

Optimal Design Methodology for an AGV Transportation System in an Automated Container Terminal

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In this study, we propose an optimal design methodology in an automated container terminal. In an automated port transportation system, timeliness is always an important constraint. Therefore, this system offers improvements in efficiency. In this study, we describe an optimal design methodology for a transportation system with AGVs.

This design problem can be considered as a combinatorial optimization problem. Therefore, it is necessary to consider the following design elements: (1) an optimal number of working agents to satisfy the requirement, and (2) an optimal number of paths between agents that are engaged. For this study, an AGV transportation system was designed; it is shown in Fig.1.

For these purposes, we applied a closed queuing network of the queuing network theory, which is used to analyze and design the large-scale computer systems for transportation systems. Additionally, we use a simulation-based optimization method; then we propose the methodology that is mixed with the above two methods. Fig.2 and 3 show the design results of the AGV transportation systems.

Keywords: AGV, transportation system, queuing network theory, optimal design methodology

References

- 1) Satoshi Hoshino, Jun Ota, Akiko Shinozaki, Hideki Hashimoto: Optimal Design Methodology for an AGV Transportation System by Using the Queuing Network Theory, Proc. Int. Symp. Distributed Autonomous Robotics Systems, 2004. Submitting.

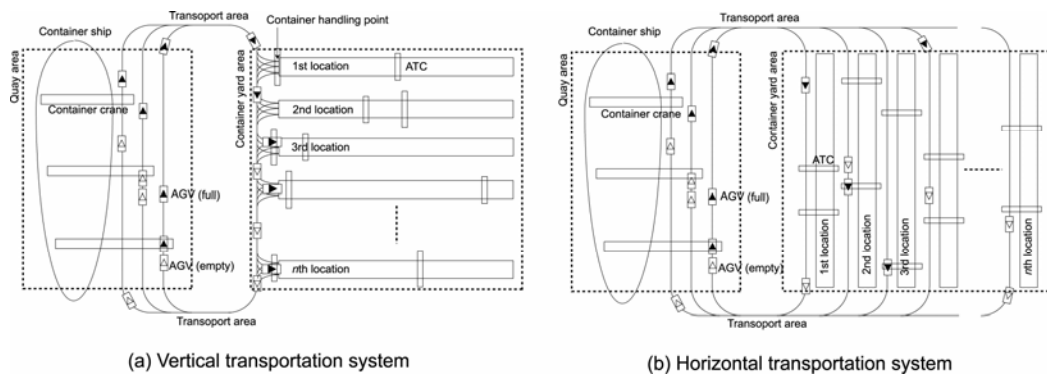


Fig.1 Two types of the AGV transportation system

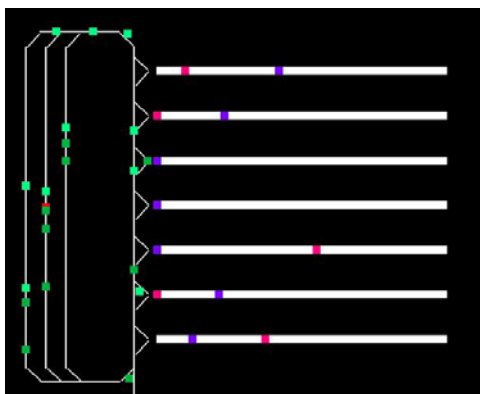


Fig.2 Vertical transport simulator

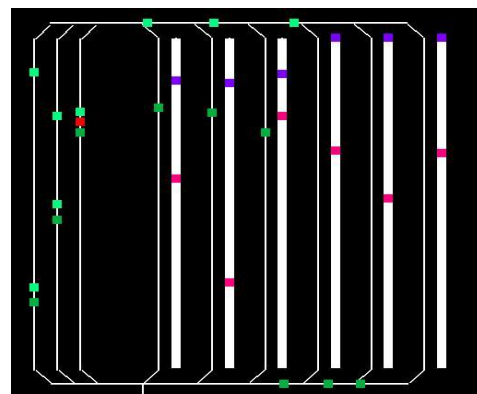


Fig.3 Horizontal transport simulator