

Project Code : MRG 5280191

Project Title : A new bucketless finite capacity material requirement planning system for multi-stage assembly flow shop.

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Project Period : March 2009 to March 2011

Abstract

This paper aims to develop a new algorithm of bucketless finite capacity material requirement planning (FCMRP) system for multi-stage assembly flow shop. The developed FCMRP system is a combination between sequencing heuristic and optimization technique. The sequencing heuristic attempts to allocate operations to proper work centers and also determine the sequence of the operations on each work center. The optimization technique is then applied in order to determine the optimal start time of the sequenced operations. To guarantee a practical solution to the planner, real data from a selected factory is used to analyze and evaluate the effectiveness of the proposed FCMRP system. There are five performance measures, namely, total tardiness, number of tardy orders, total earliness, number of early orders, and average flow-time. The performance measures obtained from the proposed FCMRP system are compared to those of a previous FCMRP system. The result shows that the proposed FCMRP system outperforms the previous one for all performance measures except for the number of early orders and total earliness. **The combination of FCMRP-P3 system and MST rule outperforms other combinations in term of overall performance index.** The proposed FCMRP system offers an adjustable solution which is a compromised solution among the conflicting performance measures. The user can adjust the weight of each performance measure to obtain the desired performance. **The calculation time for the proposed FCMRP system is not more than 10 minutes which is very practical for the planner of the factory.**

Keywords: Material requirement planning; Finite capacity; Permutation scheduling; Non-permutation scheduling; Linear programming; Application in industry.