ABSTRACT

Providing a safety environment by risk assessment remains as an urgent and important issue to be addressed in recent years. The purpose of this paper is to develop a methodology of risk assessment through considering the identification of hazardous events by construction of a database for occupational accidents and an information processing model of occupational accidents, risk analysis based on a risk matrix and a measure for safety management.

KEY WORDS: Risk Analysis, Risk Assessment, Occupational Accident, Database, Information Processing Model, Measure for Occupational Safety Management

INTRODUCTION

Carelessness of humans, wrong sequence of worker’s operations, and insufficient environment of work site remain the key risk factors for industrial accidents. Japanese Industrial Safety and Health Act was revised in 2005, which recommends implementation of risk assessments for promotion of occupational safety management to the broad industrial sectors in Japan. Industrial companies including shipyards are taking a interest in OHSAS 18001 (Occupational Health and Safety Assessment Series). Providing a safety environment by risk assessment remains as an urgent and important issue to be addressed in recent years.

The purpose of this paper is to consider a methodology of risk assessment with the following processes;

(1) The process of identification of hazardous event
For identification of hazardous event, database about occupational accident at shipyard has been constructed by analyzing the unpublished reports of Shipbuilder’s association of Japan. But, data of these reports is summarized in paper based contexts only and aren’t stylized on the description. To unify the formulation of database, the proposed database is fixed to include items for analyzing factors of occupational accidents. Furthermore, information processing model of occupational accident based on applied cognitive psychology is proposed for identifying hazardous human factors.

(2) The process of risk analysis
The risk matrix analysis is taken to evaluate the risk of some extracted hazardous events by constructed database analysis. Relativity among environmental factors, human factors and damage due to occupational accident is analyzed through risk matrix analysis.

(3) The process of measure for safety management
To reduce worker’s safety bias on ordinary behavior, experience of simulated dangerous situations by mock-up model is tried as a measure of safety management for some hazardous occupational accidents at shipyards.

Finally, in this paper, the above analytical process is considered by applying it to the fall type accidents which forms 30% of occupational accidents at Japanese shipyards every year.

There are three main approaches to analyze a human error, such as cause of human error by omission of duty, by behaviors based on motive and by behaviors based on correct or incorrect intentions, and these differences are depend on psychological frame of human model. In this paper, a human error is considered to be caused by behaviors based on intentions in the psychological frame of the cognitive psychology, which is applied through proposed information processing model on worker’s behavior at shipyard.

CONSTRUCTION OF DATABASE ON OCCUPATIONAL SAFETY

Approximately 130 cases of occupational accidents per year has been recorded by statistical results of the Shipbuilders’ Association of Japan with which all major Japanese shipyards are affiliated.

Occupational accidents are classified in 21 categories by the Japanese Ministry of Health, Labor and Welfare. The major ones among them are shown in Table 1 as an example. Here, categories on this table are described by referring to Occupational Injury and Illness Classification Manual (1992). Three major typical occupational accidents at shipyards are falling from higher elevation to a lower level, caught in or compressed by machines and cranes while operating them or some being struck by falling or flying object such as during crane operations in the ship building.

Figure 1 shows the breakdown of categories of occupational accident at shipyards by compiled statistical data for 11 years from 1993 to 2003. Total of the above three types of occupational accidents amount to 66.7% of all occupational accidents. Especially the accident due to falling to a lower place happen about 33% of the approximately 130 cases of occupational accidents per year and is all the top order of all categories of occupational