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Non-Population Search Algorithms for Capacitated Material Requirement Planning in Multi-Stage Assembly Flow Shop with Alternative Machines

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Abstract : This paper aims to present non-population search algorithms called tabu search (TS), simulated annealing (SA) and variable neighborhood search (VNS) to minimize the total cost of capacitated MRP problem in multi-stage assembly flow shop with two alternative machines. There are three main steps for the algorithm. Firstly, an initial sequence of orders is constructed by a simple due date-based dispatching rule. Secondly, the sequence of orders is repeatedly improved to reduce the total cost by applying TS, SA and VNS separately. Finally, the total cost is further reduced by optimizing the start time of each operation using the linear programming (LP) model. Parameters of the algorithm are tuned by using real data from automotive companies. The result shows that VNS significantly outperforms TS, SA and the existing algorithm.

Keywords : capacitated MRP, tabu search, simulated annealing, variable neighborhood search, linear programming, assembly flow shop, application in industry
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