A mathematical programming model for cell formation problem with machine replication

ABSTRACT

Cell formation (CF) is a crucial aspect in the design of cellular manufacturing (CM) systems. This paper develops a comprehensive mathematical programming model for the cell formation problem, where product demands, cell size limits, sequence of operations, multiple units of identical machines, machine capacity, or machine cost are all considered. In this model, the intercell moves are restricted to be unidirectional from one cell to the downstream cells, without backtracking. The proposed model is investigated through several numerical examples. To evaluate the solution quality of the proposed model, it is compared with some well-known cell formation methods from the literature, by using group capability index (GCI) as a performance measure. The results and comparisons indicate that the proposed model produces solution with a higher performance.

Keyword: Cell formation; Group capability index; Mathematical model development