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RELIABILITY MODEL EXPLOITATION IN INDUSTRIAL SYSTEM MAINTAINABILITY USING EXPERT SYSTEM EVALUATION

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ABSTRACT

The reliability control is an important economic factor for any industrial system. To assess the reliability of these systems, it is necessary to know the failure modes which the system is subjected. This knowledge allows him to create a database that will be exploited later for the reliability modelling. This article focuses on the evaluation of the reliability model used in industrial system maintainability using expert system evaluation. The obtained results in this paper have allowed us to reduce maintenance costs and ensure the availability of industrial equipment to ensure continuity of production.

Keywords: reliability estimation, maintenance, reliability, failure, maintenance costs, availability.

INTRODUCTION

In this paper, we propose the use of optimization techniques based on the reliability model exploitation using expert system evaluation, to improve the maintenance actions planning in the industrials installations. These industrial installations present in their operation a risk to passed in degraded mode and undergo accidental defects.

In several applications, there are more than a few techniques that can be used for increase maintenance actions. By the basis of this work, we can confirm that the conditional maintenance optimizes the maintenance and especially to perform at the right time with the right cost. We evaluate the cost summary of maintenance according to the numbers of interventions of the different components responsible for the unavailability of our application system.

CONDITIONAL PREVENTIVE MAINTENANCE

The conditional preventive maintenance is defined as being the intervention that one carries out it only when the state of system requires for it. The immediate consequence it is necessary to know to set up techniques of monitoring of the state of system (technical and economic reliability) and especially to be able to qualify in a precise way the state of this system. This operation requires to proceed as a preliminary to the choice; a certain indicators of monitoring, resulting from the parameter less elaborate size of which the acquisition is as often as possible under exploitation in the system. Figure 1 illustrates the principle of this type of conditional maintenance.

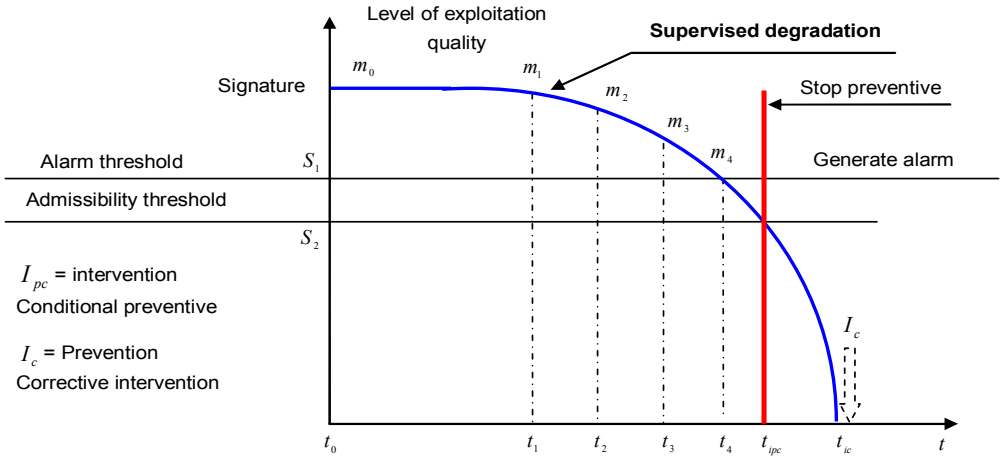

Fig. 1 - Principe of the conditional maintenance

This figure shows that our expert system can stopped the examined system, only when there is some probability of failure, after exceeding the threshold S_i defined by indicators of degraded operation in the presence of faults m_i (fault signature), in the intervals of exploitation or observation system t_i. This method has the advantage of avoiding the surprise of malfunctions, we can be programmed a conditional preventive intervention (I_{pc}) or a corrective action in the examined system (I_c).

RESULTS AND CONCLUSION

Our work relates to the topic of the reliability analysis in industrial equipment, for the study of their availability. This availability is based on the combination of reliability, maintainability and support maintenance. For our application, we have chosen to study the reliability of a high pressure pump, based on the history of work on this equipment, we found the uptime (TBF) of the pump and we made a classification according to the number of failures in our examined system.

The work presented in this paper focuses on the reliability model exploitation based on the use of expert system evaluation. In this work, we have validate this approach, by their use on examined system, the studied equipment is similar to any industrial plant and has an expected failure at unknown time. On this basis, this leads to increased reliability as possible, in order to reduce maintenance costs and improve reliability. The results obtained by this approach based on expert system evaluation leads us to improve the availability, by preventive maintenance actions targeted and studied in order to improve the reliability in industrial plants.

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