

Abstract

This paper deals with the manufacturing cell formation (MCF) problem, which is based on group technology principles, using a graph partitioning formulation. An attempt has been made to take into account the natural constraints of real-life production systems, such as operation sequences, minimum and maximum numbers of cells, and maximum cell sizes. Cohabitation constraints were added to the proposed model in order to deal with the necessity of grouping certain machines in the same cell for technical reasons, and non-cohabitation constraints were included to prevent placing certain machines in close vicinity. First, the problem is solved with a genetic algorithm (GA), using a binary coding system that has proved superior to the classic integer coding systems. A new Branch-and-Bound (B&B) enhancement is then proposed to improve the GA's performance. The results obtained for medium-sized instances using this enhancement are better than those obtained using the GA alone. Given these results, it is reasonable to assume that the B&B enhancement will provide good results for large real-life problems.