A Scheme for Deadlock-free Part-flow Control in FMS

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ABSTRACT

FMS(Flexible Manufacturing Systems) can be viewed as discrete event dynamic systems and controlled in event-driven scheme. These discrete and dynamic natures are primarily due to concurrent part-flows of various parts and limited buffer spaces. The advantages of FMS can also be achieved by these concurrent operations of various parts. In controlling FMS, the emphasis must be put on keeping part-flows, that is, routing parts without causing unnecessary blockings and deadlock. And the complexities of this problem force decisions to be made hierachically by shop-floor controller and cell controllers.

In this paper, we propose an automata-based operation model of FMS and a scheme for deadlock-free controlling part-flows. This scheme consists of an inner cell routing control mechanism for cell controllers and an deadlock-free intercell routing control mechanism for shop-floor controller.