

A decision-making procedure on process centering: a lower bound of the estimated accuracy index

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Abstract

Process accuracy index C_a has been proposed in the manufacturing industry to provide numerical measures on assessing process performance with respect to the accuracy. Investigations on process centering (the ability to cluster around the specification midpoint) in existing engineering statistics and quality assurance literature reveal conservatively rare. In this paper, a natural estimator of the accuracy index is considered under the normality assumption. The exact probability density function and the r -th moment raised from a non-central chi-squared distribution of the estimated index are derived. A decision-making procedure on process centering for in-plant applications is constructed. Values in lower bound of the estimated index required to ensure the process reaching a desirable accuracy level of the time are also tabulated. A practical example is presented to illustrate how the proposed reliable procedure may be applied.

Keywords : Accuracy index, decision, performance, process centering.

1. Introduction

Process capability indices C_p , k , and C_{pk} are three basic indices (Kane, 1986) that have been widely used in the manufacturing industry to provide numerical measures on process potential and performance. While C_p measures the overall process variation relative to the manufacturing

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