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A case study of production scheduling and shop floor control for hybrid flexible flowshop

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Abstract

The case company of this research is a tool holders firm and in which the grinding is the critical manufacturing process which is a hybrid flexible flowshop (HFFS) manufacturing system. In this research, a mixed-integer linear programming (MILP) model and a genetic algorithm (GA) are firstly developed for HFFS scheduling with unrelated machines and setups in grinding manufacturing process of tool holders. The objective is to minimize total tardiness. The HFFS with unrelated parallel machines and setup time are taken as a basis to benchmark two types of autonomous control methods. The shop floor management procedures and mechanisms of dynamic HFFS are modeled based on lean theory. Autonomous control systems are characterized by a shift of decision-making capabilities from the system layer to its elements. The intelligent physical objects, i.e. machines and production orders or jobs, can make and execute decisions according to their own objectives. The objective of the proposed autonomous control systems are to monitor the operations of shop floor control and adjust the workload of machines in order to minimize the total tardiness of orders (jobs) for hybrid flexible fowshop. The experimental results show that the proposed architecture can move up the synergy of enterprise operations.

Keywords:
Hybrid Flexible Flowshop, Genetic Algorithm, Autonomous Control Systems, Scheduling; Shop Floor Control.

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Biography

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