

Summary

Automation of terminals is done for several reasons. Vessel sizes still increases and the service time per vessel will be the same, this means more work in the same time. Automation gives some other advantages in data security, error prevention and sometimes decreasing costs. In this report is an in-depth view into terminal automation provided with trends and latest developments in yard automation. Processes of terminals and especially the yard are described. Also some research is done to safety and implementation of automation.

When vessel arrives, containers are loaded and unloaded out and in to the stacking yard by special equipment. External transportation modes pick up and deliver containers from and to the container yard. There are some bottlenecks which should be removed before automation. For terminal management key performance indicators are introduced to maintain productivity and a certain service level. Control levels, planning and software are also resources for management to deal with the complexity of terminals.

Container yards have some standard layouts and this layout is affected by several factors. For automation Rail Mounted Cranes, Rubber Tired Cranes, Overhead Bridge Cranes, Straddle Carriers and other High Stacking Systems are able to use for yard equipment. The throughput of a container yard is depending on a lot of factors. Automation is not only automation of equipment but also taking care to optimize every process, otherwise it is not sufficient to automate, depending on the reason to automate. Different sensors are required to fulfill processes in automation.

The human factor is the most important factor for accidents in terminals. With management, systems and additional rules, automation can maintain a higher safety level. Sometimes safety is the issue to automate in less developed countries.

There are some differences in automation between existing terminals and new, to be developed terminals. Important trends are found in twistlock handling, uncoupling transfer process from stacking and quay processes and a lot of software and sensing techniques.

The best solution for automation terminals does not exist, every terminal operator has to fit its storage system to the whole terminal. Some global conclusions follow: processes influencing container yard are handling, transfer and the mode itself. Bottlenecks can be found in special transport and capacity, balance and type of equipment. There are three possibilities for yard layout: the transfer points on end of the yard, parallel in the yard or single rows of containers. A lot of performance indicators are considered, divided in service- and productivity-oriented.