Abstract

This paper deals with manufacturing cell formation considering the dynamic behavior of the production system. First, we discuss the importance of taking into account the dynamic aspect of the problem that has been poorly studied in the related literature. We argue that by considering a multi-periodic planning horizon, we can tackle the problem according to two strategies: passive and active. The first strategy consists of maintaining the same composition of machines during the overall planning horizon, while the second allows performing a different composition for each period. We present a graph theory model for the problem. For the passive cell formation problem (PCFP), we prove that it amounts to a cell formation problem in a static system. In order to solve the active cell formation problem (ACFP), we propose a Shortest Path heuristic (SP) and a Genetic Algorithm (GA) based method. When the decision maker wants to choose the most adequate strategy for its environment, we state that the decision problem between active and passive strategies can be solved by solving ACFP. However, the complexity of ACFP justifies the need to control the presented solving approaches. In this situation, we propose a new fuzzy logic enhancement to the GA. The results, using this enhancement, are better than those obtained using the SP method or the GA alone