International Journal of Production Research ›
Volume 49, 2011 - Issue 5: Multi-agent and holonic techniques for manufacturing systems: technologies and applications

Original Articles

Multi-agent based scheduling in manufacturing cells in a dynamic environment

Paolo Renna

Pages 1285-1301 | Accepted 01 Aug 2010, Published online: 15 Dec 2010

Cite this article https://doi.org/10.1080/00207543.2010.518736

Abstract

Manufacturing systems need to develop more strongly time-oriented strategies in order to react to the dynamic conditions of the competitive environment. This research concerns the scheduling of cellular manufacturing systems by multi-agent architecture in real time. This research proposes a coordination approach for the multi-agent architecture based on the computation of internal and external indexes of the generic manufacturing cell. The proposed approach has been compared with an approach based on the workload index in order to provide evidence of the improvements. A simulation environment developed in the ARENA® package was used to implement the approaches and evaluate the performance measures. The performance measures investigated are: throughput time, throughput, work in process, machines average utilisation, and tardiness. Several scenarios are considered: from static to very dynamic

conditions for internal and external exceptions of the manufacturing system. The simulation results highlight that the performance of the proposed approach outperforms the performance of the benchmark in all conditions.

Keywords:

multi-agent systems | scheduling | negotiation | dynamic environment | simulation

Related Research Data

Internet Scheduling Environment With Market-Driven Agents
Source: IEEE Transactions on Systems Man and Cybernetics - Part A Systems and Humans
Agent-Based Systems for Manufacturing
Source: CIRP Annals
A hybrid scheduling and control system architecture for warehouse management
Source: IEEE Transactions on Robotics and Automation
Development of the order fulfillment process in the foundry fab by applying distributed multi-agents on a generic message-passing platform
Source: IEEE/ASME Transactions on Mechatronics
Dynamic shopfloor scheduling in multi-agent manufacturing systems
Source: Expert Systems with Applications
A distributed architecture and negotiation protocol for scheduling in manufacturing systems
Source: Computers in Industry