

**Abstract:**

This paper deals with the manufacturing cell formation (MCF) problem, which is based on group technology (GT) principles, by using a graph-theoretic model. Due to the exponential nature of the problem, various heuristics and meta-heuristics have been proposed to solve it. However, only few studies have attempted to develop exact algorithms. In this paper, we develop two B&B algorithms, taking into account the actual constraints of production. The first algorithm is based on the notion of co-cycles (cuts) in the generation of solutions. The second has a similar structure, except that it is improved by using the constraints. The obtained results of the two algorithms are reported for medium-sized instances. [Received 6 December 2013; Revised 10 March 2014; Accepted 3 August 2014]