

# A comparative study of different pull control strategies in multi-product manufacturing systems using discrete event simulation

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## ABSTRACT

Pull production control strategies coordinate manufacturing operations based on actual demand. Up to now, relevant publications mostly examine manufacturing systems that produce a single type of a product. In this research, we examine the CONWIP, Base Stock, and CONWIP/Kanban Hybrid pull strategies in multi-product manufacturing systems. In a multi-product manufacturing system, several types of products are manufactured by utilizing the same resources. We develop queueing network models of multi-stage, multi-product manufacturing systems operating under the three aforementioned pull control strategies. Simulation models of the alternative production systems are implemented using an open-source software. A comparative evaluation of CONWIP, Base Stock and CONWIP/Kanban Hybrid in multi-product manufacturing is carried out in a series of simulation experiments with varying demand arrival rates, setup times and control parameters. The control strategies are compared based on average wait time of backordered demand, average finished products inventories, and average length of backorders queues. The Base Stock strategy excels when the manufacturing system is subjected to high demand arrival rates. The CONWIP strategy produced consistently the highest level of finished goods inventories. The CONWIP/Kanban Hybrid strategy is significantly affected by the workload that is imposed on the system.

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