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Development of a risk analysis model to evaluate human error in industrial plants and in critical infrastructures

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Abstract

The complexity of production systems negatively affects operator’s ability to make decisions during emergency conditions. The aim of the present research is to propose a hybrid model for human error probability analysis, called Emergency Human Error Analysis (EHEA), which considers all contingency factors that influence decisions and actions of the operator. The model aims to evaluate the human error probability in emergency conditions in industrial plants and critical infrastructures. The proposed model is based on SHERPA model (simulator for human error probability analysis) and on the performance shaping factors relationship, which represents the environmental system. This model can be used in preventive phase to analyze the possible accident scenarios. A real case study concerning the emergency conditions in a petrochemical plant is analyzed.

Acronyms

APJ, Absolute Probability Judgment; ATHEANA, A Technique for Human Event Analysis; CREAM, Cognitive Reliability and Error Analysis Method; EHEA, Emergency Human Error Analysis; GTT, Generic Task; HCR, Human Cognitive Reliability Correlation; HEART, Human error assessment and reduction technique; HEP, Human error probability; HEP_{nom}, Nominal Human error probability; HEP_{cont}, Contextualized Human error probability; HRA, Human reliability analysis; OAT, Operator Action Tree; PSF, Performance Shaping Factor; PSF_{comp}, Complete Performance Shaping Factor; PROCOS, Probabilistic Cognitive Simulator; SHARP, Systematic Human Action Reliability; SHERPA, Systematic Human Error Reduction & Prediction Approach; SHERPA, Simulator for Human Error Probability Analysis; SLIM, Success Likelihood Index Method; SPAR-H, Standardized Plant Analysis Risk – Human reliability analysis; TESEO, The empirical technique to estimate operator’s error; THERP, Technique for Human Error Rate Prediction

Keywords: Human Reliability Analysis, Human Error Probability, Accident Model, Disaster Management, Human Factor.

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