Replenishment Policy and SKU Classification to Pod Assignment Design for Robotic Mobile Fulfillment System Performances

Shuo-Yan CHOU, Edwin HENDRAWAN, Anindhita DEWABHARATA[1], and Ferani E. ZULVIA
Department of Industrial Management, National Taiwan University of Science and Technology, Taipei, Taiwan, ROC.

Abstract. Robotic Mobile Fulfillment System (RMFS) is a well-known automated parts-to-picker system that is highly suitable in a fast-moving warehouse for handling critical challenges in the e-commerce industry. Implementing this system in the e-commerce industry has been shown to boost the throughput compared with the traditional picker-to-parts picking system. Nevertheless, there are still several ways to increase the efficiency of the warehouse. Therefore, this study proposes product-to-Pod or SKU-to-Pod assignment and replenishment policies that can increase warehouse efficiency using a simulation approach. There are three SKU-to-pod assignment policies evaluated in this study. They are Random Assignments, One Pod One Class, and Mix Class One Pod assignments. In addition, four replenishment policies, including the Emptiest Pod, Pod Inventory Level, Warehouse Inventory-SKU in Pod, and Stockout Probability, are also simulated. The simulation results show that the Mix Class One Pod assignments combined with Warehouse Inventory-SKU in Pod is the best policy. The SKU-to-pod policy can improve pod utilization by increasing pick units in each visit. Pod with more SKU types is likely to fulfill more orders. The replenishment policy has the role of maintaining the inventory of the warehouse and keeping the pod at a high service level. Other than that, replenishment triggers reduced visits to the picking station. A pod with insufficient capacity could not be assigned with the new order, although it already has the most order assigned.

Keywords. Robotic Mobile Fulfillment System, Pod Replenishment, SKU Classification, Pod Utilization.

[1] Corresponding Author, Mail: d10101801@mail.ntust.edu.tw.