

Incorporating a Reliability Engineering Tool in Economic and Economic Statistical Design of Control Charts With Non-Uniform Inspection Scheme

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Abstract

The time to the change point of a process, called as shock model or the process failure mechanism, may have the most vital role in economic and economic statistical design of control charts. A supreme tool in reliability engineering for the failure rate shape identification is the total time on test plot and is studied in this paper to be applied for picking out an appropriate failure model. For this purpose, we need the estimations of the change points of the process that may be considered as the most important advantage of applying control charts in the literature of statistical process monitoring. The unknown parameters of the fitted distribution then can be estimated by some common statistical methods like maximum likelihood based on the estimated change point data. The generalized cost model of Rahim and Banerjee (1993) which can be considered for both uniform and non-uniform sampling schemes and adapted for fitted shock model will determine the design parameters of control charts in an economically optimal point of view or considering economic statistical model. The proposed practical approach is illustrated by a numerical study on the optimal design of \bar{X} control chart for monitoring the process mean of production systems with bathtub-shaped failure rate.

Keywords

Change point estimation; Control chart design; Integrated Hazard over Sampling Interval; Bathtub-shaped hazard rate; Total time on test plot.

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