

A REVIEW OF ACCELERATED TEST MODELS
by

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ABSTRACT

Engineers in the manufacturing industries have used accelerated test (AT) experiments for many decades. The purpose of AT experiments is to acquire reliability information quickly. Test units of a material, component, subsystem, or entire systems are subjected to higher-than-usual levels of one or more accelerating variables such as temperature or stress. Then the AT results are used to predict life of the units at use conditions. The extrapolation is typically justified (correctly or incorrectly) on the basis of physically motivated models or a combination of empirical model fitting with a sufficient amount of previous experience in testing similar units. The need to extrapolate in both time and the accelerating variables generally necessitates the use of fully parametric models. Statisticians have made important contributions in the development of appropriate stochastic models for AT data (typically a distribution for the response and regression relationships between the parameters of this distribution and the accelerating variable(s)), statistical methods for AT planning (choice of accelerating variable levels and allocation of available test units to those levels), and methods of estimation of suitable reliability metrics. This paper provides a review of many of the AT models that have been use successfully in this area.