

# An Analysis of Online Quality Control by Attributes with an Imperfect Classification System and Inspections with Samples of Size $n$ \*

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## Abstract

In this article we propose a new online control system aiming to lower the instants in which the production process migrates from being in- to out-of-control state, which generates an increase in the non-conformity rates. As shifts from in- to out-of-control are non-deterministic, a sample of size  $n$  is collected, for each  $m$  or  $L$  units produced, and each element from the sample is imprecisely classified as conform or non-conform (that is, there may be classification errors). If the amount of conform units from the sample is equal or greater than  $a$ , the process would not be adjusted and another sample would be collected after  $m$  units produced. If the quantity of conform units is inferior to  $a$ , the process would be adjusted and another sample would be collected after  $L$  units produced, given that  $L > m$ . A genetic algorithm is proposed to approximately find the values of  $a$ ,  $n$ ,  $m$ , and  $L$  that minimize all costs involved in the process being controlled. All procedures are illustrated through a detailed numerical example that attests the efficacy and efficiency of the proposed online control system.

**Keywords:** Online control by attributes, classification errors, economic planning, genetic algorithms.

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