RESEARCH PROPOSAL

Determination of Special Purpose Sampling Plans based on Taguchi Process Capability Index

In general, during any manufacturing process, it is very necessary to verify whether the process has capability to produce the product within the specification limits preset in the manufacturing industry or not when the process is in-control. Such process capability is represented by numerical measure namely, process capability index. Process capability indices (PCIs) relate the natural variation of the process with the specification limits, from this performance of the process is assessed and it is helpful to provide improved directions of product functions for producers. Usually, it is assumed that the process output is normally distributed when estimating the process capability. Among a number of PCIs used under various situations, the most frequently used PCIs is C_{pm} and it is also referred to as Taguchi process capability index. C_{pm} can reflect process loss in addition to process yield, thus is considered as the most appropriate index for process quality evaluation in manufacturing industries. Every finished or semi-finished product is to be inspected to confirm that they satisfy the consumer requirements even though the products produced under good process with high PCI. In this circumstance, one of the major tools of statistical quality control namely, acceptance sampling which utilizes statistical techniques in product's quality assurance is employed and acceptance sampling plan states the rules for sampling and the criteria to make a decision on the submitted lot with respect to the quality level. Acceptance sampling plans can be employed to inspect the products under attribute quality characteristic and variables quality characteristic. The design of sampling plan is defined as the determination of plan parameters so that it should satisfy producer as well as consumer expectations. Conventional variables sampling plans designing only depend on process performance without considering engineering specifications. For overcoming this disadvantage, designing on variables sampling plans based on PCIs is considered. Similarly, conventional attribute and variables sampling plans involve large sample size to make a decision hence, to dispose the lot with less inspection, special purpose sampling plans were proposed for the purpose of disposing the lots which are coming serially in the order of production. Some of the

special purpose sampling plans such as chain sampling plan, repetitive group sampling plan, quick switching system, multiple dependent (deferred) state sampling plan, tightened-normal-tightened sampling scheme, skip-lot sampling plan, etc. So far these special purpose sampling plans have been proposed for the application of both attribute and variables quality characteristics. But, the sampling plans based on Taguchi capability index do not exist in acceptance sampling literature. Hence, it is proposed to design certain new special purpose sampling plans based on Taguchi capability index. The performance measures and properties of such sampling plans will be discussed. Tables will be constructed for easy selection of the optimal parameters. These special purpose plans based on C_{pm} will be very efficient and useful in disposing the lot with less inspection time and cost.

Objectives

- To design the special purpose sampling plans based on Taguchi capability index to ascertain the capability of the process to produce the product within the specification limits

- To study the performance measures such as probability of acceptance, average sample number, average total inspection, average outgoing quality etc., of proposed special purpose plans based on C_{pm}

- To construct tables for the selection of optimal plan parameters based on the approach of two points on the OC curve

- To determine the application of the proposed plans in the appropriate situations