

Variable Sampling Interval \bar{X} Control Charts for Skewed Populations

최 인 수
한국과학기술원 산업경영연구소

배 도 선
한국과학기술원 산업공학과

Abstract

Variable sampling interval(VSI) control charts in which the sampling interval between two successive samples is allowed to vary based on the value of the preceding sample statistic have received much attention. The rationale of VSI control charts is that the sampling interval should be short if a sample statistic shows some indication of a process change, and long if there is no such indication. In the standard(STD) VSI \bar{X} control charts, control and threshold limits are usually set to be equidistant from center line, and the equidistant limits may be reasonable when the distribution of the quality characteristic is normal or approximately normal. In many situations, however, we may have reason to doubt the validity of the normality assumption. When the underlying distribution is skewed, variability pattern of the skewed distribution is different from the normality assumed in placing control and threshold limits on the STD VSI \bar{X} control charts. Thus the objectives of the STD VSI \bar{X} control charts may not be attained and a method which considers the actual variability pattern of the population is desirable.

In this paper, we propose a simple heuristic method of constructing VSI \bar{X} control charts with no assumptions on the population. It provides asymmetric control limits from mean and asymmetric threshold limits from mode in accordance with the shape of the underlying population using different factors in computing upper and lower limits. When the underlying population is symmetric, however, the charts reduce to the STD VSI \bar{X} control charts. The performances of the proposed charts are compared with the STD VSI \bar{X} control charts and the fixed sampling interval \bar{X} control charts using different variances in computing upper and lower control limits when the underlying population is Weibull or lognormal.