A Decision Support System for a Modified Kanban-Controlled Flowshop

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Abstract

Researchers and practitioners have long been interested in developing effective priority rules for a variety of production systems. Implementing some of these priority rules require robust computing resources and networks to collect and analyze data in real time to provide decision support to station operators in production systems. Numerous priority rules have been developed and implemented in a variety of production systems. Some of these priority systems like Kanban in Just-In-Time (JIT) systems have been deployed using simple and creative ways. However, others require computing resources and networks to implement effectively. One such priority rule is NERJIT that uses real time information about demand for each product and each station's Work-In-Process (WIP) units (Ardalan, Diaz, 2012). NERJIT for a product in a station is determined by subtracting the WIP of that product in that station and all the station's downstream stations from demand for that product. NERJIT is the amount of deficit for each product at each station. Operators assign priority based on NERJIT and produce products with the largest deficit. The use of this priority rule requires real time information about demand and WIP for each product in each station.

While NERJIT priority rule is easy to understand, its calculation for each product in each station requires a nimble/real time data collection and information sharing system that can provide real-time information about the state of the system to each station. NERJIT for a product at a station is determined by subtracting WIP for that product in that station and its downstream stations from demand for that product. The WIP for that product is the sum of the number of units of that product currently being processed in that station and all its downstream stations, the number of units of that product in the output stock points of that station and all its downstream stations, and the number of units of that product in input stock points of that station's downstream stations.

Application of NERJIT in a production system with dynamic order arrival creates a challenging, if not impossible, situation for station operators, especially when customer arrivals are unknown and dynamic. This priority rule can be applied only when the data for its calculation is collected and applied in real-time.

This presentation discusses the information systems architecture, data flow, information systems' resources and facilities such as scanners, radio frequency identification devices, online application processing, database technology, and a network that are necessary to implement this priority rule. The costs and benefits and sensitivity analysis of the overall system including the type and profitability of the product versus the cost of the information system will be presented.

Reference

Ardalan, A., and R. Diaz, "An Evaluation of the NERJIT Priority Rule in a Kanban-Controlled Flowshop," *Production and Operations Management,* 2012, Vol. 21, No. 5, pp. 923-938.

Keywords

Decision support, JIT, Priority Rule, IT System Architecture

Biographies

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