



Smart Container Stacking in the Yard

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Abstract

The workloads at seaport container terminals are increasing; thus, to enhance performance, the focus on improving container stacking is argued to be an integral factor that should be studied. The main problem is the number of unproductive moves of handling containers. A well-planned stacking area is argued to be a key requirement in order to increase the performance of the terminal operations and assist in maximum utilization of existing resources. In this work, we investigated and then propose the best possible solution by evaluating GAs in order to minimize the unproductive moves often witnessed in terminal operations. A discrete-event simulation CSS model has been developed to study the inbound container stacking that considers in the model the following: the working of the yard crane, Automated Guided Vehicles, delivery trucks and obtain the simulation-based results of GA. We propose a mathematical model to minimize the container handling costs during stacking and retrieval operations in the container terminal yard.

Keywords: Container Terminal; Automated guided vehicle (AGV); Genetic Algorithm (GA); Container stacking

1. Introduction

A container terminal has three main areas. One is quayside where the ships come and dock, a quay crane load and unload the container from ship and load on AGVs or lifting vehicles on another side, other is landside where a railway system for transferring the containers and truck stand where trucks wait for the turn to load container for delivery and the third one is yard where containers are stacked and retrieved. Yang J. H. and Kim, K. H. (2006) said that the increasing demand of global transportation necessitates the concern of productivity of container yards. The operational efficiency of seaport container terminal is influenced by the performance of its sub-systems. It is necessary to investigate all sub-systems but mainly

focus on the most important part of the system which is the container yard. If that part is working well, then it means we achieve maximum efficiency in the form of time and cost reduction of a container terminal because container handling in the yard is very expensive and especially in the case of re-handling or unproductive moves in stacking system. There are many operational rules to achieve the operational efficiency at the terminal.

The container yard plays a vital role in the terminal in that it affects the overall performance of seaport container terminal. According to Miguel A. Salido et al. (2009), a container stack is a type of temporary store where containers await further transport by truck, train or vessel. The container yard is a storage area where containers stacked and retrieved for further

