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Weibull Accelerated Life Testing Analysis using Expected Failure Times

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Abstract: The paper presents a method to give confidence to the extrapolation in an accelerated Weibull lifetime testing (ALT) analysis. In the method the Weibull scale parameters η of the normal stress level is estimated based on both the customer time and reliability requirements, and on the expected Weibull shape parameter β. The efficiency of the method is based on the fact that because the addressed sample size n completely determines the estimated η value, then this n value also represents the parts that have to be tested without failures in the ALT analysis. Additionally, based on the found normal Weibull stress level family (β, η) and on the tested high values, the corresponding expected η values for the ALT analysis are addressed and used to design the final ALT test. Numerical application using the Arrhenius model is given also.

Keywords: Weibull distribution, ALT/CALT analysis, Expected failure times.