

Preface to the Special Issue on Cutting and Packing

Cutting and packing (C&P) problems are hard combinatorial problems, which arise in the context of many real-world applications, both in industry and in services. In general, they require that “large objects” be divided into “small items” in such a way that waste is minimized. Problems of this kind may involve the cutting of paper rolls into narrower ones in the paper industry, the cutting of large wooden boards into smaller rectangular panels in the furniture industry, the cutting of irregularly shaped components of garment from fabric rolls in the fashion industry, but also the packing of boxes into containers or the loading of boxes on pallets in logistics applications.

The aim of this double special issue of the International Transactions in Operational Research (ITOR) is to publish high-quality, state-of-the-art papers that contribute to the methodology and practice of cutting and packing, by either presenting new insights for understanding problem structure, new algorithmic approaches, or innovative resolution of real-life problems and practical applications. This special issue is also linked to the EURO Summer Institute on Cutting and Packing (ESI-CP), which was held in Porto, Portugal, July 16–29, 2012.

This special issue starts with a group of three papers in the area of 1D-Cutting and sequence related problems. The first paper co-authored by Vancroonenburg, Garraffa, Salassa, Vanden Berghe and Wauters presents a heuristic for a cutting problem with sequence dependent cut losses. The second paper co-authored by Gonçalves and Resende develops a biased random-key genetic algorithm for the minimization of open stacks problem. The third paper co-authored by Marinelli, Arbib and Ventura presents an integer linear programming model for the cutting stock problem with bounded open stacks.

The second group of papers includes five papers in the area of 2D-Cutting. The fourth paper co-authored by Wei, Qin and Cheang proposes an efficient algorithm for the two-dimensional strip packing problem. The fifth paper co-authored by Scheithauer and Buchwald develops upper bounds for heuristic approaches to the strip packing problem. The sixth paper co-authored by Birgin, Andrade and Morabito presents an approach to two-stage 2D guillotine cutting problems with usable leftovers. The seventh paper co-authored by Silva, Oliveira and Wäscher presents a review of solution methods and computational experiments for the pallet loading problem. The eighth paper co-authored by Scholz, Neidlein and Wäscher presents a problem generator for the 2D-Rectangular single large object placement problem with defects.

The third group of papers includes five papers in the area of 3D-Cutting, container loading, bin packing and shipper sizes. The ninth paper co-authored by Paquay, Schyns and Limbourg proposes

an exact formulation for the 3D bin packing problem in the specific case of air cargo. The tenth paper co-authored by Ramos, Oliveira and Lopes develops a physical packing sequence algorithm for the container loading problem with static mechanical equilibrium conditions. The eleventh paper co-authored by Costa and Captivo presents a case study in weight distribution in container loading. The twelfth paper co-authored by Alvarez-Valdes, Alonso, Parreño and Tamarit determines the best shipper sizes for sending products to customers. The thirteenth paper co-authored by Zhao, Bennell, Bektas and Dowsland presents a comparative review of 3D container loading algorithms.

The remaining two papers address other Cutting and Packing areas. The fourteenth paper authored by M'Hallah and Bouziri presents heuristics for cut order planning in the apparel industry, while the fifteenth paper authored by Pedroso, Cunha and Tavares proposes an approach for the recursive circle packing problem

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A. Miguel Gomes
José Fernando Gonçalves
Ramón Alvarez-Valdés
and
J. Valério de Carvalho
Special Issue Editors