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RISK ANALYSIS IN CONTEXT OF NON-MAINTENANCE

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ABSTRACT

Any industrial facility has their maintenance plan. Even when there is no plan, it is a passive maintenance plan, where some risks are assumed. Our study pursue a Management Maintenance System where the best equipment availability and performance considering minimal costs is the objective. For this study, we select two equipment's from a ship and consider three stages of the study. The stages are the definition of evaluation criteria and it meaningfulness, second the data from the first stage that can provide enough information for the maintenance plan decision and third the decision-making based on the process. The decision of the maintenance system will be based in a Fuzzy model considering a Risk-Based Maintenance.

Keywords: Risk, maintenance, condition based maintenance.

INTRODUCTION

The development in maintenance has been continuously changing because of the nowadays-complex systems and equipment's (Khan F. *et al*, 2004). Knowing a ship equipment's and systems performance versus condition, can be crucial for a decision-making process.

In the present paper, we propose the process of decision-making based on a risk-based maintenance (RBM) system. This can reduce the probability of failure of equipment and the consequences of failure (Arunraj N. *et al*, 2006). For this aim, knowing the equipment's lifecycle, the maintenance plan should be defined accordingly and should enhance the equipment availability (Lampreia, S. *et al*, 2019).

The evaluating criteria for Maintenance Strategies Selection (MSS) depends on the organizational goals and objectives and could be decided in consensus with field experts (Jamshidi A., 2015). Therefore, before start the study, the evaluating criteria should be defined. In addition, the strategies and the criteria should be adapted to the needs of the organization and system.

In the past, Fuzzy data has been applied for modelling complex systems (Kaymak U. *et al*, 1997). We believe that applying the Fuzzy models will allow defining the criteria and decision-making process on a Risk-Based Maintenance process implemented on a system or equipment. The decision-making process based on risk are based in variables that do not admit accurate values, so we will try to quantify the quality and try to eliminate the decision based on human sense and deductive thinking, where people infer conclusion from what they know.

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RESULTS AND CONCLUSIONS

Considering other risk-based maintenance systems applied to compressors (Oliveira N., 2015), the Fuzzy Logic Control will be applied to analyze the non-maintenance risk but also the implication to do or not in the universe criteria.

For the criteria to be used for the Failure, we considered the failures based on the MTBF (Mean Time to Failure); for the Safety based on the personnel injuries, on the equipment safety and any environmental impact; and for the Efficiency of the personnel and material performance. For the Feasible maintenance, we considered the available employees and tools. In addition, for the Cost of monitoring, personnel education, portable equipment, fixed equipment and the software costs. All the five criteria compete to a data processor, which will provide the results to maintenance decision.

The air-compressor under study is pursuing a bath life cycle, and it is on the middle. The water electro-pump it is in the end of the lifecycle. We applied the same methodology to both equipment's but in the subgroups of the criteria, there is a different analysis accordingly to the equipment's specifications.

The results we obtain to the air compressor was to continuing apply a Condition Based Maintenance (CBM) system and for the water electro pump it was a contingency maintenance.

We believe that applying the Fuzzy logic in a condition based maintenance system it is viable. In addition, for the organization the RBM it is also viable, and can contribute to decrease the maintenance cost, but also increase the reliability in systems.

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