

Summary

During the last decades an enormous increase in freight transportation can be observed. A significant part of this freight transportation takes place by shipping it via maritime container terminals in standardized containers. Maritime container terminals are critical elements in the entire freight transportation chain and therefore an improvement of the performance of these terminals is desired. Because the performance of such a terminal is strongly dependent on the performance of the storage yard, the goal in this study is to determine how a storage yard can be controlled in order to optimize maritime container terminal performance.

In order to evaluate the influence on performance of various yard controller strategies a simulation program in Tomas Delphi has been constructed. The program contains eight elements of a storage yard in order to simulate the system and the controller of a real terminal. These elements are a yard, a lane, a pile, an ASC, a container, a yard controller, a task and a container generator to simulate the arrival and departure of containers.

In this report four different types of control strategies are evaluated. First of all, the way in which an ASC is assigned by the controller to perform a certain task is varied. Secondly, it is investigated what the effect is of a controller which is able to use the information (from the customer) of future container arrivals compared to a controller which is not able to use this information. Thirdly, two different types of stack strategies are compared. Last of all, also three types of reshuffle strategies are evaluated, which are applied by the controller when the equipment is temporarily waiting.

It can be concluded that the way in which an ASC is assigned has a significant influence on performance caused by the increasing ASC travel-advantage effect, mentioned in this study. Using information about future arrivals has a positive influence primarily on the ship waiting time and the stack and reshuffle strategies have primarily a positive influence on the truck and train waiting times.

In future studies it is recommended to model a larger part of the container terminal and to model the processes in the storage yard in more detail. Also it is recommended to validate the model proposed in this study with a real container terminal, this is also important because a few strong assumptions were made on ASC movement. Based on the observed and significant influence of the various control strategies on terminal performance, it is advised to create new strategies. Many suggestions were made. An idea for creating new strategies is by focusing on the minimization of ASC moves only necessary in order to approach another container (stored below other containers).