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PII: S0305-0483(14)00157-1
DOI: http://dx.doi.org/10.1016/j.omega.2014.12.002
Reference: OME1465

To appear in: *Omega*

Received date: 6 March 2014
Accepted date: 11 December 2014

Cite this article as: Ning Wang, Bo Jin, Andrew Lim, Target-guided algorithms for the container pre-marshalling problem, *Omega,* http://dx.doi.org/10.1016/j.omega.2014.12.002

# Target-guided algorithms for the container pre-marshalling problem

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**Abstract**

The container pre-marshalling problem (CPMP) aims to rearrange containers in a bay with the least movement effort; thus, in the final layout, containers are piled according to a predetermined order. Previous researchers, without exception, assumed that all the stacks in a bay are functionally identical. Such a classical problem setting is reexamined in this paper. Moreover, a new problem the CPMP with a dummy stack (CPMPDS) is proposed. At terminals with transfer lanes, a bay includes a row of ordinary stacks and a dummy stack. The dummy stack is actually the bay space that is reserved for trucks. Therefore, containers can be shipped out from the bay. During the pre-marshalling process, the dummy stack temporarily stores containers as an ordinary stack. However, the dummy stack must be emptied at the end of pre-marshalling. In this paper, target-guided algorithms are proposed to handle both the classical CPMP and new CPMPDS. All the proposed algorithms guarantee termination. Experimental results in terms of the CPMP show that the proposed algorithms surpass the state-of-the-art algorithm.

*Keywords:* container pre-marshalling problem, target-guided algorithm, dummy stack



## 1. Introduction

Seaborne transportation is the cornerstone of international trade and undoubtedly an engine of global economic development. According to the *Review of Maritime Transport* (2012) released

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