

# Process Capability Indices with Measurement Errors

Student: M. Y. Liao      Advisor: Dr. W. L. Pearn

Department of Industrial Engineering and Management  
College of Management, National Chiao Tung University

## Abstract

Process capability indices have been widely used in the manufacturing industry. Those capability indices, quantifying process potential and performance, are important for any successful quality improvement activities and quality program implementation. Most research works related to process capability analysis have assumed no gauge measurement errors. However, the quality of data on the process characteristics relies very much on the gauge measurement. Conclusions about capability of the process just only based on the single numerical value of the index are not reliable. In our research study, we conduct the performance of the estimators of the indices,  $C_p$ ,  $C_{PK}$ ,  $C_{PL}$  and  $C_{PU}$  with gauge measurement errors, and present adjusted confidence interval bounds and critical values for capability estimation or testing purpose of those indices with unavoidable measurement errors. Our research would help practitioners to determine whether the factory processes meet the capability requirement, and make more reliable decisions.

**Keywords:** confidence interval, critical value, gauge measurement error, process capability analysis.