

CONSTRUCT THE MONITORING SYSTEM OF REFLOW PROCESS USING A BOOTSTRAP CONCEPT

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Abstract:

During recent years, profile monitoring has been proposed and extensively investigated under various linear (or nonlinear) process profiles. Generally, the methodology of profile monitoring combines the model fitting and statistical process control (SPC). In some practical circumstances, when the quality of a process is better characterized using a functional relationship between the quality characteristic and two or more explanatory variables that is also called a profile. The main objective of this research is to develop a superior monitoring criterion for dealing with the nonlinear profile of the reflow process. Firstly, the bootstrap method was applied to construct the confidence interval via the collected samples in each time point. Using the confidence intervals in different time points, the monitoring band could be obtained and executed the profile monitoring for reflow process. To exhibit a reasonable comparison, this paper also utilized the polynomial regression, sum of sine and B-spline formulas to fit the profile models for transferring the proposed monitoring band so that the methods in different parameter monitoring can be executed and compared by using the well-known Hotelling's T^2 control charts. The experimental results show that the proposed framework presented better performances, and all fitted transferring limits can correctly identify the outlying profiles in phase I. In phase II, the proposed method also provided a satisfactory sensitivity and performances via out-of-control average run length (ARL_{out}).

Keywords: nonlinear profile, bootstrap, polynomial regression formula, sum of sine formula, B-Spline formula, Hotelling's T^2 , average run length (ARL_{out})