

A COMPARISON OF PERFORMANCE OF RESIDUAL
CONTROL CHARTS FOR TREND STATIONARY
AR(p) PROCESSES

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Abstract: The main goal of this paper is to implement Statistical Process Control (SPC) with Residual Control Charts. In real life applications, such as in industries or manufacturing, many processes are described by autocorrelated observations. In addition to autocorrelation, some types of industrial processes also exhibit a particular kind of trend behavior. A typical example of process with autocorrelations arises in chemical processes. One of the main characteristics of a control chart are the Average Run Length (ARL_0) (mean of false alarm times) and the Average Delay time (ARL_1) (mean delay of true alarm times). The main parameter observed for a given process is the mean shift. If a process has no mean shift, then the ARL_0 should be sufficiently large. On the opposite side, when a mean shift occurs the ARL_1 should be small in order to indicate the mean shift quickly. We compared the performance of the Shewhart - \bar{x} , EWMA, and GMA residual control charts for autocorrelation observations with upward/downward linear trend. These comparisons are made for different magnitudes of the mean shift and various levels of autocorrelation.

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