A Heuristic for a part-mix allocation problem in a mixed production system with a Flexible Manufacturing Cell (FMC) and a Conventional Job Shop.

이 동호, 김 영대

한국과학기술원 산업공학과

This study considers the part-mix allocation problem in a mixed production system composed of a Flexible Manufacturing Cell (FMC) and a job-shop-type conventional cell with the objective of minimizing the makespan. The problem occurs in a number of small-to-medium sized cellular manufacturing systems, where an FMC is introduced as a means of partial automation or capacity expansion. In this study, the newly introduced FMC is assumed to be used as a parallel processor to the conventional job shop. This is because of the inherent flexibility of the FMC.

For the part-mix allocation problem arising from the mixed manufacturing system, we develop a heuristic algorithm to minimize the makespan for a given set of part types and corresponding lot sizes specified by a master production schedule (MPS) in a production period. Due to the computational complexity of the two subproblems, we use the priority dispatching procedure in the job-shop-type conventional cell and a part grouping heuristic in the FMC, where the part group is a set of part types for simultaneous processing. Here, the job shop makespan scheduling problem is a well-known NP-hard problem. And, so is the part grouping problem.

The proposed heuristic is a combination of the two procedures and considers the division of lots by the smaller lots in the conventional cell. Computational results show that a better makespan can be obtained by dividing a given lot into several smaller lots when scheduling the production. Conseqently, this study is expected to give a good usage of a newly introduced FMC in small-to-medium sized firms, in particular, minimizing the makespan is critical.