ONLINE ISSN : 1881-1760
PRINT ISSN : 1880-3717

Journal of the Japan Society of Naval Architects and Ocean Engineers
Vol. 3 (2006) pp.105-117

[PDF (1284K)] [References]

Functional Consideration for Safety and Reliability with the aim of Establishing the Handling Support System of Liquid Cargo

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(Received March 7, 2006)

Summary: The thinking faculty and operating ability of cargo operators tend to be affected by their mental task loads under the pressure from liquid cargo loading/unloading environment. The suitable cargo handling support system has to be taken to cope with the relation between tensional stress degrees and human errors of operators during cargo handling.This paper, on the subject of mental stress and task loads of a liquid cargo control operator, consists of the quantitative analysis of the tensional stresses by measuring the fractal nature of heart rate variability under mental work-load during cargo handling on two domestic oil tankers that are respectively equipped with/without the automatic cargo control system. And the way of supporting cargo handling in order to reduce the work-load and human errors is predicted for the task with high-tension under complicated condition of cargo handling.Furthermore, the specific method to search for almost all of the human error factors, that could be taken measures by the automatic handling system, is proposed. And the evaluation method of the quantitative degree of the improved safety on the basis of probability of human error in the functional system is carried out using apprehensive degree that is defined as similar to the sense scale based on the experience of skilled ship cargo operators. The quantitative evaluation for the improvement of safety is predicted respectively to the conventional site operation, the simple remote operation with monitoring and the operation by full automatic system for comparison.

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