

A Deterministic Finite Automata approach for Resource Assessment and Real-time Allocation

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ABSTRACT

An automated process system is composed of work cells and material handlers (robots), interlinked through material transportation system and controlled by an intelligent control system. One of the primary functions that a control system will perform is scheduling of resources for the completion of required processes associated with the jobs which enters its work domain. As part of resource assignment, a control system evaluates capability of each work center to match with process requirements for a job. The overall objectives of this exercise is for the control system to choose resource/s appropriately so that it can achieve a certain global objective such as optimizing WIP, flow time, product mix, etc. This paper presents a Deterministic Finite Automata (DFA) approach to model the construct of each work center, which is used to assess the capability of any work center/cell and perform real-time resource allocation. This model uses a transformed version of process plans which are tested on work center DFAs to make the assessment. The method is extended to analyze work center configurations and perform job scheduling to balance the workload under the existing configuration constraints.

Keywords: Deterministic Finite Automaton, FMS cell, Resource allocation, Process capability analysis.