

Performance optimization of simultaneous machine and automated guided vehicle scheduling using fuzzy logic controller based genetic algorithm.

Abstract

The current trend in manufacturing technology is considered by two main items automation and flexibility. Flexible manufacturing system (FMS) is one of the most identified systems that include both automation and flexibility criteria. It comprises three principle elements: computer controlled machine tools, an automated material handling system and a computer control system. One of the automated materials handling equipment in FMS is automated guided vehicles (AGVs). Integrated scheduling of AGVs and machines is an essential factor contributing to the efficiency of the manufacturing system in FMS environment. Previously, genetic algorithm (GA) is considered as a heuristic method to solve AGV scheduling problem. GA may not be able to achieve the global optimum due to premature convergence because of control's lack on its operators parameters. Fuzzy logic controller (FLC) is proposed to control the behavior of GA during solving the scheduling problem of AGVs. This paper presents a job-based GA that is based on job sequencing. Through the optimization, the FLC is used to control the GA operators (crossover and mutation rate) simultaneous to solve the AGV scheduling problem

Keyword: Flexible manufacturing system; Automated guided vehicle; Simultaneous scheduling; Genetic algorithm; Fuzzy logic controller; Optimization