A Genetic Algorithm Based Permutation and Non-Permutation Scheduling Heuristics for Finite Capacity Material Requirement Planning Problem

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Abstract : This paper presents a genetic algorithm based permutation and non-permutation scheduling heuristics (GAPNP) to solve a multi-stage finite capacity material requirement planning (FCMRP) problem in automotive assembly flow shop with unrelated parallel machines. In the algorithm, the sequences of orders are iteratively improved by the GA characteristics, whereas the required operations are scheduled based on the presented permutation and non-permutation heuristics. Finally, a linear programming is applied to minimize the total cost. The presented GAPNP algorithm is evaluated by using real datasets from automotive companies. The required parameters for GAPNP are intently tuned to obtain a common parameter setting for all case studies. The results show that GAPNP significantly outperforms the benchmark algorithm about 30% on average.