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STATISTICAL INFERENCE ON PROCESS CAPABILITY INDICES

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Abstract

Process capability indices are unitless functions of the parameters and the specifications of a process. The parameters of the process are the mean and the standard deviation and the specifications are the lower specification limit, the upper specification limit and the target value. Various indices have been proposed, but the most widely used are C_p, C_{pk}, C_{pm} and C_{pmk}. All the indices involve the parameters of the process which are usually unknown. Hence, we have to estimate the indices via a random sample from the process. Several authors have dealt with the problems of estimation and statistical inference on process capability indices when the distribution of the process is the normal distribution.The aim of the paper is to present the most widely used indices, their estimators and their drawbacks. Furthermore, some new indices are proposed that overcome the drawbacks of the standard indices and the sampling distributions of their estimators are derived via simulation.

Keywords and Phrases: process capability indices; specification limits; estimation; process yield; bootstrap method;