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

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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

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Source: IEEE Transactions on Systems Man and Cybernetics - Part A Systems and Humans
Agent-Based Systems for Manufacturing
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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
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