

A Performance Comparison between Conventional and Flexible Box Erecting Machines Using Dispatching Rules

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Abstract : In this paper, we introduce a flexible box erecting machine (BEM) that swiftly and automatically transforms cardboard into a three dimensional box. Recently, the parcel service and home-shopping industries have grown rapidly, and there is an increasing need for various box types to ship various products. However, workers cannot fold thousands of boxes manually in a day. As such, automatic BEMs are garnering greater attention. This study takes equipment operation into consideration as well as mechanical improvements in order to design a BEM that is able to outperform its conventional counterparts. We analyzed six dispatching rules - First In First Out (FIFO), Shortest Processing Time (SPT), Earliest Due Date (EDD), Setup Avoidance, EDD + SPT, and EDD + Setup Avoidance - to determine which one was most suitable for BEM operation. Consequently, SPT and Setup Avoidance were found to be the most critical rules, followed by EDD + Setup Avoidance, EDD + SPT, EDD, and FIFO. This hierarchy was valid for both our conventional BEM and our new flexible BEM from the viewpoint of processing time. We believe that this research can contribute to flexible BEM management, which has the potential to increase productivity and convenience.

Keywords : automation, box erecting machine, dispatching rule, setup time

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