ABSTRACT

A DYNAMIC SUBOPTIMAL SEQUENCING ALGORITHM OF PRODUCTION ORDER SHEETS — A FINITE STATE SYSTEM APPROACH —

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Manufactured goods on order, for example, general-purpose induction motors for specific uses, can be assembled in a flow shop by installation of a preassembling system, which mainly consists of automatic warehouses and marshalling shops. In a marshalling shop, a human picker takes parts out of a parts-oriented pallet and puts them in a kit pallet according to assembling instructions. The preassembling system contains four working elements; stacker cranes, shuttle cars, human pickers and a kit-pallet line, operations of which are needed to optimize by curtailment of total working hour in dealing many given order sheets.

It becomes clear by system analysis that the number of operating times of a stacker crane in a day can be reduced by using repeatedly parts-pallets which have been already outputted on a waiting table by previous instructions. Reduction of this number of times substantially results in that of the total working hour, which becomes possible mainly by improvement of the dealing sequence of order sheets. This sequencing problem has the following two features: there are many (about one hundred) order sheets to be sequenced, and the performance of each decision is strongly dependent on the previous decisions. This paper introduces a finite state system to express the problem, and then proposes a dynamic suboptimal sequencing algorithm which is a dynamic decision process in the finite state system.

Selecting one hundred typical order sheets for a day from six-month actual data, we solve the sequencing problem, and calculate the number of outputting times of stacker cranes and the total working hour by digital simulations. Results show that both of them decrease remarkably to about one third and two thirds, respectively.