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Deficiencies with Weibull Demonstration Test Planning

M. N. Prado-Barrera and M. R. Piña-Monarez

Electrical and Computational Engineering Department
Engineering and Technology Institute
Universidad Autónoma de Ciudad Juárez
Cd. Juárez Chih. México, C.P. 32310
Ph (656) 688-4843 | Fx (656) 688-4813

Corresponding author's Email: mariel.prado@uacj.mx

Author Note: M. N. Prado-Barrera is a Doctoral Engineering Program (DOCI) student. M. R. Piña-Monarez is a UACJ postgraduate department researcher.

Abstract: Success run testing is commonly used for Weibull distribution in reliability demonstration test planning. However, this method is not efficient, because it is based on the binomial distribution, and since it is based on a constant hazard rate, it does not take into account the effect that the time has on the estimated reliability. This constant rate differs with that of the Weibull Distribution, which has a decreasing hazard rate when the value of β is less than 1, and an increasing hazard rate when β is bigger than 1. As a consequence of this, the reliability demonstrated, by using the binomial method, is overestimated (when $\beta < 1$), or underestimated (when $\beta > 1$), thus incurring warranty costs or unnecessary costs in design changes. This paper focuses on statistically analyzing this limitation. An application to show this issue is given.

Keywords: Demonstration Test Planning, Success Run Testing, Binomial Distribution, Weibull Distribution