

Acceptance Sampling for Non-Gaussian Variables with Robust Methods – Part II

Elisabete Carolino (lizcarolino@gmail.com)

Escola Superior de Tecnologias da Saúde de Lisboa (ESTeSL-IPL), Portugal,

Isabel Barão

*Faculdade de Ciências e Centro de Matemática e Aplicações Fundamentais, (ULisboa),
Portugal, (mibarao@fc.ul.pt)*

Abstract

In the quality control of a production process (of goods or services), from a statistical point of view, the focus is either on the process itself with application of Statistical Process Control or on its frontiers, with application of Acceptance Sampling (AS) and Experimental Design. AS is used to inspect either the process output (final product) or the process input (raw material). The purpose of the design of a sampling plan is to determine a course of action that, if applied to a series of lots of a given quality, and based on sampling information, leads to a specified risk of accepting/rejecting them. Thus AS yields quality assurance. The classic AS by variables is based on the hypothesis that the observed quality characteristics follow the Gaussian distribution (treated in classical standards). This is sometimes an abusive assumption that leads to wrong decisions. AS for non-Gaussian variables, mainly for variables with asymmetric and/or heavy tailed distributions, is a relevant topic. When we have a known non-Gaussian distribution we can build specific AS plans associated with that distribution. Alternatively, we can use the Gaussian classical plans with robust estimators of location and scale — for example, the total median and the sample median as location estimates, and the full range, the sample range and the interquartile range, as scale estimates. In this work we will address the problem of determining AS plans by variables for Extreme Value distributions (Weibull and Fréchet) with unknown shape parameter. Classical plans, specific plans and plans using the robust estimates for location and scale are determined and compared.

Key-Words: quality control; acceptance sampling; acceptance sampling by variables; robust methods