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On a Process Capability Index for Asymmetric Specifications

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ABSTRACT

Among the process capability indices considered in the literature C_{pm} is one of the most widely used, despite the fact that its performance often becomes unsatisfactory in the case of processes with asymmetric specifications, i.e., processes whose target value is not located at the midpoint of the specification area. In this article, a new index that is a variant of C_{pm}, is introduced and shown to overcome this deficiency. In particular, the proposed index performs satisfactorily for processes with symmetric or asymmetric specifications. Moreover, the article compares the suggested index with the existing indices for asymmetric specifications, investigates the distributional properties of its estimator under the assumption of normality and deals with the assessment of confidence intervals using three bootstrap methods. The coverage achieved by each of these methods is investigated via simulation.

Key Words: Process capability indices; Asymmetric specifications; Process loss; Proportion of conformance; Confidence intervals; Bootstrap.