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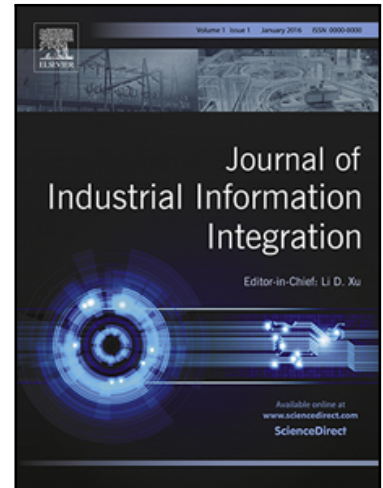
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# Monitoring Multivariate Profile Data in Plastic Parts Manufacturing Industries : An Intelligently Data Processing

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## Abstract:

In some real cases, more complicated models such as multivariate profile, rather than simple linear profile is addressed to model the performance of the process because of the existence of correlation between the response variables. In this case, if one ignores the correlation structure of response variables by assuming separate profiles then misleading results are expected. The complicated approach, in practice, is capable of leading practitioners to analyze parameters of the performance of the process effectively. This advanced approach also helps industrial information engineers to provide the information and communication technology (ICT) effectively for real industrial cases.

Extrusion is a process that is extensively used in different plastic parts manufacturing industries. Technical analysis and our statistical analysis (in this research) indicate that there are correlations between controllable technical variables of an extrusion process. In this study, two important correlated response variables, namely, flow rate per unit length and mass per unit area characteristics are considered. Monitoring jointly these two important quality factors with multivariate profile supports integration purposes of industrial information effectively. In this paper Wilks' lambda statistic, is used for analysis of the performance of the proposed multivariate profile model in phase-I of statistical control. The performance of the proposed multivariate profile model is investigated using test power term through several different numerical cases. The proposed approach is capable of facilitating information technology (IT) activities of the studied manufacturing industry.

**Keywords:** Multivariate profile, Statistical process control, Extrusion, Phase-I of control

## 1 Introduction

In statistical process control, quality of a process or a product is monitored traditionally by a random variable or by a vector involving several correlated quality characteristics. However, really, in many practical cases, the quality of a process or a product should be described by a relationship between one or more response(s) variable(s) and one or more independent variables. This advanced regression approach is referred to as the profile monitoring. The profile approach provides more realistic capability of monitoring product/process characteristics comparing to conventional methods. The new approach can be attended in the second level of the discipline structure of industrial information integration engineering (IIIE) introduced by Xu [1].

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