An optimal configuration of operating policies for direct-input-output manufacturing system using the Taguchi method

Joon-Mook Lim*, Kil-Soo Kim**, Bong-Jin Yum** and Hark Hwang**

* Department of Industrial Engineering, Kangnung National University, Jibyundong, Kangnung, Kangwondo, 210-701, KOREA
** Department of Industrial Engineering, Korea Advanced Institute of Science and Technology, 373-1 Gusong-Dong, Yusong-Gu, Taejon, 305-701, KOREA

ABSTRACT

Some modern manufacturing systems have workstations directly integrated with centralized storage and handling system for work-in-process. We consider a Direct-Input-Output manufacturing system(DIOMS) which has a number of machine centers placed along a built-in automated storage/retrieval system(AS/RS). The storage/retrieval(S/R) machine handles parts placed on pallets for the machine centers located at either one side or both sides of the AS/RS.

This paper studies the operation aspect of DIOMS with the Taguchi method. Four operating policies including input sequencing control, dispatching rule of the S/R machine, machine center-based part type selection rule and storage assignment policy are treated as the design factors. For the performance measures, mean flow time and throughput are adopted. Number of machine centers, number of part types, demand rate, processing time and rate of each part type, vertical and horizontal speed of the S/R machine and size of local buffer in the machine centers are considered as the noise factors in generating various DIOMS.

Based on experimental data from computer simulations, an optimal configuration of operating policies is presented which is a combination of some level of each design factor. The validity of the Taguchi method is investigated by comparing the results obtained by the full factorial design.