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Service-level performance of MRP, kanban, CONWIP and DBR due to parameter stability and environmental robustness

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Abstract

Decisions regarding production planning and control strategy (PPCS) choices can be classified as strategic, whereas parametrization issues are of a tactical nature. However, readjustment is often skipped either as a result of a lack of planning expertise or because it would require extended planning. For this reason, robustness, which is defined as PPCS behaviour within dynamic environments, is investigated. To achieve a greater understanding of the sensitivity on parameter changes in a production system, PPCS stability is examined. An eM-Plant based simulation model is presented that discusses the service-level performance of material requirement planning (MRP), kanban, constant work in process (CONWIP) and drum–buffer–rope (DBR) in a flow-shop with attention to the work in process (WIP). Although the service-level performance of CONWIP exceeds that of the other systems, CONWIP struggles to maintain its

advantage under dynamic conditions. The paper seeks to support industrial practitioneers both in their choice of a specific PPCS and to parametrize the PPCS successfully.

Keywords:

Production planning and control strategy (PPCS) | Robustness | Stability | Simulation