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Home ► All Journals ► Engineering & Technology ► International Journal of Production Research List of Issues ► Volume 57, Issue 17 ► Using queuing theory and simulated annea

International Journal of Production Research >

Volume 57, 2019 - Issue 17

1.334 40 Views | CrossRef citations to date | Altmetric

Using queuing theory and simulated annealing to design the facility layout in an AGV-based modular manufacturing system

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Pages 5538-5555 | Received 20 Feb 2018, Accepted 30 Sep 2018, Published online: 16 Oct 2018

66 Cite this article https://doi.org/10.1080/00207543.2018.1533654





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Abstract

An automated guided vehicle-based flow production system is used for manufacturing prefabricated bathroom units. One unit can occupy a space of more than 10 m². Due to large time deviations in sequential processes, queues are formed and greater plant space is needed. Reducing work-in-progress helps to save plant space but renders manufacture less efficient. The research explores better workstation arrangements. An open queuing network (OQN) model was used to approximate the flow production system. Since the problem of workstation arrangement is a combinatorial optimisation problem, simulated annealing (SA) was applied to search for a good solution. The combination of an OQN model and SA provides a powerful tool to solve the facility layout problem for a stochastic flow production system. The experimental results show

that the proposed approach has the potential to guide industrial layout design and practice.

Keywords:

facility layout flow lines queuing theory modular manufacturing simulated annealing

Acknowledgement

The authors thank the industrial partner of this project – Excel Precast Pte Ltd for their financial support, valuable practical recommendations and guidance, and a lot of time spent on discussions. Without their help, it is impossible for the authors to design a production system with practical values for the industry. The authors also appreciate the help from Prof. Peter J. Edwards (School of Property, Construction and Project, RMIT University, Melbourne, Australia) who have spent time reading and polishing the paper. Finally, the authors thank the anonymous reviewers whose comments and suggestions helped to improve the layout and presentation of this paper.

Disclosure statement

No potential conflict of interest was reported by the authors.

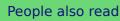
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Funding

The work was supported by the National Research Foundation of Singapore [grant number NRF IIP project M4098029].



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