

ADVANCED METHODS FOR CONTAINER STACKING

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ABSTRACT

A container terminal's view is determined by large gantry cranes and large container stacks. Containers have been designed in such a way that they can be stacked on top of each other without any supporting shelf or rack structure. The disadvantage of this fact is that when the bottom container is needed, all the other containers need to be moved aside, which means a lot of unproductive moves if the containers are stacked high. In this presentation we first give an overview of container stacking problems, on a strategic, tactical and operational level. The first level is especially important if automated stacking cranes are used, such as in Rotterdam's ECT or Hamburg's CTA. During the design important decisions have to be made concerning stack dimensioning and equipment capacity. On a tactical scale one has to make decisions about stack capacity in relation to equipment about the choice of operational strategies, including a decision about whether to apply stack reorganizations or not. Finally at an operational level one has to decide on where to put a container given information on its foreseen retrieval. Important aspects are with which modality it will leave the stack and when. At an operational level it is important to avoid container reshuffles and to have enough handling capacity, e.g. by being close to the location of the departure modality. Next we give the results of a detailed simulation study on stacking rules in an automated stacking system as used by ECT. We discuss main advantages and limitations of the design chosen. Finally, we discuss the role of the stack not only as main decoupling point between transport modalities, but also as virtual stocking point in the intercontinental supply chain.

Key Words: *Container Stacking, Simulation.*