

# **Inferential Problems Connected with Process Capability Indices**

**Perakis Michael**

## **Abstract**

Process capability indices are measures of the capability of a process to produce according to some specifications connected with a measurable characteristic of its produced items. Various such indices have been suggested in the literature. The majority of the suggested indices is applicable in the case of univariate normal processes. Nevertheless, some indices in the literature for processes that are not necessarily normally distributed or univariate have also been proposed. The definition and the investigation of such indices is a much more difficult task in comparison to the case of univariate normal processes.

In this thesis, various aspects on process capability indices are considered. In particular, several new indices with quite appealing features are defined. The distributional properties of these indices as well as of some indices existing in the literature are investigated for normal and various non-normal processes. Several new and more effective techniques for obtaining confidence intervals or lower confidence limits for the actual values of some of these indices are suggested. In addition, a comparative study of the efficacy of various methods for approximating the critical values of tests on the actual values of some indices is provided.

Finally, some topics on the proportion of conformance of a process, whose value is associated with the majority of process capability indices, are considered. In particular, its relationship with the basic process capability indices is thoroughly investigated and some new techniques for constructing lower confidence limits or assessing probabilities connected with it are suggested.