

Manufacturing process planning optimisation in reconfigurable multiple parts flow lines

ABSTRACT

Purpose: This paper explores the capabilities of genetic algorithms in handling optimization of the critical issues mentioned above for the purpose of manufacturing process planning in reconfigurable manufacturing activities. Two modified genetic algorithms are devised and employed to provide the best approximate process planning solution. Modifications included adapting genetic operators to the problem specific knowledge and implementing application specific heuristics to enhance the search efficiency. **Design/methodology/approach:** The genetic algorithm methodology implements a genetic algorithm that is augmented by application specific heuristics in order to guide the search for an optimal solution. The case study is based on the manufacturing system. Raw materials enter the system through an input stage and exit the system through an output stage. The system is composed of sixteen (16) processing modules that are arranged in four processing stages. **Findings:** The results indicate that the two genetic algorithms are able to converge to optimal solutions in reasonable time. A computational study shows that improved solutions can be obtained by implementing a genetic algorithm with an extended diversity control mechanism. **Research limitations/implications:** This paper has examined the issues of MPP optimization in a reconfigurable manufacturing framework with the help of a reconfigurable multiparts manufacturing flow line. **Originality/value:** The results of the case illustration have demonstrated the practical use of diversity control implemented in the MGATO technique. In comparison to MGAWTO, the implemented MGATO improves the population diversity through a customized threshold operator. It was clear that the MGATO can obtain better solution quality by foiling the tendency towards premature convergence. **Keywords:** Reconfigurable manufacturing; Manufacturing process planning optimisation; Process selection; Process sequencing; Parts loading scheduling

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