the following paper:

Männel, D. (2017): Hybrid Algorithms for the Vehicle Routing Problem with Pickup and Delivery and Two-dimensional Loading Constraints.

Abstract:

We extend the classical Pickup and Delivery Problem (PDP) to an integrated routing and two-dimensional loading problem, calle PDP with two-dimensional loading constraints (2L-PDP). A set of routes of minimum total length has to be determined such that each request is transported from a loading site to the corresponding unloading site. Each request consists of a given set of 2D rectangular items with a certain weight. The vehicles have a weight capacity and a rectangular two-dimensional loading area. All loading and unloading operations must be done exclusively by movements parallel to the longitudinal axis of the loading area of vehicle and without moving items of other requests. Furthermore, each item must not be moved after loading and before unloading.
The problem is of interest for the transport of rectangular-shaped items that cannot be stacked one on top of the other because their weight, fragility or large dimensions. The 2L-PDP also generalizes the well-known Capacitated Vehicle Routing Problem wi Two-dimensional Loading Constraints (2L-CVRP), in which the demand of each customer is to be transported from the depot to the customer's unloading site.
This paper proposes two hybrid algorithms for solving the 2L-PDP and each one consists of a routing and a packing procedure. Within both approaches, the routing procedure modifies a well-known large neighborhood search for the one-dimensional PDP a the packing procedure uses six different constructive heuristics for packing the items. Computational experiments were carried o using 60 newly proposed 2L-PDP benchmark instances with up to 150 requests.

Typ	› Titel	Content
	› 2L-PDP-instances	This file contains all data files for the Vehicle Routing Problem with Pickup and Delivery and 2D Loading Constraints.

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