About Shewhart control charts to monitor the Weibull mean based on a Gamma distribution [*]

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Abstract

A control chart for the mean of a process whose quality characteristic follows a Weibull distribution is evaluated. In this sense, a transformation that follows an exponential distribution is used involving the parameters of scale and form of a Weibull distribution. Such a transformation allows to obtain analytically the control limits to monitor the mean using the Gamma distribution. Compared with recent results in the literature, lower average run lengths after a change (ARL_1) values are measured without the need to use intensive Monte Carlo simulation to obtain the control limits as well as to calculate the ARL_1 values. A numerical example is presented in detail to illustrate the efficiency and effectiveness of the developed control chart.

Keywords: Weibull distribution; control charts; Exponential distribution; Gamma distribution; average run length; variable transformations

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