

Parallel Machine Scheduling by Family Batching with Sequence-independent Set-up Times

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Abstract—This paper presents a new approach for transforming MRP orders, planned periodically, e.g. on a weekly base, into a detailed schedule of jobs. In this model for a parallel machine environment, the jobs are partitioned into families and a family specific set-up time is required at the start of each period and of each batch, where a batch is a maximal set of jobs in the same family, that are processed consecutively. An integer program is formulated for both the problem of minimising the number of overloaded periods and the problem of minimising the total overtime. These programs generate benchmark results for the heuristic approach. A heuristic model is developed that constructs a schedule in which overloaded periods are relieved and set-up time is saved. In this approach, the job sequence is constructed by repeatedly solving a knapsack problem for each machine. The weights used in this knapsack problem relate to the preferred priorities of the jobs not yet scheduled and determine the quality of the final sequence. The different features of the heuristic model are compared using a large set of test problems. The results show that the quality of the final schedule depends on an appropriate choice of the weights.

Keywords—Set-up times, Family batching, Parallel machine scheduling

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