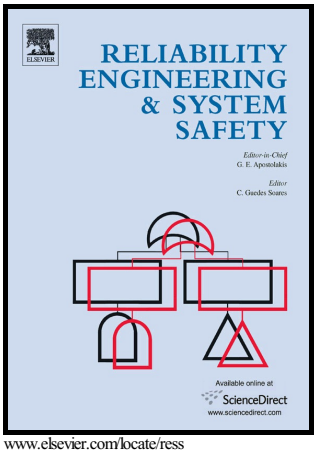

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A study of postponed replacement in a delay time model

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Abstract

We develop a delay time model for a one component system with postponed replacement to analyze situations in which maintenance might not be executed immediately upon discovery of a defect in the system. Reasons for postponement are numerous: to avoid production disruption or unnecessary or ineffective replacement; to prepare for replacement; to extend component life; to wait for an opportunity. This paper explores conditions that make postponement cost-effective. We are interested in modelling the reality in which a maintainer either prioritizes functional continuity or is not confident of the inspection test indicating a defective state. In some cases more frequent inspection and a longer time limit for postponement are recommended to take advantage of maintenance opportunities, characterized by their low cost, arising after a positive inspection. However, when the cost of failure increases, a significant reduction in the time limit of postponement interval is observed. The examples reveal that both the time to defect arrival and delay time have a significant effect upon the cost-effectiveness of maintenance at the limit of postponement. Also, more simply, we find that opportunities must occur frequently enough and inspection should be a high quality procedure to risk postponement.

Keywords: opportunistic maintenance; delay time modelling; imperfect inspection; false positive; false negative; postponed replacement; manufacturing

1 Introduction

In this paper, we develop a model to analyze different situations in which maintenance might be postponed. Often there exist situations that encourage postponement because