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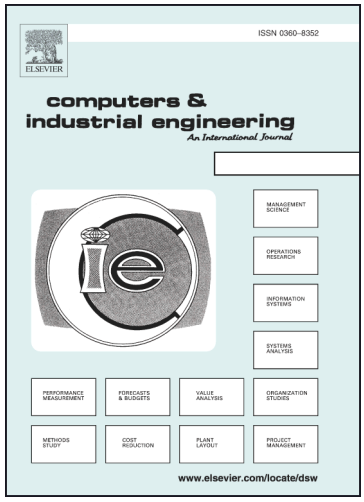

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A.S. Xanthopoulos, D.E. Koulouriotis, A. Gasteratos

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Adaptive card-based production control policies

A. S. Xanthopoulos[a], D. E. Koulouriotis[b] and A. Gasteratos[c]

[a,b,c]Department of Production & Management Engineering, Democritus University of Thrace
V. Sofias 12, 67100, Xanthi, Greece

[a]axanthop@pme.duth.gr, +30 25410 79320 (corresponding author)

[b]jimk@pme.duth.gr, +30 25410 79358

[c]agaster@pme.duth.gr, +30 25410 79359

Abstract This article is about adaptive production control policies based on Kanban and CONWIP. First, it is shown that the Extended Kanban and the Generalized Kanban control policies, which have not been considered up to now in the relevant literature, actually fall within the category of adaptive card-based production control policies. Moving further, two novel adaptive production control policies are proposed, the Adaptive Generic Kanban and the Adaptive Extended Kanban. The proposed policies along with Extended Kanban and Generalized Kanban are compared in a simulation study to five existing adaptive approaches for controlling Kanban and CONWIP systems. It is noted that a comparative evaluation of these five existing adaptive policies is also absent from the relevant bibliography. The set of nine policies is tested in a tri-objective optimization problem, i.e. minimizing mean Work-In-Process, mean finished goods inventory and mean length of backorders queue under three different demand patterns. A multi-objective evolutionary algorithm is used to find optimal or near-optimal parameters for the control policies, and the resulting Pareto fronts are compared in terms of several metrics. In this experimental trial, the Extended Kanban, the Generalized Kanban and Adaptive Extended Kanban policies achieve the highest ranking.
Key terms: production, Kanban, CONWIP, adaptive production control.

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