

## Summary

Container transportation is a big part of the world wide transportation industry. Due to the standardized container sizes containers are an easy handled transportation aid. This property makes a container well suited for intermodal transportation, the transportation of a person or a load from its origin to its destination by a sequence of at least two transportation modes, like by ocean liner, train or truck, the transfer from one mode to the next being performed at an intermodal terminal.

The container transportation is still heavily expanding and future problems will arise. The infrastructure will get heavily congested, more strict environmental regulations of governments must be respected, performance requirements of the supply chain have to be met, etc. With this perspective in mind the need for better container transportation management gets bigger and bigger. At the moment no coordination between the actions of different container transportation actors, think of seaports, intermodal terminals, container depots and container needing businesses, exist.

In this research the possibility for network-wide automatic control of container transportation will be explored. In this research this is done by using a model predictive control strategy for implementing a MATLAB simulation model. This model is based on the container transportation network of The Netherlands, containing the dynamics and constraints of the different network components. This model is divided into a real world part, the so-called system, and a controlling part, the so called controller. The system acts as a representation of the real world which updates its current state according the decisions of the controlling part. The controller minimizes the total network costs made by the different network components for a certain future time period, the prediction horizon, according the current state of the system. This minimization problem is bounded by the network dynamics and capacity constraints of the model and is solved using integer linear programming.

With this model simulations of several different scenarios are performed. The general behavior of the controller is studied as well as the behavior when container demand at a network component is bigger than the supply, the transportation costs are altered and the transportation times are altered. Also a sensitivity analysis of the controller to last-minute transportation costs changes, in example when suddenly a traffic jam or a mechanical defect occurs.

The results show that network-wide automatic control of container transportation has the possibilities to solve some of the problems caused by the expanding container transportation volume. By looking network-wide congestions can be prevented by transporting earlier or with another transportation mode. Also the performance of the supply chain can be improved by looking farther ahead. By setting the right parameter values the operator of the automatic controller can influence its choices to ensure that governmental regulations are met.