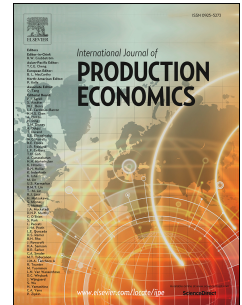


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Single Batch Processing Machine Scheduling with Two-Dimensional Bin Packing Constraints

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Abstract

We study the problem of minimizing the makespan for jobs on a single batch processing machine (BPM). A BPM can process several jobs as a batch simultaneously. Unlike the classic batch processing machine scheduling problems in which the capacity of a machine is modeled as one-dimensional knapsack constraints, in this research, the machine's capacity is represented by a two-dimensional rectangle and a job occupies a rectangle of its dimensions, i.e., width and height, while being processed on the machine. The processing time and the dimensions of the jobs are non-identical. A batch's processing time equals to the longest processing time of jobs in the batch. A batch is feasible only if the jobs can be placed in the machine without overlapping with each other. Arising from practical industrial applications such as advanced manufacturing and wafer fabrication, this problem is a generalization of both the classic single BPM scheduling problem and the two-dimensional bin packing problem (2D-BPP), which are both proven to be NP-hard. Thus, it is NP-hard as well. We present a mixed integer programming (MIP) model for this problem. We also

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