

# Fault detection and diagnosis using principal component analysis. Application to low pressure lost foam casting process

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**Abstract:** Process fault detection and diagnosis plays a very important role in the production security and the product quality. In this paper, in order to improve the accuracy for fault detection and diagnosis, a new method based on Principal Component Analysis (PCA) is proposed in low pressure lost foam casting process. PCA method reduces the dimensionality of the original data set by the projection of the data set onto a smaller subspace defined by the principal components, the aim of this method is to establish the normal statistical correlation among the coefficients of the data set to detect and diagnose the faults. The process faults are detected and diagnosed using Multivariate Statistical Process Control (MSPC) parameters such as: Hotelling's T<sup>2</sup>-statistic, Q-statistic or Squared Prediction Error (SPE) and Q-residual contribution. The monitoring results indicates that the proposed method can be detect and diagnose the abnormal change of the process.

**Keywords :** fault detection and diagnosis, principal component analysis, multivariate statistical process control, T<sup>2</sup>-statistic, Q-statistic, squared prediction error, Q-residual contribution.