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Articles

The search for the optimal number of kanbans in unstable assembly-tree layout systems under intensive loading conditions

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Abstract

The JIT system and its operational techniques have shown noticeable advantages when applied in an ideal factory. The steadiness of demand and production times and the reduction of set-up times represent the key factor necessary in order to correctly execute JIT. Ideal environments are designed to work with smooth and stable demand patterns, constant and balanced processing times, small lot sizes and without scraps and reworks. However, these conditions are difficult to realise in real productive systems. In these contexts, the increase of operational costs, owing to the growth of inventories, necessary to match demand, often causes the failure of many JIT implementations. For these reasons, during the past years researchers have been investigating the issues related to JIT implementation in unsteady productive

organisations. In this area, the kanban system, responsible for the exact propagation of information and for inventory control, is the most widely researched control mechanism. Literature proposes various kanban systems; in all cases the determination of the number of kanbans depends both on the management method chosen at each stage of the process as well as on the fluctuation of operative variables. This study deals with the problem of choosing the optimal number of kanbans in a multi-stage productive environment organised in an assembly-tree layout. In particular, this paper proposes a heuristic procedure to determine the number of kanbans and compares it with the traditional methods applied in manufacturing contexts.

Keywords:

just-in-time system | kanban | simulation