

A Multiple Criteria Genetic Algorithm Scheduling Tool for Production Scheduling in the Capital Goods Industry

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Abstract

Production planners usually aim to satisfy multiple objectives. This paper describes the development of a genetic algorithm tool that finds optimum trade-offs among delivery performance, resource utilisation, and work-in-progress inventory. The tool was specifically developed to meet the requirements of capital goods companies that manufacture products with deep and complex product structures with components that have long and complicated routings. The model takes into account operation and assembly precedence relationships and finite capacity constraints. The tool was tested using various production problems that were obtained from a collaborating company. A series of experiments showed the tool provides a set of non-dominated solutions that enable the planner to choose an optimum trade-off according to their preferences. Previous research had optimised a single objective function. This is the first scheduling tool of its type that has simultaneously optimised delivery performance, resource utilisation and work-in-progress inventory. The quality of the schedules produced was significantly better than the approaches used by the collaborating company.

Keywords: genetic algorithms, capital goods, multiple criteria, production scheduling

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