Variables Multiple Dependent State Sampling Plans Based on Process Performance Index

Chien-Wei Wu, Yen-Wen Chen
Department of Industrial Engineering and Engineering Management
National Tsing Hua University
Hsinchu, Taiwan

Abstract

Acceptance sampling plans have been one of practical tools for quality assurance applications, which provide the vendor and the customer decision rules for product acceptance determination. Many kinds of acceptance sampling plans were developed for different purposes. A multiple dependent state (MDS) sampling plan for attributes inspection was firstly introduced by Wortham and Baker in 1976, and Balamurial and Jun (2006) extended to variables inspection with unilateral specification limit. This paper attempts to design a new variables MDS sampling plan for two-sided specification limits based on the most commonly used capability index. The operating characteristic (OC) curve of the proposed plan is derived based on the exact sampling distribution and the plan parameters are determined by minimizing the sample number required for inspection with two constraints specified by the producer and the consumer. The efficiency of proposed variables MDS plan is examined and also compared with the existing variables single sampling plan in terms of sample size required for inspection. Moreover, tables of the plan parameters for various required quality levels and allowable risks are provided for practical applications.

Keywords
Multiple dependent state sampling plan, process capability index, operator characteristic curve, exact sampling distribution.

Biography

Chien-Wei Wu is currently a Professor in the Department of Industrial Engineering and Engineering Management at National Tsing Hua (NTHU) University, Taiwan. He worked for National Taiwan University of Science and Technology (NTUST) and Feng Chia University (FCU) before he joined NTHU. Dr. Wu received his Ph.D. degree in Industrial Engineering and Management with Outstanding Ph.D Student Award from National Chiao Tung University in 2004, the M.S. degree in Statistics from National Tsing Hua University in 2002 and the B.S. degree in Applied Mathematics with the Phi Tao Phi Honor from National Chung Hsing University in 2000. Dr. Wu is also serving as one of Editors-in-Chief of Quality Technology and Quantitative Management and editorial board members for various international journals. His research interests include quality engineering and management, statistical process control, process capability analysis, applied statistics and data analysis.

Yen-Wen Chen is a master student in the Department of Industrial Engineering and Engineering Management at National Tsing Hua University, Taiwan. He received the B.S. degree in Industrial Engineering and Systems Management at Feng Chia University. His research interests include applications of process capability indices, acceptance sampling plans, quality measurement and statistical analysis. Mr. Yen-Wen Chen can be contacted at s100034505@m100.nthu.edu.tw.