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Scheduling group of jobs with the dedicated processing property on parallel machine shops

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Abstract

One of the required things for developing smart factory that is currently issued in the field of manufacturing is an intelligent scheduling of jobs, for the objective of maximizing customer satisfaction, production quantity and quality. In this research, a scheduling of jobs in the automation manufacturing systems is considered. In the parallel machine shop, there exists a characteristic called as the dedicated processing property in which a set of jobs should be processed at the preferred machine although parallel machines can process several types of jobs. This property is reported at the many manufacturing lines, such as liquid crystal display manufacturing and semiconductor fabrications. The reason why dedicated processing machines are selected is due to the quality problems. In this problem, we also consider setup required operations for changing type of groups when changing process of different groups of jobs. For the objective of minimizing the time of last completed jobs, i.e. makespan of jobs, various heuristics are developed. We performed computational experiments with randomly generated test problems to evaluate performance of the devised methods and better solutions are shown by the suggested ones in a reasonable amount of computation time. Therefore, if the proposed scheduling methods are applied to the smart factory scheduling system, one may argue that production quantity and quality can be improved.

Keywords:
Dedicated parallel machines, scheduling, manufacturing