عنوان مقاله:

A modified method on estimating and assessing the process yield with imprecise multiple characteristics

محل انتشار:

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خلاصه مقاله:

The conventional advanced process yield index S^{T}_{pk} is widely applied in industry to provide an exact measure of the overall production yield whose quality characteristics are mutually independent and multivariate normally distributed. While one can find numerous studies that consider a crisp estimation of S^{T}_{pk} to evaluate and test the overall process yield, the recorded measurements of product quality characteristics are not always reported precisely. This paper presents a new fuzzy-based method to assess the overall process yield in the presence of a specified degree of ambiguity for the sample data. After finding a fuzzy estimator of S^{T}_{pk} based on Buckley's approach, a new fuzzy three-decision testing rule is proposed to evaluate process performance based on critical values and fuzzy p-values. Subsequently, this work extends the application of the proposed method to the class of correlated characteristics by adopting the principal component analysis technique. The introduced fuzzy testing procedure includes the existing customary binary-decision testing rule as a spacial case. In addition, comparative studies are conducted to display the benefits of the proposed rule. Finally, two industrial examples are given for independent and correlated characteristics to guide the practitioners.

کلمات کلیدی:

Process capability indices, process yield, Hypothesis testing, p-value, Critical value, fuzzy numbers arithmetic