Reliability Estimation of Mechanical Components Using Accelerated Life Testing Models

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Résumé en anglais	This chapter presents an overview of using accelerated life testing (ALT) models for reliability estimation on mechanical components. The reliability is estimated by considering two test plans: a classical one testing a sample system under accelerated conditions only and a second plan with previous accelerated damage. The principle of the test plan with previous accelerated damage is testing the sample under step-stress. In the beginning (until time N 1), the sample is tested under stress s 1 (accelerated testing: s1>s0); when the tested units have used many of their “resources,” the stress s 1 is replaced by the operating conditions s 0 (until the time N 2). Therefore, failure times under the accelerated conditions can be used to estimate reliability function in operating conditions. The time transformation function is considered as log-linear and four types of estimation are studied: parametric, Extended Hazard Regression (GPH), semi-parametric, and nonparametric models. The chapter is illustrated by a simulation example of ball bearings testing. The results are used to analyze and compare these estimation methods. The simulations have been performed both with censored data and without censoring, in order to examine the asymptotic behavior of the different estimates.
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