World Academy of Science, Engineering and Technology
International Journal of Industrial and Manufacturing Engineering
Vol:11, No:05, 2017

Optimal Bayesian Chart for Controlling Expected Number of Defects in Production Processes

Authors : V. Makis, L. Jafari

Abstract : In this paper, we develop an optimal Bayesian chart to control the expected number of defects per inspection unit in production processes with long production runs. We formulate this control problem in the optimal stopping framework. The objective is to determine the optimal stopping rule minimizing the long-run expected average cost per unit time considering partial information obtained from the process sampling at regular epochs. We prove the optimality of the control limit policy, i.e., the process is stopped and the search for assignable causes is initiated when the posterior probability that the process is out of control exceeds a control limit. An algorithm in the semi-Markov decision process framework is developed to calculate the optimal control limit and the corresponding average cost. Numerical examples are presented to illustrate the developed optimal control chart and to compare it with the traditional u-chart.

Keywords : Bayesian u-chart, economic design, optimal stopping, semi-Markov decision process, statistical process control
Conference Title : ICAIME 2017 : International Conference on Advances in Industrial and Manufacturing Engineering
Conference Location : Rome, Italy
Conference Dates : May 04-05, 2017