Journal of Applied Statistics ›
Volume 38, 2011 - Issue 11

Original Articles

A modified economic-statistical design of the T^2 control chart with variable sample sizes and control limits

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Pages 2459-2469 | Received 19 Feb 2010, Accepted 15 Jan 2011, Published online: 09 Mar 2011

Cite this article https://doi.org/10.1080/02664763.2011.559205

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Abstract

Recent studies have shown that using variable sampling size and control limits (VSSC) schemes result in charts with more statistical power than variable sampling size (VSS) when detecting small to moderate shifts in the process mean vector. This paper presents an economic-statistical design (ESD) of the VSSC T^2 control chart using the general model of Lorenzen and Vance [22]. The genetic algorithm approach is then employed to search for the optimal values of the six test parameters of the chart. We then compare the expected cost per unit of time of the optimally designed VSSC chart with optimally designed VSS and FRS (fixed ratio sampling) T^2 charts as well as MEWMA charts.

Keywords:

Hotelling's T^2 control chart | economic-statistical design (ESD) | Markov chain | genetic algorithm (GA)

variable sampling size and control limits (VSSC) scheme

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