

Effective Control Chart for Monitoring the Stability of Non-normal Process Capability

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Abstract

Quality has been shown as the major criterion in many supplier selection studies. Among various quality assurance activities, process capability indices are widely used to quantify the relationship between the actual process performance and specification limits in many high-tech industries. By a suitable analysis of an index, a production department can trace and improve a poor process to enhance the quality level and satisfy customer requirements. Recently, some practical process capability control charts were developed for illustrating the continuous assessments of process capability. These charts contain information regarding the ability of the process to meet or exceed customer requirement over the life of a process. However, the process distribution is often ab-normal. Therefore, this study integrates the bootstrap procedure to construct a capability control chart for non-normal processes. The simulations show that the empirical coverage probability of our proposed chart is close to the desired coverage probability as the size of subgroup is large enough.

Keywords: Bootstrap, non-normal, process capability.

1. Introduction

Quality assurance and quality control address the means and techniques of producing high quality products. ISO 9000 and Japan Industrial Standards (JISZ 8101) rely on quality control and quality assurance as systematic activities to provide adequate confidence that products or services are produced economically at a quality sufficient to meet customer requirements. Among these quality assurance activities, process capability analysis has always been considered one of the most important engineering decision tools. Quantifying the relationship between the actual process performance and specification limits is the main objective in process capability analysis, and the process capability indices (PCIs) have been widely adopted to this end. By suitable analysis of the PCIs, a production department can trace and improve a poor process to enhance the quality level and satisfy customer requirements. Several authors have promoted the use of various PCIs and examined them with varying degrees of completeness, examples of which include [4], [10]–[11], [13]–[15], [24]–[27].