World Academy of Science, Engineering and Technology
International Journal of Industrial and Manufacturing Engineering
Vol:11, No:06, 2017

A Partially Accelerated Life Test Planning with Competing Risks and Linear Degradation Path under Tampered Failure Rate Model

Authors : Fariba Azizi, Firoozeh Haghighi, Viliam Makis

Abstract : In this paper, we propose a method to model the relationship between failure time and degradation for a simple step stress test where underlying degradation path is linear and different causes of failure are possible. It is assumed that the intensity function depends only on the degradation value. No assumptions are made about the distribution of the failure times. A simple step-stress test is used to shorten failure time of products and a tampered failure rate (TFR) model is proposed to describe the effect of the changing stress on the intensities. We assume that some of the products that fail during the test have a cause of failure that is only known to belong to a certain subset of all possible failures. This case is known as masking. In the presence of masking, the maximum likelihood estimates (MLEs) of the model parameters are obtained through an expectation-maximization (EM) algorithm by treating the causes of failure as missing values. The effect of incomplete information on the estimation of parameters is studied through a Monte-Carlo simulation. Finally, a real example is analyzed to illustrate the application of the proposed methods.

Keywords : cause of failure, linear degradation path, reliability function, expectation-maximization algorithm, intensity, masked data
Conference Title : ICIMSE 2017 : International Conference on Industrial and Manufacturing Systems Engineering
Conference Location : Toronto, Canada
Conference Dates : June 15-16, 2017