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A Note on the Weibull and Lognormal Distribution Discrimination

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Abstract: Although, in reliability analysis, when the square coefficient of variation (cv^2) of the lognormal distribution is less than 1 and the shape parameter of the Weibull distribution (β) is between 1 and 3.6, the probability density functions are similar in shape, they should not be considered to be equivalent from each other. This is because for the lognormal distribution the high and low percentiles are larger than those obtained for the Weibull distribution, therefore an error of selection between them generates estimations of reliability indicators which differ significantly, impacting in the decision made. In this article, this problem is evidenced 1) statistically on how the standard test for goodness of fit Kolmogorov–Smirnov, probability plots and the maximum likelihood are inefficient to discriminate between these distributions under the above conditions and 2) through a practical example, by showing the impact that these differences have on the reliability indicators and on the warranty costs.

Keywords: Weibull Distribution, Lognormal Distribution, Goodness of Fit, Reliability Analysis