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# A hybrid genetic and imperialist competitive algorithm approach to dynamic cellular manufacturing system

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## Abstract

Cellular manufacturing system is an important application of group technology, which deals with grouping the parts and machines into cells, based on their similarity in design or production process. Since a purpose of this article is designing the cells under indefinite demand values up to the end of previous period, a dynamic multi-objective mathematical model based on this condition is proposed, and a heuristic approach has been developed in order to solve the problem. During this procedure, since the proposed model is a nondeterministic polynomial-time-hard problem, a new hybrid meta-heuristic approach called genetic imperialist competitive algorithm is implemented to solve it. Also, an experimental design has been used for tuning essential parameters. The proposed model has been verified by some hypothetical numerical examples with different input parameters and also by a real-world case study taken from a glass mold company. The comparison of results of the proposed genetic imperialist competitive algorithm and the genetic algorithm verifies the efficiency of the proposed solution

approach. Also, the results show that the accuracy of the proposed algorithm is comparable with the exact solution methods such as branch and bound algorithm in both solution quality and computational time aspects.