

Fuzzy based approach for monitoring the mean and range of the products quality

ABSTRACT

Due to competition in the market, organization must have quality improvement program. Statistical quality control and especially control charts are proven quality improvement techniques. Control charts are based on the quality characteristics measurement in the course of time. There are some situations such as measurement error, sophisticated measurement instruments, costly skilled inspectors, environmental condition and imprecise specification limits that the quality characteristics of the products cannot be measured precisely. Fuzzy set theory is a well-known and proven technique in the case of imprecise, vague and uncertain situations. In the literature of control charts, there are also some research used fuzzy set theory that construct fuzzy control charts, determines the process condition by using transformation and defuzzification techniques (indirectly) which may reduce some useful information from the process. The purpose of this article is to develop a fuzzy Mean and Range (\bar{X} - R) control charts and monitor the process condition without any transformation techniques (directly). In this approach, observations and control limits are in case of triangular fuzzy numbers. The process condition is determined based on the percentage of area of the sample mean which remains outside the control limits. A numerical example in food industry is presented to illustrate the proposed approach. The result shows that the proposed approach is capable to detect even small shifts in the process quickly without any transformation techniques.

Keyword: Statistical process control; Control charts; Fuzzy set theory; Fuzzy control charts