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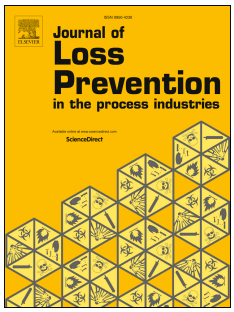

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Development of a Human Reliability Assessment Technique for the Maintenance Procedures of Marine and Offshore Operations

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Abstract

Continuous monitoring and maintenance of assets is important for safe and reliable marine and offshore operations. On-board maintenance activities carried out by seafarers/operators are often prone to error, leading to an accident. Marine environmental and operational conditions significantly affect human performance and influence seafarers/operators to make un-intentional errors. International Maritime Organization (IMO) guidance recommends implementing Human Error Assessment and Reduction Technique (HEART) for assessing the effect of human error probability considering quantitative risk analysis of shipping and offshore operations. The conventional HEART is not specifically developed to apply to marine and offshore operations and therefore it is necessary to develop an operational specific methodology capturing unique features of marine environment and operations. In this study, by revising and modifying the HEART to assess and quantify the potential human errors in different marine environmental and operational conditions, a new methodology is developed. As a part of the developed methodology, the Error Producing Condition (EPC) and Error Influencing Factor (EIF) tables are refined and developed to reflect the particular conditions of marine environments for Human Error Probability (HEP) estimation. The EIF tables for both engine and deck departments are developed separately considering the answers to a questionnaire survey among experienced seafarers from around the world. As the case studies the developed methodology is applied to the maintenance procedures of a marine engine exhaust turbocharger and also a condensate pump on an offshore oil and gas facilities. Application of the developed methodology confirms that extreme weather, extreme workplace temperature, high ship motion, high level of noise and vibration, and work overload and stress increase the likelihood of human error as well as potential accidents. It is