A New Lot Sentencing Method for Products with Multiple Quality Characteristics Based on Process Yield

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Abstract

To make a cost-efficient and reliable lot disposition, various acceptance sampling strategies were developed for different perspectives in recent years. In this article, we propose a new method involving a flexible operating mechanism of decision rules, and the quality characteristic of interest of the inspected product considers multiple dimensions. The plan parameters, critical values and required sample size of the proposed method are obtained by solving a constructed optimization model, which minimizes the required average sample number (ASN) and constrains two non-linear equations under desirable quality levels of submission and tolerable sampling risks simultaneously. Both ASN and operating characteristic (OC) functions of the proposed method are derived based on the Markov chain technique. To examine the performance of the proposed method, several analyses are conducted and also compared with existing methods under the same conditions. The results indicated that the proposed method (i) has a better discriminatory power with equal sample consumption, (ii) requires a smaller ASN for inspection under the same conditions, (iii) provides a flexible operating procedure, which may avoid the disruption between the vendors and buyers. Thus, the proposed method provides a more efficient and reliable lot sentencing scheme for products with multiple quality characteristics. In addition, an example taken from the real-world application is illustrated to show the practicability of the proposed method.

Keywords
Lot disposition, process yield index, multiple quality characteristics, Markov chain and operating characteristic function.

Acknowledgement
This work was partially supported by the Ministry of Science and Technology (MOST) of Taiwan under Grant No. MOST 110-2221-E-167-028.

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